BETHLEHEM LANDFILL COMPANY

Phase V Expansion

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN SUPPORTING DOCUMENTATION

Volume 1 of 2

September 11, 2023

Prepared by:
Martin and Martin, Incorporated
37 South Main Street, Suite A
Chambersburg, PA 17201
Phone: 717.264.6759
Fax: 717.264.7339
Website: martinandmartininc.com

Bethlehem Landfill Company (BLC)

PHASE V EXPANSION

Land Development and Lot Consolidation Plan Supporting Documentation

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SECTION 1

Applications & Transmittal

rev. 02/08/06
rev. 01/03/13

File No. _____

LOWER SAUCON TOWNSHIP PLANNING APPLICATION
3700 OLD PHILADELPHIA PIKE
BETHLEHEM, PA 18015
(610) 865-3291

Type of Application: Date of Application **September 11, 2023**

☐ CONDITIONAL USE ☐ REQUEST TO COUNCIL ☐ SITE PLAN ☐ MINOR SUBDIVISION

☒ LAND DEVELOPMENT ☐ MAJOR SUBDIVISION ☐ SKETCH PLAN
☒ Preliminary Plan ☐ Preliminary Plan ☐ Formal Review
☐ Final Plan ☐ Final Plan ☐ Informal Review

☐ OTHER _____

Name of Development **Bethlehem Landfill Company - Phase V Expansion**

Location/Address of Property **2335 Applebutter Road, Bethlehem, PA 18015**

Type of Request **Preliminary Land Development and Lot Consolidation Plan**

Tax Map **P7/5/33-0719, N8/14/10719E, N8/14/20719E, N8/14/1A0719, N8/14/150719, N8/14/1B0719** Zoning District **LI**

Number of Lots **5** Total Acreage **503.46 Ac.**

Water Supply: On Lot ☐ Public ☒ Sewerage Supply: On Lot ☐ Public ☒

Owner **Bethlehem Landfill Company** Fax No. _____ Phone No. **610-317-3200**

Owner's Address **2335 Applebutter Road, Bethlehem, PA 18015**

Applicant **Bethlehem Landfill Company** Fax No. _____ Phone No. **610-317-3200**

Applicant's Address **2335 Applebutter Road, Bethlehem, PA 18015**

Registered Engineer **Martin & Martin, Inc. - Joseph McDowell, P.E.** Fax No. _____ Phone No. **717-264-6759**

Engineer's Address **37 South Main Street, Suite A, Chambersburg, PA 17201**

Attorney **Maryanne Garber, Esq./Buchanan Ingersoll & Rooney PC** Fax No. _____ Phone No. **215-665-5379**

Attorney's Address **Two Liberty Place, 50 S. 16th Street, Suite 3200 Philadelphia, PA 19102-2555**

Lower Saucon Township representatives are authorized to enter land for site inspection, if necessary.

David Ramin 9/8/2023
Signature of Owner Date

David Ramin 9/8/2023
Signature of Applicant Date

For Office Use Only
Fees Received – Application $ _____ Escrow $_____
ck#_____ ck#_____

rev. 05/09/07

Lower Saucon Township Plan Submission Checklist

Applicant			Township
N/A	1.	Six (6) Copies of the Planning Modules, including plans.	
N/A-PaDEP	2.	Four (4) Copies of the Erosion and Sedimentation Control Plan and Narrative.	
Section 10	3.	Four (4) Copies of the Stormwater Management Plan, including calculations.	
		See Section 10 for PCSM Narrative and Plan Sheet PC-1 to PC-12 for Plans	
Section 3	4.	Four (4) Copies of the Traffic Impact Study.	
N/A	5.	Four (4) Copies of the PennDOT Highway Occupancy Application, Permit, and Drawings.	
		See Section 3 for PennDOT Acknowledgment of Ex. HOP	
Attached	6.	Twenty-five (25) sets of plans, folded to 8½"x11" (preferred), or individually rolled is acceptable.	
Section 1 & 13	7.	Four (4) copies of application, plan checklist, cover letter, waiver request letter, etc.	
Attached	8.	Sixteen (16) copies of the overall plan for the subdivision or land development, at a sheet size of 8½" x 11". **(11" x 17" Copies Provided of LDP and PCSM Plans)**	
Section 1	9.	Application, information sheet and escrow fees made payable to "Lower Saucon Township." (Application and Escrow fees shall be **separate** checks.)	
Attached & Section 8	10.	Application, plans and fee for review by Lehigh Valley Planning Commission. (To be stamped by the Township)	
Section 8	11.	One (1) copy of the application for review by Lehigh Valley Planning Commission, for Township files.	
N/A	12.	Application, plans and fee for review by Northampton Conservation District. (To be stamped by the Township)	
N/A	13.	One (1) copy of the application for review by Northampton Conservation District, for Township files.	
Section 12	14.	Four (4) copies of the deed by which the property was acquired and the names of the real (title) owner of the property, the names of all equitable owners, and the names of all option holders.	
Section 2	15.	List of anticipated permits and/or approvals required for the project from all agencies having jurisdiction.	
N/A	16.	Four (4) copies of any other required applications, permits, etc.	
Attached	17.	Two (2) CD's of all plans in AutoCAD/Arc View GIS format. **(Flash Drives Provided)**	
Section 12	18.	Proof of documentation for surrounding property owner notifications.	

rev. 09/21/04

Lower Saucon Township Checklist for Final Plans Preliminary Subdivisions or Land Developments

INFORMATION REQUIRED BY APPLICANT:	WHERE REQUIRED INFORMATION IS PROVIDED: Application form or sheet in the plans submitted (indicate plan sheet number).	IF INFORMATION IS NOT PROVIDED, PLEASE INDICATE REASON: a) Not applicable (explain). b) Waiver is requested; must be on waiver list.
General Information		
• Name of subdivision or land development.	Cover Sheet	
• Tax block and parcel number(s) and deed reference or source of title.	Plan Sheet 2 of 29	
• Name & address of the owner, applicant, or developer.	Cover Sheet	
• Name & address of persons preparing the plan (Engineer, Surveyor, Architect, etc.)	Cover Sheet	
• Proof of any variances or special exceptions granted.	Cover Sheet	
• Key Map – showing all areas within ½ mile of the proposed site.	Cover Sheet	
• Total acreage of the tract.	Plan Sheet 3 of 29	
• Date and revision dates, True North Point, and a graphic and written scale.	All Plan Sheets	
• Zoning District(s), location and area (in acres) of the subdivision or land development area.	Plan Sheet 3 of 29	
• Copies of required permits and other supporting documents.	25 Copies of Plans 4 Copies of Support Doc.	
Existing Features **(Within 500 feet, unless otherwise specified within §145-33 or §180-102)**		
• Location, names, and width of abutting streets, roads, and nearest cross streets.	Plan Sheet 3 of 29	
• Location and names of railroads.	Plan Sheet 3 of 29	
• Location of adjacent property lines, driveways on adjacent lots, structures (less than 100ft. from property line), and the names of adjacent property owners.	Plan Sheet 3 of 29	
• Names of all bordering subdivisions.		N/A - None Present
• Location of watercourses and recognized environmental and historic resources and open spaces.	Plan Sheet 3 of 29	
• Location of sanitary sewers, water mains, fire hydrants, storm drains and pipes, on-lot sewage systems and well(s), utility transmission lines, and similar features within 500 feet.	Plan Sheets 3, 6 and 7 of 29	
• Existing and proposed contour, at maximum two-foot intervals and limit of earth disturbance.	Plan Sheets 7, 12 of 29	
• Location and dimensions of all existing buildings and structures, walls, fences, utility buildings, existing major trees, and other significant landscape elements.	Plan Sheets 6, 11 of 29	
• Location of all existing watercourses, wetlands, drainageways, floodplain limits and rock outcroppings, cliffs quarries, and woodlands. Including the location of carbonate geology features that may pertain to the site.	Plan Sheets 6 and 8 of 29	
• Existing easements, right-of-way or paper streets, a copy of the current deed for the property, including any deed restrictions.	Plan Sheets 3, 6 and 8 of 29	
• Description of easement and right-of-way ownership, maintenance responsibilities, and restrictions.	Cover Sheet, Plan Sheets 3, 6, 11 and 29 of 29	

INFORMATION REQUIRED BY APPLICANT:	WHERE REQUIRED INFORMATION IS PROVIDED: Application form or sheet in the plans submitted (indicate plan sheet number).	IF INFORMATION IS NOT PROVIDED, PLEASE INDICATE REASON: a) Not applicable (explain). b) Waiver is requested; must be on waiver list.
• Calculations of slope, woodland cover, floodplain, wetlands, riparian corridors, rock outcrop, cliff and quarry areas, and watershed protection areas with calculation of adjusted setbacks, lot size, and development density.	Plan Sheets 8, 9 and 10 of 29	
• Locations, dimensions and surfacing materials of off street parking and loading spaces, traffic access, circulation drives, and pedestrian walks.	Plan Sheet 11 of 29	
• Complete outline survey of the property to be subdivided or developed, with bearings, distances, monuments, and curve data labeled.	Plan Sheets 2 and 3 of 29	
• Plans and profiles showing existing sanitary sewers, waterlines, storm pipes, and facilities, as well as other underground utilities.	PC-3, PC-4, PC-5, PC-6 and PC-12	
• Building restriction lines with distances from the right-of-way lines and property lines and tie dimensions from all existing structures to the property lines.	Plan Sheet 3 of 29	
• Description of easements, including easement for utility, screening, pathway, crosswalk, drainage, or other requirements.	Plan Sheets 2 and 3 of 29	
• Location of all passing and failing soil test trenches and percolation tests.		N/A - None Proposed
• Illustration of Soil types and description of their properties from the Northampton Soil Survey.	Plan Sheet 7 of 29	
Proposed Layout		
• Zoning Data for all proposed buildings, structures or uses; include height, number of floors and total floor area, lot coverage, number of parking spaces and dwelling units, total building area and proposed uses.	Plan Sheet 11 of 29	
• The layout of streets, design dimensions, courses and curve data, including names and width of streets, roads and crosswalks.		N/A - No Streets Proposed
• Location of sidewalks, pathways, curbing, and any unusual construction features; with specific details.		N/A - None Proposed
• Location, dimensions, and proposed surfacing materials of proposed off street parking and loading spaces, traffic access, circulation drives, and pedestrian walks.	Plan Sheet 11 of 29	
• Projected volumes of vehicle and pedestrian traffic using the site.	Section 3	
• Lot layout and proposed dimensions of each lot.	Plan Sheet 2 of 29	
• Lot numbers and a statement of total number of lots and parcels.	Plan Sheet 2 of 29	
• Lot size to the nearest square foot and 0.01 acre for the net and gross areas of each lot.	Plan Sheet 2 of 29	
• Reference note regarding any land or streets potentially dedicated to the Township.		N/A - None Proposed
• Profile of existing center lines when a road continuation or stub road is proposed (200 feet beyond the subdivision boundary).		N/A - No Road Continuation Proposed
• Plans and profiles showing proposed sanity sewers, waterlines, storm pipes, and facilities, as well as other underground utilities.	Plan Sheets PC-2, PC-3, PC-4, PC-5, PC-6, and PC-12	

INFORMATION REQUIRED BY APPLICANT:	WHERE REQUIRED INFORMATION IS PROVIDED: Application form or sheet in the plans submitted (indicate plan sheet number).	IF INFORMATION IS NOT PROVIDED, PLEASE INDICATE REASON: a) Not applicable (explain). b) Waiver is requested; must be on waiver list.
• Location of fire hydrants, street signs, and streetlights.		N/A - None Proposed
• Indication and description of use for lots in which a use other than residential use is intended.	Cover Sheet	
• Typical cross sections for streets and sidewalks, with paving materials labeled.		N/A - No Streets or Sidewalk Proposed
• Typical paving cross sections for private drives or parking areas.	Plan Sheet 25 of 29	
• Description of proposed easement ownership, maintenance responsibilities, and restrictions.	Cover Sheet	
• Location of no-parking and fire zones.		N/A - None Proposed
• Certification of public and centralized sewer and/or required groundwater quality and supply report, for public, centralized, or private single lot wells.		N/A - Public Utilities
• Bridge or culvert design details of other drainage structures and utility facilities.	Plan Sheets PC-1 to PC-12 Inclusive	
• Storm drainage computations.	Section 10 - Volume #2	
• Detention facilities construction plan.	Plan Sheets PC-1 to PC-12 Inclusive	
• Soil erosion and sediment control plan, including location, type and design of proposed control devices.		N/A - To be provided via copy of PADEP Applications
• Lighting plan, existing and proposed, include location, type, design, shielding, and hours of operation.		N/A - None Proposed
• Landscape Plan, including any proposed buffers, with details, requirements, and specifications.	Plan Sheets 28 and 29 of 29	
• Summary planting list.	Plan Sheet 29 of 29	
• Proposed Construction timetable and/or phasing plan.	Plan Sheets 27, 27A and 27B of 29	
• Sketch Plan of contiguous land holdings of the applicant/developer.		N/A
• Community Impact Statement	Section 15	
• Certificates and Signature blocks.	Cover Sheet, Plan Sheets 2, 3, 4, 5 and 11 of 29	
• Description and elevation view of all proposed structures.		N/A - No Proposed Buildings
• Sign proposals and requirements, including type, description, design, color and illumination for all signs.		N/A - No Sign Modifications Proposed
• Description of water supply, fire protection, sewage facilities, and stormwater management facilities, with calculations.	Section 10 & 15	
• Project Narrative	Section 2	
• Certification that utilities to be provided are adequate for intended use.		N/A - No Public Utilities Proposed
• Traffic Impact Study	Section 3	

Prepared By:

Jon M Shell

Signature

9/7/23

Date

02/08/06 rev.
04/11/07 rev.
05/19/08 rev.

PROFESSIONAL ESCROW AGREEMENT

THIS AGREEMENT, dated this _____ day of _____, 20____, by and between **LOWER SAUCON TOWNSHIP**, a Township of the Second Class, with its principal place of business being located at 3700 Old Philadelphia Pike, Bethlehem, PA 18015 (hereinafter referred to as "TOWNSHIP")

AND

Bethlehem Landfill Company

_____ (hereinafter referred to as "DEVELOPER/ OWNER"),

WITNESSETH:

WHEREAS, DEVELOPER/OWNER, is the equitable/record owner of **Tax Parcel Nos. P7/5/33-0719, N8/14/10719E, N8/14/20719E, N8/14/1A0719, N8/14/1B0719, N8/14/150719** (address) consisting of **503.46** acres, located in Lower Saucon Township, Northampton County, Pennsylvania, and is in the process of requesting subdivision/land development plan approval relative to said premises; and

WHEREAS, DEVELOPER/OWNER has requested to meet and consult with the TOWNSHIP's professionals and consultants, including, but not limited to the Township Engineer, Township Solicitor, and other experts, consultants and professionals employed and/or contracted by the TOWNSHIP relative to said subdivision/land development plan review (hereinafter "Professionals"); and

WHEREAS, DEVELOPER/OWNER recognizes that the administrative overhead of the Township, including but not limited to the staff services of its employees now or hereafter employed (hereinafter "Staff") will be utilized in said review discussions, all to the financial detriment of the Township; and

WHEREAS, DEVELOPER/OWNER further recognized that the TOWNSHIP will incur a certain amount of fees, costs, charges and expenses (collectively "Expenses") on account of said review discussions; and

WHEREAS, DEVELOPER/OWNER realizes that said Expenses will be incurred by the TOWNSHIP relative to review discussions with its Professionals and Staff, and DEVELOPER/ OWNER is willing to be solely responsible for the payment of the same, so long as the same are reasonable.

NOW THEREFORE, intending to be legally bound, the parties hereto do hereby promise, covenant and agree as follows:

1. The "Whereas" clauses above mentioned are incorporated herein by reference as if fully set out and, further, form part of the parties' agreement.

2. DEVELOPER/OWNER hereby warrants and represents that it is the record/equitable owner of the subject Premises, as evidenced by **the Deeds submitted to the Township on September 11, 2023**; and further, that it agrees to be bound by the terms and conditions of the within Agreement.

3. TOWNSHIP, at the request of DEVELOPER/OWNER agrees to allow its Professionals and Staff to meet for review purposes with DEVELOPER/OWNER, so long as the reasonable Expenses incurred by the TOWNSHIP relative to the same are fully paid by DEVELOPER/OWNER. DEVELOPER/OWNER hereby agrees to be solely responsible for the payment of same. DEVELOPER/ OWNER acknowledges that it may not be required by law to reimburse the Township for the Township Solicitor's fees. However, by executing this Agreement, DEVELOPER/ OWNER is requesting that the Township Solicitor participate in the review process and agrees to pay the Township Solicitor's fees related to that review.

4. In consideration for the privilege of DEVELOPER/OWNER meeting with the Professionals and Staff of TOWNSHIP, DEVELOPER/OWNER hereby agrees that this Agreement supplements the TOWNSHIP's Fee Schedule and any other applicable laws, ordinances, rules and regulations governing reimbursement to the TOWNSHIP of said Expenses, including applicant's rights under the Pennsylvania Municipalities Planning Code (MPC). DEVELOPER will deposit, for the sole benefit of the TOWNSHIP, as escrow agent, the initial sum of **Eight thousand and no cents** ($ **8,000.00**) Dollars; said monies to be held in the TOWNSHIP name alone, as escrowee, in a non-interest bearing segregated account not co-mingled with its general fund, for the exclusive purposes hereinafter set forth (hereinafter "Escrow"). Receipt of the amount of $ **8,000.00** will be acknowledged by TOWNSHIP when so deposited.

5. DEVELOPER/OWNER agrees that the Escrow account shall be used to reimburse the TOWNSHIP for any and all Expenses, fees and charges of its Professionals and Staff, which may be based on minimum charges for particular services, including Township Solicitor's fees. The TOWNSHIP will provide DEVELOPER/OWNER, on a monthly basis, with an itemized invoice containing copies of all invoices received by the TOWNSHIP from its Professionals and/or Staff during the prior month. Any dispute as to the items contained on said invoices shall be resolved in accordance with the applicable provisions of the MPC.

In the event DEVELOPER/OWNER disputes the amount of any Professional fee, DEVELOPER/OWNER shall notify the TOWNSHIP in writing by certified or registered mail of any

disputed fees. Said notification must be received by the TOWNSHIP within fourteen (14) days from the date the TOWNSHIP issued a summary statement of itemized fees to the DEVELOPER/OWNER.

6. The DEVELOPER/OWNER shall be responsible for maintaining the original balance relative to the escrow account established with the Township for the payment of Township costs and fees. Each month, the Township shall forward an invoice to the applicant setting forth the amount deducted from the said escrow account for payment of costs and fees. Within ten (10) days of the date of the invoice, the applicant shall remit the amount of the invoice to the Township, thereby bringing the balance of the escrow account back to the original amount. Any invoices not paid within the aforementioned time period shall be charged interest o the overdue balance at a rate of one and one-half (1 ½%) percent. In the event that the balance of the Escrow Account fails to be replenished, the TOWNSHIP may direct its professionals and consultants to cease work on the applicant's submission until such time as the escrow account balance is restored to its original amount. At its sole discretion, the TOWNSHIP shall review the Escrow account on a periodic basis and may require a reasonable increase in the Minimum Balance. At such time after the subdivision/land development project receives final approval, or Developer/Owner notifies the Township in writing that the project is being terminated, any balance remaining in the Escrow account shall be returned to DEVELOPER/OWNER.

7. DEVELOPER/OWNER hereby agrees that the 90 day time period for Preliminary/Final plan review imposed by the MPC shall not commence until the date of the regular meeting of the Planning Commission following the date a complete Preliminary/ Final application for approval is filed. Further, in the event that the within mentioned Escrow is established prior to the filing of the application for approval, the 90 day time period shall not commence until the next meeting of the Planning Commission following the submission of said application.

8. The Escrow established herein shall be deemed Cash Collateral for the sole and exclusive benefit of the TOWNSHIP, as that term is applied in Bankruptcy proceedings. This instrument shall also be deemed a security agreement creating a first-lien security interest in favor of the TOWNSHIP in the Escrow.

9. If DEVELOPER/OWNER fails at any time, following a request from the TOWNSHIP in accordance with paragraph 6 to replenish the escrow, the parties agree that the TOWNSHIP Professionals and Staff will not be obligated to converse or meet with the DEVELOPER/OWNER or his representatives; and DEVELOPER/OWNER waives any rights it may have under the MPC or any decisional law pertinent thereto, relative to the 90 day time limit for review imposed by Section 508 of the MPC. The review discussions with the TOWNSHIP Professionals and Staff shall continue at such time as the Escrow is replenished by DEVELOPER/OWNER.

10. The parties agree that the within Escrow Agreement is a professional Escrow only and shall in no way, either expressly or tacitly, be construed as a construction escrow.

11. Either party may terminate this Agreement for any reason by providing a notice of intent to Terminate. It is understood and agreed that, other than for good cause shown, the TOWNSHIP may not terminate this Agreement so long as the DEVELOPER/OWNER is in compliance in all material respects with all of the terms of this Agreement and any other related documentation between the parties, their successors and assigns. Upon receipt of said Notice by the TOWNSHIP, this Agreement shall terminate forty-five (45) days from said date. All Professional Fees due the TOWNSHIP, including those incurred by the TOWNSHIP within the above-referenced time period, shall be paid from the Escrow created herein. Any balance in the Escrow fund shall be paid by the TOWNSHIP to DEVELOPER/OWNER within ten (10) days after the above-mentioned forty-five (45) day time period.

12. Any notice of Intent to Terminate required under this Agreement, to be effective, shall be forwarded by certified mail, return receipt requested, to addresses as follows:

IF TO DEVELOPER/OWNER:

Name: **Bethlehem Landfill Company; David Pannucci**

Address: **2335 Applebutter Road**

Bethlehem, PA 18015

Phone: **610-317-3200**

WITH COPY TO:

Maryanne Starr Garber, Esq.
Buchanan Ingersoll & Rooney PC
Two Liberty Place
50 S. 16th Street, Suite 3200
Philadelphia, PA 19102-2555

IF TO THE TOWNSHIP, ADDRESSED AS FOLLOWS:

Lower Saucon Township
3700 Old Philadelphia Pike
Bethlehem, PA 18015

WITH A COPY TO:

B. Lincoln Treadwell, Jr., Esq.
Treadwell Law Offices, P.C.
915 West Broad Street
Bethlehem, PA 18018

13. The invalidity or unenforceability of any particular provision of this Agreement shall not affect any other provision hereof, and the Agreement shall be construed in all respects as if such invalid or unenforceable provisions were omitted.

14. No failure to act upon any default or to exercise any right or remedy hereunder shall constitute a waiver of such default or a waiver of any other terms of the within Agreement.

15. This Agreement shall be binding upon the parties hereto, their successors and assigns, and shall not be altered, amended or vacated except by the express written consent of all parties.

16. This Agreement shall be governed and shall be construed and interpreted in accordance with the laws of the Commonwealth of Pennsylvania.

17. This Agreement may be signed in multiple counterparts and all such counterparts shall be deemed to be one and the same Agreement.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year aforesaid.

ATTEST: LOWER SAUCON TOWNSHIP

_____ _____

Title: _____

COMMONWEALTH OF PENNSYLVANIA :
: SS:
COUNTY OF NORTHAMPTON :

On this _____ day of _____, 20___, before me, a Notary Public, the undersigned officer, personally appeared _____, who acknowledged himself/herself to be the _____ of LOWER SAUCON TOWNSHIP and that he/she, as such officer, being authorized to do so, executed the foregoing Agreement for the purposes herein contained by signing for LOWER SAUCON TOWNSHIP by himself/herself as such officer.

_____
Notary Public

02/08/06 rev.
04/11/07 rev.
05/19/08 rev.

WITNESS:

Joseph McDowell

APPLICANT:

Title: Regional Engineer

Title:

COMMONWEALTH OF PENNSYLVANIA :
: SS:
COUNTY OF NORTHAMPTON :

On this 11 day of September, 2023 before me, a Notary Public, the undersigned officer, personally appeared David Pannucci, who acknowledged himself/herself to be the Regional Engineer of Bethlehem Landfill, a Pennsylvania Company, and that he/she, as such officer, being authorized to do so, executed the foregoing Agreement for the purposes herein contained by signing for Waste Connections, Inc by himself/herself as such officer.

Commonwealth of Pennsylvania - Notary Seal
KEVIN BODNER - Notary Public
Franklin County
My Commission Expires January 28, 2025
Commission Number 1274323

Notary Public

SECTION 2

Project Narrative

BETHLEHEM LANDFILL COMPANY (BLC)
PHASE V EXPANSION
LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN
SUPPORTING DOCUMENTATION
SECTION 2

PROJECT NARRATIVE

INTRODUCTION

BLC is seeking to continue landfill operations at the Bethlehem Landfill (Pennsylvania Solid Waste Permit No. 100020) by adding disposal capacity through both lateral and overlay expansions of the existing facility. The proposed expansion will have an estimated life of ±20 years at the currently permitted waste acceptance limits. This project is referenced herein as the Phase V Expansion. The land upon which the Phase V Expansion is located is zoned LI, a district in which landfills are a permitted use. Therefore, BLC seeks Preliminary Land Development Plan Approval of the Phase V Expansion from Lower Saucon Township Council. Future additional approvals that will be required for the Phase V Expansion include a Major Modification to the landfill's PADEP Solid Waste Permit from PADEP. As such, per Section 180-109(F)(1) of the Lower Saucon Township Zoning Ordinance ("Zoning Ordinance"), the Phase V Expansion is not subject to the Zoning Ordinance's site plan approval process and requirements.

The Phase V Expansion proposes 86 acres of lateral expansion (new disposal footprint/newly lined area) and 23.64 acres of disposal area atop previously permitted lined disposal area. The total Phase V development area, which includes the proposed disposal area as well as associated new or alternative landfill support activities and structures, is 171 acres, all to be located within a proposed consolidated lot of 503.4595 acres (said consolidation to be sought as part of this land development approval process). Refer to attached Preliminary Phase V Land Development and Lot Consolidation Plan which depicts and describes the Phase V Expansion proposed as well as the contact person for the development and operation phases of the facility listed as the Owner/Applicant being Bethlehem Landfill Company, Mr. David Pannucci. The Plans provided also identify the ultimate use and ground cover within the consolidated landfill lot. The ultimate ground cover will be more fully specified within a Closure Plan required as part of a PADEP Solid Waste Application.

The Phase V Expansion proposes additional capacity, as well as new disposal area and related activities, beyond the current PADEP Solid Waste Permit Boundary for Bethlehem Landfill. As such, a Major Modification to the landfill's PADEP Solid Waste Permit will be required prior to development of the Phase V Expansion. A proposed new PADEP Solid Waste Permit Boundary is delineated on the Preliminary Phase V Land Development and Lot Consolidation Plan. That proposed permit boundary is subject to approval by PADEP and may be modified as part of that PADEP review process. However, the permit boundary as currently shown represents the maximum additional permit area sought by BLC as part of the Phase V Expansion. No Solid Waste Permit Applications have been filed with PADEP. Upon filing of the Solid Waste Permit Application, copies of the entire application will be provided to the Township

A proposed expanded disposal footprint (within the proposed PADEP Solid Waste Permit Boundary) is also delineated on the Preliminary Phase V Land Development and Lot Consolidation Plan. Like the PADEP Solid Waste Permit Boundary, that proposed disposal

footprint is subject to modification resulting from PADEP's review of the Major Permit Modification. However, the proposed disposal area referenced above represents the maximum disposal footprint being sought by BLC.

OPERATIONS

The landfill's existing operations will not change with the Phase V Expansion. The type and amount of waste it is permitted to receive will remain the same. The landfill's current permitted average daily volume (ADV) is 1,375 tons/day and its current permitted maximum daily volume (MDV) is 1,800 tons/day. The landfill is open to receive waste between 7 AM and 4 PM Monday through Saturday with operating hours being 6 AM to 6 PM. The landfill has operated pursuant to these same ADV/MDV permit limits and days/hours of operation for nearly two decades. The ADV/MDV and days/hours of operation will not change with the Phase V Expansion. By maintaining these existing conditions, the vehicle trips to and from the site related to the Phase V Expansion will be substantially similar to those generated by current operations. Furthermore, the existing PADEP-approved designated haul route that trucks must use to get to the site, as well as access to the site from Applebutter Road, will remain the same.

By maintaining existing operations, the procedures for emergencies, hazards and accidents shall be in accordance with the currently approved Preparedness, Prevention and Contingency Plan for the facility. A copy of said Plan is attached hereto in Section 6. This Plan shall be updated upon construction of the Phase V Expansion and will be made part of the DEP Solid Waste Application.

In addition to no operational changes, no change in the number or classification of employees is proposed. The current number and Job Classification of employees are as follows:

1 - District Manager
1 - Compliance Manager
2 - Office Staff/Scale House
1 - Operations Manager
5 - Operators
1 - Mechanic
Laborers are hired as needed

ZONING

BLC is proposing to develop the Phase V Expansion in accordance with Section 180-109(G) of the Lower Saucon Township Zoning Ordinance (Natural Resource Mitigation Alternative) and has provided the information and calculations required by that Section on Sheets 8, 9 and 10 of the Preliminary Phase V Land Development and Lot Consolidation Plan. BLC will demonstrate and make the required dedication and/or fee-in-lieu of dedication payment prior to final land development approval.

The Phase V Expansion Excess Resources Utilization includes impacts to waterways and wetlands. These impacts will be mitigated through the filing of a Joint Permit Application with PADEP and USACE. This filing will be made after the requested Preliminary Land Development Plan approval has been obtained.

Finally, in conjunction with Preliminary Land Development Plan Approval, BLC is seeking relief that Council is empowered to grant relating to a perimeter earthen berm. Section 109(F)(3)(a) of the Lower Saucon Township Zoning Ordinance requires a perimeter earthen berm along property lines where new disposal area is proposed. The earthen berm is unnecessary because of the existing vegetation, which provides more effective screening/buffering than a berm. As part of this Application, BLC requests that Lower Saucon Township Council make a determination, pursuant to Section 180109.F(3)(a)[4], that existing features serve as an acceptable substitute for this berm requirement. Council has made this determination with past expansions of the landfill, including the Northern Realignment, the Southeastern Realignment, and the Phase IV Expansion.

LINER SYSTEM

The liner system for the new disposal footprint (outside existing permitted lined disposal area) which is approximately 87 acres, will be identical to the facility's currently permitted liner system. The liner systems are designed and will be constructed and operated to prevent the migration of leachate through the liner. The liner system is designed to be resistant to a physical failure and to be chemically compatible with the anticipated waste stream and resultant leachate through the use of high density polyethylene (HDPE) geomembrane.

Each element of the liner system will be designed and constructed to meet or exceed the performance standards and requirements of Section 273.251 of the current DEP municipal waste rules and regulations.

LANDFILL CAPACITY, LIFE EXPECTANCY AND SEQUENCE OF DISPOSAL OPERATIONS

The sequence of operation will generally consistent with the Cell Development Schedule depicted on Plan Sheets 27, 27A and 27B of the Preliminary Phase V Land Development and Lot Consolidation Plan beginning with development of Cell 5A and concluding with final capping and closure of Cell 5-J. The size of each new cell, its capacity, longevity, and fill volumes are shown on the following table.

BETHLEHEM LANDFILL – PHASE V EXPANSION

Cell #	Area Cell (Acres)	Capacity (1)		Longevity (month) (3)
		CY	Tons (2)	
Cell 5-A	3.2	154,300	103,381	2.9
Cell 5-B	10.0	940,900	630,403	17.6
Cell 5-C	10.0	1,121,300	751,271	21.0
Cell 5-D	10.0	1,301,100	871,737	24.4
Cell 5-E	8.5	1,698,800	1,138,196	31.8
Cell 5-F	8.5	2,050,900	1,374,103	38.4
Cell 5-G	8.5	1,268,700	850,029	23.8
Cell 5-H	8.5	817,000	547,390	15.3
Cell 5-I	10.0	444,400	297,748	8.3
Cell 5-J	10.0	841,200	563,640	15.8

(1) Capacity excludes excavation grade
(2) Assumes VCF = 0.67
(3) 1,375 Tons/day – 312 days/year, 26 days/month

SECTION 3

Traffic Impact Evaluation

BETHLEHEM LANDFILL COMPANY (BLC)

PHASE V EXPANSION

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN

SUPPORTING DOCUMENTATION

SECTION 3

TRAFFIC IMPACT EVALUATION

The Phase V Expansion proposes no change to the average daily or maximum daily tonnage to be accepted, or to the routes to be traveled accessing the site. Pennoni Associates has prepared a Traffic Impact Analysis included herein as Exhibit #2 concluding the Bethlehem Landfill traffic with the Phase V Expansion can be adequately accommodated by the existing surrounding roadway network.

Exhibit #1, included herewith, is a Memorandum from PennDOT dated April 16, 2023 stating the existing HOP for the BLC access from Applebutter Road remains valid for the proposed Phase V Expansion.

Exhibits included:

Exhibit #1 – Memo Dated April 16, 2023 from PennDOT – Ex. HOP Adequate

Exhibit #2 – Traffic Impact Analysis – December 2022 by Pennoni Assoicates

SECTION 3

Traffic Impact Evaluation

Exhibit 1

pennsylvania
DEPARTMENT OF TRANSPORTATION

Date: 04/16/2023

Subject: Highway Occupancy Permit Application No. 302360, Cycle No.1 - Not Required

To: Bethlehem Landfill Company
2335 Applebutter Road
Bethlehem, PA 18015

From: PennDOT Engineering District 5-0
1002 Hamilton Street
Allentown, PA 18101

Dear Applicant,

PennDOT has reviewed your recent request for occupancy of State highway right-of-way as identified in the subject Highway Occupancy Permit Application and has determined that a permit or supplement is not required for the following reason:

The Department does not have any comments related to the Phase V Expansion Project. The existing HOP remains valid with this proposal.

If a check or money order for the permit or supplement fee was submitted to the Department, it will be returned.

If you have any questions regarding this matter, you may contact Marah Haddad, District Permit Manager, at (610) 871-4467.

SECTION 3

Traffic Impact Analysis

Exhibit 2

TRANSPORTATION IMPACT ANALYSIS

Bethlehem Landfill Evaluation
Applebutter Road, Lower Saucon Township
Northampton County, Pennsylvania

Prepared For:

Bethlehem Landfill Company
2335 Applebutter Road
Bethlehem, PA 18015
(610) 317- 3200

Prepared By:

Pennoni Associates Inc.
81 Highland Avenue,
Suite 230
Bethlehem, PA 18017
(610) 231 - 0600

Timothy M. Kramer, PE, PTOE
PENNSYLVANIA PE 081964

Proj. No. MRMTN22001

December 2022

Pennoni

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Pennoni

Tables

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Appendices

1. EXECUTIVE SUMMARY

This Traffic Impact Assessment has been completed to determine if the current and proposed roadway system surrounding the Bethlehem Landfill Company (BLC) is adequate to accommodate the current permitted daily tonnages of an average 1,375 tons per day and a maximum of 1,800 tons per day. BLC asked Pennoni to complete this assessment in connection with a proposed expansion of the existing landfill ("Phase V Expansion").

The landfill is situated on a tract of land on the northern side of Applebutter Road (SR 2012), east of Shimersville Road (SR 2014), in Lower Saucon Township, Northampton County (Figure 1). The site operates with an average daily volume (ADV) intake of 1,375 tons with a maximum daily volume (MDV) of 1,800 tons. The landfill is currently open to receive waste from 7 AM to 4 PM. No change in these hours, or in the ADV/MDV, is being sought in connection with the Phase V Expansion. By maintaining the hours/days of operation and the ADV and MDV, the vehicle trips to and from the site are expected to remain the same. Access to the site is provided via the existing full access driveway on Applebutter Road (SR 2012) and will not change with the Phase V Expansion.

For the purposes of this analysis, the Bethlehem Landfill scenarios are assumed to be 2022 & 2032.

The scope of this Transportation Impact Analysis includes the following intersections:

- Applebutter Road (SR 2012) and Landfill Site Driveway
- Applebutter Road (SR 2012) and Shimersville Road (SR 2014)

Manual traffic turning movement counts were conducted from 6:00 AM until 6:00 PM to capture the entire time period the site is operational.

Trip generation for the maximum daily volume in landfill activity was estimated by comparing existing traffic and tonnage data with the current maximum daily tonnage and resulted in a total of 102 new weekday trips, 12 new AM peak hour trips and 2 new PM peak hour trips.

Three (3) study periods were evaluated: 2022 Existing Conditions (1,414 tons), 2022 Existing Conditions at the existing Maximum Daily Volume of 1,800 tons and 2032 Future Conditions at the Maximum Daily Volume of 1,800 tons. **Table 1** summarizes the Levels of Service for the study area intersections for both study periods.

As can be seen in **Table 1**, all movements at all intersections are expected to operate at no worse than no-build levels of service, even with the additional traffic from the development at maximum daily intake (current levels are no worse than maximum intake levels of service). The westbound left at the Shimersville Road & Applebutter Road operates at LOS E in existing conditions and

continues to operate at LOS E at the current landfill maximum intake. Signalizing the intersection is the only way to mitigate the deficient levels of service. However, due to the low minor street volumes not satisfying the minor street thresholds, signal warrants are not anticipated to be satisfied for the 2022 analyses.

All movements at the site driveway are expected to operate at Level of Service B or better.

Table 2 summarizes the existing and proposed auxiliary lane storage lengths and the 95th percentile queue lengths for the auxiliary lanes and through movement at all study intersections. **Table 2** illustrates that the Bethlehem Landfill traffic at maximum intake does not create any auxiliary lane deficiencies.

This study shows that the Bethlehem Landfill traffic can be adequately accommodated by the surrounding roadway network.

Table 1 – Level of Service & Delay Comparison

		AM Peak Hour						PM Peak Hour					
Intersection	Movement	2022 Existing		2022 Existing (1,800 MDV)		2032 Future (1,800 MDV)		2022 Existing		2022 Existing (1,800 MDV)		2032 Future (1,800 MDV)	
Applebutter Road (SR 2012) & Site Driveway	EB LT	A	9.4	A	9.5	A	9.5	A	0	A	0	A	0
	WB TR	A	0	A	0	A	0	A	0	A	0	A	0
	SB LR	B	10.1	B	10.1	B	10.1	A	8.6	A	8.6	A	8.6
Overall Intersection		A	2.4	A	2.9	A	2.8	A	0.3	A	0.4	A	0.4
Applebutter Road (SR 2012) & Shimersville Road (SR 2014)	WB L	C	17.3	C	17.4	C	18.5	E	40.1	E	40.9	E	48.2
	WB R	B	10.6	B	10.6	B	10.8	C	15.6	C	15.6	C	16.4
	NB T	A	0	A	0	A	0	A	0	A	0	A	0
	NB R	A	0	A	0	A	0	A	0	A	0	A	0
	SB LT	A	8.3	A	8.3	A	8.3	A	9.6	A	9.6	A	9.7
	SB T	A	0.1	A	0.1	A	0.2	A	0.4	A	0.4	A	0.4
Overall Intersection		A	2.6	A	2.6	A	2.7	A	3	A	3.1	A	3.4

Table 2 – 95th Percentile Queue Summary (feet)

			AM Peak Hour			PM Peak Hour		
Intersection	Movement	Queue Storage (feet)*	2022 Existing	2022 Existing (1,800 MDV)	2032 Future (1,800 MDV)	2022 Existing	2022 Existing (1,800 MDV)	2032 Future (1,800 MDV)
Applebutter Road (SR 2012) & Site Driveway	EB LT	100+	3	5	5	0	0	0
	WB TR	100+	0	0	0	0	0	0
	SB LR	100+	3	3	3	0	0	0
Applebutter Road (SR 2012) & Shimersville Road (SR 2014)	WB L	500+	13	15	15	25	28	35
	WB R	50	13	13	13	15	15	18
	NB T	500+	0	0	0	0	0	0
	NB R	500	0	0	0	0	0	0
	SB LT	500+	3	3	3	10	10	10
	SB T	500+	0	0	0	0	0	0

2. PROJECT DESCRIPTION

This Traffic Impact Assessment has been completed to determine if the current and proposed roadway system surrounding the Bethlehem Landfill Company (BLC) is adequate to accommodate the current permitted daily tonnages of an average 1,375 tons per day and a maximum of 1,800 tons per day. BLC asked Pennoni to complete this assessment in connection with a proposed expansion of the existing landfill ("Phase V Expansion").

The landfill is situated on a tract of land on the northern side of Applebutter Road (SR 2012), east of Shimersville Road (SR 2014), in Lower Saucon Township, Northampton County (Figure 1). The site operates with an average daily volume (ADV) intake of 1,375 tons with a maximum daily volume (MDV) of 1,800 tons. The landfill is currently open to receive waste from 7 AM to 4 PM. No change in these hours, or in the ADV/MDV, is being sought in connection with the Phase V Expansion. By maintaining the hours/days of operation and the ADV and MDV, the vehicle trips to and from the site are expected to remain the same. Access to the site is provided via the existing full access driveway on Applebutter Road (SR 2012) and will not change with the Phase V Expansion.

For the purposes of this analysis, the Bethlehem Landfill scenarios are assumed to be 2022 & 2032.

3. EXISTING ROADWAY CHARACTERISTICS

Applebutter Road (SR 2012) is an east-west State Road extending from Shimersville Road (SR 2014) to the west toward Lower Saucon Road to the east. The road has one travel lane in each direction within the study area. Applebutter Road (SR 2012) is classified as an urban collector according to PennDOT's Northampton County Federal Functional Class Map and has a roadway typology of neighborhood collector. The roadway is under PennDOT jurisdiction and is posted with a speed limit of 40 MPH, but advisory speeds of 20 MPH are posted due to horizontal and vertical curvature of the roadway. The intersection of Applebutter Road (SR 2012) and Shimersville Road (SR 2014) is an unsignalized T-shaped intersection with stop control for the Applebutter Road (SR 2012) approach. This approach includes a stop-controlled channelized right turn lane.

Shimersville Road (SR 2014) is a north-south State Road west of the site. The road has one travel lane in each direction near East 4th Street/Hellertown Road (SR 0412) and widens to a four-lane roadway in the vicinity of Applebutter Road (SR 2012). Shimersville Road (SR 2014) is classified as an urban collector according to PennDOT's Northampton County Federal Functional Class Map and has a roadway typology of community collector. The roadway is under PennDOT jurisdiction and is posted with a speed limit of 40 MPH. Shimersville Road (SR 2014) terminates at East 4th Street/Hellertown Road (SR 0412).

4. LAND USES ALONG APPROACH ROUTE

The land uses along the approach route vary dramatically, including residential and agricultural, but are primarily commercial and industrial. The East Branch of the Saucon Creek and its tributary run along Applebutter Road (SR 2012), which is also the outfall for a sewage treatment plant at the intersection of Applebutter Road (SR 2012) and Shimersville Road (SR 2014). No other cultural, historic, environmental or recreational sensitive areas exist along the approach route.

Lower Saucon Township has previously expressed concern for potential stream pollution should a trash hauling vehicle fail to properly negotiate a sharp curve in Applebutter Road (SR 2012). No incidents of stream pollution attributable to landfill traffic have occurred since the opening of the landfill.

5. EXISTING TRAFFIC VOLUMES

Manual turning movement counts were conducted on Tuesday, November 1, 2022 for the weekday AM and PM peak hours at the following intersections:

- Applebutter Road (SR 2012) and Landfill Site Driveway
- Applebutter Road (SR 2012) and Shimersville Road (SR 2014)

Manual traffic turning movement counts were conducted from 6:00 AM until 6:00 PM to capture the entire time period the site is operational. Volume data obtained from the manual turning movement counts are located in **Appendix A**.

The Existing 2022 traffic volumes are illustrated in **Figure 2**.

The current (2022) Average Daily Traffic (ADT) for each study roadway as obtained from the PENNDOT iTMS Website is shown in **Table 3** below. This data can be found in **Appendix B**. It should be noted that the Current Average Daily Traffic data listed in the iTMS reports is current information. Even though the base year might be listed as 2019 or 2020, the ADT listed in the report has been grown by the appropriate growth factor to the current year.

TABLE 3 – ADT OF STUDY ROADWAYS

Roadway	Current ADT (vehicles per day)
Applebutter Road (SR 2012)	1,293
Shimersville Road (SR 2014)	9,998

Analysis and discussion of existing operations follow in the Operational Analysis section of the report.

6. SIGHT DISTANCE

The following table shows the required and available sight distances from the existing driveway location and potential secondary driveway location. The purpose of the second access is for access to proposed leachate storage tanks in the event that trucking of leachate to a Publicly Owned Treatment Works (POTW) in emergency situations is needed. In the rare situation that the second access is needed for this purpose, a maximum of 10 trucks per day would utilize this access over the course of a few days. This secondary access is not proposed for delivery of landfill waste. The potential secondary access is located east of the existing landfill driveway, approximately 1,340 feet west of Sherry Hill Road.

TABLE 4 – SIGHT DISTANCE

Driveway Location	Required Stopping Sight Distance[1]		Preferred Intersection Sight Distance		Available (Current) Stopping Sight Distance		Proposed Sight Distance	
	Looking Left	Looking Right	Looking Left[2]	Looking Right[3]	Looking Left	Looking Right	Looking Left	Looking Right
Existing Driveway	314'	304'	445'	385'	450+'	400+'	450+'	400+'
Potential Eastern Driveway	345'	280'	445'	385'	450+'	300'	450+'	300'

[1] PA Code Title 67 Chapter 441 §441.8(h)(2) as calculated on back of form M-950S

[2] AASHTO *A Policy on Geometric Design of Highways and Streets,* 2018 Intersection Sight Distance Case B2

[3] AASHTO *A Policy on Geometric Design of Highways and Streets,* 2018 Intersection Sight Distance Case B1

As shown in **Table 4**, the site Driveway Location to SR 2012 (Applebutter Road) meets or exceeds the minimum required and preferred Safe Stopping Sight Distance criteria.

7. PLANNED ROADWAY IMPROVEMENTS

Based upon a review of the PennDOT Transportation Improvement Program (TIP), SR 2012 (Applebutter Road) is listed to be resurfaced along the entire project limits with a tentative let date of April 2029.

8. TRIP GENERATION AND DISTRIBUTION

8.1. TRIP GENERATION

Trip Generation is the method of determining the amount of future traffic associated with a proposed land use. The Institute of Transportation Engineers' (ITE) *Trip Generation*, 11th Edition, is typically used to determine anticipated trips generated by a particular development. However, since there is no ITE Land Use Code applicable for this use, trip generation for the proposed increase in landfill activity was estimated by comparing existing traffic and tonnage data with the proposed maximum daily tonnage. The current daily maximum volume (1,800 tons) is 1.27 times higher than the tonnage delivered on the day of the count (1,414.9 tons). Based upon the truck weight intake data for the same day, the average intake per vehicle is 12.63 tons/vehicle, however, this does not account for other vehicles entering and exiting the site not delivering waste, including landfill employees. Therefore, the existing driveway traffic volumes was increased by a factor of 1.27 to account for an estimate of the additional future peak hour activity at the landfill. Weight intake and delivery truck data is located in **Appendix D**.

Table 5 illustrates the total trips that are currently generated by the Bethlehem Landfill and those that are anticipated to be generated at maximum daily volume intake.

TABLE 5 – BETHLEHEM LANDFILL TRIP GENERATION

	Size (tonnage)	AM Peak Hour			PM Peak Hour			Weekday		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Existing Landfill	1,414.9	36	10	46	0	7	7	189	189	378
Landfill at MDV	1,800 MDV	46	12	58	0	9	9	240	240	480
Net Increase at MDV		**10**	**2**	**12**	**0**	**2**	**2**	**51**	**51**	**102**

As shown in **Table 5**, the landfill at the maximum permitted intake is anticipated to result in the addition of 102 new weekday trips, 12 new AM peak hour trips and 2 new PM peak hour trips.

8.2. TRIP DISTRIBUTION

Trips for the Bethlehem Landfill at maximum daily intake were assigned to the intersections by examination of current volume distributions and the roadway network in the vicinity of the site. It is expected that traffic will arrive and depart the site via the following distribution:

- 100% to/from the south via Shimersville Road

Figure 3 illustrates the trip generation distribution and assignments, and traffic volume projection spreadsheets are located in **Appendix C**.

8.3. 2022 MAXIMUM INTAKE TRAFFIC CONDITIONS

Maximum intake volumes were derived by adding the site generated traffic volumes to the Existing 2022 traffic volumes. Maximum intake traffic volumes for the 2022 Existing Conditions are shown in **Figure 4.**

8.4. 2032 MAXIMUM INTAKE TRAFFIC CONDITIONS

A growth rate of 4.8% (0.47% compounded for 10 years) was used to calculate future traffic for the 2032 Future Conditions year. The rate was obtained from the current PennDOT Table, "Growth Factors for August 2022 to July 2023" for an urban non-interstate in Northampton County. Maximum intake volumes for the 2032 Future (1,800 MDV) conditions were derived by adding the additional site generated traffic volumes to the 2032 Future traffic volumes. Maximum intake traffic volumes for the 2032 Future Conditions are shown in **Figure 4A**.

9. AUXILIARY LANE WARRANT ANALYSIS

Auxiliary lane warrant analyses were performed per Publication 46, Traffic Engineering Manual, published by PennDOT, for the site driveway. Based on the auxiliary lane warrant analysis, neither a left turn lane nor a right turn lane is warranted at this location for the maximum intake scenario.

The auxiliary lane warrant analysis printouts are included in **Appendix E**.

10. TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic signal warrant analyses were performed per Publication 46, Traffic Engineering Manual, published by PennDOT, for the intersection of SR 2014 (Shimersville Road) & SR 2012 (Applebutter Road). Based on the signal warrant analyses, traffic signals are not warranted at this location.

The traffic signal warrant analysis information is included in **Appendix F**.

11. OPERATIONAL ANALYSIS

11.1. METHODOLOGY

Operations were evaluated at the study intersections. The analyses were performed in accordance with the procedures outlined in the *Highway Capacity Manual (HCM) 6th Edition*, published by the Transportation Research Board, as implemented by Trafficware's Synchro 11 software package and its HCM 6th Edition module. In addition, this study incorporates the Pennsylvania Default Values as prescribed in PennDOT's Publication 46, Traffic Engineering Manual, Section 10.4.

The Synchro software does not have fields to enter base critical headway and base follow-up headway, which are the defaults provided in PennDOT's Publication 46. The Synchro software has fields that are editable for the critical headway for movement and follow-up headway for movement as calculated by HCM equations 19-30 and 19-31, respectively. The equations are calculated in spreadsheets in **Appendix G**.

The results of the Synchro HCM analyses provide Level of Service (LOS), average seconds of vehicle delay experienced by motorists for each intersection and critical lane group, and 95th percentile queue values.

LOS is a qualitative measure of vehicle operator satisfaction with the overall driving experience through a particular facility, and in most cases, signalized and unsignalized intersections. Performance is quantified with designations of LOS 'A' through 'F' based on the average control delay (given in seconds per vehicle) per lane group and the overall intersection. These LOS designations describe the performance of the intersection from the motorist's perspective; with LOS 'A' representing the best or most ideal, free-flowing conditions and LOS 'F' representing congested conditions. Delay is the additional travel time experienced by a driver, passenger, or pedestrian. Control delay results when a control device causes a lane group to reduce speed or to stop; it is measured in comparison with an uncontrolled condition. Any estimate of the average travel speed on a street implies the effects of control delay.

By utilizing models to evaluate the flow of traffic at intersections, the delay experienced by vehicles at intersections can be estimated. These models consider such factors as traffic volume, roadway geometry, traffic control, and driver behavior. Levels of Service designations are based on comparisons of average delays calculated by models with perceived acceptable delays.

The definitions of Levels of Service "A" through "F" for both signalized and unsignalized intersections are contained in **Appendix H**. The values in these tables were used to derive the performance measures of the study intersections.

The analyses were conducted for the weekday AM and PM peak hours. **Figures 5 through 6A** illustrate the levels of service for all study conditions. Synchro reports are included in **Appendix I**.

11.2. LEVELS OF SERVICE FOR STUDY INTERSECTIONS

The results of the Synchro analyses provide Level of Service (LOS) and average seconds of vehicle delay experienced by motorists for each intersection and critical lane group are presented in **Table 1**. Synchro reports are included in **Appendix I**.

As can be seen in **Table 1**, all movements at all intersections are expected to operate at no worse than existing levels of service, even with the additional traffic from operating at the maximum daily intake volume. The westbound left at the Shimersville Road & Applebutter Road operates at LOS E in existing conditions and continues to operate at LOS E with the landfill operating at permitted maximum.

11.3. QUEUE ANALYSIS

The 95th percentile queues were analyzed in accordance with the procedures outlined in the *HCM 6th Edition* as implemented by Trafficware's Synchro software package. In addition, this study incorporates the Pennsylvania Default Values as prescribed in PennDOT's Publication 46, Traffic Engineering Manual, Section 10.4. **Table 2** summarizes the existing and maximum intake auxiliary lane storage lengths and the 95th percentile queue lengths for the auxiliary lanes and through movements at all study intersections. Synchro reports are included in **Appendix I**.

As can be seen in **Table 2**, all queues that currently stay within the available storage length are projected to remain within the available or proposed storage bay lengths. As a result, no queue storage problems are expected as a result of operating at the maximum permitted intake volume.

12. CRASH ANALYSIS

Crash data was obtained from PennDOT for the last five years (2016 through 2021) for Applebutter Road (SR 2012), from the intersection with Shimersville Road to the eastern property limits of the existing site.

The crash data includes 16 crashes along SR 2012 and 12 crashes at intersections along Applebutter Road. There is a combined total of 28 reportable crashes in the study area.

Of all the crashes within the project limits, 43 percent of the crashes (12 total) occurred at intersections or were related to an intersection (i.e. a rear end crash at the end of a queue approaching an intersection), these crashes are summarized in **Table 6** on the following page.

TABLE 6
REPORTABLE CRASH SUMMARY

Intersection	Total	Severity	Collision Type
Applebutter Road (SR 2012) & Shimersville Road (SR 2014)	11	PDO – 5 Injury – 6 Fatal – 0 Unknown – 0	Angle – 5 Non-Collision – 2 Hit Fixed Object – 3 Rear End – 1
Applebutter Road (SR 2012) & N. Easton Road	1	PDO – 1 Injury – 0 Fatal – 0 Unknown – 0	Hit Fixed Object – 1
Applebutter Road (Midblock)	16	PDO – 13 Injury – 1 Fatal – 0 Unknown – 2	Angle – 1 Rear End – 1 Hit Fixed Object – 9 Head-on – 1 Same-direction Sideswipe – 2 Non-collision – 2

As shown in **Table 6**, there were a total of 13 Hit Fixed object crashes (46% of total crashes) along Applebutter Road in the last 5 years. Based upon a detailed review of the crash data, all of these crashes were a result of improper driving errors or other factors such as deer in the road.

13. ROADWAY CONDITION REVIEW

A field review of the existing SR 2012 (Applebutter Road) was conducted to evaluate roadway conditions, pavement markings, painted legend markings, sign location/conditions and proximity of roadside obstructions.

Applebutter Road is primarily comprised of 11-foot-wide travel lanes with variable width shoulders ranging from 0' to 5'. The pavement is generally in good condition within the study limits. Two localized areas were noted where roadside drainage appears to be causing minor settling and

pavement cracking at the shoulder limits. Roadside obstructions are located 2-8 feet from the edge of pavement. It was noted that several utility lines have been relocated to new utility poles farther from the roadway. There are several abandoned poles remaining close to the roadway that were not removed after the last utility was relocated.

Regulatory and advisory signage is posted along Applebutter Road within the study limits. Horizontal curves are signed in advance with advisory speed plaques and chevrons through the curves for increased visibility.

Pavement markings are visible and maintained within the study limits. Applebutter Road is striped with 4" white edge lines and 4" double yellow center line. Painted legends on the roadway supplement advance signage on approaches to horizontal curves.

A detailed summary of existing signs and painted legends are contained in **Appendix J**.

14. CONCLUSION

There are no notable increases (greater than 10 seconds) in delay for the overall intersection Level of Service at the study area intersections.

All queues that currently stay within the available storage length are projected to remain within the available storage bay lengths. No queue storage problems are expected as a result of this development.

The landfill operating at the maximum permitted daily intake volume is anticipated to result in the addition of 102 new weekday trips, 12 new AM peak hour trips and 2 new PM peak hour trips based upon weigh intake data and traffic counts at the existing site.

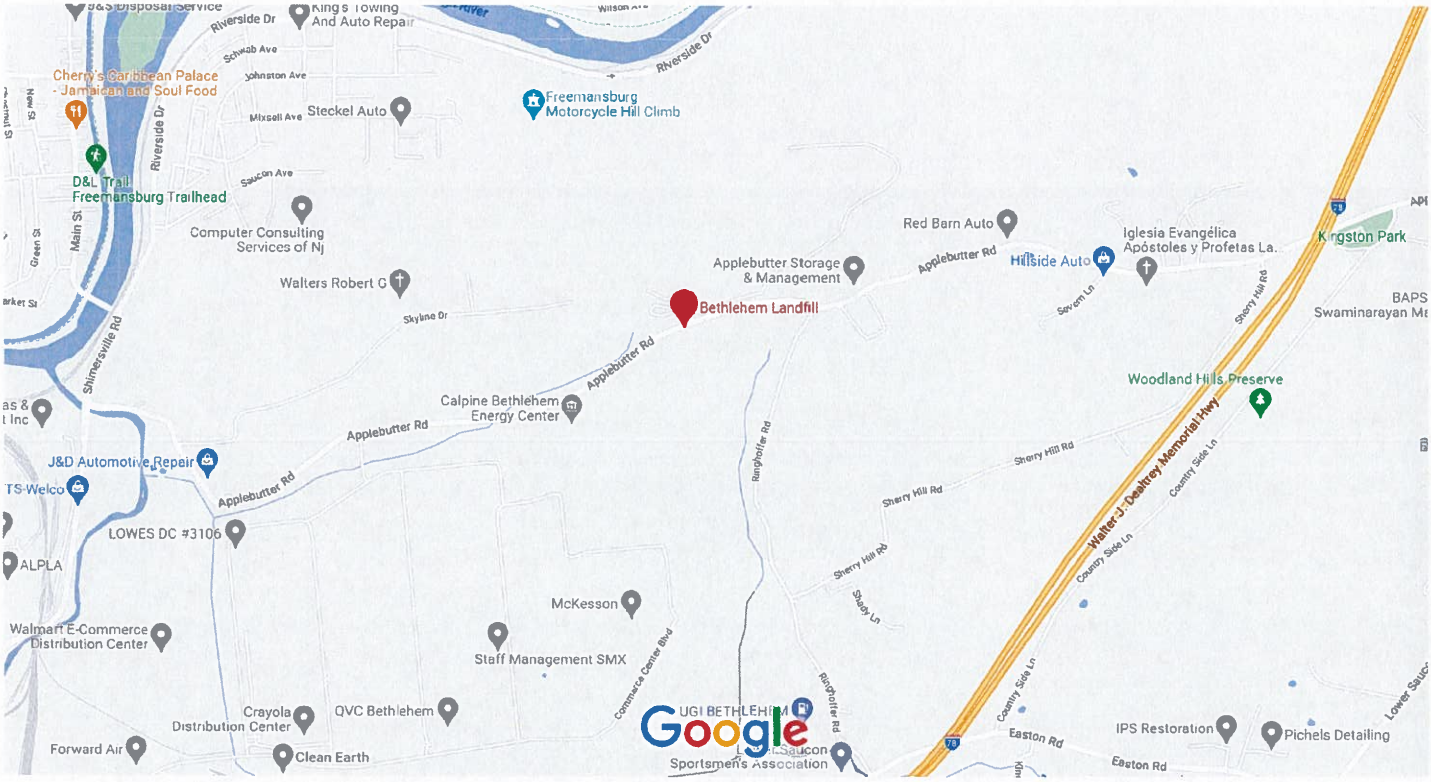
As can be seen in **Table 1**, all movements at all intersections are expected to operate at no worse than existing levels of service, even with the additional traffic from the development at maximum daily intake (current levels are no worse than maximum intake levels of service). The westbound left at the Shimersville Road & Applebutter Road operates at LOS E in existing conditions and continues to operate at LOS E at the current landfill maximum intake.

All movements at the existing site driveway are expected to operate at Level of Service B or better.

This study shows that traffic for the Bethlehem Landfill can be adequately accommodated by the surrounding roadway network.

FIGURES

N



SITE LOCATION MAP

BETHLEHEM LANDFILL EVALUATION

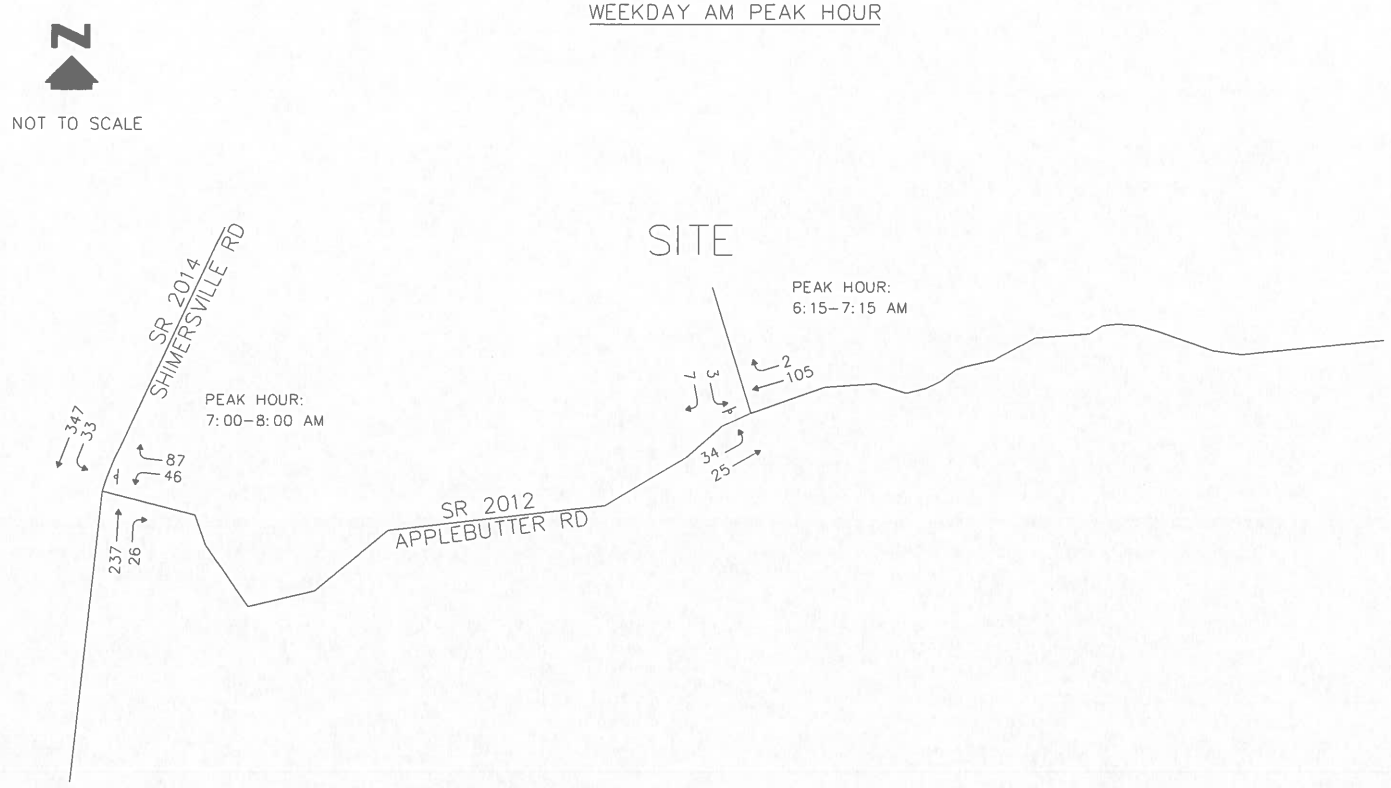
FIGURE 1

Pennoni

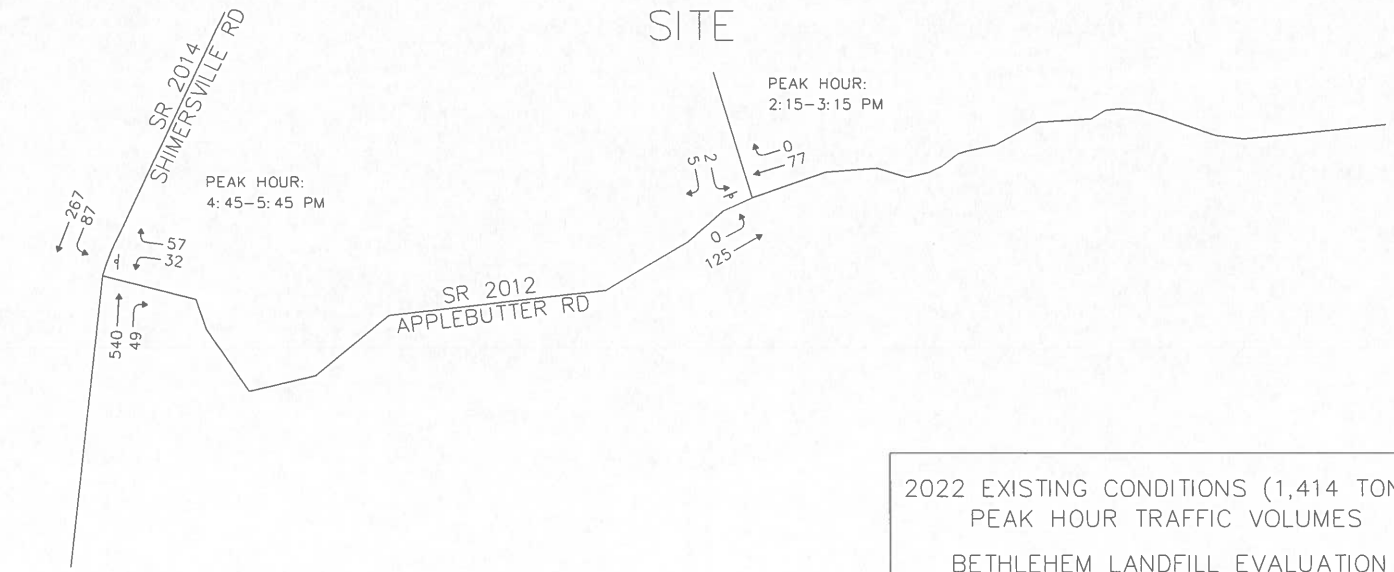
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR



WEEKDAY PM PEAK HOUR



2022 EXISTING CONDITIONS (1,414 TONS)
PEAK HOUR TRAFFIC VOLUMES

BETHLEHEM LANDFILL EVALUATION

FIGURE 2

LEGEND:

– STOP SIGN

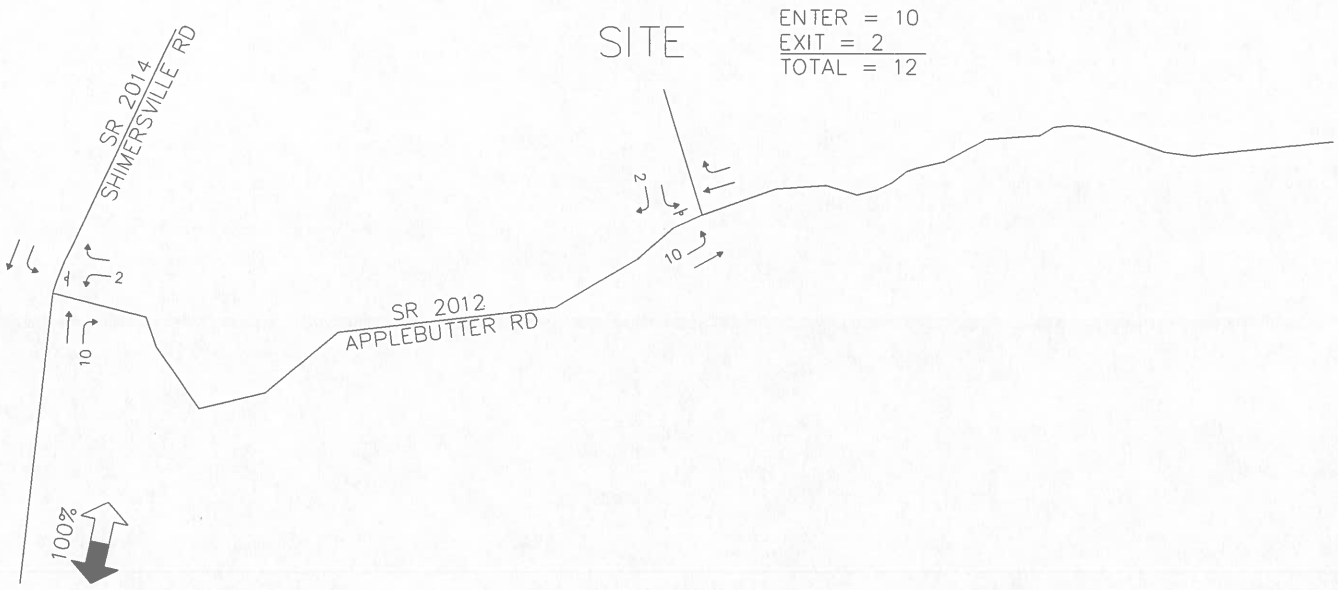
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR

N

NOT TO SCALE



WEEKDAY PM PEAK HOUR

LEGEND:

– STOP SIGN

TRIP DISTRIBUTION AND ASSIGNMENT
PEAK HOUR TRAFFIC VOLUMES

BETHLEHEM LANDFILL EVALUATION

FIGURE 3

Pennoni

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR

N

NOT TO SCALE

WEEKDAY PM PEAK HOUR

2022 EXISTING CONDITIONS (1,800 TONS)
PEAK HOUR TRAFFIC VOLUMES

BETHLEHEM LANDFILL EVALUATION

FIGURE 4

LEGEND:

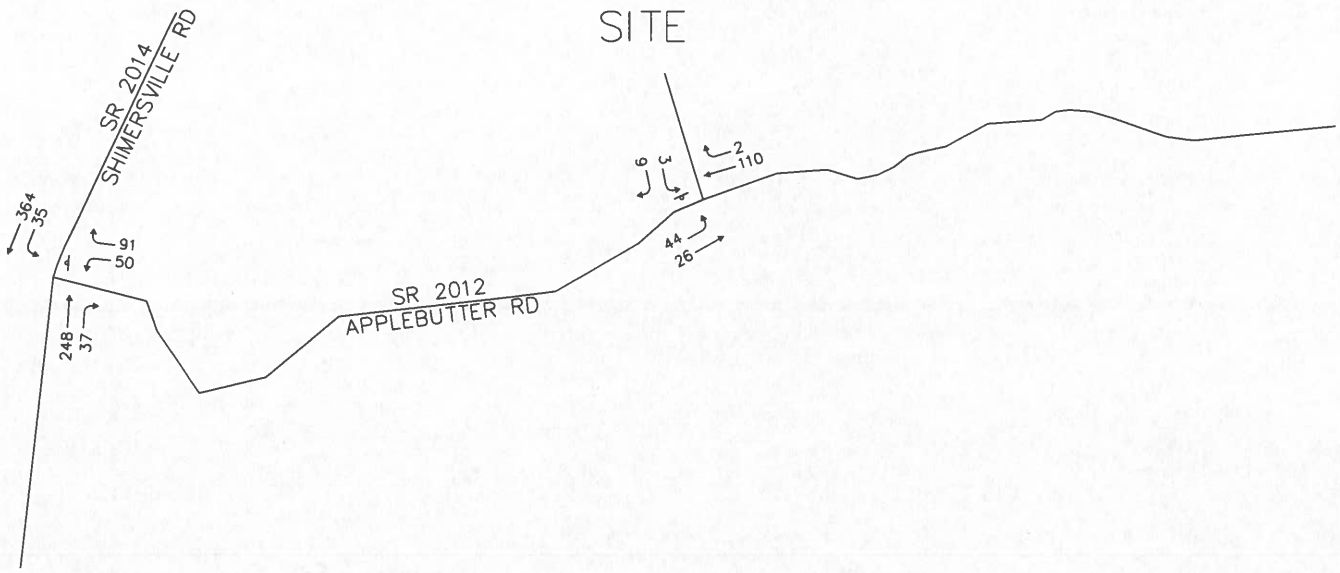
4 – STOP SIGN

Pennoni

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR



WEEKDAY PM PEAK HOUR

2032 FUTURE CONDITIONS (1,800 TONS)
PEAK HOUR TRAFFIC VOLUMES

BETHLEHEM LANDFILL EVALUATION

FIGURE 4A

LEGEND:

– STOP SIGN

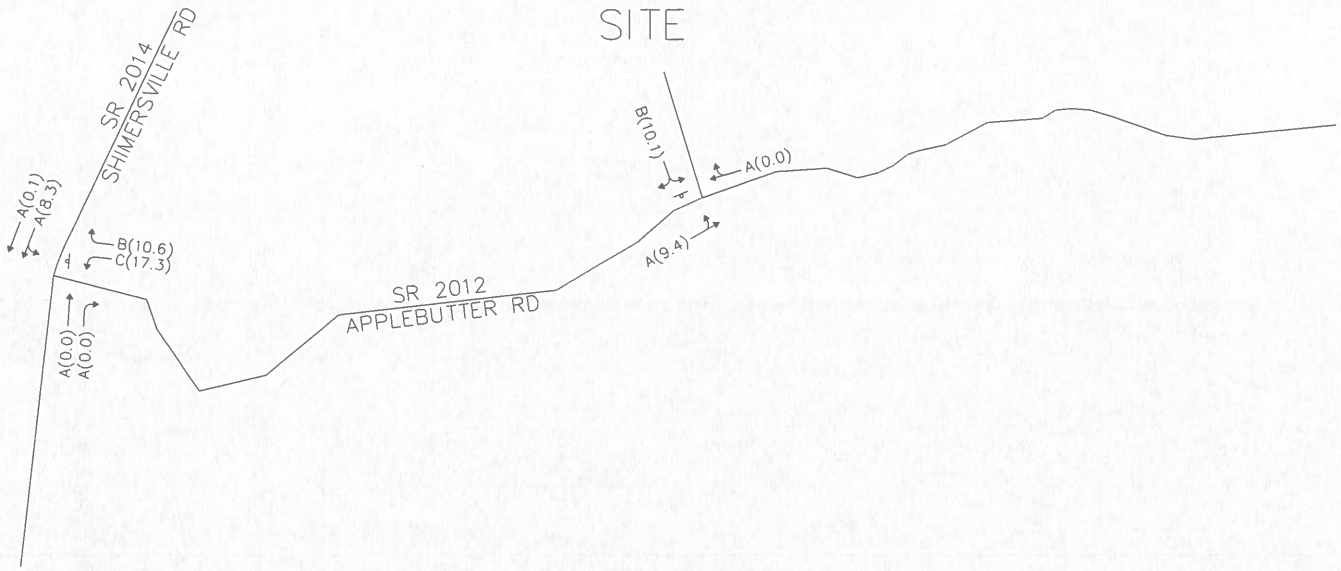
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR

N

NOT TO SCALE



WEEKDAY PM PEAK HOUR

LEGEND:

A(9.8) – LEVEL OF SERVICE (DELAY)

– STOP SIGN

2022 EXISTING CONDITIONS (1,414 TONS)
PEAK HOUR LEVELS OF SERVICE

BETHLEHEM LANDFILL EVALUATION

FIGURE 5

Pennoni

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

WEEKDAY AM PEAK HOUR

N

NOT TO SCALE

WEEKDAY PM PEAK HOUR

LEGEND:

A(9.8) – LEVEL OF SERVICE (DELAY)

– STOP SIGN

2022 EXISTING CONDITIONS (1,800 TONS)
PEAK HOUR LEVELS OF SERVICE

BETHLEHEM LANDFILL EVALUATION

FIGURE 6

Pennoni

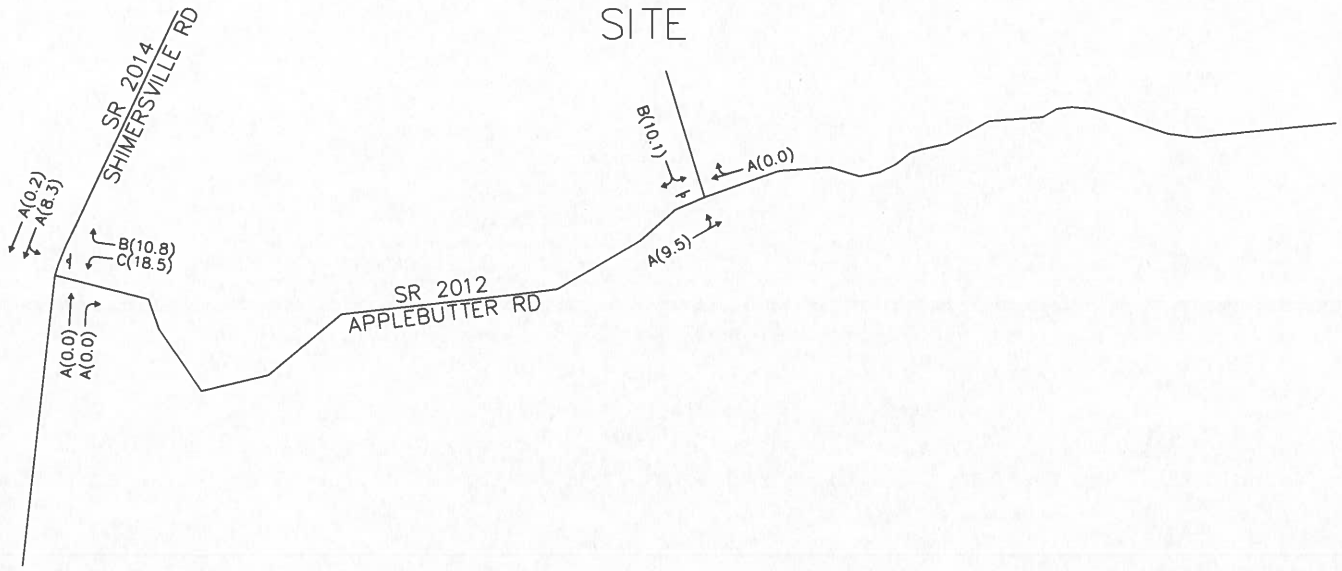
PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

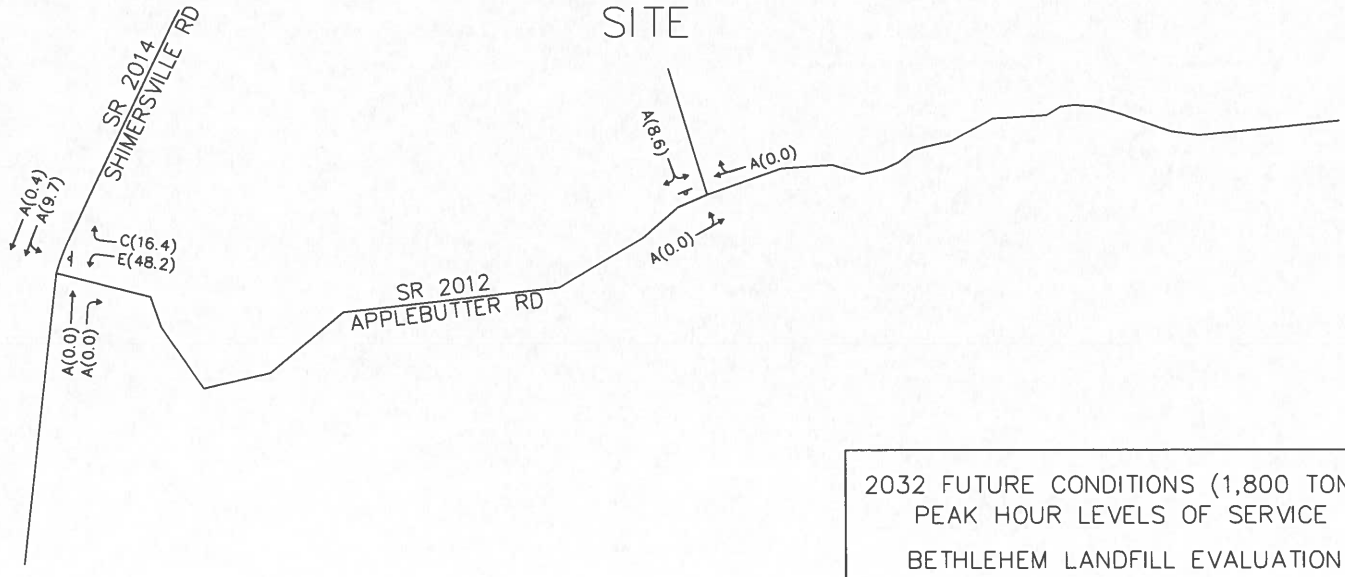
WEEKDAY AM PEAK HOUR

N

NOT TO SCALE



WEEKDAY PM PEAK HOUR



LEGEND:

A(9.8) – LEVEL OF SERVICE (DELAY)

– STOP SIGN

2032 FUTURE CONDITIONS (1,800 TONS)
PEAK HOUR LEVELS OF SERVICE

BETHLEHEM LANDFILL EVALUATION

FIGURE 6A

Pennoni

PENNONI ASSOCIATES INC.
CONSULTING ENGINEERS
81 HIGHLAND AVENUE
SUITE 230
BETHLEHEM, PA 18017

MRMTN22001

APPENDICES

APPENDIX A - TRAFFIC COUNT DATA

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

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Imperial Traffic & Data Collection
www.imperialtdc.com
PO BOX 4637
Cherry Hill, New Jersey, United States 08034
609-706-6100 hfurey@imperialtdc.com

Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022
Page No: 1

Turning Movement Data

Start Time	Applebutter Road Eastbound					Applebuttter Road Westbound					Landfill Southbound					Int. Total
	U-Turn	Left	Thru	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Right	Peds	App. Total	
6:00 AM	0	3	3	0	6	0	8	0	0	8	0	0	1	0	1	15
6:15 AM	0	8	3	0	11	0	10	1	0	11	0	0	1	0	1	23
6:30 AM	0	8	10	0	18	0	19	0	0	19	0	0	1	0	1	38
6:45 AM	0	6	17	0	23	0	8	0	0	8	0	1	1	0	2	33
Hourly Total	0	25	33	0	58	0	45	1	0	46	0	1	4	0	5	109
7:00 AM	0	22	7	0	29	0	15	0	0	15	0	2	0	0	2	46
7:15 AM	0	5	6	0	11	0	25	1	0	26	0	1	1	0	2	39
7:30 AM	0	2	4	0	6	0	26	0	0	26	0	0	2	0	2	34
7:45 AM	0	5	8	0	13	0	39	1	0	40	0	0	4	0	4	57
Hourly Total	0	34	25	0	59	0	105	2	0	107	0	3	7	0	10	176
8:00 AM	0	0	7	0	7	0	27	0	0	27	0	1	2	0	3	37
8:15 AM	0	6	11	0	17	0	26	0	0	26	0	0	1	0	1	44
8:30 AM	0	2	10	0	12	0	15	1	0	16	0	1	5	0	6	34
8:45 AM	0	4	16	0	20	0	20	0	0	20	0	1	3	0	4	44
Hourly Total	0	12	44	0	56	0	88	1	0	89	0	3	11	0	14	159
9:00 AM	0	2	11	0	13	0	10	0	0	10	0	0	7	0	7	30
9:15 AM	0	3	9	0	12	0	17	1	0	18	0	0	2	0	2	32
9:30 AM	0	3	14	1	17	0	6	1	0	7	0	0	4	0	4	28
9:45 AM	0	2	8	0	10	0	8	0	0	8	0	0	8	0	8	26
Hourly Total	0	10	42	1	52	0	41	2	0	43	0	0	21	0	21	116
10:00 AM	0	1	16	0	17	0	15	1	0	16	0	0	4	0	4	37
10:15 AM	0	7	6	0	13	0	16	0	0	16	0	1	2	0	3	32
10:30 AM	0	5	7	0	12	0	15	0	0	15	0	0	3	0	3	30
10:45 AM	0	4	14	0	18	0	7	0	0	7	0	1	4	0	5	30
Hourly Total	0	17	43	0	60	0	53	1	0	54	0	2	13	0	15	129
11:00 AM	0	3	12	0	15	0	16	2	0	18	0	0	5	0	5	38
11:15 AM	0	5	5	0	10	0	10	0	0	10	0	1	5	0	6	26
11:30 AM	0	3	15	0	18	0	15	1	0	16	0	2	5	0	7	41
11:45 AM	0	7	14	0	21	0	12	0	0	12	0	1	9	0	10	43
Hourly Total	0	18	46	0	64	0	53	3	0	56	0	4	24	0	28	148
12:00 PM	0	4	12	0	16	0	17	1	0	18	0	2	4	0	6	40
12:15 PM	0	10	20	0	30	0	8	1	0	9	0	0	6	0	6	45
12:30 PM	0	5	17	0	22	0	14	0	0	14	0	0	7	0	7	43
12:45 PM	0	4	11	0	15	0	12	0	0	12	0	0	4	1	4	31
Hourly Total	0	23	60	0	83	0	51	2	0	53	0	2	21	1	23	159
1:00 PM	0	4	8	0	12	0	20	2	0	22	0	0	5	0	5	39

1:15 PM	0	4	8	0	12	0	9	0	0	9	0	2	1	0	3	24
1:30 PM	0	3	19	0	22	0	19	0	0	19	0	0	4	0	4	45
1:45 PM	0	2	14	0	16	0	11	2	0	13	0	2	3	0	5	34
Hourly Total	0	13	49	0	62	0	59	4	0	63	0	4	13	0	17	142
2:00 PM	0	5	11	0	16	0	5	1	0	6	0	1	4	0	5	27
2:15 PM	0	3	17	0	20	1	14	1	0	16	0	0	6	0	6	42
2:30 PM	0	2	22	0	24	0	17	0	0	17	0	2	2	0	4	45
2:45 PM	0	0	24	0	24	0	17	1	0	18	0	1	6	0	7	49
Hourly Total	0	10	74	0	84	1	53	3	0	57	0	4	18	0	22	163
3:00 PM	0	2	27	0	29	0	14	1	0	15	0	0	10	0	10	54
3:15 PM	0	2	24	0	26	0	18	0	0	18	0	0	3	0	3	47
3:30 PM	0	0	23	0	23	0	20	0	0	20	0	2	2	0	4	47
3:45 PM	0	0	22	0	22	0	20	0	0	20	0	0	2	0	2	44
Hourly Total	0	4	96	0	100	0	72	1	0	73	0	2	17	0	19	192
4:00 PM	0	0	34	0	34	0	24	0	0	24	0	1	2	0	3	61
4:15 PM	0	0	21	0	21	0	20	2	0	22	0	1	2	0	3	46
4:30 PM	0	0	26	0	26	0	21	0	0	21	0	0	2	0	2	49
4:45 PM	0	0	36	0	36	0	13	0	0	13	0	1	2	0	3	52
Hourly Total	0	0	117	0	117	0	78	2	0	80	0	3	8	0	11	208
5:00 PM	0	0	32	0	32	1	26	0	0	27	0	1	1	0	2	61
5:15 PM	0	0	31	0	31	0	17	0	0	17	0	0	0	0	0	48
5:30 PM	0	0	25	0	25	0	20	0	0	20	0	0	0	0	0	45
5:45 PM	0	0	19	0	19	1	16	1	0	18	0	0	2	0	2	39
Hourly Total	0	0	107	0	107	2	79	1	0	82	0	1	3	0	4	193
Grand Total	0	166	736	1	902	3	777	23	0	803	0	29	160	1	189	1894
Approach %	0.0	18.4	81.6	-	-	0.4	96.8	2.9	-	-	0.0	15.3	84.7	-	-	-
Total %	0.0	8.8	38.9	-	47.6	0.2	41.0	1.2	-	42.4	0.0	1.5	8.4	-	10.0	-
Lights	0	49	702	-	751	3	733	9	-	745	0	9	46	-	55	1551
% Lights	-	29.5	95.4	-	83.3	100.0	94.3	39.1	-	92.8	-	31.0	28.8	-	29.1	81.9
Mediums	0	63	28	-	91	0	36	13	-	49	0	17	63	-	80	220
% Mediums	-	38.0	3.8	-	10.1	0.0	4.6	56.5	-	6.1	-	58.6	39.4	-	42.3	11.6
Articulated Trucks	0	54	6	-	60	0	8	1	-	9	0	3	51	-	54	123
% Articulated Trucks	-	32.5	0.8	-	6.7	0.0	1.0	4.3	-	1.1	-	10.3	31.9	-	28.6	6.5
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	1	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	100.0	-	-	-	-	-	-	-	-	-	100.0	-	-

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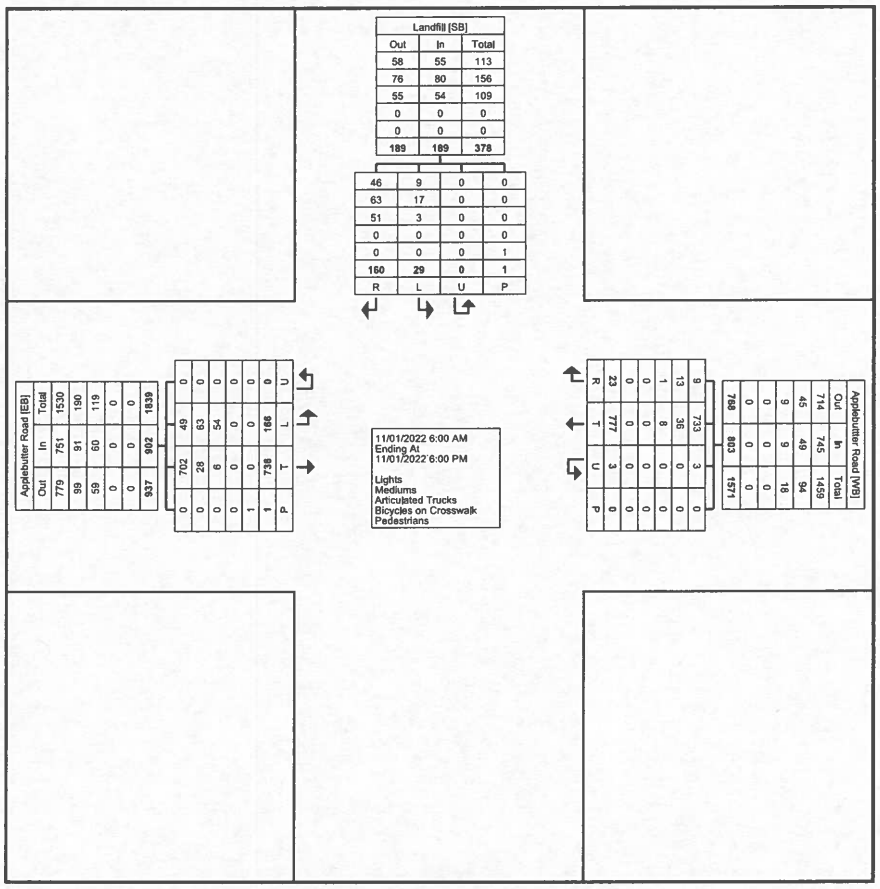
Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022



Turning Movement Data Plot

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

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Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022
Page No: 4

Turning Movement Peak Hour Data (7:00 AM)

Start Time	Applebutter Road Eastbound					Applebuttter Road Westbound					Landfill Southbound					
	U-Turn	Left	Thru	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Right	Peds	App. Total	Int. Total
7:00 AM	0	22	7	0	29	0	15	0	0	15	0	2	0	0	2	46
7:15 AM	0	5	6	0	11	0	25	1	0	26	0	1	1	0	2	39
7:30 AM	0	2	4	0	6	0	26	0	0	26	0	0	2	0	2	34
7:45 AM	0	5	8	0	13	0	39	1	0	40	0	0	4	0	4	57
Total	0	34	25	0	59	0	105	2	0	107	0	3	7	0	10	176
Approach %	0.0	57.6	42.4	-	-	0.0	98.1	1.9	-	-	0.0	30.0	70.0	-	-	-
Total %	0.0	19.3	14.2	-	33.5	0.0	59.7	1.1	-	60.8	0.0	1.7	4.0	-	5.7	-
PHF	0.000	0.386	0.781	-	0.509	0.000	0.673	0.500	-	0.669	0.000	0.375	0.438	-	0.625	0.772
Lights	0	8	23	-	31	0	101	1	-	102	0	0	1	-	1	134
% Lights	-	23.5	92.0	-	52.5	-	96.2	50.0	-	95.3	-	0.0	14.3	-	10.0	76.1
Mediums	0	5	2	-	7	0	3	1	-	4	0	0	2	-	2	13
% Mediums	-	14.7	8.0	-	11.9	-	2.9	50.0	-	3.7	-	0.0	28.6	-	20.0	7.4
Articulated Trucks	0	21	0	-	21	0	1	0	-	1	0	3	4	-	7	29
% Articulated Trucks	-	61.8	0.0	-	35.6	-	1.0	0.0	-	0.9	-	100.0	57.1	-	70.0	16.5
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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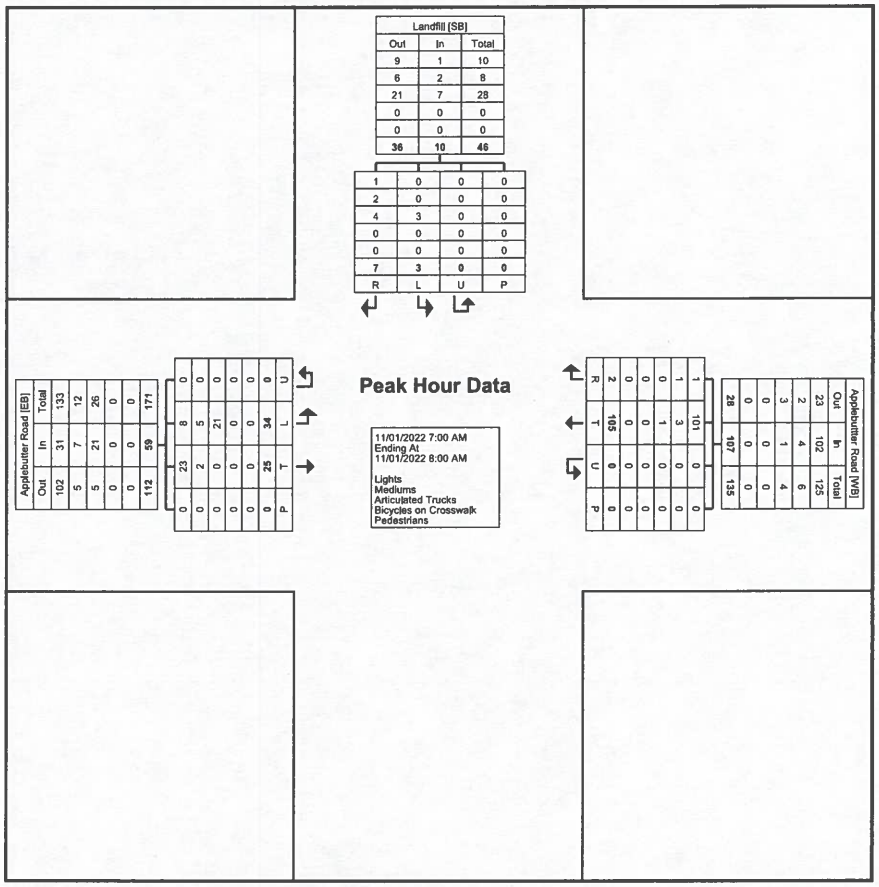
Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022



Turning Movement Peak Hour Data Plot (7:00 AM)

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

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Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022

Turning Movement Peak Hour Data (11:45 AM)

Start Time	Applebutter Road Eastbound					Applebuttter Road Westbound					Landfill Southbound					
	U-Turn	Left	Thru	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Right	Peds	App. Total	Int. Total
11:45 AM	0	7	14	0	21	0	12	0	0	12	0	1	9	0	10	43
12:00 PM	0	4	12	0	16	0	17	1	0	18	0	2	4	0	6	40
12:15 PM	0	10	20	0	30	0	8	1	0	9	0	0	6	0	6	45
12:30 PM	0	5	17	0	22	0	14	0	0	14	0	0	7	0	7	43
Total	0	26	63	0	89	0	51	2	0	53	0	3	26	0	29	171
Approach %	0.0	29.2	70.8	-	-	0.0	96.2	3.8	-	-	0.0	10.3	89.7	-	-	-
Total %	0.0	15.2	36.8	-	52.0	0.0	29.8	1.2	-	31.0	0.0	1.8	15.2	-	17.0	-
PHF	0.000	0.650	0.788	-	0.742	0.000	0.750	0.500	-	0.736	0.000	0.375	0.722	-	0.725	0.950
Lights	0	9	55	-	64	0	48	0	-	48	0	1	6	-	7	119
% Lights	-	34.6	87.3	-	71.9	-	94.1	0.0	-	90.6	-	33.3	23.1	-	24.1	69.6
Mediums	0	14	8	-	22	0	3	2	-	5	0	2	16	-	18	45
% Mediums	-	53.8	12.7	-	24.7	-	5.9	100.0	-	9.4	-	66.7	61.5	-	62.1	26.3
Articulated Trucks	0	3	0	-	3	0	0	0	-	0	0	0	4	-	4	7
% Articulated Trucks	-	11.5	0.0	-	3.4	-	0.0	0.0	-	0.0	-	0.0	15.4	-	13.8	4.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

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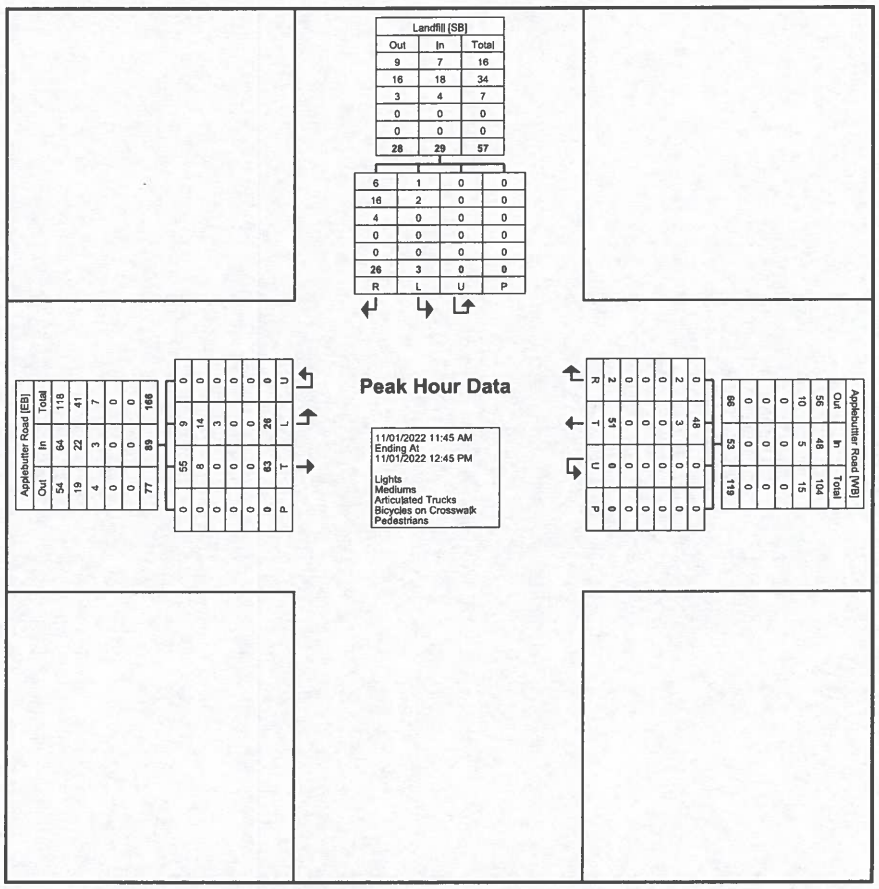
Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022



Turning Movement Peak Hour Data Plot (11:45 AM)

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

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Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022

Turning Movement Peak Hour Data (4:30 PM)

Start Time	Applebutter Road Eastbound					Applebuttter Road Westbound					Landfill Southbound					Int. Total
	U-Turn	Left	Thru	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Right	Peds	App. Total	
4:30 PM	0	0	26	0	26	0	21	0	0	21	0	0	2	0	2	49
4:45 PM	0	0	36	0	36	0	13	0	0	13	0	1	2	0	3	52
5:00 PM	0	0	32	0	32	1	26	0	0	27	0	1	1	0	2	61
5:15 PM	0	0	31	0	31	0	17	0	0	17	0	0	0	0	0	48
Total	0	0	125	0	125	1	77	0	0	78	0	2	5	0	7	210
Approach %	0.0	0.0	100.0	-	-	1.3	98.7	0.0	-	-	0.0	28.6	71.4	-	-	-
Total %	0.0	0.0	59.5	-	59.5	0.5	36.7	0.0	-	37.1	0.0	1.0	2.4	-	3.3	-
PHF	0.000	0.000	0.868	-	0.868	0.250	0.740	0.000	-	0.722	0.000	0.500	0.625	-	0.583	0.861
Lights	0	0	124	-	124	1	74	0	-	75	0	2	5	-	7	206
% Lights	-	-	99.2	-	99.2	100.0	96.1	-	-	96.2	-	100.0	100.0	-	100.0	98.1
Mediums	0	0	1	-	1	0	3	0	-	3	0	0	0	-	0	4
% Mediums	-	-	0.8	-	0.8	0.0	3.9	-	-	3.8	-	0.0	0.0	-	0.0	1.9
Articulated Trucks	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
% Articulated Trucks	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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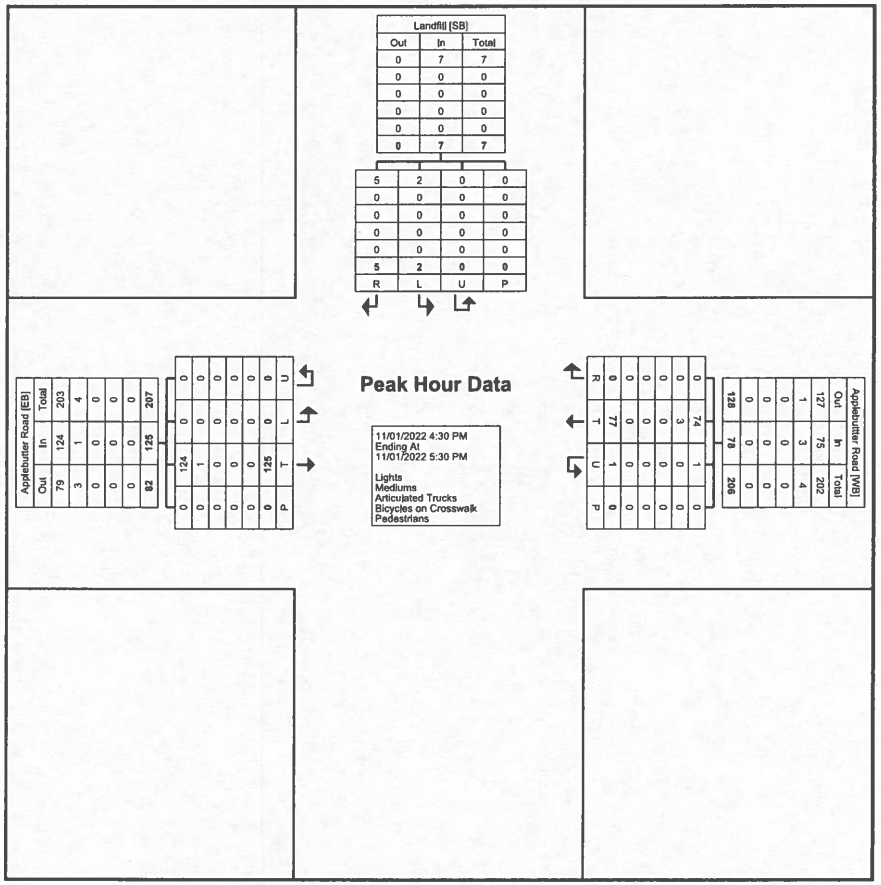
Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.621562, -75.309086

Count Name: 1. Applebutter Road & Bethlehem Landfill Driveway
Site Code: 1
Start Date: 11/01/2022



Turning Movement Peak Hour Data Plot (4:30 PM)

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

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Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022

Turning Movement Data

Start Time	Applebuttter Road Westbound					Shimersville Road Northbound					Shimersville Road Southbound					Int. Total
	U-Turn	Left	Right	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Peds	App. Total	
6:00 AM	0	4	11	0	15	0	27	3	0	30	0	8	63	0	71	116
6:15 AM	0	3	6	0	9	0	41	9	0	50	0	5	78	0	83	142
6:30 AM	0	14	23	0	37	0	20	19	0	39	0	14	93	0	107	183
6:45 AM	0	6	7	0	13	0	52	12	0	64	0	21	81	0	102	179
Hourly Total	0	27	47	0	74	0	140	43	0	183	0	48	315	0	363	620
7:00 AM	0	6	8	0	14	0	53	16	0	69	0	13	76	0	89	172
7:15 AM	0	12	14	0	26	0	55	8	0	63	0	5	78	0	83	172
7:30 AM	0	10	20	0	30	0	73	8	0	81	0	2	104	0	106	217
7:45 AM	0	16	27	0	43	0	60	7	0	67	0	13	85	0	98	208
Hourly Total	0	44	69	0	113	0	241	39	0	280	0	33	343	0	376	769
8:00 AM	0	12	20	0	32	0	59	5	0	64	0	5	68	0	73	169
8:15 AM	0	8	20	1	28	0	45	6	0	51	0	13	90	0	103	182
8:30 AM	0	10	13	0	23	0	55	7	0	62	0	8	79	0	87	172
8:45 AM	0	7	18	0	25	0	57	4	0	61	0	12	65	0	77	163
Hourly Total	0	37	71	1	108	0	216	22	0	238	0	38	302	0	340	686
9:00 AM	0	11	10	0	21	0	55	5	0	60	0	12	65	0	77	158
9:15 AM	0	8	14	0	22	0	39	6	0	45	0	12	52	0	64	131
9:30 AM	0	9	8	0	17	0	39	5	0	44	0	13	42	0	55	116
9:45 AM	0	5	12	0	17	0	34	5	0	39	0	11	50	0	61	117
Hourly Total	0	33	44	0	77	0	167	21	0	188	0	48	209	0	257	522
10:00 AM	0	10	10	0	20	0	45	7	0	52	0	6	44	0	50	122
10:15 AM	0	5	11	0	16	0	41	7	0	48	0	11	48	0	59	123
10:30 AM	0	10	13	0	23	0	32	10	0	42	0	6	35	0	41	106
10:45 AM	0	5	7	0	12	0	67	5	0	72	0	15	49	0	64	148
Hourly Total	0	30	41	0	71	0	185	29	0	214	0	38	176	0	214	499
11:00 AM	0	7	11	0	18	0	44	7	0	51	0	10	39	0	49	118
11:15 AM	0	11	11	0	22	0	55	6	0	61	0	8	47	0	55	138
11:30 AM	0	9	15	0	24	0	43	9	0	52	0	11	46	0	57	133
11:45 AM	0	11	12	0	23	0	45	14	0	59	0	8	44	0	52	134
Hourly Total	0	38	49	0	87	0	187	36	0	223	0	37	176	0	213	523
12:00 PM	0	7	18	0	25	0	57	8	0	65	0	9	50	0	59	149
12:15 PM	0	6	10	0	16	0	71	13	0	84	0	15	40	0	55	155
12:30 PM	0	6	14	0	20	0	57	9	0	66	0	13	59	0	72	158
12:45 PM	0	11	14	0	25	0	56	8	0	64	0	11	53	0	64	153
Hourly Total	0	30	56	0	86	0	241	38	0	279	0	48	202	0	250	615
1:00 PM	0	5	19	0	24	0	40	9	0	49	0	4	46	0	50	123

1:15 PM	0	3	12	0	15	0	49	10	0	59	0	8	54	0	62	136
1:30 PM	0	11	11	0	22	0	68	10	0	78	0	15	60	0	75	175
1:45 PM	0	7	11	0	18	0	63	3	0	66	0	14	44	0	58	142
Hourly Total	0	26	53	0	79	0	220	32	0	252	0	41	204	0	245	576
2:00 PM	0	5	9	2	14	0	63	5	0	68	1	12	62	1	75	157
2:15 PM	0	7	11	0	18	0	73	9	0	82	0	16	42	0	58	158
2:30 PM	0	14	13	1	27	0	84	12	0	96	0	14	59	0	73	196
2:45 PM	0	11	13	0	24	0	86	2	0	88	0	23	72	0	95	207
Hourly Total	0	37	46	3	83	0	306	28	0	334	1	65	235	1	301	718
3:00 PM	0	8	20	0	28	0	95	15	0	110	0	16	69	0	85	223
3:15 PM	0	3	18	0	21	0	96	11	0	107	1	21	72	0	94	222
3:30 PM	0	9	16	0	25	0	101	8	0	109	0	18	85	0	103	237
3:45 PM	0	7	22	0	29	0	122	10	0	132	0	19	73	0	92	253
Hourly Total	0	27	76	0	103	0	414	44	0	458	1	74	299	0	374	935
4:00 PM	0	12	23	0	35	0	124	12	0	136	0	19	61	0	80	251
4:15 PM	0	9	17	0	26	0	149	4	0	153	0	13	48	0	61	240
4:30 PM	0	12	21	0	33	0	114	13	0	127	0	15	69	0	84	244
4:45 PM	0	3	10	0	13	0	137	14	0	151	0	21	56	0	77	241
Hourly Total	0	36	71	0	107	0	524	43	0	567	0	68	234	0	302	976
5:00 PM	0	11	13	0	24	0	167	18	0	185	0	16	75	0	91	300
5:15 PM	0	14	17	0	31	0	126	7	0	133	0	26	56	0	82	246
5:30 PM	0	4	17	0	21	0	110	10	0	120	0	24	80	0	104	245
5:45 PM	0	5	10	0	15	0	97	5	0	102	0	17	69	0	86	203
Hourly Total	0	34	57	0	91	0	500	40	0	540	0	83	280	0	363	994
Grand Total	0	399	680	4	1079	0	3341	415	0	3756	2	621	2975	1	3598	8433
Approach %	0.0	37.0	63.0	-	-	0.0	89.0	11.0	-	-	0.1	17.3	82.7	-	-	-
Total %	0.0	4.7	8.1	-	12.8	0.0	39.6	4.9	-	44.5	0.0	7.4	35.3	-	42.7	-
Lights	0	283	630	-	913	0	3228	283	-	3511	2	586	2870	-	3458	7882
% Lights	-	70.9	92.6	-	84.6	-	96.6	68.2	-	93.5	100.0	94.4	96.5	-	96.1	93.5
Mediums	0	67	48	-	115	0	103	78	-	181	0	30	100	-	130	426
% Mediums	-	16.8	7.1	-	10.7	-	3.1	18.8	-	4.8	0.0	4.8	3.4	-	3.6	5.1
Articulated Trucks	0	49	2	-	51	0	10	54	-	64	0	5	5	-	10	125
% Articulated Trucks	-	12.3	0.3	-	4.7	-	0.3	13.0	-	1.7	0.0	0.8	0.2	-	0.3	1.5
Bicycles on Crosswalk	-	-	-	2	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	50.0	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	2	-	-	-	-	0	-	-	-	-	1	-	-
% Pedestrians	-	-	-	50.0	-	-	-	-	-	-	-	-	-	100.0	-	-

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

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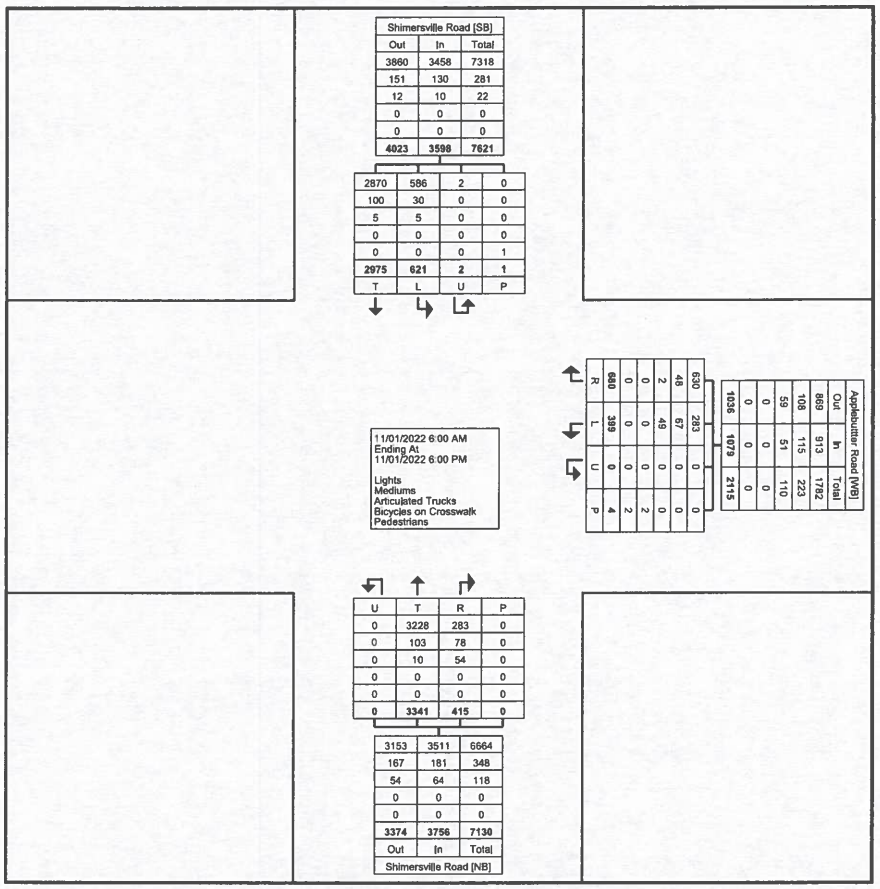

Turning Movement Data Plot

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

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Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Applebuttter Road Westbound					Shimersville Road Northbound					Shimersville Road Southbound					
	U-Turn	Left	Right	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Peds	App. Total	Int. Total
7:30 AM	0	10	20	0	30	0	73	8	0	81	0	2	104	0	106	217
7:45 AM	0	16	27	0	43	0	60	7	0	67	0	13	85	0	98	208
8:00 AM	0	12	20	0	32	0	59	5	0	64	0	5	68	0	73	169
8:15 AM	0	8	20	1	28	0	45	6	0	51	0	13	90	0	103	182
Total	0	46	87	1	133	0	237	26	0	263	0	33	347	0	380	776
Approach %	0.0	34.6	65.4	-	-	0.0	90.1	9.9	-	-	0.0	8.7	91.3	-	-	-
Total %	0.0	5.9	11.2	-	17.1	0.0	30.5	3.4	-	33.9	0.0	4.3	44.7	-	49.0	-
PHF	0.000	0.719	0.806	-	0.773	0.000	0.812	0.813	-	0.812	0.000	0.635	0.834	-	0.896	0.894
Lights	0	34	76	-	110	0	223	16	-	239	0	30	332	-	362	711
% Lights	-	73.9	87.4	-	82.7	-	94.1	61.5	-	90.9	-	90.9	95.7	-	95.3	91.6
Mediums	0	6	9	-	15	0	13	8	-	21	0	3	15	-	18	54
% Mediums	-	13.0	10.3	-	11.3	-	5.5	30.8	-	8.0	-	9.1	4.3	-	4.7	7.0
Articulated Trucks	0	6	2	-	8	0	1	2	-	3	0	0	0	-	0	11
% Articulated Trucks	-	13.0	2.3	-	6.0	-	0.4	7.7	-	1.1	-	0.0	0.0	-	0.0	1.4
Bicycles on Crosswalk	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-

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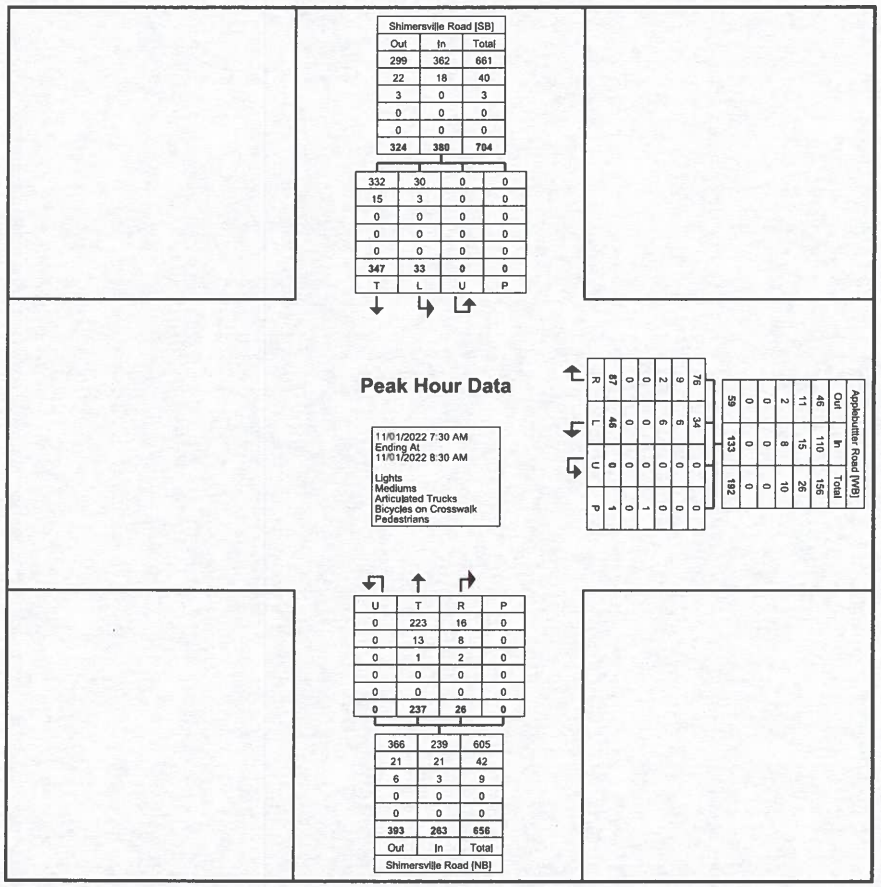
Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

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Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Applebuttter Road Westbound					Shimersville Road Northbound					Shimersville Road Southbound					
	U-Turn	Left	Right	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Peds	App. Total	Int. Total
12:00 PM	0	7	18	0	25	0	57	8	0	65	0	9	50	0	59	149
12:15 PM	0	6	10	0	16	0	71	13	0	84	0	15	40	0	55	155
12:30 PM	0	6	14	0	20	0	57	9	0	66	0	13	59	0	72	158
12:45 PM	0	11	14	0	25	0	56	8	0	64	0	11	53	0	64	153
Total	0	30	56	0	86	0	241	38	0	279	0	48	202	0	250	615
Approach %	0.0	34.9	65.1	-	-	0.0	86.4	13.6	-	-	0.0	19.2	80.8	-	-	-
Total %	0.0	4.9	9.1	-	14.0	0.0	39.2	6.2	-	45.4	0.0	7.8	32.8	-	40.7	-
PHF	0.000	0.682	0.778	-	0.860	0.000	0.849	0.731	-	0.830	0.000	0.800	0.856	-	0.868	0.973
Lights	0	16	49	-	65	0	236	23	-	259	0	44	192	-	236	560
% Lights	-	53.3	87.5	-	75.6	-	97.9	60.5	-	92.8	-	91.7	95.0	-	94.4	91.1
Mediums	0	12	7	-	19	0	5	9	-	14	0	4	10	-	14	47
% Mediums	-	40.0	12.5	-	22.1	-	2.1	23.7	-	5.0	-	8.3	5.0	-	5.6	7.6
Articulated Trucks	0	2	0	-	2	0	0	6	-	6	0	0	0	-	0	8
% Articulated Trucks	-	6.7	0.0	-	2.3	-	0.0	15.8	-	2.2	-	0.0	0.0	-	0.0	1.3
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

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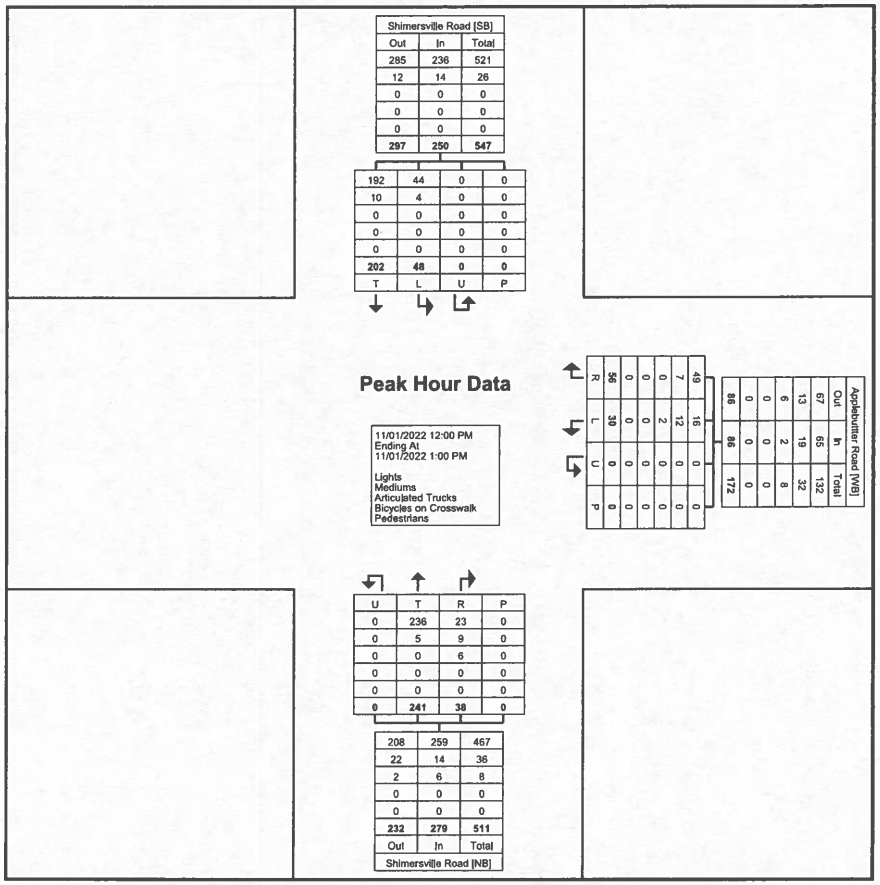
Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022



Turning Movement Peak Hour Data Plot (12:00 PM)

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Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022

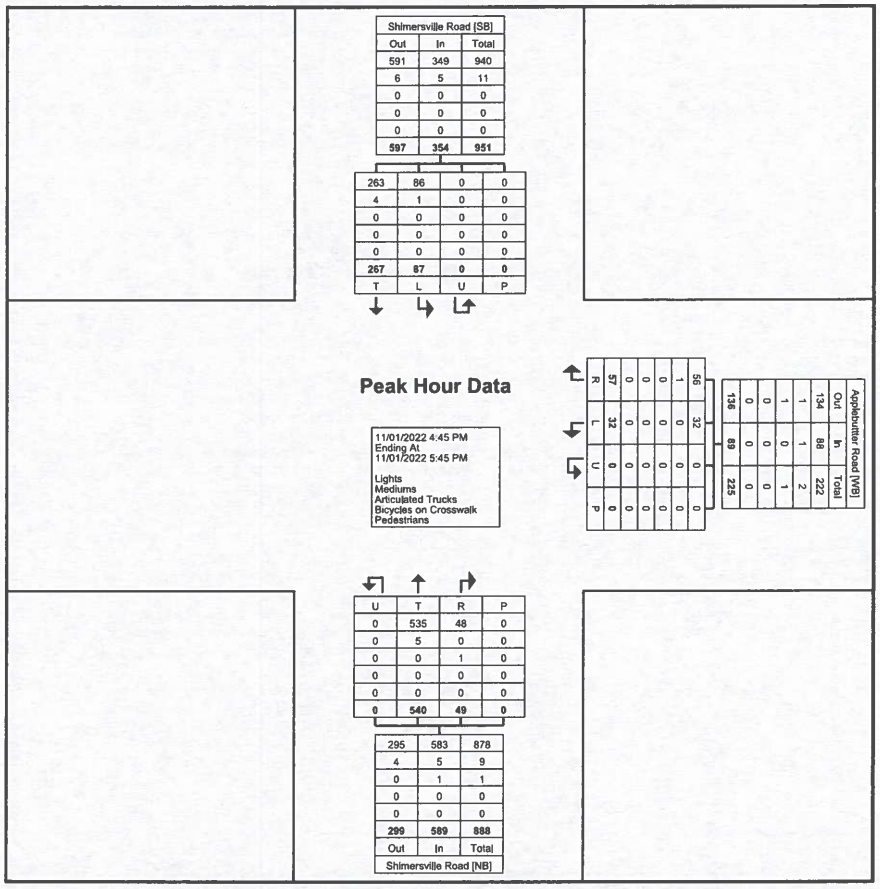
Turning Movement Peak Hour Data (4:45 PM)

Start Time	Applebuttter Road Westbound					Shimersville Road Northbound					Shimersville Road Southbound					Int. Total
	U-Turn	Left	Right	Peds	App. Total	U-Turn	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Peds	App. Total	
4:45 PM	0	3	10	0	13	0	137	14	0	151	0	21	56	0	77	241
5:00 PM	0	11	13	0	24	0	167	18	0	185	0	16	75	0	91	300
5:15 PM	0	14	17	0	31	0	126	7	0	133	0	26	56	0	82	246
5:30 PM	0	4	17	0	21	0	110	10	0	120	0	24	80	0	104	245
Total	0	32	57	0	89	0	540	49	0	589	0	87	267	0	354	1032
Approach %	0.0	36.0	64.0	-	-	0.0	91.7	8.3	-	-	0.0	24.6	75.4	-	-	-
Total %	0.0	3.1	5.5	-	8.6	0.0	52.3	4.7	-	57.1	0.0	8.4	25.9	-	34.3	-
PHF	0.000	0.571	0.838	-	0.718	0.000	0.808	0.681	-	0.796	0.000	0.837	0.834	-	0.851	0.860
Lights	0	32	56	-	88	0	535	48	-	583	0	86	263	-	349	1020
% Lights	-	100.0	98.2	-	98.9	-	99.1	98.0	-	99.0	-	98.9	98.5	-	98.6	98.8
Mediums	0	0	1	-	1	0	5	0	-	5	0	1	4	-	5	11
% Mediums	-	0.0	1.8	-	1.1	-	0.9	0.0	-	0.8	-	1.1	1.5	-	1.4	1.1
Articulated Trucks	0	0	0	-	0	0	0	1	-	1	0	0	0	-	0	1
% Articulated Trucks	-	0.0	0.0	-	0.0	-	0.0	2.0	-	0.2	-	0.0	0.0	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Project: Applebutter
Municipality: Bethlehem, Northampton County, PA
Setup: GP
Location: 40.618875, -75.334647

Imperial
TRAFFIC & DATA COLLECTION
Imperial Traffic & Data Collection
www.imperialtdc.com
PO BOX 4637
Cherry Hill, New Jersey, United States 08034
609-706-6100 hfurey@imperialtdc.com

Count Name: 2. Applebutter Road and Shimersville Road
Site Code: 2
Start Date: 11/01/2022



Turning Movement Peak Hour Data Plot (4:45 PM)

APPENDIX B - PENNDOT ITMS WEBSITE DATA

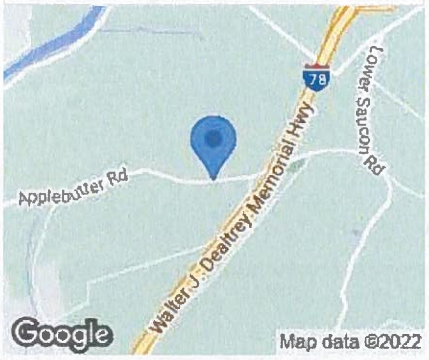
TMS Site 17809: Traffic Monitoring Report

Location Description: Between Severn Lane and Sherry Hill Road

Details	
Type of Count	MACHINE CLASS
Type of Site	Portable
Schedule	1 TIME/YR
Duration	24 HRS
Frequency Cycle	05
Cycle Year	01

Location	
County	NORTHAMPTON (48)
Route	2012
Segment	0050
Offset	1911
Latitude	40.62327
Longitude	-75.28884

Map



Traffic Data

Date	Volume	Truck Volume	Truck %	Volume Graph
Oct 30, 2019	1,293	99	7.7	[redacted]
Sep 25, 2014	1,269			[redacted]
Aug 11, 2009	886			[redacted]
Aug 03, 2004	1,153			[redacted]

TMS Site 17947: Traffic Monitoring Report

Location Description: 0.35 MILE NORTH OF SR 0412

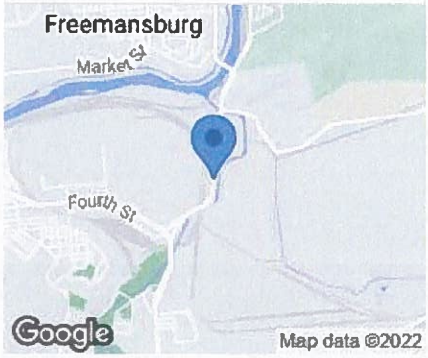
Details

Type of Count	MACHINE CLASS
Type of Site	Portable
Schedule	1 TIME/YR
Duration	24 HRS
Frequency Cycle	05
Cycle Year	01

Location

County	NORTHAMPTON (48)
Route	2014
Segment	0020
Offset	1619
Latitude	40.61371
Longitude	-75.33529

Map



Traffic Data

Date	Volume	Truck Volume	Truck %	Volume Graph
July 31, 2019	9,998	764	7.6	
Apr 24, 2014	7,943			
Oct 20, 2009	8,385			
Aug 07, 2007	7,577			
Aug 01, 2000	13,630			
Oct 23, 1990	7,511	352	4.7	

APPENDIX C – TRAFFIC VOLUME SPREADSHEETS

Weekday AM Peak Hour

Int. No.	Street	Movement	2022 Existing (Raw)	2032 No-Build	Site Traffic (To 1,800 Tons)	2022 Existing (1,800 Tons)	2032 Future (1,800 Tons)
1	SR 2012 (Applebutter Road)	WB L	46	48	2	48	50
		WB R	87	91		87	91
	SR 2014 (Shimersville Road)	NB T	237	248		237	248
		NB R	26	27	10	36	37
	SR 2014 (Shimersville Road)	SB L	33	35		33	35
		SB T	347	364		347	364
2	SR 2012 (Applebutter Road)	EB L	34	34	10	44	44
		EB T	25	26		25	26
	SR 2012 (Applebutter Road)	WB T	105	110		105	110
		WB R	2	2		2	2
	Landfill Driveway	SB L	3	3		3	3
		SB R	7	7	2	9	9

Weekday PM Peak Hour

Int. No.	Street	Movement	2022 Existing (Raw)	2032 No-Build	Site Traffic (To 1,800 Tons)	2022 Existing (1,800 Tons)	2032 Future (1,800 Tons)
1	SR 2012 (Applebutter Road)	WB L	32	34	2	34	36
		WB R	57	60		57	60
	SR 2014 (Shimersville Road)	NB T	540	566		540	566
		NB R	49	51		49	51
	SR 2014 (Shimersville Road)	SB L	87	91		87	91
		SB T	267	280		267	280
2	SR 2012 (Applebutter Road)	EB L	0	0		0	0
		EB T	125	131		125	131
	SR 2012 (Applebutter Road)	WB T	77	81		77	81
		WB R	0	0		0	0
	Landfill Driveway	SB L	2	2		2	2
		SB R	5	5	2	7	7

APPENDIX D – WEIGHT INTAKE AND DELIVERY TRUCK DATA

# of Tks	CUSTNU	CUSTOMER	DATEIN	TIMEIN	TIMEOUT	MATERIAL	QUANTITY	ORIGIN	VEHICLE
1	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	07:01:21	07:01:21	MSW	11.95	LEHIGH	REP1229
2	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	07:02:48	07:31:05	MSW	0.19	NORTHAMPTON	REP3376
3	1141	YOST HAULING	2022-11-01	07:09:27	07:52:53	MSW	19.00	NORTHAMPTON	JMC201
4	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:11:20	07:55:32	ICMSW	23.28	NEW YORK	JOY107
5	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:12:34	07:12:34	ICMSW	23.95	NEW YORK	CH2809-76
6	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:14:35	07:14:35	ICMSW	22.19	NEW YORK	WIL245-115
7	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:17:23	07:17:23	ICMSW	20.58	NEW YORK	WIL145-263
8	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:18:54	07:18:54	ICMSW	22.15	NEW YORK	WIL1258-20
9	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:20:57	08:37:23	ICMSW	22.60	NEW YORK	WIL45
10	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	07:22:20	08:38:34	CD	23.06	NEW JERSEY	ALE44
11	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:25:10	07:25:10	ICMSW	21.98	NEW YORK	CHE2093-28
12	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:27:52	07:27:52	ICMSW	23.71	NEW YORK	ANT712-951
13	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:30:24	09:07:55	ICMSW	23.51	NEW YORK	ROG916
14	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:32:27	07:32:27	ICMSW	23.55	NEW YORK	ROG420-44
15	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:34:02	07:34:02	ICMSW	23.60	NEW YORK	IP216-46
16	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	07:37:01	09:38:20	ICMSW	23.69	NEW YORK	AZ2028
17	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	07:38:35	07:38:35	CD	24.69	NEW JERSEY	EVO104-533
18	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:41:58	07:41:58	ICMSW	24.09	NEW YORK	MES525-12
19	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	07:44:19	07:44:19	ICMSW	23.69	NEW YORK	MES513-42
20	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	07:45:43	07:45:43	CD	22.36	NEW JERSEY	HT2481-427
21	1216	SYNAGRO - EPIC	2022-11-01	07:47:10	08:39:38	ADCSOIL	19.78	NEW JERSEY	RTL71
22	1216	SYNAGRO - EPIC	2022-11-01	07:48:39	08:04:45	ADCSOIL	21.29	NEW JERSEY	RTL40
23	1271	514 WASHINGTON AVE LLC	2022-11-01	07:49:51	07:49:51	CD	23.47	NEW JERSEY	BH3076-103
24	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	07:51:36	07:51:36	CD	21.84	NEW JERSEY	HT2100-351
25	1169	MONTECALVO DISPOSAL SERVICES I	2022-11-01	07:54:27	07:54:27	MSW	19.85	NEW JERSEY	MONT517-68
26	1008	DELGUIERICO WRECKING & SALVAGE	2022-11-01	07:58:34	09:10:08	MSW	6.01	BUCKS	DEL208
27	1216	SYNAGRO - EPIC	2022-11-01	08:00:08	08:34:24	ADCSOIL	21.30	NEW JERSEY	RTL74
28	0	CASH	2022-11-01	08:03:01	08:03:01	MSWLD	0.00	LEHIGH	
29	1017	LANDFILLCONTAINER	2022-11-01	08:20:44	08:20:44	CD	2.60	NORTHAMPTON	RO1-5
30	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	08:22:38	08:54:19	ICIWASTE	17.96	NORTHAMPTON	REP3716
31	1090	AFFORDABLE HAULING AND DUMPST	2022-11-01	08:24:25	09:04:44	CD	8.53	LEHIGH	SRS17
32	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	08:28:55	09:01:12	CD	1.48	NORTHAMPTON	RIZZ15
33	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	08:32:08	09:11:38	MSW	2.15	NORTHAMPTON	REP3376
34	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	08:52:53	09:22:38	MSW	0.43	NORTHAMPTON	RIZZ21
35	1005	CITY OF BETH - PARKS	2022-11-01	08:58:40	08:58:40	MSW	4.81	NORTHAMPTON	BET160
36	1005	CITY OF BETH - PARKS	2022-11-01	09:00:08	09:00:08	MSW	2.24	NORTHAMPTON	BET087
37	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	09:06:29	09:06:29	ICMSW	25.16	NEW YORK	TUF148-619
38	1087	WHITETAIL DISPOSAL	2022-11-01	09:14:47	09:14:47	MSW	10.66	NORTHAMPTON	WHITE5399
39	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	09:19:27	09:19:27	ICMSW	24.29	NEW YORK	JEY720-875
40	1169	MONTECALVO DISPOSAL SERVICES I	2022-11-01	09:21:02	09:21:02	MSW	19.92	NEW JERSEY	MONT505-17
41	1017	LANDFILLCONTAINER	2022-11-01	09:28:27	09:28:27	CD	1.65	NORTHAMPTON	RO1-6
42	0	CASH	2022-11-01	09:30:59	09:54:07	CD	1.79	NORTHAMPTON	SCARTELLI
43	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	09:33:55	09:33:55	ICMSW	24.49	NEW YORK	CAN413-56
44	1009	EAST PENN SANITATION	2022-11-01	09:36:07	10:05:19	ICIWASTE	3.25	NORTHAMPTON	HER810
45	1009	EAST PENN SANITATION	2022-11-01	09:57:07	11:22:56	MSW	23.58	NORTHAMPTON	JV353
46	1266	DANIELS HEALTH	2022-11-01	09:59:21	11:52:07	MSW	18.85	NORTHAMPTON	DAN580155
47	1087	WHITETAIL DISPOSAL	2022-11-01	10:03:56	10:27:34	MSW	2.87	LEHIGH	WHITE5342
48	1016	SYMONS SANITATION	2022-11-01	10:20:05	10:20:05	MSW	8.11	NORTHAMPTON	SYM308
49	0	CASH	2022-11-01	10:25:21	10:25:21	MSWLD	0.00	LEHIGH	
50	0	CASH	2022-11-01	10:29:24	10:29:24	MSWLD	0.00	NORTHAMPTON	
51	1009	EAST PENN SANITATION	2022-11-01	10:31:17	11:32:23	MSW	23.75	NORTHAMPTON	JMC201
52	1089	AMERICAN WASTE MANAGEMENT SV	2022-11-01	10:32:48	11:24:23	SLUDGE	16.38	NEW YORK	LUZ229
53	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	10:34:22	11:22:00	CD	2.45	NORTHAMPTON	RIZZ15
54	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	10:38:59	10:38:59	ICMSW	23.96	NEW YORK	AUA1924-39
55	1021	BOROUGH OF HELLERTOWN	2022-11-01	10:41:01	10:41:01	MSW	8.36	NORTHAMPTON	HTOWN11
56	1009	EAST PENN SANITATION	2022-11-01	10:42:31	11:30:21	ICIWASTE	4.34	NORTHAMPTON	HER810
57	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	10:44:35	11:31:25	MSW	2.37	NORTHAMPTON	RIZZ21
58	1169	MONTECALVO DISPOSAL SERVICES I	2022-11-01	10:47:21	10:47:21	MSW	19.84	NEW JERSEY	MONT504-26
59	1005	CITY OF BETH - PARKS	2022-11-01	10:49:31	10:49:31	MSW	2.23	NORTHAMPTON	BET106
60	1087	WHITETAIL DISPOSAL	2022-11-01	10:54:03	10:54:03	MSW	11.98	LEHIGH	WHITE169

61	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:00:04	11:00:04	MSW	10.54	LEHIGH	REP2024
62	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:10:36	11:10:36	MSW	12.25	NORTHAMPTON	REP2026
63	1087	WHITETAIL DISPOSAL	2022-11-01	11:13:12	11:13:12	MSW	3.95	NORTHAMPTON	WHITE56
64	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:14:29	11:14:29	MSW	12.28	LEHIGH	REP1229
65	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	11:17:01	11:17:01	CD	21.59	NEW JERSEY	ALE44-528
66	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:20:07	11:20:07	MSW	4.65	LEHIGH	REP1262
67	1008	DELGUIERICO WRECKING & SALVAGE	2022-11-01	11:26:26	11:26:26	MSW	9.51	BUCKS	DEL231
68	1193	LECK WASTE SERVICES	2022-11-01	11:43:52	12:14:11	MSW	0.98	NORTHAMPTON	LECK188
69	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:47:25	11:47:25	ICIWASTE	0.91	LEHIGH	REP1230
70	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	11:47:25	11:47:25	MSWGEO	6.09	LEHIGH	REP1230
71	1090	AFFORDABLE HAULING AND DUMPST	2022-11-01	11:50:31	12:36:13	MSW	1.81	LEHIGH	SRS17
72	1008	DELGUIERICO WRECKING & SALVAGE	2022-11-01	11:55:50	11:55:50	MSW	3.21	BUCKS	DEL214
73	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	11:57:08	12:29:00	CD	1.16	NORTHAMPTON	RIZZ15
74	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	11:59:38	11:59:38	ICMSW	25.62	NEW YORK	HDG247-663
75	1137	J.P. MASCARO & SONS	2022-11-01	12:03:04	12:41:37	ICIWASTE	2.40	NORTHAMPTON	MASRO161
76	1014	REPUBLIC SVS - RARITAN VALLEY	2022-11-01	12:05:07	12:55:27	ICIWASTE	6.04	NORTHAMPTON	REP3716
77	1023	WM - TELFORD (ADS)	2022-11-01	12:07:16	12:50:59	ICIWASTE	5.14	BUCKS	WM412944
78	0	CASH	2022-11-01	12:10:54	12:10:54	C&DLD	0.00	LEHIGH	
79	1009	EAST PENN SANITATION	2022-11-01	12:12:41	13:00:17	ICIWASTE	2.05	NORTHAMPTON	HER810
80	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	12:20:01	12:20:01	CD	23.59	NEW JERSEY	EVO104-521
81	1008	DELGUIERICO WRECKING & SALVAGE	2022-11-01	12:25:55	12:25:55	MSW	8.34	BUCKS	DEL215
82	1008	DELGUIERICO WRECKING & SALVAGE	2022-11-01	12:27:31	13:10:45	MSW	2.21	BUCKS	DEL204
83	1216	SYNAGRO - EPIC	2022-11-01	12:30:29	12:53:57	ADCSOIL	20.29	NEW JERSEY	RTL30
84	1194	AMERICAN CONTAINER SERVICE	2022-11-01	12:46:20	13:21:30	MSW	6.05	NORTHAMPTON	AM1
85	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	12:46:48	12:46:48	ICMSW	21.57	NEW YORK	WIL245-115
86	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	12:52:35	12:52:35	CD	22.88	NEW JERSEY	HT2481-146
87	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	12:56:54	12:56:54	ICMSW	24.45	NEW YORK	CH2809-76
88	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	12:58:40	12:58:40	ICMSW	23.29	NEW YORK	JOY107-48
89	1137	J.P. MASCARO & SONS	2022-11-01	13:02:32	13:02:32	MSW	11.54	LEHIGH	MASFE162
90	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	13:17:31	13:17:31	ICMSW	21.74	NEW YORK	WIL145-263
91	1087	WHITETAIL DISPOSAL	2022-11-01	13:19:10	13:19:10	MSW	6.45	NORTHAMPTON	WHITE5749
92	1218	BOROUGH OF QUAKERTOWN	2022-11-01	13:20:18	13:20:18	MSW	7.97	BUCKS	QTOWNT55
93	1090	AFFORDABLE HAULING AND DUMPST	2022-11-01	13:27:55	13:54:38	CD	3.66	LEHIGH	SRS17
94	1048	SAKOUTIS BROTHERS DISPOSAL	2022-11-01	13:41:06	13:41:06	CD	23.50	NEW JERSEY	HT2100-522
95	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	13:43:06	13:43:06	ICMSW	22.65	NEW YORK	WIL1258-20
96	0	CASH	2022-11-01	13:45:28	14:13:22	CD	1.28	LEHIGH	
97	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	13:48:32	13:48:32	ICMSW	24.37	NEW YORK	ROG916-02
98	1087	WHITETAIL DISPOSAL	2022-11-01	13:57:17	14:20:09	MSW	1.47	LEHIGH	WHITE5342
99	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	13:59:52	14:21:00	MSW	2.20	NORTHAMPTON	RIZZ15
100	0	CASH	2022-11-01	14:04:25	14:26:45	CD	0.70	LEHIGH	
101	1087	WHITETAIL DISPOSAL	2022-11-01	14:05:24	14:05:24	MSW	14.11	NORTHAMPTON	WHITE166
102	1217	SWINT HAULING & DISPOSAL	2022-11-01	14:06:32	14:31:48	CD	1.79	NORTHAMPTON	SWINT50
103	1018	WASTE CONNECTIONS-COURT ST	2022-11-01	14:11:46	14:11:46	ICMSW	24.21	NEW YORK	ROG420-44
104	1019	WASTE CONNECTIONS-50TH ST	2022-11-01	14:18:24	14:18:24	ICMSW	23.59	NEW YORK	WIL45-09
105	1023	WM - TELFORD (ADS)	2022-11-01	14:22:13	14:45:24	ICIWASTE	7.71	BUCKS	WM412944
106	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	14:25:56	14:46:43	MSW	5.18	NORTHAMPTON	RIZZ21
107	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	14:33:02	14:54:44	MSW	9.15	LEHIGH	RIZZ17
108	1087	WHITETAIL DISPOSAL	2022-11-01	14:34:23	14:34:23	MSW	8.47	NORTHAMPTON	WHITE72
109	1087	WHITETAIL DISPOSAL	2022-11-01	15:08:17	15:08:17	MSW	14.36	NORTHAMPTON	WHITE199
110	1052	RIZZ CONTAINER & DISPOSAL	2022-11-01	15:18:40	15:36:59	CD	1.47	NORTHAMPTON	RIZZ15
111	1032	J&S DISPOSAL	2022-11-01	15:28:55	15:28:55	MSW	10.97	NORTHAMPTON	JS12
112	1087	WHITETAIL DISPOSAL	2022-11-01	15:35:10	15:35:10	MSW	5.70	NORTHAMPTON	WHITE201
							1414.93	Tons	
							12.63	Avg. Tons/Vehicle	

APPENDIX E – AUXILIARY LANE WARRANT ANALYSIS

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Lower Saucon Township	Analysis Date:	12/19/2022
County:	Northampton County	Conducted By:	TMK
PennDOT Engineering District:	5	Checked By:	SMH
		Agency/Company Name:	Pennoni

Intersection & Approach Description: Applebutter Road (SR 2012) & Landfill Driveway - EB SR 2012 Approach

Analysis Period:	2032 Future Year (1,800 MDV)	Number of Approach Lanes:	1
Design Hour:	AM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40	Type of Analysis	
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	44	76.0%	95
	Through	-	26	8.0%	30
	Right	No	0	0.0%	N/A
Opposing	Left	No	0	0.0%	N/A
	Through	-	110	4.0%	117
	Right	Yes	2	50.0%	4

Advancing Volume:	125
Opposing Volume:	121
Left Turn Volume:	95
% Left Turns in Advancing Volume:	76.00%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	0	0.0%	N/A
	Through	-	110	4.0%	N/A
	Right	-	2	50.0%	N/A

Advancing Volume:	N/A
Right Turn Volume:	N/A

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 2**

Warrant Met?: **No**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	95
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

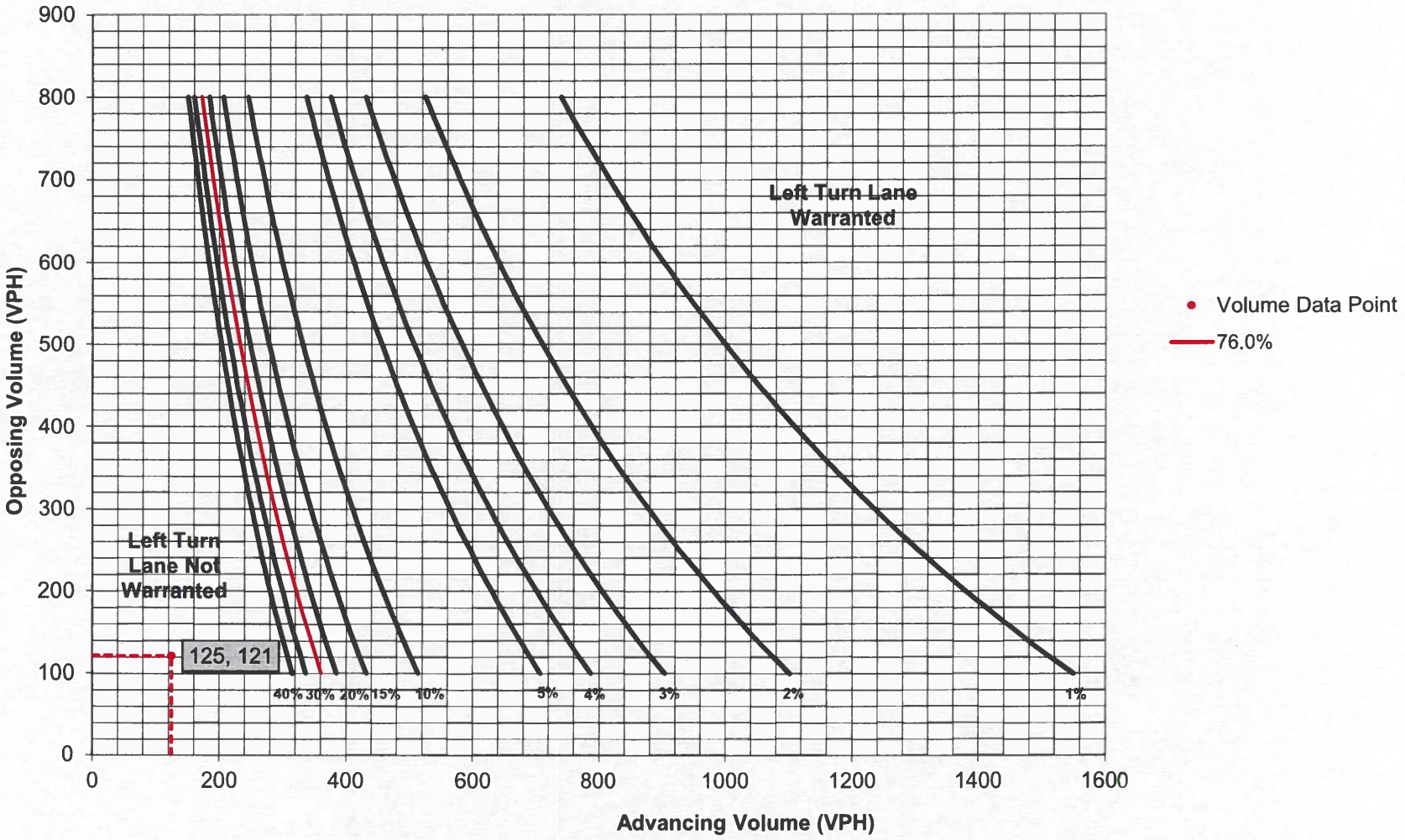
Left Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	N/A	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 2. Warrant for left turn lanes on two-lane highways (40 mph speed, unsignalized and signalized intersections)

(L = % Left Turns in Advancing Volume)



Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Lower Saucon Township	Analysis Date:	12/19/2022
County:	Northampton County	Conducted By:	TMK
PennDOT Engineering District:	5	Checked By:	SMH
		Agency/Company Name:	Pennoni

Intersection & Approach Description: Applebutter Road (SR 2012) & Landfill Driveway - EB SR 2012 Approach

Analysis Period:	2032 Future Year (1,800 MDV)	Number of Approach Lanes:	1
Design Hour:	AM Peak Hour	Undivided or Divided Highway:	Undivided
Intersection Control:	Unsignalized		
Posted Speed Limit (MPH):	40	Type of Analysis	
Type of Terrain:	Rolling	Left or Right-Turn Lane Analysis?:	Right Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	44	76.0%	N/A
	Through	-	26	8.0%	N/A
	Right	No	0	0.0%	N/A
Opposing	Left	No	0	0.0%	N/A
	Through	-	110	4.0%	N/A
	Right	Yes	2	50.0%	N/A

Advancing Volume:	N/A
Opposing Volume:	N/A
Left Turn Volume:	N/A
% Left Turns in Advancing Volume:	N/A

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	No	0	0.0%	N/A
	Through	-	110	4.0%	117
	Right	-	2	50.0%	4

Advancing Volume:	121
Right Turn Volume:	4

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure:	N/A
Warrant Met?:	N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure:	Figure 9
Warrant Met?:	No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	4
Cycles Per Hour (Assumed):	60
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

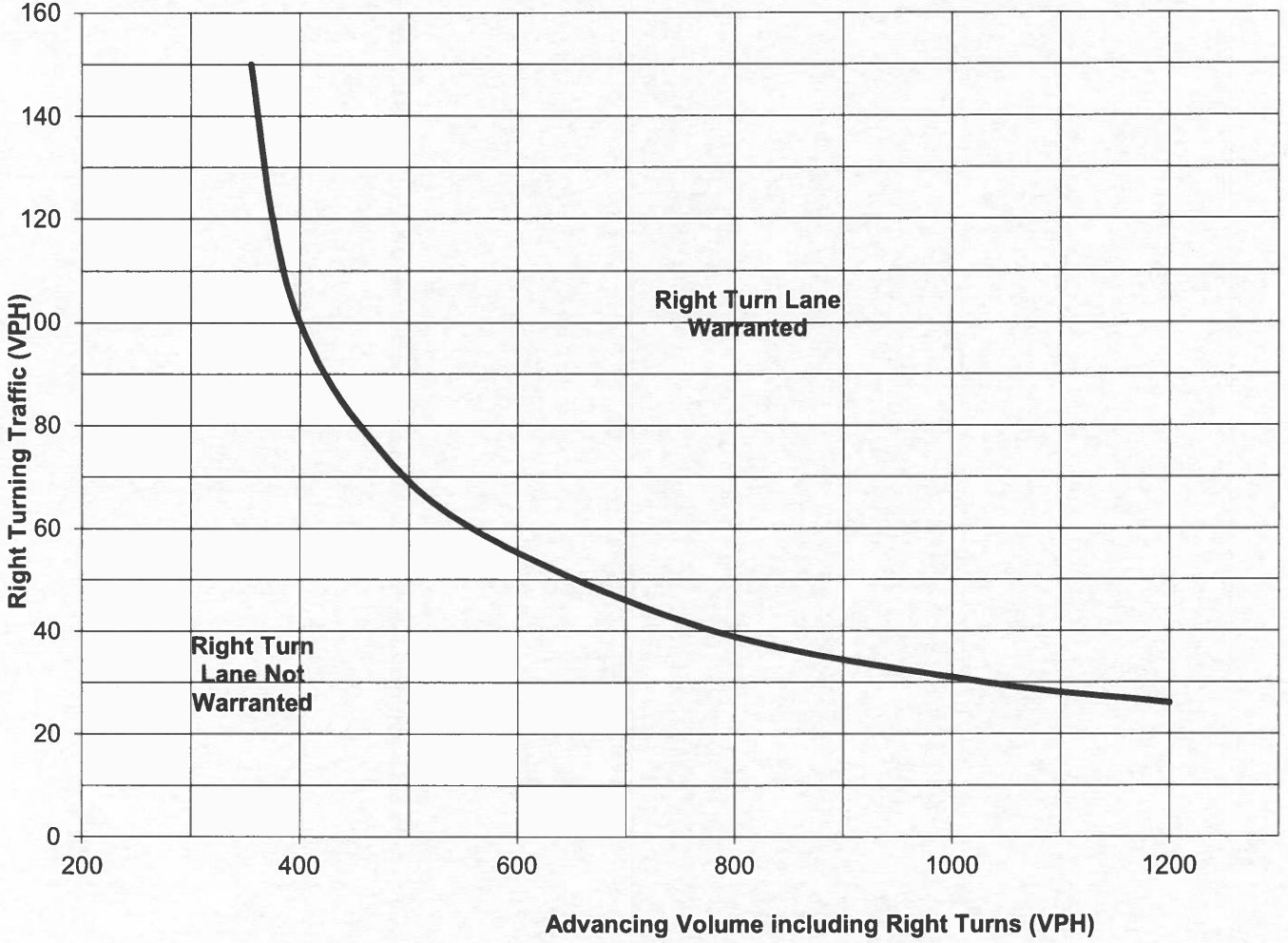
Type of Traffic Control	Speed (MPH)					
	25-35		40-45		50-60	
	Turn Demand Volume					
	High	Low	High	Low	High	Low
Signalized	A	A	B or C	B or C	B or C	B or C
Unsignalized	A	A	C	B	B or C	B

Right Turn Lane Storage Length, Condition A:	N/A	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	N/A	Feet

Additional Findings: N/A

Additional Comments / Justifications:

Figure 9. Warrant for right turn lanes on two-lane roadways
(40 mph or lower speeds, unsignalized and signalized intersections)



APPENDIX F – SIGNAL WARRANT ANALYSIS

Traffic Signal Warrant Analysis Workbook

1/17/2023

STUDY AND ANALYSIS INFORMATION

Municipality:	Lower Saucon Township	Analysis Date:	11/9/2022
County:	Northampton County	Conducted By:	TMK
PennDOT Engineering District:	5	Agency/Company Name:	Pennoni

Analysis Information

Data Collection Date:	11/1/2022
Day of the Week:	Tuesday

Is the intersection in a built-up area of an isolated community of <10,000 population? No

Major Street Information

Major Street Name and Route Number:	Shimersville Road (SR 2014)
Major Street Approach #1 Direction:	N-Bound
Major Street Approach #2 Direction:	S-Bound

Number of Lanes for Moving Traffic on Each Major Street Approach:	2	LANE(S)
Speed Limit or 85th Percentile Speed on the Major Street:	40	MPH

Minor Street Information

Minor Street Name and Route Number:	Applebutter Road (SR 2012)
Minor Street Approach #1 Direction:	W-Bound
Minor Street Approach #2 Direction:	N/A

Number of Lanes for Moving Traffic on Each Minor Street Approach:	1	LANE(S)

TRAFFIC SIGNAL WARRANT ANALYSIS FINDINGS

	Applicable?	Warrant Met?
Warrant 1, Eight-Hour Vehicular Volume	No	N/A
Warrant 2, Four-Hour Vehicular Volume	No	N/A
Warrant 3, Peak Hour	Yes	No
Warrant 4, Pedestrian Volume	Yes	No
Warrant 5, School Crossing	Yes	No
Warrant 6, Coordinated Signal System	Yes	No
Warrant 7, Crash Experience	Yes	No
Warrant 8, Roadway Network	Yes	No
Warrant 9, Intersection Near a Grade Crossing	No	N/A
Warrant PA-1, ADT Volume Warrant	Yes	No
Warrant PA-2, Midblock and Trail Crossings	Yes	No

ENTER VOLUME DATA PER 15 MINUTE INTERVAL, PER APPROACH						
Time Interval		Major Street Approach #1 (N-Bound)	Major Street Approach #2 (S-Bound)	Major Street Combined	Minor Street Approach #1 (W-Bound)	Minor Street Approach #2 (N/A)
Begin At	End Of	Volume	Volume	Total Volume	Volume	Volume
12:00 AM	12:14 AM			0		
12:15 AM	12:29 AM			0		
12:30 AM	12:44 AM			0		
12:45 AM	12:59 AM			0		
1:00 AM	1:14 AM			0		
1:15 AM	1:29 AM			0		
1:30 AM	1:44 AM			0		
1:45 AM	1:59 AM			0		
2:00 AM	2:14 AM			0		
2:15 AM	2:29 AM			0		
2:30 AM	2:44 AM			0		
2:45 AM	2:59 AM			0		
3:00 AM	3:14 AM			0		
3:15 AM	3:29 AM			0		
3:30 AM	3:44 AM			0		
3:45 AM	3:59 AM			0		
4:00 AM	4:14 AM			0		
4:15 AM	4:29 AM			0		
4:30 AM	4:44 AM			0		
4:45 AM	4:59 AM			0		
5:00 AM	5:14 AM			0		
5:15 AM	5:29 AM			0		
5:30 AM	5:44 AM			0		
5:45 AM	5:59 AM			0		
6:00 AM	6:14 AM			0		
6:15 AM	6:29 AM			0		
6:30 AM	6:44 AM			0		
6:45 AM	6:59 AM			0		
7:00 AM	7:14 AM	285	399	684	141	
7:15 AM	7:29 AM			0		
7:30 AM	7:44 AM			0		
7:45 AM	7:59 AM			0		
8:00 AM	8:14 AM			0		
8:15 AM	8:29 AM			0		
8:30 AM	8:44 AM			0		
8:45 AM	8:59 AM			0		
9:00 AM	9:14 AM			0		
9:15 AM	9:29 AM			0		
9:30 AM	9:44 AM			0		
9:45 AM	9:59 AM			0		
10:00 AM	10:14 AM			0		
10:15 AM	10:29 AM			0		
10:30 AM	10:44 AM			0		
10:45 AM	10:59 AM			0		
11:00 AM	11:14 AM			0		
11:15 AM	11:29 AM			0		
11:30 AM	11:44 AM			0		
11:45 AM	11:59 AM			0		
12:00 PM	12:14 PM			0		
12:15 PM	12:29 PM			0		
12:30 PM	12:44 PM			0		
12:45 PM	12:59 PM			0		
1:00 PM	1:14 PM			0		
1:15 PM	1:29 PM			0		
1:30 PM	1:44 PM			0		
1:45 PM	1:59 PM			0		
2:00 PM	2:14 PM			0		
2:15 PM	2:29 PM			0		
2:30 PM	2:44 PM			0		
2:45 PM	2:59 PM			0		
3:00 PM	3:14 PM			0		
3:15 PM	3:29 PM			0		
3:30 PM	3:44 PM			0		
3:45 PM	3:59 PM			0		
4:00 PM	4:14 PM	617	371	988	96	
4:15 PM	4:29 PM			0		
4:30 PM	4:44 PM			0		
4:45 PM	4:59 PM			0		
5:00 PM	5:14 PM			0		
5:15 PM	5:29 PM			0		
5:30 PM	5:44 PM			0		
5:45 PM	5:59 PM			0		
6:00 PM	6:14 PM			0		
6:15 PM	6:29 PM			0		
6:30 PM	6:44 PM			0		
6:45 PM	6:59 PM			0		
7:00 PM	7:14 PM			0		
7:15 PM	7:29 PM			0		
7:30 PM	7:44 PM			0		
7:45 PM	7:59 PM			0		
8:00 PM	8:14 PM			0		
8:15 PM	8:29 PM			0		
8:30 PM	8:44 PM			0		
8:45 PM	8:59 PM			0		
9:00 PM	9:14 PM			0		
9:15 PM	9:29 PM			0		
9:30 PM	9:44 PM			0		
9:45 PM	9:59 PM			0		
10:00 PM	10:14 PM			0		
10:15 PM	10:29 PM			0		
10:30 PM	10:44 PM			0		
10:45 PM	10:59 PM			0		
11:00 PM	11:14 PM			0		
11:15 PM	11:29 PM			0		
11:30 PM	11:44 PM			0		
11:45 PM	11:59 PM			0		
Approach Totals:		902	770	1672	237	0

MUTCD WARRANT 3, PEAK HOUR

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	2 or More Lanes
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No
Is this signal warrant being applied for an unusual case, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time?	No

Indicate whether all three of the following conditions for the same 1 hour (any four consecutive 15-minute periods) of an average day are present*	
Does the total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equal or exceed 4 vehicle-hours for a one-lane approach or 5 vehicle-hours for a two-lane approach?	No
Does the volume on the same minor-street approach (one direction only) equal or exceed 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes?	Yes
Does the total entering volume serviced during the hour equal or exceed 650 vehicles per hour for intersection with three approaches or 800 vehicles per hour for intersections with four or more approaches?	Yes

**If applicable, attach all supporting calculations and documentation.*

Total Number of Unique Hours Met On Figure 4C-3
0

Hour Interval Beginning At	Hourly Vehicular Volume: Major Street Combined Vehicles Per Hour (VPH)	Hourly Vehicular Volume: Highest Minor Street Approach Vehicles Per Hour (VPH)	Hour Met?
12:00 AM	0	0	
12:15 AM	0	0	
12:30 AM	0	0	
12:45 AM	0	0	
1:00 AM	0	0	
1:15 AM	0	0	
1:30 AM	0	0	
1:45 AM	0	0	
2:00 AM	0	0	
2:15 AM	0	0	
2:30 AM	0	0	
2:45 AM	0	0	
3:00 AM	0	0	
3:15 AM	0	0	
3:30 AM	0	0	
3:45 AM	0	0	
4:00 AM	0	0	
4:15 AM	0	0	
4:30 AM	0	0	
4:45 AM	0	0	
5:00 AM	0	0	
5:15 AM	0	0	
5:30 AM	0	0	
5:45 AM	0	0	
6:00 AM	0	0	
6:15 AM	684	141	
6:30 AM	684	141	
6:45 AM	684	141	
7:00 AM	684	141	
7:15 AM	0	0	
7:30 AM	0	0	
7:45 AM	0	0	
8:00 AM	0	0	
8:15 AM	0	0	
8:30 AM	0	0	
8:45 AM	0	0	
9:00 AM	0	0	
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12:45 PM	0	0	
1:00 PM	0	0	
1:15 PM	0	0	
1:30 PM	0	0	
1:45 PM	0	0	
2:00 PM	0	0	
2:15 PM	0	0	
2:30 PM	0	0	
2:45 PM	0	0	
3:00 PM	0	0	
3:15 PM	988	96	
3:30 PM	988	96	
3:45 PM	988	96	
4:00 PM	988	96	
4:15 PM	0	0	
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5:00 PM	0	0	
5:15 PM	0	0	
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6:30 PM	0	0	
6:45 PM	0	0	
7:00 PM	0	0	
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7:45 PM	0	0	
8:00 PM	0	0	
8:15 PM	0	0	
8:30 PM	0	0	
8:45 PM	0	0	
9:00 PM	0	0	
9:15 PM	0	0	
9:30 PM	0	0	
9:45 PM	0	0	
10:00 PM	0	0	
10:15 PM	0	0	
10:30 PM	0	0	
10:45 PM	0	0	
11:00 PM	0	0	

MUTCD WARRANT 4, PEDESTRIAN VOLUME

Built-up Isolated Community With Less Than 10,000 Population or Above 35 MPH on Major Street?	Yes
15th Percentile Pedestrian Crossing Speed Less than 3.5 f/s?*	No
Is the distance to the nearest traffic control signal or STOP sign controlling the major street that pedestrians desire to cross less than 300 feet?	No
If the distance to the nearest traffic control signal or STOP sign controlling the major street that pedestrians desire to cross is less than 300 feet, will the proposed traffic control signal restrict the progressive movement of traffic?*	N/A
Total Number of Unique Hours Met for Criterion A:	0
Total Number of Unique Hours Met for Criterion B:	0

*If applicable, attach all supporting calculations, documentation, and findings.

*If applicable, attach supporting justification.

Hourly Vehicular & Pedestrian Volume				
Hour Interval Beginning At	Major Street Combined Vehicles Per Hour (VPH)	Total of All Pedestrians Crossing Major Street Pedestrians Per Hour (PPH)	Criterion A: 4-Hour Hour Met on Figure 4C-6?	Criterion B: 1-Hour Hour Met on Figure 4C-8?
12:00 AM	0			
12:15 AM	0			
12:30 AM	0			
12:45 AM	0			
1:00 AM	0			
1:15 AM	0			
1:30 AM	0			
1:45 AM	0			
2:00 AM	0			
2:15 AM	0			
2:30 AM	0			
2:45 AM	0			
3:00 AM	0			
3:15 AM	0			
3:30 AM	0			
3:45 AM	0			
4:00 AM	0			
4:15 AM	0			
4:30 AM	0			
4:45 AM	0			
5:00 AM	0			
5:15 AM	0	0		
5:30 AM	0	0		
5:45 AM	0	0		
6:00 AM	0	0		
6:15 AM	684	0		
6:30 AM	684	0		
6:45 AM	684	0		
7:00 AM	684	0		
7:15 AM	0	0		
7:30 AM	0	0		
7:45 AM	0	0		
8:00 AM	0	0		
8:15 AM	0	0		
8:30 AM	0	0		
8:45 AM	0	0		
9:00 AM	0	0		
9:15 AM	0	0		
9:30 AM	0	0		
9:45 AM	0	0		
10:00 AM	0	0		
10:15 AM	0	0		
10:30 AM	0	0		
10:45 AM	0	0		
11:00 AM	0	0		
11:15 AM	0	0		
11:30 AM	0	0		
11:45 AM	0	0		
12:00 PM	0	0		
12:15 PM	0	0		
12:30 PM	0	0		
12:45 PM	0	0		
1:00 PM	0	0		
1:15 PM	0	1		
1:30 PM	0	0		
1:45 PM	0	0		
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2:30 PM	0	0		
2:45 PM	0	0		
3:00 PM	0	0		
3:15 PM	988	0		
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4:15 PM	0	0		
4:30 PM	0	0		
4:45 PM	0	0		
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8:45 PM	0			
9:00 PM	0			
9:15 PM	0			
9:30 PM	0			
9:45 PM	0			
10:00 PM	0			
10:15 PM	0			
10:30 PM	0			
10:45 PM	0			
11:00 PM	0			

MUTCD WARRANT 5, SCHOOL CROSSING

Do schoolchildren (elementary through high school students) cross the major street?	No
Has consideration been given to implement other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade-separated crossing?	No
Is the distance to the nearest traffic control signal along the major street less than 300 feet?	No
If the distance to the nearest traffic control signal along the major street is less than 300 feet, will the proposed traffic control signal restrict the progressive movement of traffic?	No
Minimum of 20 schoolchildren during the highest crossing hour?	No
Has a traffic engineering study been conducted to determine the adequacy and frequency of gaps in the vehicular traffic stream as related to the number and size of groups of schoolchildren at an established school crossing across the major street?	No

Pedestrian Gap Acceptance Engineering and Traffic Study Evaluation*

Data Collection Date:	7/25/2012	Sufficient median for major street Crossing 1?	No
Day of the Week:	Monday	Sufficient median for major street Crossing 2?	No

	Study Period	Study Duration (mins)	Crossing 1 (Stage 1)		Crossing 1 (Stage 2)		Crossing 2 (Stage 1)		Crossing 2 (Stage 2)	
			Total Adequate Gaps	Met?	Total Adequate Gaps	Met?	Total Adequate Gaps	Met?	Total Adequate Gaps	Met?
1	Morning			N/A		N/A		N/A		N/A
2	Afternoon			N/A		N/A		N/A		N/A
3				N/A		N/A		N/A		N/A
4				N/A		N/A		N/A		N/A
5				N/A		N/A		N/A		N/A
			Summary:	Not Met		Not Met		Not Met		Not Met

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for specific study requirements and additional Department documentation requirements to justify the installation of a signal under Warrant 5. Refer to ITE's Manual of Transportation Engineering Studies for specific details related to conducting a pedestrian gap acceptance engineering and traffic study. Attach all supplementary documentation and calculations.*

MUTCD WARRANT 6, COORDINATED SIGNAL SYSTEM*

On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.	No
On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.	No

**Warrant 6 should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.*

MUTCD WARRANT 7, CRASH EXPERIENCE

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	2 or More Lanes
Minor Street:	1 Lane

Has adequate trial of alternatives with satisfactory observance and enforcement failed to reduce the crash frequency?	N/A
Five or more reportable and/or non-reportable crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period during the most recent 3 years of available crash data.* *If applicable, attach a summary of the crash data analysis used for this criterion.*	N/A
For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition A in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.	No
For each of any 8 hours of an average day, the vehicles per hour given in both the 80% columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection.	No
The volume of pedestrian traffic is not less than 80% of the requirements specified in Warrant 4, the Pedestrian Volume warrant.* *If applicable, attach all supporting calculations and documentation.*	N/A

MUTCD WARRANT 8, ROADWAY NETWORK*

Is the major street classified as an Urban Extension, Principal Arterial, or Minor Arterial that is a reasonable connection between two Principal Arterials and/or Urban Extensions as shown on the official Functional Classification Map?	No
Does the intersection have a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1,2, and 3 during an average weekday?	Yes
Does the intersection have a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?	No
Is the major street part of the street or highway system that serves as the principal roadway network for through traffic flow?	Yes
Does the major street include rural or suburban highways outside, entering, or traversing a city?	No
Does the major street appear as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study?	No

**Refer to Section 4.3 of PennDOT Publication 46 (Traffic Engineering Manual) for additional Department documentation requirements to justify the installation of a signal under Warrant 8. Attach all supplementary documentation and calculations, especially those relating to traffic volume projections and subsequent Warrant analyses.*

Traffic Signal Warrant Analysis Workbook

1/17/2023

WARRANT PA-1, ADT VOLUME WARRANT

Number of Lanes for Moving Traffic on Each Approach	
Major Street:	2 or More Lanes
Minor Street:	1 Lane

Built-up Isolated Community With Less Than 10,000 Population or Above 40 MPH on Major Street?	No

Estimated ADT of Major Street (Both Approaches)*: 9998 vpd

**If applicable, attach all supporting calculations and documentation.*

Estimated ADT of Higher-Volume Minor Street (One Direction Only)*: 1505 vpd

**If applicable, attach all supporting calculations and documentation.*

Condition A - ADT Volume Warrant					
Number of lanes for moving traffic on each approach		Estimated ADT*			
		Major Street (Both Approaches)		Higher-Volume Minor Street Approach (One Direction Only)	
Major Street	Minor Street	100%	70%	100%	70%
1	1	10,000	7,000	3,000	2,100
2 or More	1	12,000	8,400	3,000	2,100
2 or More	2 or More	12,000	8,400	4,000	2,800
1	2 or More	10,000	7,000	4,000	2,800

Condition B - ADT Volume Warrant					
Number of lanes for moving traffic on each approach		Estimated ADT*			
		Major Street (Both Approaches)		Higher-Volume Minor Street Approach (One Direction Only)	
Major Street	Minor Street	100%	70%	100%	70%
1	1	15,000	10,500	1,500	1,050
2 or More	1	18,000	12,600	1,500	1,050
2 or More	2 or More	18,000	12,600	2,000	1,400
1	2 or More	15,000	10,500	2,000	1,400

Condition A Met?	No
Condition B Met?	No

WARRANT PA-2, OPTIONAL TRAFFIC SIGNAL WARRANT FOR MIDBLOCK CROSSINGS AND TRAIL CROSSINGS

Has District Traffic Engineer approval been acquired to conduct this analysis? N/A

Will the proposed traffic signal be at least 100' from adjacent intersections? N/A

85th Percentile Speed on the Major Street: 40 MPH

Length of Uncontrolled Crossing: 50 feet

Data Collection Date: 7/27/2012

Day of the Week: Monday

Hourly Vehicular & Pedestrian Volume			
Hour Interval		Major Street Combined	Total of All Pedestrians Crossing Major Street
#	Beginning At	Vehicles Per Hour (VPH)	Pedestrians Per Hour (PPH)
1	2:00 PM	634	1
2		0	0
3		0	0
4		0	0
5		0	0
6		0	0
7		0	0
8		0	0
9		0	0
10		0	0

Applicable Exhibit for Comparison: Exhibit 4-7

Does at least one hour plot above the applicable line for the appropriate exhibit? N/A

APPENDIX G – HEADWAY CALCULATIONS

Two Way Stop Control Headway Calculations

Intersection: Applebutter Road & Site Driveway

Major Direction: East - West
Area Type: Suburban
Intersection Type: T Intersection

HCM2010 Equation 19-30: $t_{c,x} = t_{c,base} + t_{c,HV}P_{HV} + t_{c,G}G - t_{3,LT}$
HCM2010 Equation 19-31: $t_{f,x} = t_{f,base} + t_{f,HV}P_{HV}$

AM Peak Hour

Approach	Movement	Type	Major Street Lanes (2 or 4)	$t_{c,base,46}$ PennDOT Base Critical Headway	$t_{c,HV}$ Adjust for Heavy Veh	P_{HV} Percent Heavy Veh (decimal)	$t_{c,G}$ Adjust for Grade	G Grade (integer)	T-intersection? (Y or N)	$t_{3,LT}$	$t_{f,base,46}$ PennDOT Base Follow-up Headway	$t_{c,HV}$ Adjust for Heavy Veh	$t_{c,x}$ **Critical Headway for Movement**	$t_{c,x}$ **Follow-up Headway for Movement**
EB	L	Major Left	2	4.3	1.0	0.76	0.0	2	Y	0	3.0	0.9	**5.1**	**3.7**
SB	L	Minor Left	2	7.1	1.0	1	0.2	-5	Y	0.7	3.0	0.9	**6.4**	**3.9**
SB	R	Minor Right	2	6.2	1.0	0.86	0.1	-5	Y	0	3.1	0.9	**6.6**	**3.9**

PM Peak Hour

Approach	Movement	Type	Major Street Lanes (2 or 4)	$t_{c,base,46}$ PennDOT Base Critical Headway	$t_{c,HV}$ Adjust for Heavy Veh	P_{HV} Percent Heavy Veh (decimal)	$t_{c,G}$ Adjust for Grade	G Grade (integer)	T-intersection? (Y or N)	$t_{3,LT}$	$t_{f,base,46}$ PennDOT Base Follow-up Headway	$t_{c,HV}$ Adjust for Heavy Veh	$t_{c,x}$ **Critical Headway for Movement**	$t_{c,x}$ **Follow-up Headway for Movement**
EB	L	Major Left	2	4.3	1.0	0	0.0	2	Y	0	3.0	0.9	**4.3**	**3.0**
SB	L	Minor Left	2	7.1	1.0	0	0.2	-5	Y	0.7	3.0	0.9	**5.4**	**3.0**
SB	R	Minor Right	2	6.2	1.0	0	0.1	-5	Y	0	3.1	0.9	**5.7**	**3.1**

Two Way Stop Control Headway Calculations

Intersection: Shimersville Road & Applebutter Road

Major Direction: North - South
Area Type: Suburban
Intersection Type: T Intersection

HCM2010 Equation 19-30: $t_{c,x} = t_{c,base} + t_{c,HV}P_{HV} + t_{c,G}G - t_{3,LT}$
HCM2010 Equation 19-31: $t_{f,x} = t_{f,base} + t_{f,HV}P_{HV}$

AM Peak Hour

Approach	Movement	Type	Major Street Lanes (2 or 4)	$t_{c,base,46}$ PennDOT Base Critical Headway	$t_{c,HV}$ Adjust for Heavy Veh	P_{HV} Percent Heavy Veh (decimal)	$t_{c,G}$ Adjust for Grade	G Grade (integer)	T-intersection? (Y or N)	$t_{3,LT}$	$t_{f,base,46}$ PennDOT Base Follow-up Headway	$t_{c,HV}$ Adjust for Heavy Veh	$t_{c,x}$ **Critical Headway for Movement**	$t_{c,x}$ **Follow-up Headway for Movement**
WB	L	Minor Left	4	8.4	2.0	0.26	0.2	6	Y		0.7	2.8	1.0	**9.4**	**3.1**
WB	R	Minor Right	4	7.2	2.0	0.13	0.1	6	Y		0	2.9	1.0	**8.1**	**3.0**
SB	L	Major Left	4	3.9	2.0	0.09	0.0	-4	Y		0	2.4	1.0	**4.1**	**2.5**

PM Peak Hour

Approach	Movement	Type	Major Street Lanes (2 or 4)	$t_{c,base,46}$ PennDOT Base Critical Headway	$t_{c,HV}$ Adjust for Heavy Veh	P_{HV} Percent Heavy Veh (decimal)	$t_{c,G}$ Adjust for Grade	G Grade (integer)	T-intersection? (Y or N)	$t_{3,LT}$	$t_{f,base,46}$ PennDOT Base Follow-up Headway	$t_{c,HV}$ Adjust for Heavy Veh	$t_{c,x}$ **Critical Headway for Movement**	$t_{c,x}$ **Follow-up Headway for Movement**
WB	L	Minor Left	4	8.4	2.0	0	0.2	6	Y		0.7	2.8	1.0	**8.9**	**2.8**
WB	R	Minor Right	4	7.2	2.0	0.02	0.1	6	Y		0	2.9	1.0	**7.8**	**2.9**
SB	L	Major Left	4	3.9	2.0	0.01	0.0	-4	Y		0	2.4	1.0	**3.9**	**2.4**

APPENDIX H – LEVEL OF SERVICE DEFINITIONS

Signalized Intersection Level of Service (HCM 2010)

Control Delay Per Vehicle (sec)	LOS by Volume to Capacity Ratio	
	≤1	>1
≤10	A	F
>10 and ≤20	B	F
>20 and ≤35	C	F
>35 and ≤55	D	F
>55 and ≤80	E	F
>80	F	F

Unsignalized Intersection Level of Service (HCM 2010)

Control Delay Per Vehicle (sec)	LOS by Volume to Capacity Ratio	
	≤1	>1
≤10	A	F
>10 and ≤15	B	F
>15 and ≤25	C	F
>25 and ≤35	D	F
>35 and ≤50	E	F
>50	F	F

APPENDIX I – CAPACITY ANALYSES

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	34	25	105	2	3	7
Future Volume (vph)	34	25	105	2	3	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.997		0.907	
Flt Protected		0.972			0.985	
Satd. Flow (prot)	0	1136	1669	0	953	0
Flt Permitted		0.972			0.985	
Satd. Flow (perm)	0	1136	1669	0	953	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	76%	8%	4%	50%	100%	86%
Adj. Flow (vph)	44	32	136	3	4	9
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	76	139	0	13	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.0%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	34	25	105	2	3	7
Future Vol, veh/h	34	25	105	2	3	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	76	8	4	50	100	86
Mvmt Flow	44	32	136	3	4	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	139	0	-	0	258	138
Stage 1	-	-	-	-	138	-
Stage 2	-	-	-	-	120	-
Critical Hdwy	5.1	-	-	-	6.4	6.56
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	3.7	-	-	-	3.9	3.9
Pot Cap-1 Maneuver	857	-	-	-	669	773
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	822	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	857	-	-	-	634	773
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	822	-

Approach	EB	WB	SB
HCM Control Delay, s	5.4	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	857	-	-	-	725
HCM Lane V/C Ratio	0.052	-	-	-	0.018
HCM Control Delay (s)	9.4	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	46	87	237	26	33	347
Future Volume (vph)	46	87	237	26	33	347
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.996
Satd. Flow (prot)	1273	1270	1609	1050	0	3216
Flt Permitted	0.950					0.996
Satd. Flow (perm)	1273	1270	1609	1050	0	3216
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	26%	13%	6%	38%	9%	4%
Adj. Flow (vph)	52	98	266	29	37	390
Shared Lane Traffic (%)						
Lane Group Flow (vph)	52	98	266	29	0	427
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	87	237	26	33	347
Future Vol, veh/h	46	87	237	26	33	347
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	26	13	6	38	9	4
Mvmt Flow	52	98	266	29	37	390

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	535	266	0	0	295	0
Stage 1	266	-	-	-	-	-
Stage 2	269	-	-	-	-	-
Critical Hdwy	9.4	8.1	-	-	4.1	-
Critical Hdwy Stg 1	6.99	-	-	-	-	-
Critical Hdwy Stg 2	7.39	-	-	-	-	-
Follow-up Hdwy	3.1	3	-	-	2.5	-
Pot Cap-1 Maneuver	358	735	-	-	1138	-
Stage 1	775	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	343	735	-	-	1138	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.9	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	343	735	1138	-
HCM Lane V/C Ratio	-	-	0.151	0.133	0.033	-
HCM Control Delay (s)	-	-	17.3	10.6	8.3	0.1
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.5	0.1	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	125	77	0	2	5
Future Volume (vph)	0	125	77	0	2	5
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.899	
Flt Protected					0.988	
Satd. Flow (prot)	0	1706	1690	0	1803	0
Flt Permitted					0.988	
Satd. Flow (perm)	0	1706	1690	0	1803	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	1%	4%	0%	0%	0%
Adj. Flow (vph)	0	145	90	0	2	6
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	145	90	0	8	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 16.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	125	77	0	2	5
Future Vol, veh/h	0	125	77	0	2	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	0	145	90	0	2	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	90	0	-	0	235	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	145	-
Critical Hdwy	4.3	-	-	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	3	-	-	-	3	3.1
Pot Cap-1 Maneuver	1119	-	-	-	929	1047
Stage 1	-	-	-	-	1116	-
Stage 2	-	-	-	-	1067	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1119	-	-	-	929	1047
Mov Cap-2 Maneuver	-	-	-	-	929	-
Stage 1	-	-	-	-	1116	-
Stage 2	-	-	-	-	1067	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1119	-	-	-	1010
HCM Lane V/C Ratio	-	-	-	-	0.008
HCM Control Delay (s)	0	-	-	-	8.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	32	57	540	49	87	267
Future Volume (vph)	32	57	540	49	87	267
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.988
Satd. Flow (prot)	1603	1406	1688	1421	0	3299
Flt Permitted	0.950					0.988
Satd. Flow (perm)	1603	1406	1688	1421	0	3299
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	2%	1%	2%	1%	1%
Adj. Flow (vph)	37	66	628	57	101	310
Shared Lane Traffic (%)						
Lane Group Flow (vph)	37	66	628	57	0	411
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.8%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	57	540	49	87	267
Future Vol, veh/h	32	57	540	49	87	267
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	2	1	2	1	1
Mvmt Flow	37	66	628	57	101	310

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	985	628	0	0	685	0
Stage 1	628	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	8.9	7.8	-	-	3.9	-
Critical Hdwy Stg 1	6.6	-	-	-	-	-
Critical Hdwy Stg 2	7	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	-	-	2.4	-
Pot Cap-1 Maneuver	161	406	-	-	890	-
Stage 1	514	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	139	406	-	-	890	-
Mov Cap-2 Maneuver	139	-	-	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	634	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.4	0	2.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	139	406	890	-
HCM Lane V/C Ratio	-	-	0.268	0.163	0.114	-
HCM Control Delay (s)	-	-	40.1	15.6	9.6	0.4
HCM Lane LOS	-	-	E	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0.6	0.4	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	44	25	105	2	3	9
Future Volume (vph)	44	25	105	2	3	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.997		0.899	
Flt Protected		0.969			0.988	
Satd. Flow (prot)	0	1101	1669	0	951	0
Flt Permitted		0.969			0.988	
Satd. Flow (perm)	0	1101	1669	0	951	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	76%	8%	4%	50%	100%	86%
Adj. Flow (vph)	57	32	136	3	4	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	89	139	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.6%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	44	25	105	2	3	9
Future Vol, veh/h	44	25	105	2	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	76	8	4	50	100	86
Mvmt Flow	57	32	136	3	4	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	139	0	-	0	284	138
Stage 1	-	-	-	-	138	-
Stage 2	-	-	-	-	146	-
Critical Hdwy	5.1	-	-	-	6.4	6.56
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	3.7	-	-	-	3.9	3.9
Pot Cap-1 Maneuver	857	-	-	-	647	773
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	802	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	857	-	-	-	603	773
Mov Cap-2 Maneuver	-	-	-	-	603	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	802	-

Approach	EB	WB	SB
HCM Control Delay, s	6.1	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	857	-	-	-	722
HCM Lane V/C Ratio	0.067	-	-	-	0.022
HCM Control Delay (s)	9.5	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	48	87	237	36	33	347
Future Volume (vph)	48	87	237	36	33	347
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.996
Satd. Flow (prot)	1273	1270	1609	1050	0	3216
Flt Permitted	0.950					0.996
Satd. Flow (perm)	1273	1270	1609	1050	0	3216
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	26%	13%	6%	38%	9%	4%
Adj. Flow (vph)	54	98	266	40	37	390
Shared Lane Traffic (%)						
Lane Group Flow (vph)	54	98	266	40	0	427
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.6%		ICU Level of Service A	
Analysis Period (min) 15			

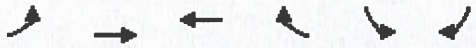
Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	87	237	36	33	347
Future Vol, veh/h	48	87	237	36	33	347
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	26	13	6	38	9	4
Mvmt Flow	54	98	266	40	37	390

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	535	266	0	0	306	0
Stage 1	266	-	-	-	-	-
Stage 2	269	-	-	-	-	-
Critical Hdwy	9.4	8.1	-	-	4.1	-
Critical Hdwy Stg 1	6.99	-	-	-	-	-
Critical Hdwy Stg 2	7.39	-	-	-	-	-
Follow-up Hdwy	3.1	3	-	-	2.5	-
Pot Cap-1 Maneuver	358	735	-	-	1128	-
Stage 1	775	-	-	-	-	-
Stage 2	749	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	343	735	-	-	1128	-
Mov Cap-2 Maneuver	343	-	-	-	-	-
Stage 1	775	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	343	735	1128	-
HCM Lane V/C Ratio	-	-	0.157	0.133	0.033	-
HCM Control Delay (s)	-	-	17.4	10.6	8.3	0.1
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.5	0.1	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	125	77	0	2	7
Future Volume (vph)	0	125	77	0	2	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.892	
Flt Protected					0.990	
Satd. Flow (prot)	0	1706	1690	0	1792	0
Flt Permitted					0.990	
Satd. Flow (perm)	0	1706	1690	0	1792	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	1%	4%	0%	0%	0%
Adj. Flow (vph)	0	145	90	0	2	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	145	90	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 16.9%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	125	77	0	2	7
Future Vol, veh/h	0	125	77	0	2	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	0	145	90	0	2	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	90	0	-	0	235	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	145	-
Critical Hdwy	4.3	-	-	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	3	-	-	-	3	3.1
Pot Cap-1 Maneuver	1119	-	-	-	929	1047
Stage 1	-	-	-	-	1116	-
Stage 2	-	-	-	-	1067	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1119	-	-	-	929	1047
Mov Cap-2 Maneuver	-	-	-	-	929	-
Stage 1	-	-	-	-	1116	-
Stage 2	-	-	-	-	1067	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1119	-	-	-	1018
HCM Lane V/C Ratio	-	-	-	-	0.01
HCM Control Delay (s)	0	-	-	-	8.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	57	540	49	87	267
Future Volume (vph)	34	57	540	49	87	267
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.988
Satd. Flow (prot)	1603	1406	1688	1421	0	3299
Flt Permitted	0.950					0.988
Satd. Flow (perm)	1603	1406	1688	1421	0	3299
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	2%	1%	2%	1%	1%
Adj. Flow (vph)	40	66	628	57	101	310
Shared Lane Traffic (%)						
Lane Group Flow (vph)	40	66	628	57	0	411
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.8%		ICU Level of Service A	
Analysis Period (min) 15			

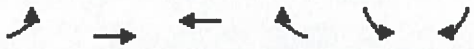
Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	34	57	540	49	87	267
Future Vol, veh/h	34	57	540	49	87	267
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	2	1	2	1	1
Mvmt Flow	40	66	628	57	101	310

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	985	628	0	0	685	0
Stage 1	628	-	-	-	-	-
Stage 2	357	-	-	-	-	-
Critical Hdwy	8.9	7.8	-	-	3.9	-
Critical Hdwy Stg 1	6.6	-	-	-	-	-
Critical Hdwy Stg 2	7	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	-	-	2.4	-
Pot Cap-1 Maneuver	161	406	-	-	890	-
Stage 1	514	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	139	406	-	-	890	-
Mov Cap-2 Maneuver	139	-	-	-	-	-
Stage 1	514	-	-	-	-	-
Stage 2	634	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.1	0	2.7
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	139	406	890	-
HCM Lane V/C Ratio	-	-	0.284	0.163	0.114	-
HCM Control Delay (s)	-	-	40.9	15.6	9.6	0.4
HCM Lane LOS	-	-	E	C	A	A
HCM 95th %tile Q(veh)	-	-	1.1	0.6	0.4	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	44	26	110	2	3	9
Future Volume (vph)	44	26	110	2	3	9
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.997		0.899	
Flt Protected		0.970			0.988	
Satd. Flow (prot)	0	1110	1670	0	951	0
Flt Permitted		0.970			0.988	
Satd. Flow (perm)	0	1110	1670	0	951	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Heavy Vehicles (%)	76%	8%	4%	50%	100%	86%
Adj. Flow (vph)	57	34	143	3	4	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	91	146	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 20.7%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	44	26	110	2	3	9
Future Vol, veh/h	44	26	110	2	3	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	76	8	4	50	100	86
Mvmt Flow	57	34	143	3	4	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	146	0	-	0	293	145
Stage 1	-	-	-	-	145	-
Stage 2	-	-	-	-	148	-
Critical Hdwy	5.1	-	-	-	6.4	6.56
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	3.7	-	-	-	3.9	3.9
Pot Cap-1 Maneuver	852	-	-	-	640	766
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	800	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	852	-	-	-	596	766
Mov Cap-2 Maneuver	-	-	-	-	596	-
Stage 1	-	-	-	-	747	-
Stage 2	-	-	-	-	800	-

Approach	EB	WB	SB
HCM Control Delay, s	6	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	852	-	-	-	715
HCM Lane V/C Ratio	0.067	-	-	-	0.022
HCM Control Delay (s)	9.5	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.1

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	50	91	248	37	35	364
Future Volume (vph)	50	91	248	37	35	364
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.996
Satd. Flow (prot)	1273	1270	1609	1050	0	3216
Flt Permitted	0.950					0.996
Satd. Flow (perm)	1273	1270	1609	1050	0	3216
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	26%	13%	6%	38%	9%	4%
Adj. Flow (vph)	56	102	279	42	39	409
Shared Lane Traffic (%)						
Lane Group Flow (vph)	56	102	279	42	0	448
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	91	248	37	35	364
Future Vol, veh/h	50	91	248	37	35	364
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	26	13	6	38	9	4
Mvmt Flow	56	102	279	42	39	409

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	562	279	0	0	321	0
Stage 1	279	-	-	-	-	-
Stage 2	283	-	-	-	-	-
Critical Hdwy	9.4	8.1	-	-	4.1	-
Critical Hdwy Stg 1	6.99	-	-	-	-	-
Critical Hdwy Stg 2	7.39	-	-	-	-	-
Follow-up Hdwy	3.1	3	-	-	2.5	-
Pot Cap-1 Maneuver	338	718	-	-	1115	-
Stage 1	760	-	-	-	-	-
Stage 2	732	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	323	718	-	-	1115	-
Mov Cap-2 Maneuver	323	-	-	-	-	-
Stage 1	760	-	-	-	-	-
Stage 2	699	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.5	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	323	718	1115	-
HCM Lane V/C Ratio	-	-	0.174	0.142	0.035	-
HCM Control Delay (s)	-	-	18.5	10.8	8.3	0.2
HCM Lane LOS	-	-	C	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.5	0.1	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	131	81	0	2	7
Future Volume (vph)	0	131	81	0	2	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	12	11	11	12	15	12
Grade (%)		2%	-2%		-5%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.892	
Flt Protected					0.990	
Satd. Flow (prot)	0	1706	1690	0	1792	0
Flt Permitted					0.990	
Satd. Flow (perm)	0	1706	1690	0	1792	0
Link Speed (mph)		40	40		25	
Link Distance (ft)		240	235		256	
Travel Time (s)		4.1	4.0		7.0	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	1%	4%	0%	0%	0%
Adj. Flow (vph)	0	152	94	0	2	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	152	94	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		15	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.09	1.13	1.11	1.06	0.92	1.04
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.3%		ICU Level of Service A	
Analysis Period (min) 15			

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↑		Y	
Traffic Vol, veh/h	0	131	81	0	2	7
Future Vol, veh/h	0	131	81	0	2	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	2	-2	-	-5	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	0	152	94	0	2	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	94	0	-	0	246	94
Stage 1	-	-	-	-	94	-
Stage 2	-	-	-	-	152	-
Critical Hdwy	4.3	-	-	-	5.4	5.7
Critical Hdwy Stg 1	-	-	-	-	4.4	-
Critical Hdwy Stg 2	-	-	-	-	4.4	-
Follow-up Hdwy	3	-	-	-	3	3.1
Pot Cap-1 Maneuver	1115	-	-	-	918	1042
Stage 1	-	-	-	-	1112	-
Stage 2	-	-	-	-	1061	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1115	-	-	-	918	1042
Mov Cap-2 Maneuver	-	-	-	-	918	-
Stage 1	-	-	-	-	1112	-
Stage 2	-	-	-	-	1061	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1115	-	-	-	1012
HCM Lane V/C Ratio	-	-	-	-	0.01
HCM Control Delay (s)	0	-	-	-	8.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	36	60	566	51	91	280
Future Volume (vph)	36	60	566	51	91	280
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	11	11
Grade (%)	6%		4%			-4%
Storage Length (ft)	0	50		0	0	
Storage Lanes	1	1		1	0	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.850		0.850		
Flt Protected	0.950					0.988
Satd. Flow (prot)	1603	1406	1688	1421	0	3299
Flt Permitted	0.950					0.988
Satd. Flow (perm)	1603	1406	1688	1421	0	3299
Link Speed (mph)	40		40			40
Link Distance (ft)	398		593			396
Travel Time (s)	6.8		10.1			6.8
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	0%	2%	1%	2%	1%	1%
Adj. Flow (vph)	42	70	658	59	106	326
Shared Lane Traffic (%)						
Lane Group Flow (vph)	42	70	658	59	0	432
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	11		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.16	1.16	1.15	1.15	1.09	1.09
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	60	566	51	91	280
Future Vol, veh/h	36	60	566	51	91	280
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	0	50	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	6	-	4	-	-	-4
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	0	2	1	2	1	1
Mvmt Flow	42	70	658	59	106	326

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1033	658	0	0	717	0
Stage 1	658	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	8.9	7.8	-	-	3.9	-
Critical Hdwy Stg 1	6.6	-	-	-	-	-
Critical Hdwy Stg 2	7	-	-	-	-	-
Follow-up Hdwy	2.8	2.9	-	-	2.4	-
Pot Cap-1 Maneuver	146	384	-	-	868	-
Stage 1	492	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	124	384	-	-	868	-
Mov Cap-2 Maneuver	124	-	-	-	-	-
Stage 1	492	-	-	-	-	-
Stage 2	608	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.3	0	2.7
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	124	384	868	-
HCM Lane V/C Ratio	-	-	0.338	0.182	0.122	-
HCM Control Delay (s)	-	-	48.2	16.4	9.7	0.4
HCM Lane LOS	-	-	E	C	A	A
HCM 95th %tile Q(veh)	-	-	1.4	0.7	0.4	-

APPENDIX J – APPLEBUTTER ROAD SIGN INVENTORY

SIGN		SERIES	DESCRIPTION	SIZE	STATION				STATUS OF NOV. 28, 2022 FIELD VIEW
1	A		SR 2012 SEG 0030 AHEAD	12 X 12	A	0	L		IN PLACE
1	B	R4-1	DO NOT PASS	24 X 30	A	104	R		IN PLACE
1	C	R2-1	35 MPH SPEED LIMIT	24 X 30	A	104	R		IN PLACE
1	D	W3-1	STOP AHEAD	30 X 30	D	140	L	Pub 236 minimum distance is 250ft fro Stop sign	IN PLACE
1	E	W1-5R	RIGHT WINDING ROAD	30 X 30	A	256	R		IN PLACE
1	F	W13-1P	20MPH ADVISORY SPEED	24 X 24	A	256	R		IN PLACE
1	G	D1-3	BETHLEHEM LEFT/ FREEMANSBURG RIGHT/ STEEL CITY RIGHT	72 X 36	D	419	L		IN PLACE
1	H	W1-6	LARGE SINGLE ARROW (LEFT)	48 X 24	D	962	L		IN PLACE
1	I	W13-1P	20MPH ADVISORY SPEED	24 X 24	D	962	L		IN PLACE
1	J	W1-6	LARGE SINGLE ARROW (RIGHT)	48 X 24	A	969	L		IN PLACE
1	K	W13-1P	20MPH ADVISORY SPEED	24 X 24	A	969	L		IN PLACE
1	L	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1256	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1256	R		IN PLACE
1	M		EASTON RD (INTERSECTION)			1268	L		IN PLACE
1	N	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1294	R		IN PLACE
1	O	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1294	R		IN PLACE
1	P	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1326	R		IN PLACE
1	Q	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1326	R		IN PLACE
1	R	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1361	R		IN PLACE
1	S	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1361	R		IN PLACE
1	T	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1413	R		IN PLACE
1	U	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1413	R		IN PLACE
1	V	W1-1L	LEFT TURN	30 X 30	A	1695	R		IN PLACE
1	W	W13-1P	15MPH ADVISORY SPEED	24 X 24	A	1695	R		IN PLACE
			W/24"		A	1900	R		NEW
			SLOW		A	1909	R		NEW
			LEFT TURN ARROW		A	1918	R		NEW
			W/24"		A	1927	R		NEW
1	X	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	1974	R		IN PLACE
1	Y	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	1974	R		IN PLACE
1	Z	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2002	R		IN PLACE
2	A	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2002	R		IN PLACE
2	B	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2029	R		IN PLACE
2	C	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2029	R		IN PLACE
2	D	W1-6	LARGE SINGLE ARROW (LEFT)	48 X 24	A	2104	R		IN PLACE
2	E	W13-1P	15MPH ADVISORY SPEED	24 X 24	A	2104	R		IN PLACE
2	F	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2116	R		IN PLACE
2	G	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2116	R		IN PLACE
2	H	W1-6	LARGE SINGLE ARROW (RIGHT)	48 X 24	D	2136	R		IN PLACE
2	I	W13-1P	15MPH ADVISORY SPEED	24 X 24	D	2136	R		IN PLACE
2	J	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2154	R		MISSING
2	K	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2154	R		MISSING
2	L	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2175	R		MISSING
2	M	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2175	R		MISSING
		R3-2	NO LEFT TURN	24 X 24	A	2242	R		NEW
2	N	R2-1	35 MPH SPEED LIMIT	24 X 30	A	2252	R	*Should be a minimum 200' from nearest advisory sign. PUB 46, 2-12	IN PLACE
2	O		W/24"		D	2326	L		IN PLACE
2	P		RIGHT TURN ARROW		D	2343	L		IN PLACE
2	Q		SLOW		D	2354	L		IN PLACE
2	R		W/24"		D	2362	L		IN PLACE
		R3-2	NO LEFT TURN		A	2362	L		NEW
2	S	W1-1R	RIGHT TURN	30 X 30	D	2440	L		IN PLACE
2	T	W13-1P	15MPH ADVISORY SPEED	24 X 24	D	2440	L		IN PLACE
2	U	W1-2L	LEFT CURVE SIGN	30 X 30	A	2464	R		IN PLACE
2	V	W13-1P	35MPH ADVISORY SPEED	24 X 24	A	2464	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2597	R		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2597	R		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2703	R		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2703	R		NEW
2	W	R2-1	35 MPH SPEED LIMIT	24 X 30	D	2727	L	*Should not be placed within 350 in advance of Advisory speed sign Pub 246, 2-12	APPEARS TO HAVE BEEN REMOVED
2	X		SR 2012 SEG 0020 AHEAD	12 X 12	A	2852	L	Lower Saucon Township	IN PLACE
2	Y		SR 2012 SEG 0010 BACK	12 X 12	D	2852	L	City of Bethlehem	IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2888	R		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2888	R		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	2973	R		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	2973	R		NEW
2	Z	W11-103	DRIVEWAY AHEAD	30 X 30	D	3141	L		IN POOR CONDITION, NEEDS REPLACING
		W1-2R	RIGHT CURVE SIGN	30 X 30	D	3184	L		NEW
		W13-1P	35MPH ADVISORY SPEED	24 X 24	D	3184	L		NEW
		W1-2R	RIGHT CURVE SIGN	30 X 30	D	3184	R		NEW
		W13-1P	35MPH ADVISORY SPEED	24 X 24	D	3184	R		NEW
3	A	R2-1	40 MPH SPEED LIMIT	24 X 30	A	3220	R	*Should not be placed within 400ft in advance of Advisory speed sign Pub 246, 2-12	IN PLACE
3	B	W1-2R	RIGHT CURVE SIGN	30 X 30	D	3313	L		APPEARS TO HAVE BEEN REMOVED AND
3	C	W13-1P	35MPH ADVISORY SPEED	24 X 24	D	3313	L		APPEARS TO HAVE BEEN REMOVED AND
3	D	W1-1R	RIGHT TURN	30 X 30	A	3382	R		MISSING
3	E	W13-1P	15MPH ADVISORY SPEED	24 X 24	A	3382	R		MISSING
		W1-1R	RIGHT TURN	30 X 30	A	3464	R		NEW
		W13-1P	30MPH ADVISORY SPEED	24 X 24	A	3464	R		NEW
		W1-1R	RIGHT TURN	30 X 30	A	3464	L		NEW
		W13-1P	30MPH ADVISORY SPEED	24 X 24	A	3464	L		NEW
3	F	S3-1	SCHOOL BUS STOP AHEAD	30 X 30	A	3688	R		IN PLACE
3	G	W7-3AP	NEXT 3/4 MILES PLAQUE	24 X 18	A	3688	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	3696	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	3696	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	3802	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	3802	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	3950	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	3950	L		NEW
		W1-1L	LEFT TURN	30 X 30	D	4076	L		NEW
		W13-1P	30MPH ADVISORY SPEED	24 X 24	D	4076	L		NEW
		W1-1L	LEFT TURN	30 X 30	D	4076	R		NEW
		W13-1P	30MPH ADVISORY SPEED	24 X 24	D	4076	R		NEW
3	H	OM-3R	RIGHT CLEARANCE MARKER	12 X 36	A	4248	R		IN PLACE
3	I	OM-3L	LEFT CLEARANCE MARKER	12 X 36	D	4252	R		IN PLACE
3	J	OM-3L	LEFT CLEARANCE MARKER	12 X 36	A	4259	L		IN PLACE
3	K	OM-3R	RIGHT CLEARANCE MARKER	12 X 36	D	4271	L		IN PLACE
3	L	W1-1L	LEFT TURN	30 X 30	D	4353	L		APPEARS TO HAVE BEEN REMOVED AND
3	M	W13-1P	30MPH ADVISORY SPEED	24 X 24	D	4353	L		APPEARS TO HAVE BEEN REMOVED AND
3	N	R2-1	40 MPH SPEED LIMIT	24 X 30	A	4617	R		IN PLACE
3	O	R2-1	40 MPH SPEED LIMIT	24 X 30	D	5164	L		IN PLACE
3	P		SR 2012 SEG 0030 AHEAD	12 X 12	A	6370	R		IN PLACE
3	Q		SR 2012 SEG 0020 BACK	12 X 12	D	6370	R		IN PLACE
3	R	R2-1	40 MPH SPEED LIMIT	24 X 30	D	6561	L		IN PLACE
3	S	R2-1	40 MPH SPEED LIMIT	24 X 30	A	6630	R		IN PLACE
3	T	OM-3R	RIGHT CLEARANCE MARKER	12 X 36	A	7903	R		IN PLACE
		OM-3R	RIGHT CLEARANCE MARKER	12 X 36	D	7913	R		NEW
3	U	OM-3L	LEFT CLEARANCE MARKER	12 X 36	D	7920	R		IN PLACE
3	V	OM-3L	LEFT CLEARANCE MARKER	12 X 36	A	7938	L		IN PLACE
3	W	S3-1	SCHOOL BUS STOP AHEAD	30 X 30	D	7981	L		IN PLACE
3	X	W7-3AP	NEXT 3/4 MILES PLAQUE	24 X 18	D	7981	L		IN PLACE
3	Y	R2-1	40 MPH SPEED LIMIT	24 X 30	A	8112	R	*Should not be placed within 400ft in advance of Advisory speed sign Pub 246, 2-12	IN PLACE
3	Z		BETHLEHEM LANDFILL DRIVEWAY			8112	L		
4	A	W1-1R	RIGHT TURN	30 X 30	A	8420	R		IN PLACE
4	B	W13-1P	30MPH ADVISORY SPEED	24 X 24	A	8420	R		IN PLACE
4	C	R2-1	40 MPH SPEED LIMIT	24 X 30	D	8658	L		IN PLACE
4	D	W1-1L	LEFT TURN	30 X 30	D	9126	L		IN PLACE
4	E	W13-1P	30MPH ADVISORY SPEED	24 X 24	D	9126	L		IN PLACE
4	F	W1-3R	RIGHT REVERSE TURN	30 X 30	A	9160	R		IN PLACE
4	G	W13-1P	20MPH ADVISORY SPEED	24 X 24	A	9160	R		IN PLACE
		W1-3R	RIGHT REVERSE TURN	30 X 30	A	9160	L		NEW
		W13-1P	20MPH ADVISORY SPEED	24 X 24	A	9160	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	9369	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	9369	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	9453	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	9453	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	9559	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	9559	L		NEW
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	9622	L		NEW
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	9622	L		NEW
			W/24"		A	9643	R		NEW
			SLOW		A	9652	R		NEW
			LEFT TURN ARROW		A	9661	R		NEW
			W/24"		A	9670	R		NEW
4	H	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	9730	R		IN PLACE
4	I	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	9730	R		IN PLACE
4	J		SR 2012 SEG 0040 AHEAD	12 X 12	A	9730	R		IN PLACE
4	K		SR 2012 SEG 0030 BACK	12 X 12	D	9730	R		IN PLACE
4	L		RINGHOFFER ROAD (INTERSECTION)			9763	R		IN PLACE
4	M	W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	9795	R		IN PLACE
4	N	W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	9795	R		IN PLACE

NOV. 28, 2022 - EXPANDED LIMITS - FIELD VIEW OF EXISTING SIGNS

		I4Q-1	ADOPT A HIGHWAY	36 X 18	A	9835	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	9877	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	9877	R		IN PLACE
			W/24"		D	9965	L		IN PLACE
			RIGHT TURN ARROW		D	9974	L		IN PLACE
			SLOW		D	9983	L		IN PLACE
		W1-3L	LEFT REVERSE TURN	30 X 30	A	9983	R		IN PLACE
		W13-1P	25MPH ADVISORY SPEED	24 X 24	A	9983	R		IN PLACE
		W1-3L	LEFT REVERSE TURN	30 X 30	A	9983	L		IN PLACE
		W13-1P	25MPH ADVISORY SPEED	24 X 24	A	9983	L		IN PLACE
		W1-3R	RIGHT REVERSE TURN	30 X 30	D	9983	L		IN PLACE
		W13-1P	20MPH ADVISORY SPEED	24 X 24	D	9983	L		IN PLACE
		W1-3R	RIGHT REVERSE TURN	30 X 30	D	9983	R		IN PLACE
		W13-1P	20MPH ADVISORY SPEED	24 X 24	D	9983	R		IN PLACE
			W/24"		D	9992	L		IN PLACE
			CABIN LANE (INTERSECTION)		A	10046	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	10173	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	10173	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	10215	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	10215	R		IN PLACE
		OM-3R	RIGHT CLEARANCE MARKER	12 X 36	A	10236	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	10258	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	10258	R		IN PLACE
		OM-3L	LEFT CLEARANCE MARKER	12 X 36	D	10258	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	10405	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	10405	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	10490	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	10490	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	10553	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	10553	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	10638	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	10638	L		IN PLACE
		W1-5L	LEFT WINDING ROAD	30 X 30	A	10743	R		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	24 X 24	A	10743	R		IN PLACE
		W1-5L	LEFT WINDING ROAD	30 X 30	A	10743	L		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	24 X 24	A	10743	L		IN PLACE
		W1-3L	LEFT REVERSE TURN	30 X 30	D	10743	L		IN PLACE
		W13-1P	25MPH ADVISORY SPEED	24 X 24	D	10743	L		IN PLACE
		W1-3L	LEFT REVERSE TURN	30 X 30	D	10743	R		IN PLACE
		W13-1P	25MPH ADVISORY SPEED	24 X 24	D	10743	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	10870	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	10870	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	10954	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	10954	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	11039	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	11039	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11145	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11145	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11208	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11208	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11292	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11292	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11377	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11377	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11461	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11461	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	A	11525	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	D	11525	L		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	11736	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	11736	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	11820	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	11820	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (LEFT)	18 X 24	A	11905	R		IN PLACE
		W1-8	CHEVRON ALIGNMENT (RIGHT)	18 X 24	D	11905	R		IN PLACE
		W1-1R	RIGHT TURN SIGN	30 X 30	A	12074	R		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	18 X 18	A	12074	R		IN PLACE
		W1-5R	RIGHT WINDING ROAD	36 X 36	D	12074	L		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	24 X 24	D	12074	L		IN PLACE
		W1-5R	RIGHT WINDING ROAD	36 X 36	D	12074	R		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	24 X 24	D	12074	R		IN PLACE
			SR 2012 SEG 0050 AHEAD	12 X 12	A	12221	R		IN PLACE
			SR 2012 SEG 0040 BACK	12 X 12	D	12221	R		IN PLACE
		W1-1L	LEFT TURN SIGN	30 X 30	D	12981	L		IN PLACE
		W13-1P	30MPH ADVISORY SPEED	18 X 18	D	12981	L		IN PLACE
		R2-1	40 MPH SPEED LIMIT	24 X 30	A	13065	R		IN PLACE
		W1-2L	LEFT CURVE SIGN	30 X 30	A	13192	R		IN PLACE
		W13-1P	35MPH ADVISORY SPEED	18 X 18	A	13192	R		IN PLACE
		R2-1	40 MPH SPEED LIMIT	24 X 30	D	13234	L		IN PLACE
			SEVERN LANE (INTERSECTION)		A	13340	R		IN PLACE
			SR 2012 SEG 0060 AHEAD	12 X 12	A	14181	L		IN PLACE
			SR 2012 SEG 0050 BACK	12 X 12	D	14181	L		IN PLACE
		W1-2R	RIGHT CURVE SIGN	30 X 30	D	14181	L		IN PLACE
		W13-1P	35MPH ADVISORY SPEED	18 X 18	D	14181	L		IN PLACE
			SHERRY HILL ROAD (INTERSECTION)			15152	R		IN PLACE

SECTION 4

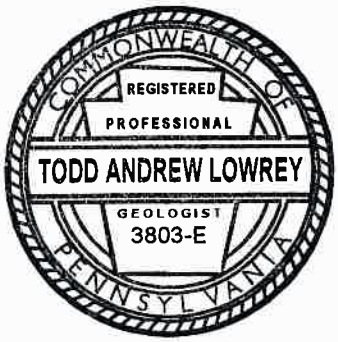
Carbonate Geology

Phase V - Carbonate Area Investigation
Waste Connections, Inc. - Bethlehem Landfill
Lower Saucon Township, Northampton County, Pennsylvania

September 2023

Prepared by:

Meiser & Earl, Inc.
2730 Carolean Industrial Dr., Suite 100
State College, PA 16801



Matthew L. Bell, G.I.T.
Project Geoscientist

Todd A. Lowrey, P.G.
Senior Hydrogeologist

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1.0 INTRODUCTION

Waste Connections, Inc. owns and operates the Bethlehem Landfill, located in Lower Saucon Township, Northampton County, Pennsylvania. Refer to Figure 1 for the location of the site and the area evaluated for this investigation. The current permitted disposal area for the Bethlehem Landfill is located on the top and southern hillside of a prominent, east-west trending ridge just south of the Lehigh River. The majority of the proposed Phase V area is located east, north, and northeast of the current permitted disposal area. The topography in the Phase V area north of the prominent ridge drops towards the Lehigh River, with relief exceeding 325 feet.

The northern portion of the proposed Phase V area includes an area of carbonate geology that has been mapped by the Pennsylvania Geological Survey and the United States Geological Survey (USGS). The carbonate geology area within the property owned by Bethlehem Landfill is located to the south of Riverside Drive along the Lehigh River. The southern limit of carbonate geology in this area, as depicted by Lower Saucon Township, was derived from the Pennsylvania Geological Survey, Open File Report 87-02, "Sinkholes and Karst Related Features of Northampton County, Pennsylvania", dated 1987. Specifically, the southern limit of the carbonate geology is the contact between the Leithsville Dolomite and the Hardyston Quartzite.

Meiser & Earl, Inc. (M&E) completed an investigation in the spring and summer of 2023 of the carbonate area in the northern portion of the proposed Phase V area. The purpose of the investigation was to address Lower Saucon Township requirements pertaining to carbonate geology areas in the Township's Environmental Protection Standards code (§ 180-95 (17)). The investigation included completing a review of available literature, a field reconnaissance, and exploratory drilling to define the limits of carbonate geology and to evaluate groundwater elevations in the carbonate area of the proposed Phase V expansion area.

2.0 DESKTOP STUDY & FIELD RECONNAISSANCE

Meiser & Earl, Inc. personnel performed a review of available geologic and hydrogeologic reports to provide background information pertaining to the local geology and

hydrogeologic setting. This consisted of a thorough review of literature through the Pennsylvania Topographic and Geologic Survey resources (maps and reports) and available U.S. Geological Survey mapping and reports. Information obtained in this search was used for this investigation and is referenced accordingly throughout this report.

A field reconnaissance of the carbonate geology area was completed by M&E on May 1 and 2, 2023, with additional field reconnaissance completed during drilling in May and June 2023. M&E looked for items specifically listed in Lower Saucon Township requirements during the field reconnaissance. The twelve items in § 180-95 (17) (c) [10] [a] are addressed below and on Drawing ME-1.

2.1 Outcrops

Bedrock outcrops are present in the vicinity of the proposed Phase V expansion area, primarily along Riverside Drive and the railroad tracks parallel to Riverside Drive. Additional outcrops were observed along and immediately north of Bull Run. Refer to Figure 2 for the locations of bedrock outcrops. Outcrops of dolomite, present in the old quarry workings (now housing the black powder only shooting range) immediately north of CA-9 are also depicted on Drawing ME-1.

2.2 Depressions

To evaluate the presence of closed depressions throughout the area of investigation, M&E performed several analyses with the PAMAP 3.2-ft. grid resolution light-detection-and-ranging (LiDAR) digital elevation model (DEM), which was flown in 2008. The available data was processed to remove the tree canopy and report "bare earth" elevations. To identify closed depressions, a "filled sink" operation was performed on the DEM raster using QGIS. The elevations of the unfilled DEM were then subtracted from the "filled sink" DEM, creating a separate DEM showing areas where closed depressions were filled by the "filled sink" operation. The identified closed depressions are contoured using a 1-foot contour interval on Drawing ME-1. This operation was able to identify closed depressions down to the size of the grid spacing of the DEM (3.2 ft. by 3.2 ft.).

Closed depressions identified by the LiDAR analyses were field checked by M&E personnel during field investigation activities. Small depressions (<10 ft. diameter) present in the investigated area were determined to be hand-dug exploration pits, likely a result of historic industrial activity on the property. Several small pits shown in light blue on Drawing ME-1 were observed in areas along the inferred contact between the Hardyston and Leithsville Formations, with material piled around the rim of each pit. Digging in the walls and floors of the small pits produced red-orange silt and clay, with weathered gneiss fragments. It is believed these pits were either to procure building materials or from small-scale iron mining from the weathered remnants of the Hardyston Formation (Aaron & Drake, 1997). Field investigation of larger depressions identified by the LiDAR analyses showed these depressions were associated with historic excavation and filling in the area, creating closed pits, with no outlet observable in the LiDAR DEM.

None of the identified and field-verified features showed indication of natural sinkhole formation, but rather human activities altering the landscape. There was also no obvious closed depression in the topographic contours and there were no voids encountered during the exploratory drilling that would suggest the presence of a sinkhole.

A “pothole” feature was observed as an approximately 2-foot diameter by 3-foot-deep hole adjacent to previous manmade structures/excavations in the access road next to well CA-7. No observations suggestive of a sinkhole were made during the drilling of CA-7 and no drilling-induced changes were observed in the pothole feature before and after the drilling of CA-7. The top hole widened following road construction for drilling and heavy rains.

2.3 Caves

No known caves are present in the proposed Phase V area south of Bull Run. There are two known caves located approximately 250 to 300 feet North of Bull Run (Figure 4). The Mid-Appalachian Region of the National Speleological Society provides a location and some cave mapping for the Redington Cave No. 1 (Snyder, 1989). Another apparent cave is located approximately 200-250 feet east of the Redington Cave No. 1 entrance, according to USGS topographic maps for the area. Given the scale of USGS 7.5-minute topographic quadrangles,

this location is likely approximate and referring to Redington Cave No. 1. Therefore, one location of the Reddington Cave No. 1 is shown on Drawing ME-1.

No additional caves were identified from field investigations associated with the Phase V carbonate area investigation.

2.4 Lineaments

Under Lower Saucon Township's formal definitions and word usages, found under Chapter 180, Article 1, Section 108-5, lineaments are "linear topographic features that are structurally controlled, thereby revealing faults, joints and fissures in the bedrock". Discussions in Schultz (1999) further classify lineaments based on their length, with the minimum length being one mile.

To evaluate the presence of lineaments in the Phase V area of investigation, Figure 22-1 from the Geology of Pennsylvania (Schultz, 1999) was geo-referenced using QGIS and compared to the Northeast Expansion Area. Several north-south trending lineaments were present east of the Site. The nearest lineament presented in Figure 22-1 from Shultz (1999) is located approximately 3,000 feet from the eastern boundary of the Bethlehem Landfill Property Boundary (Figure 3). No lineaments intersected the property boundary based on available sources.

2.5 Fracture Traces

Under Lower Saucon Township's formal definitions and word usages, found under Chapter 180, Article 1, Section 108-5, fracture traces are "linear topographic depressions or lines of depressions less than one mile in length, revealing faults, joints, or fissures in the bedrock. These linear features are characterized by increased permeability along which the solution of carbonate rocks is intensified and, hence, along which groundwater movement is concentrated."

The above definition, to a greater extent, pertains to a well-developed fracture system where linear topographic depressions or lines of depressions are present. However, linear topographic depressions or lines of depressions *are not* present in the topography at the site.

Several definitions exist for fracture traces. L.H. Lattman, a pioneer in the use of fracture traces, defined fracture traces as follows: *A photogeologic fracture trace is a natural linear feature consisting of topographic (including straight stream segments), vegetation, or soil tonal alignments, visible primarily on aerial photographs and expressed continuously for less than one mile. Only natural linear features not obviously related to outcrop pattern of tilted beds, lineation and foliation, and stratigraphic contacts are classified as fracture traces* (Meiser & Earl Hydrogeologists, 1982). "Often these linear features are expressed both on photographs and on the ground by a combination of features. For example, a straight stream segment may extend into soil tonal alignments in an adjacent field, which then passes into a line of lightly larger trees in a nearby wooded area, ending in an elongated sinkhole" (Meiser & Earl Hydrogeologists, 1982). As described above, a fracture trace can be expressed to varying degrees in several ways, depending on the type of bedrock and the nature and thickness of the overburden overlying the bedrock.

Based on Lattman's definition, fracture traces can be expressed as linear features present on aerial photographs without a clear topographic indication, including linear depressions and/or aligned depressions. Fracture traces are not necessarily identifiable in the field by a surficial expression and are often identified using aerial photographs or remote sensing techniques to identify tonal differences in the photos, which are interpreted by the geologist as a potential fracture or concentration of fractures and thus increased permeability. Fracture traces are also identifiable in non-carbonate bedrock, which is not prone to solution.

The fracture traces identified by M&E were the most significant fracture traces observed on aerial photographs with respect to potentially locating monitoring wells that are better connected with the groundwater flow system. Fracture traces were mapped using black-and-white aerial photographs by Meiser & Earl, Inc. personnel. The primary photo used for fracture-trace analysis was photo ID AVO-ID-171, flown June 5, 1947, and obtained from the Pennsylvania Department of Conservation and Natural Resources (DCNR) Penn Pilot Historic Aerial Imagery Viewer. A total of 9 fracture traces were identified on photo AVO-ID-171. Photo AVO-ID-171 was geo-referenced into geographic coordinates, using existing road intersections, and topography, using QGIS. The identified fracture traces are shown on Drawing ME-1. As

noted above, these fracture traces were not identified as linear topographic depressions or lines of depressions.

2.6 Faults & Fissures

The geologic contact between the Leithsville and Hardyston Formations was determined by M&E's drilling investigation and is an inferred thrust fault, as discussed in more detail in Section 3.2. Fissures (i.e., bedrock fractures) noted during drilling in the carbonate area appear to be filled with quartz, as indicated by the presence of free quartz grains observed in drill cuttings from the Liethsville Formation.

In addition, Miller, et al. (1939), which refers to the Leithsville Formation as the Tomstown Limestone, noted "Almost everywhere in the region the Tomstown has been shattered by earth movements and the old fissures filled with quartz veins. Locally the dolomitic limestones may contain large numbers of fine quartz veins criss-crossing in an intricate manner. Well-developed quartz crystals have been seen in some of the open fissures. The beds have also been impregnated with silica from the circulation of heated solutions. Black flint is abundant in the Tomstown in places. The flint may occur in nodules or irregular masses that cut across the beds or in lenses following the bedding planes."

2.7 Seasonal High-Water Table

Refer to Section 4.1 of the Hydrogeologic Setting for information regarding the seasonal high-water table and Drawing ME-1 for groundwater contours for the month of July 2023.

2.8 Surface Mines/Quarries

Historic surface mines and quarries were identified using several sources (Figure 4), notably USGS topographic quadrangle maps from various years and Miller, et al. (1939). Flux and lime quarries identified in Miller, et al. (1939) were geo-referenced from a 1:62,500-scale map included in the publication. Given the scale of the map included in Miller, et al. (1939) and level of detail in USGS topographic quadrangle maps, the locations are likely locally imprecise. However, some historic quarries are obvious based on topography and LiDAR-derived hillshade layers (Figure 4).

Quarrying in the vicinity of the proposed Phase V area was primarily lime quarrying and impure, high-magnesian dolomite quarrying for iron smelting flux material (Miller, et al., 1939). At the time of publication for Miller, et al. (1939) most of the quarries were active. It is unknown how long the quarries were operational after 1939. None of the identified surface mines/quarries are presently active.

2.9 Other

Several other features which required evaluation in carbonate geology areas, according to Lower Saucon Township, were not identified or not applicable to the proposed Phase V area. A list and brief expansion of each feature and its applicability to the Phase V area are detailed below:

- Ghost Lakes, Disappearing Lakes, and Disappearing Streams – No ghost lakes, disappearing lakes, or disappearing streams were identified during site reconnaissance activities. The watercourse emanating from the identified spring box location does not disappear into an obvious sinkhole or cavern. Rather, it appears the watercourse is losing water to the underlying material due to changes in lithology, hydraulic conductivity, and variability of flow from the spring box. This is supported by the variability of the end of the watercourse (termination of surface flow) observed in the field.
- Calcareous Fens – No calcareous fens were identified or observed in the carbonate area of the proposed Phase V area.
- Surface and Subsurface Pinnacles - No bedrock pinnacles were identified or observed in the carbonate area of the proposed Phase V area.
- Soil Mottling - Soil mottling, on aerial photographs, as an indication of shallow weathered pinnacles was not discernable on the aerial photographs due to the area being heavily wooded.
- Springs – No springs were identified or mapped in the carbonate area of the proposed Phase V area. Springs previously mapped and field identified in the proposed Phase V area exist south of the carbonate geology area and are underlain by the Hardyston Formation.
- Surface Drainage Entering the Ground – There was no surface drainage observed entering the ground in the carbonate geology area during the investigation, that would suggest the

presence of a sinkhole or cavern. Water was observed on July 11, 2023, flowing in the portion of the above noted watercourse that extends north of the carbonate geology boundary. As noted above, it appears the watercourse is losing water to the underlying material due to changes in lithology, hydraulic conductivity, and variability of flow from the spring box. On June 5, 2023, and August 2, 2023, the termination of flow was south of the carbonate geology boundary.

3.0 GEOLOGIC SETTING

The southern portion of Northampton County is in the Reading Prong Section of the New England Physiographic Province. The Reading Prong area is characterized by a very complex series of thrust faults that were formed during the Taconic Orogeny, 430 to 500 million years ago (Aaron and Drake, 1997). The existing permitted site is underlain by granitic and hornblende gneiss. The proposed Phase V expansion area evaluated in this investigation is underlain by the Hardyston Quartzite and Leithsville Dolomite.

Drilling at 26 locations was completed by Eichelbergers, Inc., under the supervision of M&E personnel between May 23 and June 20, 2023, to define the geologic contact between the Leithsville and Hardyston Formations and to evaluate groundwater elevations. A total of 17 locations were used to define the geologic contact and 14 locations were used to establish groundwater elevation contours. Refer to the drill logs of the exploratory drill holes and wells in Appendix A for additional information.

3.1 Stratigraphy

Three major geologic units were encountered during drilling in the carbonate area for the proposed Phase V expansion area. Descriptions provided below include information from three major sources: Miller, et al. (1939), Aaron and Drake (1997), and Drake (1996). Descriptions given in Drake (1996) are identical or very similar to those given in Aaron and Drake (1997). A stratigraphic column for the area is presented in Figure 5.

3.1.1 Gneiss Colluvium

Though not a mappable unit described in the cited literature, gneissic colluvium was encountered during drilling throughout the site. Thickness of the colluvium was variable. Composition included weathered gneiss grains, gneiss boulders, and typically orange, brown, and red silt and clay. Contacts between the colluvium and the Hardyston Formation were difficult to discern due to the similarity of the silt and clay in both units. Divisions between the two units were primarily based on the absence or faltering of the air-rotary drilling hammer.

3.1.2 Hardyston Formation

Air-rotary drilling conducted in May and June 2023 encountered the Hardyston Formation, largely as incompetent material. Obtaining return in the Hardyston Formation was difficult due to an abundance of silt and clay choking the return. The presence of the Hardyston Formation was largely based on the presence of rounded jasper grains, brittle arkosic sandstone fragments, rounded quartz grains, and white chert, which are consistent with observations made by Aaron and Drake (1997) and Miller et al., (1939).

3.1.3 Leithsville Formation

Air-rotary drilling conducted in May and June 2023 encountered the Leithsville Formation, largely as medium to dark grey crystalline dolomite, with shiny (sericite) shales/phyllite-like zones in some locations (CA-9 and CA-15B). The presence of the thick-bedded crystalline dolomite characteristic of the Leithsville Formation was obvious during drilling, as the crystalline dolomite was the hardest, most competent rock encountered during drilling. Consistent rock return and white to tan dust were typical indications of drilling in the Leithsville Formation. In addition, rock chips evaluated during drilling had a slight reaction with 10% hydrochloric acid, when powdered. The presence of the Leithsville Formation was also indicated by black chert/flint and free quartz grains. Note that similarities between the Hardyston and Leithsville Formations, include shiny, phyllite-like sericitic shales, chert, and quartz grains.

Miller, et al. (1939) referred to the Leithsville Formation as the Tomstown Limestone and noted that "The Tomstown formation of the region is composed almost entirely of dolomitic limestones. Several types have been recognized. The most common is a thin-bedded, high magnesian, impure limestone with the individual beds less than one foot thick. This grades into a more argillaceous variety with an abundance of sericite, which produces a glistening silvery appearance on the bedding planes. In turn this passes into a true sericitic shale in which there are practically no carbonates. These shales have been noted in many places and may have a thickness up to ten feet although usually less than one foot."

Based on the above observation, the sericitic shale observed in well CA-15B is assumed to be within the Leithsville Formation. Due to this observation, and the lack of encountering unweathered Hardyston Formation during drilling, the geologic contact between the Leithsville and Hardyston Formations was estimated to be located between wells CA-15 and CA-15B.

3.2 Geologic Structure

As noted above, this area within the Reading Prong contains folding and a complex series of thrust faults. The Hardyston Formation is older than the Leithsville Formation and is stratigraphically beneath the Leithsville Formation. Due to a thrust fault, referred to as the Hellertown Thrust Fault (Drake, 1997), the Hardyston Formation overlies the Leithsville Formation south of the contact between the two geologic units, indicating the geologic units are out of sequence. Bedrock strike in the area of investigation is generally southeast to northwest; however, folding and faulting of the bedrock results in varying bedrock orientations. Refer to Figure 6 for a combination of the Geologic Maps for the Nazareth Quadrangle (Aaron and Drake, 1997) and the Hellertown Quadrangle (Aaron and Drake, 1996).

As shown on the Geologic Map of the Nazareth Quadrangle (Aaron and Drake, 1997), the Hellertown Thrust Fault is the contact between the Leithsville and Hardyston Formations, where the Hardyston Formation is believed to be approximately 250 feet thick. In addition, the USGS

depicts the Hellertown Thrust Fault splitting into another fault north of the contact. Also, gneiss south of the Hardyston Formation is shown to be overturned.

Figure 7 depicts a combination of USGS geologic cross sections: the northern part of USGS cross section A-A' from the Hellertown Quadrangle, and the southern part of USGS cross section B-B' from the Nazareth Quadrangle. Note that the cross sections are offset, and are combined on Figure 7 to give an overview of the geologic structure in the area of investigation, along with the area beneath the existing landfill. The northern part of cross section A-A' depicts the Colesville Thrust Fault south of the existing landfill. The southern part of cross section B-B' shows the Hardyston Formation to be steeply dipping and at the ground surface south of the Hellertown Thrust Fault, the contact between the Leithsville and Hardyston Formations. The thrust fault is depicted at an angle of approximately 60 degrees near the ground surface. Due to the angle of the thrust fault, the depth to the Leithsville Formation increases significantly moving south from the geologic contact. Evidence of the thrust fault, such as slickensides and breccia, were not discernable during air-rotary drilling. However, the depth at which the Hardyston Formation was encountered south of the geologic contact supports the presence of a thrust fault and interpretation by the USGS.

4.0 HYDROGEOLOGIC SETTING

4.1 Water-Level Elevations and Flow Directions

From the groundwater divide present on the prominent ridge, groundwater flows to the north towards the Lehigh River, and south towards a tributary to Saucon Creek. The Lehigh River is the regional groundwater discharge point for the area. The groundwater surface, represented by groundwater contours, generally mimics topography. For this investigation, 12 wells (CA-2, CA-2A, CA-6 through CA-9, CA-12 through CA-15, and CA-15B) drilled into the Liethsville Formation were primarily used for groundwater contouring purposes within and near the Liethsville Formation. For these wells, steel casing was installed into bedrock and the wells were either completed as open rock wells or were constructed with PVC, depending on the stability of the bedrock. Most of the wells drilled into the Hardyston Formation collapsed after being drilled. For the wells drilled into the Hardyston Formation, the depth of observed dry

conditions were utilized in developing the groundwater contours. Refer to drawing ME-1 for groundwater elevation contours for water-levels measured in July 2023. Water-levels will continue to be measured monthly through May 2024 to determine the seasonal high-water table.

Wells NE-1 and NE-1A, drilled on the hillslope as part of investigating a nearby spring, were also used to evaluate water levels. Both wells were completed in the Hardyston Formation. Well NE-1 was drilled with the intent of evaluating the vertical groundwater gradient by evaluating water levels at shallow, middle, and deep intervals in the well. However, due to collapsing conditions and not being able to remove the steel casing with the drill rig, only a deep piezometer point (D) was installed at NE-1. Shallow (S) and middle (M) piezometer points were installed in NE-1A, drilled adjacent to NE-1. Water levels in the NE-1 and NE-1A piezometer points show a downward vertical groundwater gradient adjacent to the nearby spring, located approximately 100 feet to the west. Water levels from June through August, ranged from 18.4 to 20 feet below ground surface (bgs) in NE-1A (S), 22.5 to 24.7 feet bgs in NE-1A (M), and 66.1 to 67.2 feet bgs in NE-1 (D). The water level from the shallow piezometer in NE-1A was used for groundwater contouring purposes. The spring appears to be the result of a permeability contrast within the weathered Hardyston Formation.

As shown on drawing ME-1, a shallower depth to groundwater and a steeper gradient is observed on the north slope of the ridge, within the upper portion of the weathered bedrock. The depth to groundwater increases and a lesser gradient is observed in the area underlain by the Leithsville Formation, where water levels are more similar to the elevation of the Lehigh River. Due to the lesser gradient observed in water levels in the Leithsville Formation, minimal seasonal fluctuation in water levels is expected in this area. Groundwater elevation contours are shown to be at elevations lower than Bull Run, indicating that Bull Run is likely perched.

4.2 Springs

Several springs/seeps exist in the proposed Northeast Expansion area. The springs/seeps are found adjacent to the mapped wetlands on the property (Figure 2 and Drawing ME-1). The southernmost wetland originates from seeps in the colluvium. Water flows from the wetland area to a small, incised channel. The flow in the channel is not continuous downslope; water appears

to sink into the subsurface throughout the length of the channel. The end of flow varies depending on rainfall and antecedent moisture in the system.

The wetland cluster south of CA-11C is fed by at least one spring and several seeps. Flow originates in this area from a small spring box (~3 ft. by ~3ft.), located approximately 100 feet west of well NE-1. The spring box was flowing throughout the drilling, based on field observations by M&E personnel. North of the wetland cluster, flow continues in a small, incised channel. The extent of flow varies, based on field observations. Flow appears to decrease further north, with water infiltrating into unconsolidated material. On June 5, 2023, the spring box was flowing at an estimated 1-2 GPM. On July 11, 2023, the spring box was flowing at an estimated 10 GPM. On August 2, 2023, the spring box was flowing at an estimated 4 GPM. The location in the channel and extent of surface flow varied in June, July, and August, which is likely influenced by the amount of precipitation. Refer to Figure 2 and Drawing ME-1 for the limits of flow observed in the channel.

4.3 Bull Run

Bull Run crosses the northern property boundary of the site. Bull Run is classified as a cold water fishes (CWF) stream. Based on site reconnaissance, the bottom material of Bull Run, in the vicinity of the proposed expansion, is primarily cobbles and boulders. During preliminary site reconnaissance by M&E personnel on May 2, 2023, Bull Run was flowing following several days and several inches of rainfall. Streamflow was not measured on May 2, 2023, but was estimated to be less than 100 gallons per minute (GPM). During well drilling from May 22, 2023, to June 22, 2023, Bull Run was observed to be dry throughout its entire length in the vicinity of the Northeast Expansion area. During this period, no rainfall was observed until June 12, 2023. Bull Run was also observed to be dry on July 11 and August 2, 2023, supporting the conclusion that Bull Run is likely perched.

5.0 SUMMARY

Meiser & Earl, Inc. completed an investigation of a carbonate geology area in the northern portion of the Phase V area in the spring and summer of 2023. The purpose of this investigation was to define the geologic contact between the carbonate Leithsville Formation and

non-carbonate Hardyston Formation and to address Lower Saucon Township Ordinance requirements for carbonate geology areas. Below is a summary of M&E's findings applicable to the ordinance requirements:

- The geologic contact between the carbonate Leithsville and non-carbonate Hardyston Formations was defined by exploratory drilling as an inferred thrust fault. Observations made during drilling correlate with the geologic interpretation by the USGS.
- Fracture traces, outcrops, and caves were identified and located during the investigation.
- Fissures (i.e., fractures in rock) were mainly observed by M&E to be filled with quartz.
- No lineaments were found within the Bethlehem Landfill property boundary.
- Depressions were evaluated using LiDAR mapping and were field verified. Depressions identified in the area investigated were mainly found to be related to former manmade structures/excavations or historic exploratory pits/surface mining activities. There were no sinkholes identified in the Phase V carbonate area investigation. Previous surface mines/quarries pertain to historic operations for iron-flux smelting material.
- Ghost lakes, disappearing lakes, disappearing streams, calcareous fens, surface and subsurface pinnacles, soil mottling, and springs were not identified in the carbonate geology area.
- Surface drainage infiltrating into the ground was observed on July 11, 2023, in the water course for the flow from the spring box located approximately 600 feet south of the contact between the Liethsville and Hardyston Formations. The extent of flow observed was influenced by variability in flow from the spring box.
- Groundwater elevation contours show a groundwater flow direction toward the Lehigh River and indicate that Bull Run is likely a perched stream.
- The depth to water in the carbonate area is deeper than the depth to water south of the contact between the Leithsville and Hardyston Formations and similar in elevation to the Lehigh River. Given the relatively flat gradient observed in the wells in the carbonate area, the seasonal groundwater fluctuation is expected to be minimal. Water levels in the area investigated will continue to be monitored monthly through May 2024.

6.0 REFERENCES

Aaron, J.M. and Drake Jr, A.A., 1997, Geologic Map of the Nazareth Quadrangle, Northampton County, Pennsylvania; United States Geological Survey Open File Report 97-33.

Drake Jr, A.A., 1996, Geologic Map of the Hellertown Quadrangle, Northampton, Bucks, and Lehigh Counties, Pennsylvania; United States Geological Survey Open File Report 96-547.

Kochanov, W.E., 1987, Sinkholes and Karst-Related Features, Northampton County, Pennsylvania, Pennsylvania Geological Survey Open File Report 87-02.

Meiser & Earl Hydrogeologist, 1982, Use of Fracture Traces in Water Well Location: A Handbook; U.S. Department of the Interior Office of Water Research and Technology, OWRT TT/82 1.

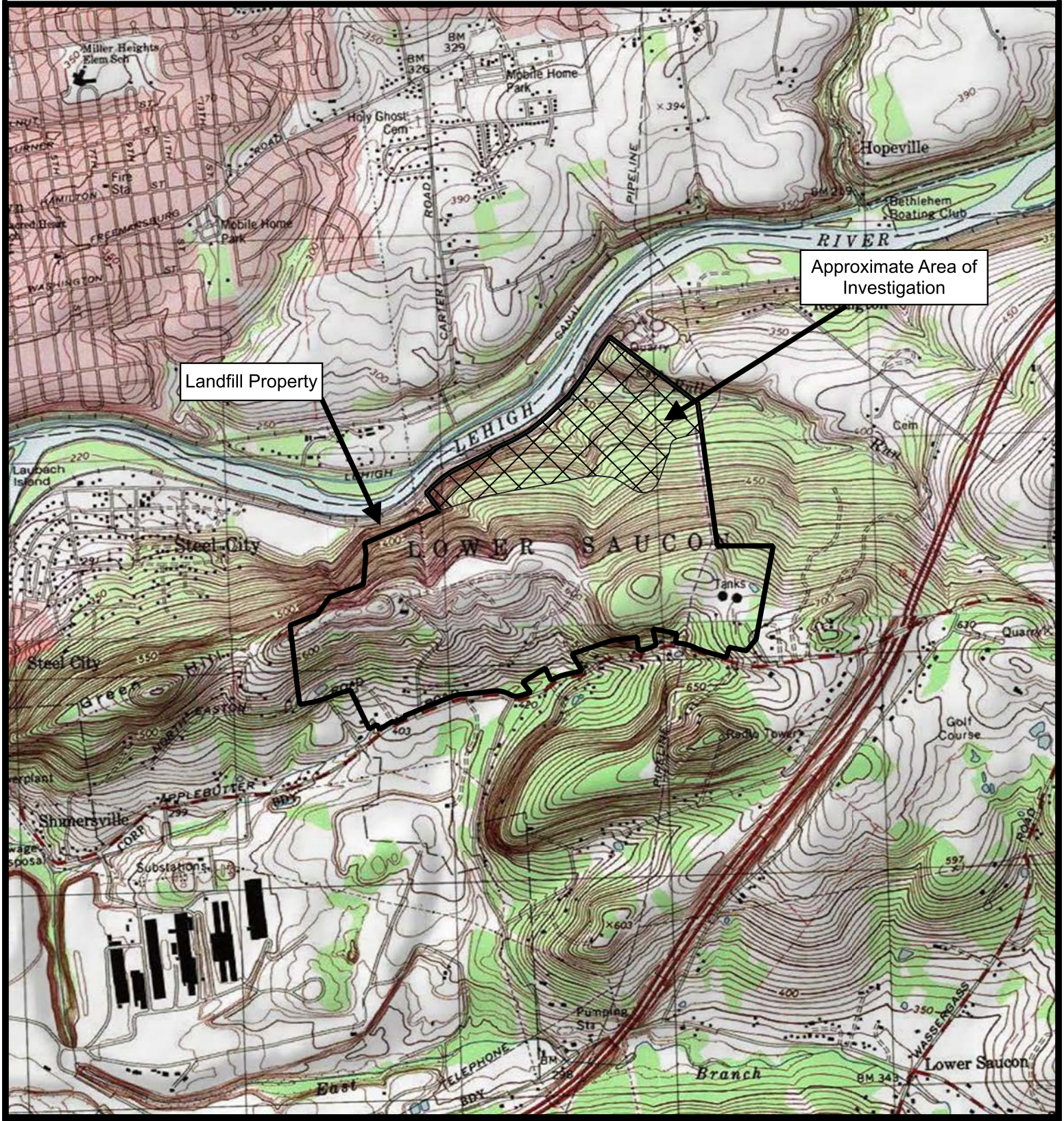
Miller, B.L., Fraser, D.M., and Miller, R.L., 1939, Northampton County, Pennsylvania, Geology and Geography; Pennsylvania Geological Survey, Fourth Series, Bulletin C48.

Shultz, C. H., ed., 1999, The geology of Pennsylvania: Pennsylvania Geological Survey, Chapter 22: Lineaments and the Interregional Relationships, 4th ser., Special Publication 1, 888 p.

Snyder, D.H., 1989, The Caves of Northampton County, Pennsylvania; Mid-Appalachian Region of the National Speleological Society, Bulletin #16.

FIGURES

FIGURE 1
Bethlehem Landfill
Site Location
Northampton County, Pennsylvania



N

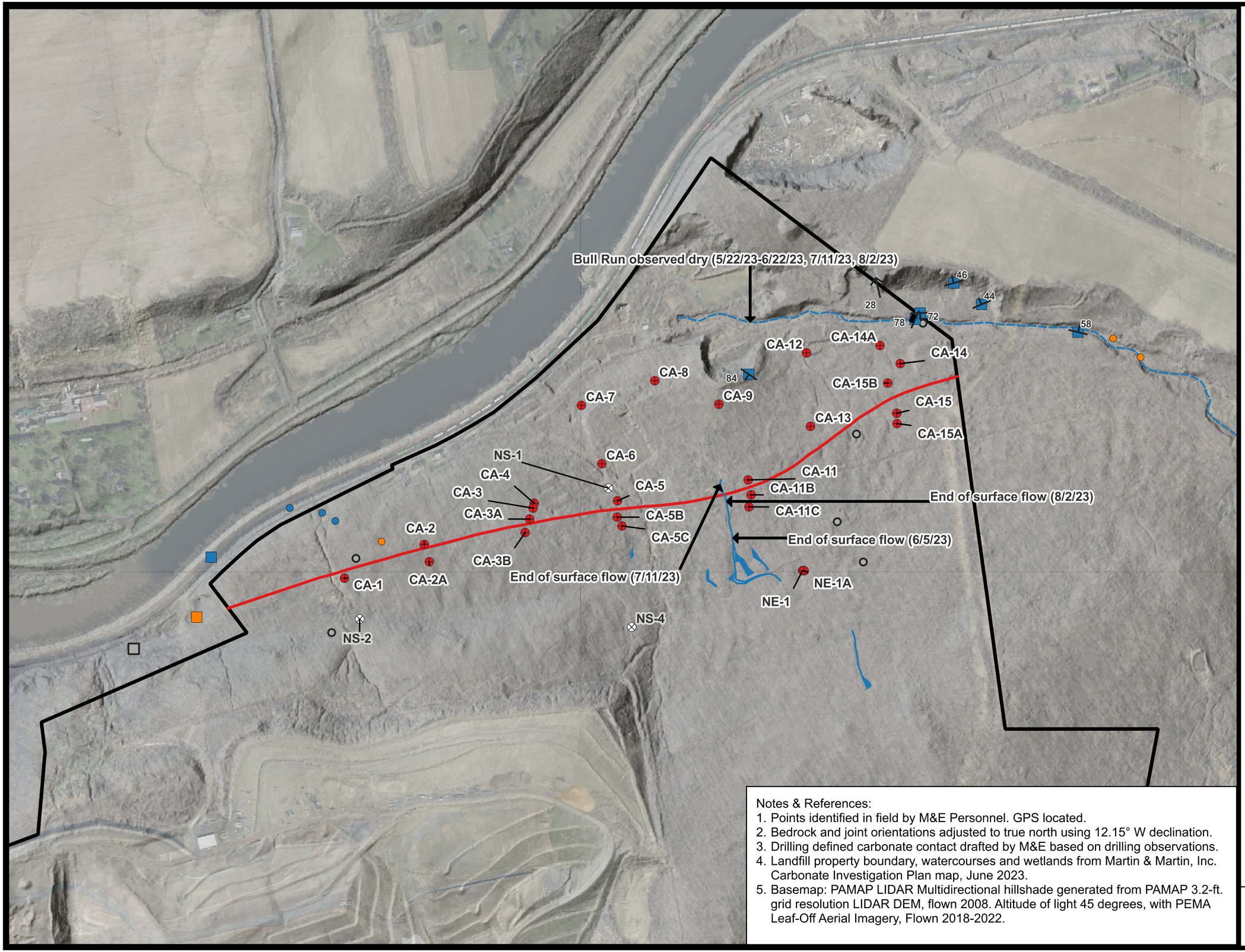
0 1,000 2,000 ft

1:24,000

Basemap: Nazareth (1999) and Hellertown (1999), PA 7.5-min. USGS Topographic Quadrangles.

MEISER & EARL, INC.
2730 Carolean Industrial Drive
Suite 100
State College, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com



Notes & References:

1. Points identified in field by M&E Personnel. GPS located.
2. Bedrock and joint orientations adjusted to true north using 12.15° W declination.
3. Drilling defined carbonate contact drafted by M&E based on drilling observations.
4. Landfill property boundary, watercourses and wetlands from Martin & Martin, Inc. Carbonate Investigation Plan map, June 2023.
5. Basemap: PAMAP LIDAR Multidirectional hillshade generated from PAMAP 3.2-ft. grid resolution LIDAR DEM, flown 2008. Altitude of light 45 degrees, with PEMA Leaf-Off Aerial Imagery, Flown 2018-2022.

FIGURE 2
Bethlehem Landfill
Site Reconnaissance Summary
Northampton County, PA

Legend:

Field Investigation Points

- Bedrock Station - Dolomite
- Bedrock Station - Gneiss
- Bedrock Station - Hardyston Formation
- Float Station - Gneiss
- Float Station - Dolomite
- Float Station - Quartzite or Conglomerate (Hardyston Formation)
- Decommissioned Well
- Carbonate Investigation Well
- Joint Set Orientation/Dip
- Bedrock Strike/Dip
- Slickenside Trend/Plunge
- Carbonate Boundary (Drilling Defined)
- Surveyed Watercourse (dashed were intermittent)
- Surveyed Wetland
- Landfill Property Boundary

N

0 500 1,000 ft

1:6,000

MEISER & EARL, INC.
2730 CAROLEAN INDUSTRIAL DRIVE
SUITE 100
STATE COLLEGE, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

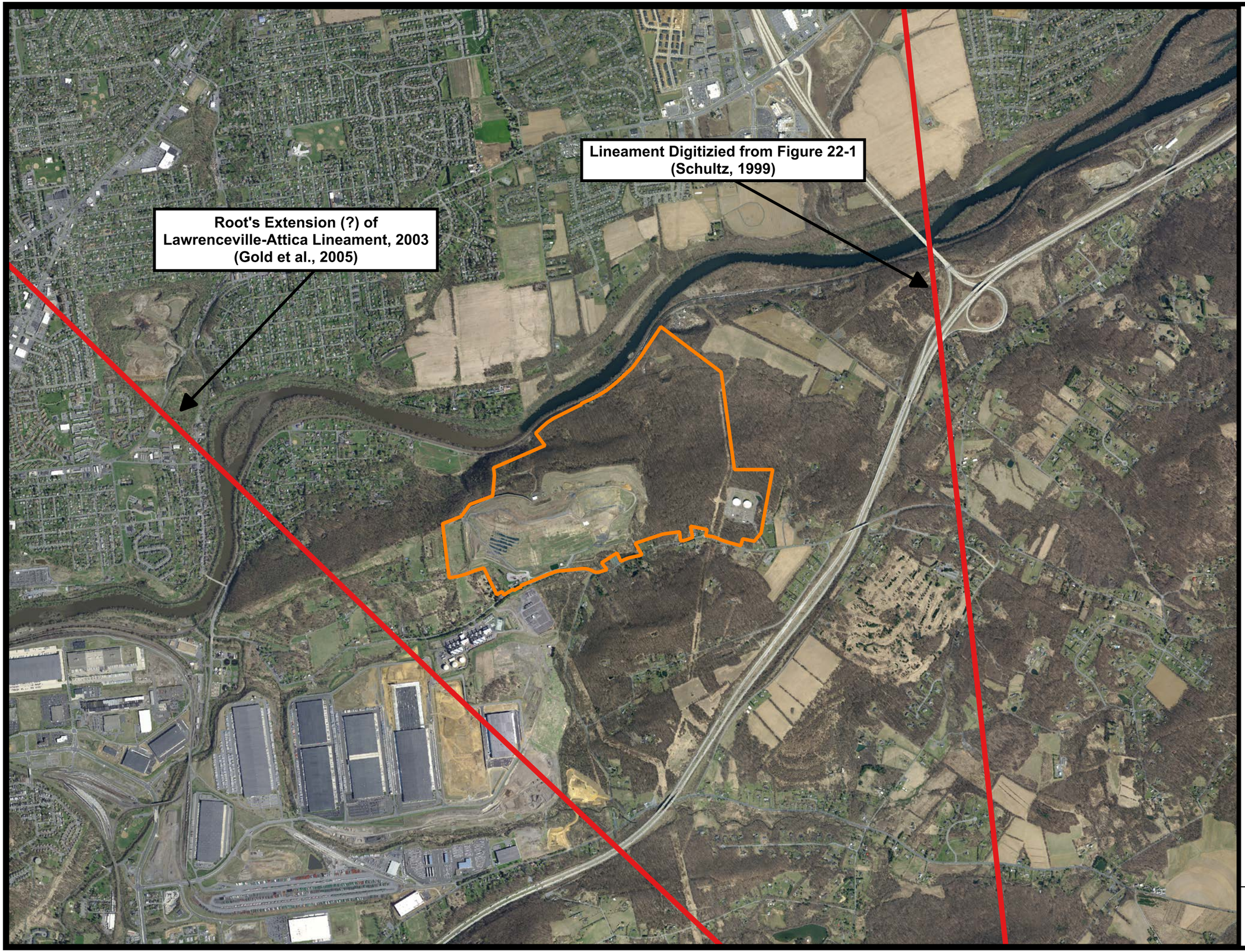


FIGURE 3
Bethlehem Landfill
Northeast Expansion
Mapped Lineaments
Northampton County, PA

Legend:

- Mapped Lineaments from Literature Review
- Landfill Property Boundary

N

0 2,000 4,000 ft

1:24,000

Notes & References:

1. Gold, D.P., Alexander, S.S., Cakir, R. and others, 2005, Basement depth and related geospatial database for Pennsylvania, Pennsylvania Geological Survey, Open File Report OFGG 05-010.
2. Shultz, C.H., 1999, The geology of Pennsylvania, Chapter 22: Lineaments and their interregional relationships, Pennsylvania Geological Survey, Special Publication SP 1.
3. Data presented in both Gold et al., (2005) and Schultz (1999) were generated at a regional scale, and thus are not meant for site-specific analysis or for use at finer (i.e. larger, more detailed) scales.
4. Basemap: Pennsylvania Emergency Management Agency (PEMA) leaf-off aerial imagery mosaic, flown 2018-2020.

MEISER & EARL, INC.
2730 CAROLEAN INDUSTRIAL DRIVE
SUITE 100
STATE COLLEGE, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

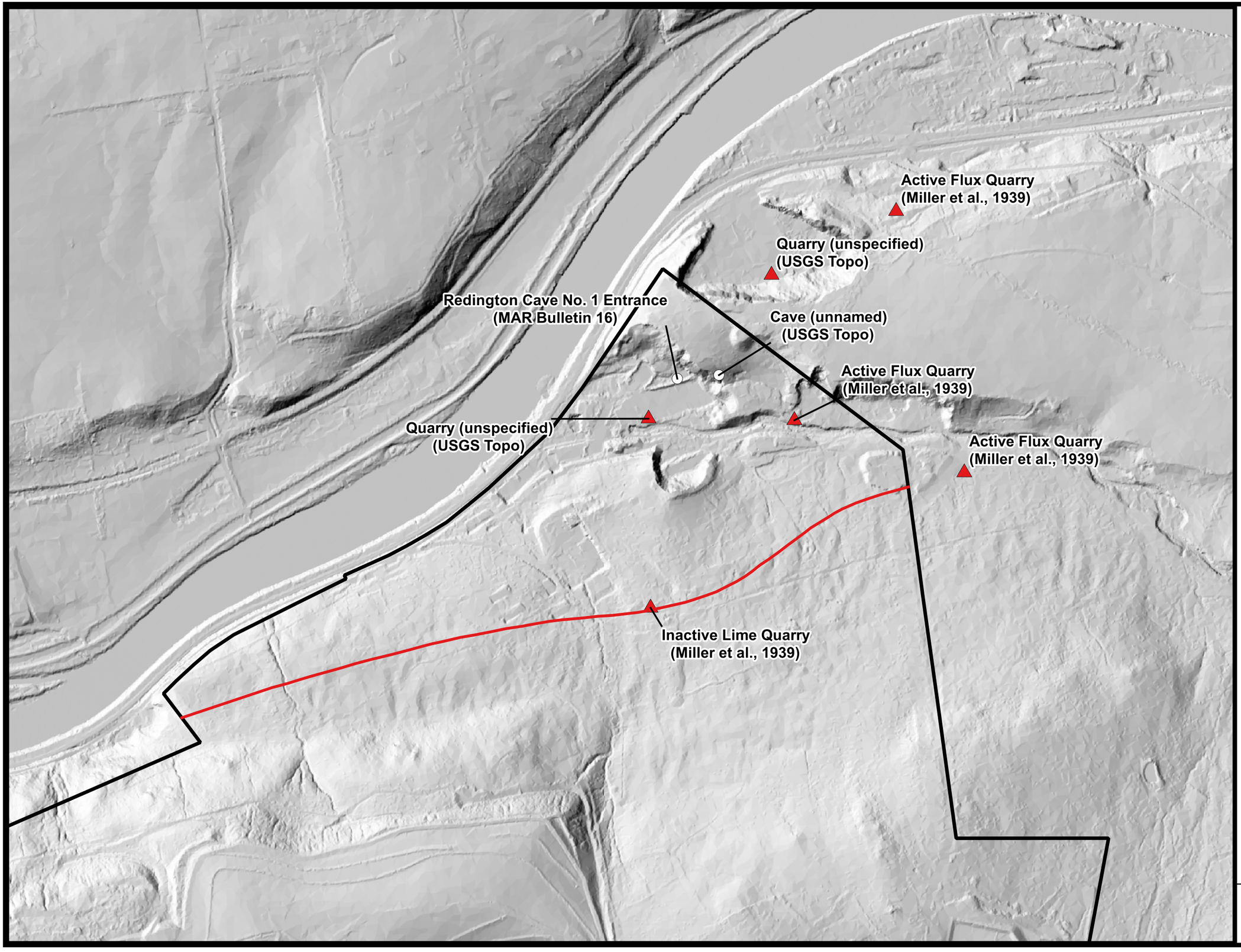


FIGURE 4
Bethlehem Landfill
Caves and Quarries
Northampton County, PA

Legend:

- Cave Location, with Reference
- Quarry Location, With Reference
- Carbonate Contact (Defined by Drilling)
- Landfill Property Boundary

N

0 500 1,000 ft

1:6,000

Notes & References:

1. Landfill property boundary digitized from Martin & Martin, Inc. Carbonate Investigation Plan Map, June 2023.
2. Drilling defined carbonate contact drafted by Meiser & Earl, Inc., based on observations during drilling.
3. Miller, B.L., Fraser, D.M., Behre Jr., C.H, Wherry, E.T., Miller, R.L. and Myers, P.B., 1939, Geologic Map of Northampton County, Pennsylvania. Scale 1 : 62,500.
4. Mid-Appalachian Region (MAR) of the National Speleological Society Bulletin 16, February 1989, The caves of Northampton County, Pennsylvania.
5. USGS Topo Map identified quarries and cave were mapped from 1960 to 2002. Westernmost USGS-mapped quarry was removed beginning in 1966.
6. Active and inactive quarry designation presented in Miller et al. (1939) is based on 1939 conditions.
7. Basemap: Multidirectional hillshade generated from PAMAP 3.2-ft grid resoltion LIDAR DEM, flown 2008. Altitude of light 45 degrees.

MEISER & EARL, INC.
2730 CAROLEAN INDUSTRIAL DRIVE
SUITE 100
STATE COLLEGE, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

Figure 5
Bethlehem Landfill
Generalized Stratigraphic Column

Generalized Geologic Units (1) (Stratigraphic Order)	Generalized Lithologic Description (2)	Air Rotary Drilling Chacteristics
Colluvium	Red, orange, and brown silt and clay with weathered gneiss fragments. Gneiss cobbles to boulders in some locations. Varying levels of soil development. Contact between colluvium and Hardyston Formation (2) difficult to discern in some locations. Varying thickness.	Drill bit hammering through gneissic boulders. Abundant silt and clay. Air return often choked by silt and clay if drilling without casing.
€l Leithsville Formation	Gray crystalling dolomite, sericitic shales, calcareous shales, occassional quartz-filled fractures. Black/dark gray to white chert abundant in some zones.	Constant, hard hammering and slow drill bit progress compared to colluvium and Hardyston Formations. Consistent air and rock return during drilling.
€h Hardyston Formation	Gray to reddish-brown thin-medium bedded quartzite, arkosic sandstone, quartz-pebble conglomerate, silty shale, carbonate-cemented sandstone, jasper, and yellow to white chert. Arkosic sandstones seem poorly cemented and highly weathered. Formation was previously mapped in the area largely based on presence of conglomerate and quartzite float and jasper grains. Unconformably overlies p€ gneiss.	Very weak and intermittent hammering during drilling. Return mostly red-orange-brown silt and clay. Air and rock return often choked by silt and clay if drilling without casing.
p€ Gneiss (undifferentiated)	Gneiss of varying mineral compositions, including quartz, oligioclase, plagioclase, epitode, clinopyroxene, and hornblende. (See Aaron & Drake (1997) for extensive discussion of mineraology and distribution)	Competent gneiss not encountered during drilling for carbonate area investigation.

Notes:
(1). No implied vertical scale.
(2.) Generalized lithologic descriptions compiled from Aaron and Drake (1997) and Miller et al., (1939).
(3). Location has been extensively folded and faulted.

MEISER & EARL, INC.
2730 Carolean Industrial Drive
Suite 100
State College, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

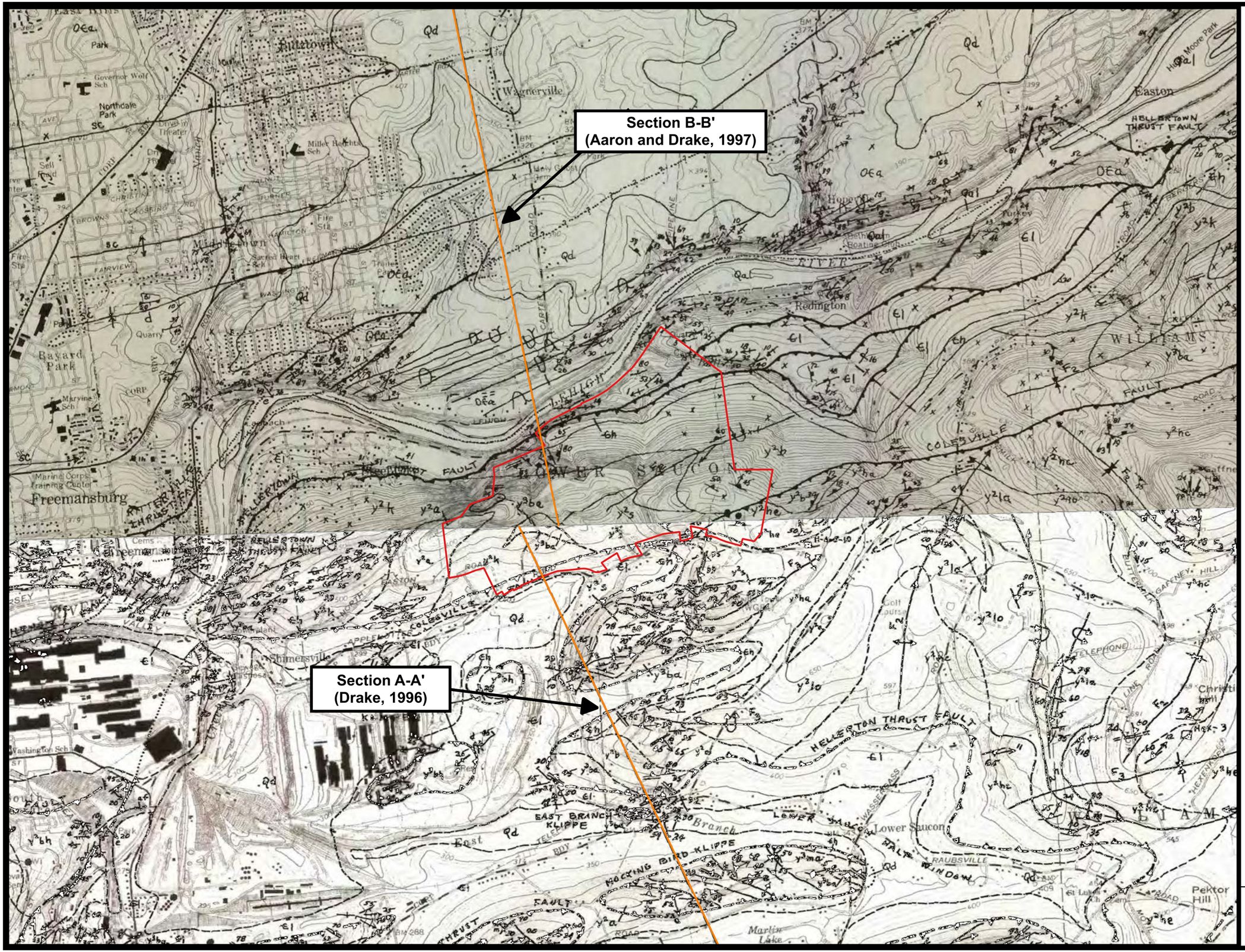


FIGURE 6
Bethlehem Landfill
USGS Geologic Maps
Northampton County, PA

Legend:

- Cross Section Lines
- Landfill Property Boundary

N

0 2,000 4,000 ft

1:24,000

Notes & References:

1. Aaron, J.M. and Drake Jr, A.A., 1997, Geologic Map of the Nazareth Quadrangle, Northampton County, Pennsylvania; United States Geological Survey Open File Report 97-33.
2. Drake Jr, A.A., 1996, Geologic Map of the Hellertown Quadrangle, Northampton, Bucks, and Lehigh Counties, Pennsylvania; United States Geological Survey Open File Report 96-547.

MEISER & EARL, INC.
2730 CAROLEAN INDUSTRIAL DRIVE
SUITE 100
STATE COLLEGE, PA 16801

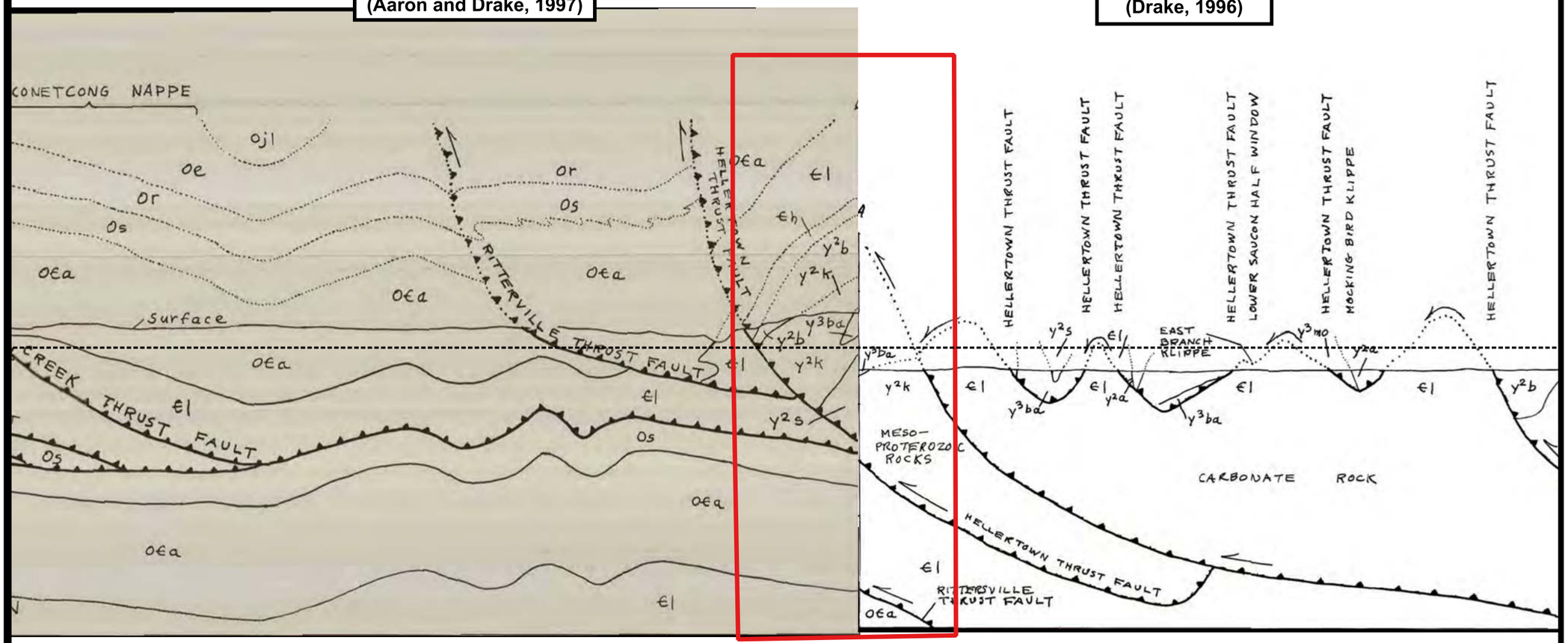
Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

NNW

SE

Section B-B'
(Aaron and Drake, 1997)

Section A-A'
(Drake, 1996)



Relevant Geologic Units:

- Os - Stonehenge Formation of Beekmantown Group
- O€a - Allentown Dolomite
- €l - Leithsville Formation
- €h - Hardyston Quartzite
- Y³ba - Microperthite alaskite
- Y²k - Potassic feldspar gneiss
- Y²s - Sillimanite-bearing gneiss
- Y²b - Biotite-quartz-feldspar gneiss

FIGURE 7
Bethlehem Landfill
USGS Geologic Cross Sections
Northampton County, PA

Legend:

----- Sea Level, per Scale Presented on Cross Sections

Approximate Landfill Property Boundary Extent

0 2,000 4,000 ft

Notes & References:

1. Vertical and horizontal scale are equal, no vertical exaggeration.
2. Discrepancies in ground surface and lithologic contacts are due to disparate orientations of A-A' (Drake, 1996) and B-B' (Aaron and Drake, 1997).
3. Drake (1996) section A-A' reports mean sea level above the ground surface elevation. Which is incorrect.
4. Aaron, J.M. and Drake Jr, A.A., 1997, Geologic Map of the Nazareth Quadrangle, Northampton County, Pennsylvania; United States Geological Survey Open File Report 97-33.
5. Drake Jr, A.A., 1996, Geologic Map of the Hellertown Quadrangle, Northampton, Bucks, and Lehigh Counties, Pennsylvania; United States Geological Survey Open File Report 96-547.

MEISER & EARL, INC.
2730 CAROLEAN INDUSTRIAL DRIVE
SUITE 100
STATE COLLEGE, PA 16801

Hydrogeologists
Phone: (814) 234-0813
FAX: (814) 234-1693
E-mail: info@meiser-earl.com
Web: www.meiser-earl.com

TABLES

TABLE 1
Bethlehem Landfill - Phase V Carbonate Area Investigation
Well Construction Summary

Well	Date Drilled	Surface Elevation (feet AMSL)	Top of Casing Elevation (feet AMSL) BOLD=surveyed	Measured Steel Casing Stickup (feet)	Total Drilled Depth (feet BGL)	Hole Diameter (inches : feet BGL)	Plumbed Depth (feet TOSC, plumbed 7/11/23)	Steel Casing Diameter/Depth (inches : feet BGL)	Bentonite Seal Outside Steel Casing (feet BGL)	PVC Below Steel Casing (feet)	Screened Interval (feet BGL)	Sandpack Interval (feet BGL)	Bentonite Interval (feet BGL)
CA-1	5/23/2023	362.59	363.95	1.36	100	10 : 0-100	71.3		NA	NA	NA	NA	NA
CA-2	5/23/2023-5/24/2023 Constructed 5/25/2023	355.23	357.14	1.91	160	10 : 0-38 6 : 38-160	161.3	6 : 38	~29-38	0.35	155-165	140-165	0-140
CA-2A	5/24/2023	364.73	366.72	1.99	178	6 : 0-178	162.6		NA	NA	NA	NA	NA
CA-3	5/24/2023	332.15	334.54	2.39	78	6 : 0-78	62.7		NA	NA	NA	NA	NA
CA-3A	5/25/2023	342.71	345.41	2.70	101	6 : 0-101	90.4		NA	NA	NA	NA	NA
CA-3B	5/25/2023	354.21	356.71	2.50	103	6 : 0-103	77.9		NA	NA	NA	NA	NA
CA-4	5/24/2023	329.72	332.25	2.53	78	6 : 0-78	77.7		NA	NA	NA	NA	NA
CA-5	5/26/2023	323.84	**325.37**	1.53	70	6 : 0-70	68.3		NA	NA	NA	NA	NA
CA-5B	5/31/2023	336.87	339.68	2.81	103	6 : 0-103	19.6		NA	NA	NA	NA	NA
CA-5C	5/31/2023-6/1/2023	342.82	345.75	2.93	153	6 : 0-153	120.4		NA	NA	NA	NA	NA
CA-6	6/2/2023	296.81	**298.25**	1.44	125	10 : 0-98 6 : 98-125	126.9	6 : 98	~89-98	NA	NA	NA	NA
CA-7	6/5/2023 Constructed 6/8/2023	253.3	**255.66**	2.36	78	10 : 0-57 6 : 57-78	78.8	6 : 57	~48-57	0.20	56-76	47-76	NA
CA-8	5/26/2023	288.62	**290.67**	2.05	100	10 : 0-32 6 : 32-100	100.4	6 : 32	~23-32	NA	NA	NA	NA
CA-9	5/30/2023	327.12	**328.59**	1.47	145	10 : 0-38 6 : 38-145	146.8	6 : 38	~29-38	NA	NA	NA	NA
CA-11	5/31/2023	361.06	362.40	1.34	50	6 : 0-50	35.8		NA	NA	NA	NA	NA
CA-11B	6/1/2023	368.25	369.73	1.48	78	6 : 0-78	23.9		NA	NA	NA	NA	NA
CA-11C	6/1/2023	371.02	373.63	2.61	129	6 : 0-129	117.6		NA	NA	NA	NA	NA
CA-12	6/22/2023	259.12	**260.93**	1.81	78	10 : 0-57 6 : 57-78	75.7	6 : 57	~48-57	0.43	58-78	NA	NA
CA-13	5/30/2023-5/31/2023	317.48	**319.56**	2.08	135	10 : 0-44 6 : 44-135	137.3	6 : 44	~33-44	0.37	95-135	NA	NA
CA-14	6/8/2023	283.77	**284.87**	1.10	78.5	10 : 0-18 6 : 18-78.5	72.1	6 : 18	~9-18	NA	NA	NA	NA
CA-14A	6/8/2023	268.52	271.20	2.68	50	10 : 0-18 6 : 18-50	50.7	6 : 18	~9-18	NA	NA	NA	NA
CA-15	6/7/2023	313.72	**315.23**	1.51	128.5	10 : 0-18 6 : 18-128.5	76.9	6 : 74 (pushed to 74)	17-18*	NA	NA	NA	NA
CA-15A	6/6/2023	320.47	322.82	2.35	179	6 : 0-179	14.2		NA	NA	NA	NA	NA
CA-15B	6/7/2023 Constructed 6/21/2023	293.15	295.53	2.38	108	10 : 0-107.5 8 : 107.5-108	110.2	8: 61.5		0.39	68-108	66-108	~64-66
NE-1 (D)	6/9/2023, 6-12-14/2023	428.15	**430.74**	2.59	150	10: 0-16 8: 16-72	108.1	10 : 16 8 : 72		0.36	101-106	100-106	74-88 88-100 Collapse
NE-1A (M)	6/19/23-6/20/23	429.22	**431.58**	2.36	58	6: 0-58	58.3	6:15	NA	0.36	48-53	46.3-53	28-46.3
NE-1A (S)	6/19/23-6/20/23	429.22	**431.58**	2.36	27	6: 0-58	29.9	6:15	NA	0.41	22-27	17-28	14-17

TABLE 2
Bethlehem Landfill - Phase V Carbonate Area Investigation
Drilling Summary

Well	Total Drilled Depth (feet BGL)	Soil + Gneiss Colluvium (Approximate)	Silt/Clay, Shale, Sandstone, Claystone (Hardyston Fmn.)	Dolomite/Sericite Shale (Leithsville Fmn.)
CA-1	100	0-4	4-100	--
CA-2	160	--	0-24	24-160
CA-2A	178	0-2	2-178	--
CA-3	78	0-4	4-44	44-78
CA-3A	101	0-~4	--	~4-101
CA-3B	103	--	0-78	78-103
CA-4	78	0-15	15-49	49-78
CA-5	70	0-29	29-46.5	46.5-70
CA-5B	103	0-29	29-53.5	53.5-103
CA-5C	153	0-26	26-122	122-153
CA-6	125	0-4	4-91	91-125
CA-7	78	0-4	--	4-78
CA-8	100	0-7	--	7-100
CA-9	145	0-16	--	16-145
CA-11	50	0-4	4-24	24-50
CA-11B	78	0-7	7-59	59-78
CA-11C	129	0-4	4-122	122-129
CA-12	78			
CA-13	135	*	0-29	29-135
		*Gneiss collivum and Hardyston Fmn. undifferentiable during drilling due to gneiss boulders		
CA-14	78.5	0-27	27-70	70-78.5
CA-14A	50	*	0-22	22-50
		*Gneiss collivum and Hardyston Fmn. undifferentiable during drilling due to gneiss boulders		
CA-15	128.5	0-46	46-128.5	--
CA-15A	179	0-10	10-179	--
CA-15B	108	0-27	27-82	82-107.5**
		**Zone non-calcareous. Gray sericite shales noted most likely correlate with Leithsville Fmn.		
NE-1 (D)				
NE-1A (M)				
NE-1A (S)				

(1) All depths are feet below ground level.
(2) Contact between colluvium and Hardyston Formation difficult to discern in most wells.

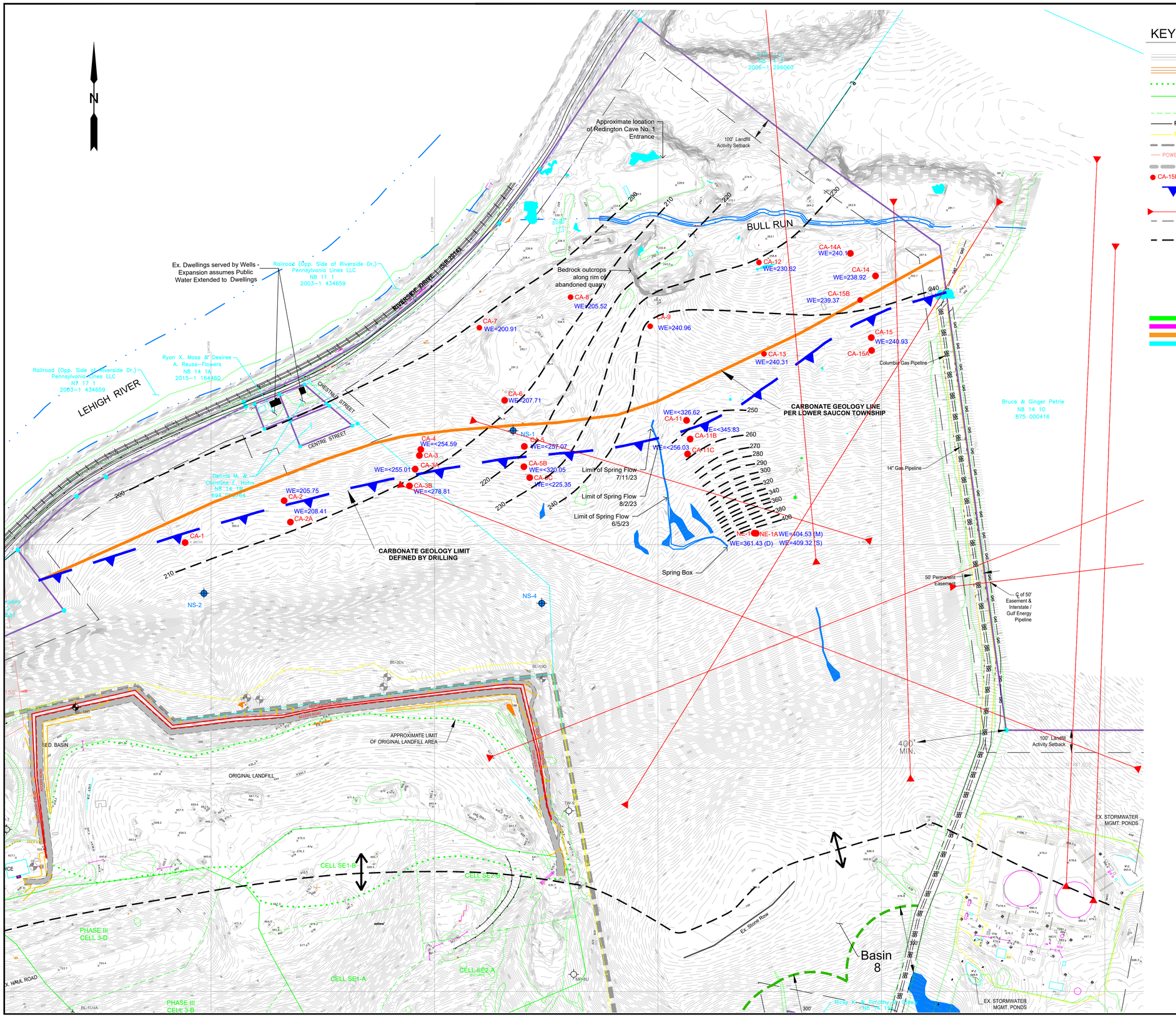
(3) Hardyston Formation was deteremined based on the presence of rounded jasper grains, brittle arkosic sandstone fragments, rounded quartz grains, white chert, and an abundance of silt and clay when drilled.

TABLE 3
Bethlehem Landfill - Phase V Carbonate Area Investigation
Water Level Summary

Well	Total Drilled Depth (feet BGL)	Plumbed Depth (feet TOSC, plumbed 7/11/23)	Depth to Competent Bedrock (feet BGL)	Surface Elevation (feet AMSL)	Top of Casing Elevation (feet AMSL) BOLD=surveyed	Measured Steel Casing Stickup (feet)	Depth to Water Water-Level Elevation (feet MSL)	Depth to Water Water-Level Elevation (feet MSL)	Depth to Water Water-Level Elevation (feet MSL)
							6/22/2023	7/11/2023	08/02/23
CA-1	100	71.3	>100	362.59	363.95	1.36	--	*58.66* *305.29*	-- <292.65
CA-2	160	161.3	34	355.23	357.14	1.91	157.10 200.04	151.39 205.75	154.12 203.02
CA-2A	178	162.6	>178	364.73	366.72	1.99	160.53 206.19	158.31 208.41	-- <204.12
CA-3	78	62.7	44	332.15	334.54	2.39	**NM**	*62.09* *272.45*	-- <271.84
CA-3A	101	90.4	4	342.71	345.41	2.70	--	-- <255.01	-- <255.01
CA-3B	103	77.9	78	354.21	356.71	2.50	--	-- <278.81	-- <278.81
CA-4	78	77.7	49	329.72	332.25	2.53	NM	-- <254.59	-- <254.59
CA-5	70	68.3	46.5	323.84	**325.37**	1.53	--	-- <257.07	-- <257.07
CA-5B	103	19.6	53.5	336.87	339.68	2.81	~97 BGL ~240	-- <320.05	-- <320.05
CA-5C	153	120.4	122	342.82	345.75	2.93	--	-- <225.35	117.56 228.19
CA-6	125	126.9	91	296.81	**298.25**	1.44	92.95 205.30	90.54 207.71	88.23 210.02
CA-7	78	78.8	12.5 (?)	253.3	**255.66**	2.36	**58.79** 196.87	54.75 200.91	56.50 199.16
CA-8	100	100.4	19	288.62	**290.67**	2.05	92.83 197.84	85.15 205.52	90.68 199.99
CA-9	145	146.8	16	327.12	**328.59**	1.47	**91.70** 236.89	87.63 240.96	77.72 250.87
CA-11	50	35.8	24	361.06	362.40	1.34	NM	-- <326.62	-- <326.62
CA-11B	78	23.9	59	368.25	369.73	1.48	--	-- <345.83	-- <345.83
CA-11C	129	117.6	122	371.02	373.63	2.61	--	-- <256.03	-- <256.03
CA-12	78	75.7	34	259.12	**260.93**	1.81	**43.98** 216.95	30.31 230.62	34.02 226.91
CA-13	135	137.3	29	317.48	**319.56**	2.08	87.65 231.91	79.25 240.31	80.22 239.34
CA-14	78.5	72.1	32	283.77	**284.87**	1.10	**53.85** 231.02	45.95 238.92	46.55 238.32
CA-14A	50	50.7	22	268.52	271.20	2.68	38.80 232.40	31.02 240.18	32.00 239.20
CA-15	128.5	76.9	>128.5	313.72	**315.23**	1.51	**87.72** 227.51	74.30 240.93	-- <238.33
CA-15A	179	14.2	>179	320.47	322.82	2.35	88.07 234.75	*5.12* *317.70*	*10.22* *312.60*
CA-15B	107.5	110.2	92	293.15	295.53	2.38	**64.30** 231.23	56.16 239.37	57.09 238.44
NE-1 (D)		108.1		428.15	**430.74**	2.59	69.80 360.94	69.31 361.43	68.70 362.04
NE-1A (M)		58.3		429.22	**431.58**	2.36	**26.52** 405.06	27.05 404.53	24.96 406.62
NE-1A (S)		29.9		429.22	**431.58**	2.36	20.73 410.85	22.26 409.32	21.68 409.90

Note:
July 11, 2023 water levels for CA-1, CA-3, and CA-15B, and the August 2, 2023 water level from CA-15A are situated on top of collapse are not representative.

DRAWING



KEY

- EXISTING CONTOURS (2' INTERVAL)
- CURRENTLY PERMITTED FINAL GRADES (TOP OF REFUSE)
- LIMIT OF ORIGINAL LANDFILL
- LIMITS OF PHASE III, PHASE IV,SOUTHEASTERN REALIGNMENT AND NORTHERN REALIGNMENT
- CELL DIVISION
- PROPERTY LINE
- LANDFILL PROPERTY LINE (224 ACRE CONSOLIDATED DEED)
- EXIST. PERMIT BOUNDARY AS TAKEN FROM MARCH 1994 PERMIT DRAWINGS
- EXISTING PP&L POWER LINE
- ZONING BOUNDARY LINES
- CA-15B WE=409.32 – EXPLORATORY WELL WITH JULY 2023 GROUNDWATER ELEVATION
- LIMITS OF CARBONATE GEOLOGY, INFERRED FAULT (DEFINED BY DRILLING)
- FRACTURE TRACE (DEFINED BY MEISER & EARL)
- GRONDWATER ELEVATION CONTOUR
- GRONDWATER DIVIDE
- DELINEATED WATERCOURSE / WETLANDS

- LIDAR-IDENTIFIED DEPRESSION IN BOULDER FIELD NOT UNDERLAIN BY CARBONATE GEOLOGY
- LIDAR-IDENTIFIED DEPRESSION ALONG RAILROAD GRADE NORTHWEST OF LANDFILL PROPERTY
- LIDAR-IDENTIFIED DEPRESSION WITHIN FORMER MANMADE STRUCTURE/EXCAVATION
- LIDAR-IDENTIFIED DEPRESSION RELATED TO HISTORIC EXPLORATORY PITS/SURFACE MINING ACTIVITIES

MAPPING COMPILED FROM: DRONE DATA CAPTURE DATE: 3-17-23
(BY: FIRMATEK, LLC
10010 SAN PEDRO AVE., SUITE 850, SAN ANTONIO, TX 78216 (210) 651-4990)
AND AERIAL PHOTOGRAPHY EXPOSED 2-9-19.
(BY: SOUTHERN RESOURCES MAPPING CORPORATION
5105 HWY. 171 NORTHPORT, ALABAMA 35473 PHONE: (205) 333-9900)
MAPPING HAS BEEN FIELD VERIFIED.

NOTE:
- DISPOSAL AREA INFORMATION TAKEN FROM PHASE III PERMIT DWGS. BY GANNETT FLEMING, DATED NOV. 9, 1993.
- PROPERTY LINE DATA TAKEN FROM PLAN BY KEYSTONE CONSULTING ENGINEERS, INC. REVISED THRU 12-13-00

NOTES:
- EXISTING PERMIT LIMIT FOLLOWS THE PROPERTY LINE UNLESS OTHERWISE SHOWN.
- SOME SITE INFORMATION FOR THIS DRAWING COMPILED FROM DRAWINGS FURNISHED BY GANNETT FLEMING, INC. of HARRISBURG, PENNSYLVANIA AND AMERICAN RESOURCE CONSULTANTS, INC. OF DOYLESTOWN, PENNSYLVANIA

- Closed depressions identified using PAMAP LIDAR (3.2ft. grid resolution). Depressions classified based on field observation.
- Fracture traces mapped by Meiser & Earl, Inc. using black and white aerial photograph AVO-10-171, dated June 5, 1947.
- Bedrock outcrops and Spring box identified in the field by Meiser & Earl, Inc. in May 2023. Additional outcrops identified north of Bull Run.
- Reddington Cave No.1 location from Mid-Appalachian Region of the National Speleological Society. Not field verified due to restricted access. No additional caverns identified.

ADDITIONAL INFORMATION PER LOWER SAUCON TOWNSHIP ORDINANCE

§ 180-95 (17) (C) [10] (A) FOR CARBONATE GEOLOGY AREAS:

[i] DEPRESSIONS - INCLUDED ON SITE PLAN.

[ii] FISSURES, LINEAMENT, FAULTS, OR FRACTURES TRACES: FISSURES (I.E., FRACTURES) ARE ADDRESSED IN PHASE V CARBONATE AREA INVESTIGATION REPORT. THERE ARE NO LINEAMENTS WITHIN THE LANDFILL PROPERTY BOUNDARY. REFER TO FIGURE 3 FOR LOCATIONS OF LINEAMENTS NOT WITHIN THE LANDFILL PROPERTY. FAULTS AND FRACTURE TRACES ARE INCLUDED ON SITE PLAN.

[iii] GHOST LAKES - NONE IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

[iv] OUTCROPS OF BEDROCK - INCLUDED ON SITE PLAN.

[v] SEASONAL HIGH WATER TABLES - INCLUDED ON SITE PLAN.

[vi] SINKHOLES AND PREVIOUSLY FILLED SINKHOLES - NONE IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

[vii] SOIL MOTTLING, ON AERIAL PHOTOGRAPHS, AS AN INDICATION OF SHALLOW WEATHERED PINNACLES - NOT APPLICABLE OR DISCERNABLE ON AERIAL PHOTOGRAPHS DUE TO AREA BEING HEAVILY WOODED.

[viii] SPRINGS - INCLUDED ON SITE PLAN, NONE IDENTIFIED IN CARBONATE GEOLOGY AREA.

[ix] SURFACE DRAINAGE ENTERING THE GROUND - THERE WAS NO SURFACE DRAINAGE OBSERVED ENTERING THE GROUND IN THE CARBONATE GEOLOGY AREA DURING THE INVESTIGATION, THAT WOULD SUGGEST THE PRESENCE OF A SINKHOLE OR CAVERN. WATER WAS OBSERVED ON JULY 11, 2023, FLOWING IN THE PORTION OF THE WATERCOURSE THAT EXTENDS NORTH OF THE CARBONATE GEOLOGY BOUNDARY. THE WATERCOURSE LOSSES WATER TO THE UNDERLYING MATERIAL DUE TO CHANGES IN LITHOLOGY, HYDRAULIC CONDUCTIVITY, AND VARIABILITY OF FLOW FROM THE SPRING BOX. ON JUNE 5, 2023, AND AUGUST 2, 2023, THE TERMINATION OF FLOW WAS SOUTH OF THE CARBONATE GEOLOGY BOUNDARY.

[x] CAVERNS - INCLUDED ON SITE PLAN AND INCLUDED ON FIGURE 4 OF PHASE V CARBONATE AREA INVESTIGATION REPORT.

[xi] DISAPPEARING LAKES - NONE IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

[xii] DISAPPEARING STREAMS - NONE IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

[xiii] SURFACE OR SUBSURFACE PINNACLES - NONE IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

[xiv] CALCAREOUS FENS - NON IDENTIFIED IN PHASE V CARBONATE AREA INVESTIGATION.

SEAL

No.	REVISION	DATE
1.	Wells, geologic contact, closed depressions, groundwater contours, groundwater divide, and additional notes added by Meiser & Earl, Inc.	9/2023

DRAFT - LOWER SAUCON TOWNSHIP ORDINANCE MAP - PHASE V -

Lower Saucon Twp. Northampton Co.

BETHLEHEM LANDFILL COMPANY
WASTE CONNECTIONS, INC.

martin and martin incorporated
37 south main street suite A
chambersburg, pennsylvania . 17201
phone: (717) 264-6759

PROJ. NO.	DWN. BY:	CHK. BY:
1162.6	MSH/MLR	TAL
DSN. BY:	JM	

0' 200' 400'

CADD FILE: 2MLB_1162_6CIP23-02-2.dwg

DATE: SEPTEMBER 2023

SCALE: 1" = 200'

DRAWING NO.: ME-1

APPENDIX A

Bethlehem Landfill

Borehole Number: CA-1
Surface Elevation (Ft/MSL): 362.59 (ft.)
Borehole Diameter: 10 inches, From 0' To 100'
_____ inches, From _____ To _____
Total Depth: 100 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/23/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Brown-orange silt/clay soil.					Stickup ~2.50'. 5' of 6" steel casing with 10x6 shale trap. Bentonite holeplug packed around casing/shale trap.
	Orange-brown silt/clay. Free quartz grains, arkosic medium-coarse grained sandstones (weathered red-black), some light gray shiny (sericite?) shale/claystone, some black chert. Trace jasper.					Hardyston Fm. ~4-100'.
40	Orange-brown silt/clay. Light gray-pale yellow siltstone/shiny (sericite?) shale. Some medium-dark gray shale (non-calcareous). Some black chert, trace fine arkosic sandstone.		clay moist, returning chunks at 42'			Little return 47-55'.
60	Orange-red-brown silt/clay. Light gray-pale yellow shiny (sericite?) shale and burgandy/ red-purple siltstone. Some black chert. Trace brown medium-coarse grained sandstone.		Dry			
80	No return.		Dry			No return 85-100'. Water level after 1 hour not measurable. No indication of competent rock throughout drilling.
100						
120						

Well/Piezometer Construction: 10" Borehole; Top of Collapse 69.95' 8/2/23 Collapse; T.D. 100'

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

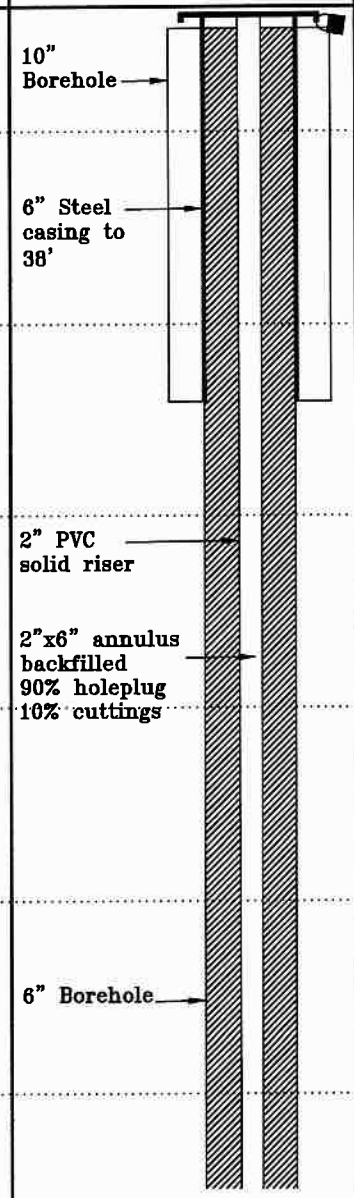
Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-2
Surface Elevation (Ft/MSL): 355.23 (ft.)
Borehole Diameter: 10 inches, From 0' To 38'
6 inches, From 38' To 160'
Total Depth: 160 (ft.)
Depth to Static Ground Water Level (SWL): 155.75 (ft.)
Date SWL Measured: 05/30/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/23-25/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0						Stickup = 1.91'.
	Brown silt, olive-gray to light-medium gray chert. Some light yellow-light gray shiny (sericite?) shale. Little red-brown fine sandstone conglomerate and quartz grains.					Hardyston Fm. 0-24'.
20	Dark gray dolomite and orange-brown silt/clay.					Weathered Leithsville Fm. 24-34'.
	Dark gray crystalline dolomite. Trace tan-light gray soft crystalline dolomite (clay-coated), potential claystone interbeds/filled fractures.		Dry			Competent bedrock at 34'. Competent Leithsville Fm. 34-160'.
40						
60						
80			Dry			
	Free quartz grains (rounded) and crystalline calcite and brown-red -tan shale. Little medium-dark gray crystalline dolomite; fracture?					
100	Dark gray fine-grained dolomite, little calcite grains (veins?).					Orange brown return. Claystone? 104-106.5'.
	Medium-dark gray crystalline dolomite. Little calcite grains (veins?). Some grains weathered with yellow-tan coatings/surfaces (fractures?).		Dry			Orange return 114-116'.
120						



* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
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(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-2
Surface Elevation (Ft/MSL): 355.23 (ft.)
Borehole Diameter: 10 inches, From 0' To 38'
6 inches, From 38' To 160'
Total Depth: 160 (ft.)
Depth to Static Ground Water Level (SWL): 155.75 (ft.)
Date SWL Measured: 05/30/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/23-25/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above.					Tan return 130-135'.	6" Borehole	120
						Tan return 140.5-145'.	2" PVC solid riser 2"x6"	
140						Little return 145-145.5'.	annulus backfilled 90% holeplug 10% cuttings	140
						Drilled to 160' on 5/23/23.		
						Deepened to 165 on 5/25/23 to cleanout prior to installing PVC.	#2 filter sand 140-165'.	
160	Medium-dark gray crystalline dolomite, some light-medium gray chert, some light-medium gray crystalline dolomite, some fragments coated with yellow-tan clay (fractures?).		Final blown yield <1 gpm				2" PVC slotted screen w/cap 145-165'	160
							T.D. 165'	
180								180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-2A
Surface Elevation (Ft/MSL): 364.73 (ft.)
Borehole Diameter: 6 inches, From 0' To 178'
_____ inches, From _____ To _____
Total Depth: 178 (ft.)
Depth to Static Ground Water Level (SWL): 156.60 (ft.)
Date SWL Measured: 05/30/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/24/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	0-1' Red-orange silt/clay with weathered gneiss. Purple-red-brown siltstone and very fine sandstone (weathers black), soft. Some light-medium gray claystone, some medium-dark black gray smokey chert. Some free quartz grains.					Steel stickup = 1.99' No clear indication of competent rock. Hardyston Fm. ~2-178'.	6" Steel casing 6" Borehole	0
20								20
40								40
60								60
80	Tan return. Mostly silt/clay. Light yellow-tan siltstone and claystone. Little brown-red fine sandstone (soft), weathers black. Medium gray-black smokey chert at 80', 90', and 155-120'.							80
100								100
120								120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-2A
Surface Elevation (Ft/MSL): 364.73 (ft.)
Borehole Diameter: 6 inches, From 0' To 178'
inches, From To
Total Depth: 178 (ft.)
Depth to Static Ground Water Level (SWL): 156.60 (ft.)
Date SWL Measured: 05/30/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/24/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above. Clay seam at 125'?							120
	Medium dark gray to olive-gray very fine sandstone, siltstone, and claystone, few shiny (sericite?) surfaces. Some tan-yellow very fine sandstone, siltstone, and claystone.						6" Borehole	
140								140
	Brown-red-tan very fine to fine sandstone, some siltstone, some light gray, platy, shiny (sericite?) claystone and shale. Trace medium gray to black smokey chert. Sequence fining upward.						Top of Collapse 160.61' 8/2/23 Collapse	
160								160
180						Wet clay on hammer when pulled from 178'.	T.D. 178'	180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-3
Surface Elevation (Ft/MSL): 332.15 (ft.)
Borehole Diameter: 6 inches, From 0' To 78'
_____ inches, From _____ To _____
Total Depth: 78 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 05/26/23 (mm/dd/yy)

Drilling Method: Air Rotary
Date Drilled: 05/24/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Red-brown silt-soil with granitic gneiss chips with large rounded black chert.					Stickup = 2.39'.	5' Total of 6" steel casing	0
	Red-brown silt/clay with pale yellow-brown medium sandstone (loosely cemented), weathered to brown-black.					Hardyston Fm. 4-44'.	6" Open rock hole	
20	Light gray claystone with orange-yellow very fine sandstone.							20
	Dark red-brown very fine sandstone and gray-brown medium sandstone.					Gradational change.		
40								40
	Medium-dark gray fine- grained crystalline dolomite. Several fractures noted (tan return).					No return, no hammering 46-52'.		
						Tan return 62', 67-69', and 71'.		
60						Leithsville Fm. 44-78'.	Top of Collapse 60.31' 8/2/23 Collapse	60
80							T.D. 78'	80
100								100
120								120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-3A
Surface Elevation (Ft/MSL): 342.71 (ft.)
Borehole Diameter: 6 inches, From 0' To 101'
_____ inches, From _____ To _____
Total Depth: 101 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 05/26/23 (mm/dd/yy)

Drilling Method: Air Rotary-T4
Date Drilled: 05/25/23 (mm/dd/yy)
Drilled By: Eichelbergers. Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Brown silty/clay with weathered gneiss and pale purple to gray-red quartz sandstone.					Stickup = 2.70'.	6" Steel casing	0
						Hammer consistent at 6'.		
	Medium-dark gray crystalline dolomite. Some yellow-brown friable sandstone interbeds.					No hammer 12-15'.	6" Open rock hole	
20						Hammer at 20'.		20
						Tan-gray return at 24'.		
						Tan return at 28'.		
						Brown return at 37'.		
40	No return.					No return 41-51'. No hammer, but resistance observed when advancing drill pipe through interval.		40
	Medium-dark gray crystalline dolomite.					Little return 51-62'.		
60						Leithsville Fm. ~4-101'.		60
						Little return on cleanout at 76'.		
80						Hammer 80-101'.		80
						Little return 80-101'.	Top of Collapse 87.7' 8/2/23 Collapse	
100			Dry				T.D. 101'	100
120								120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

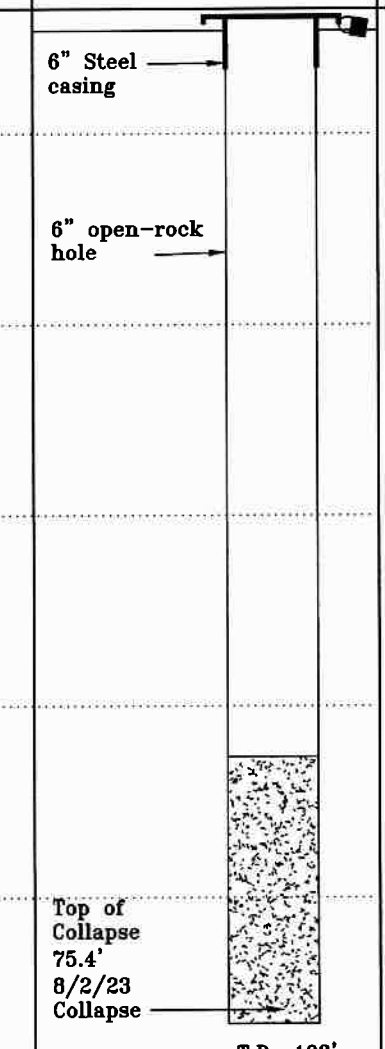
Bethlehem Landfill

Borehole Number: CA-3B
Surface Elevation (Ft/MSL): 354.21 (ft.)
Borehole Diameter: 6 inches, From 0' To 103'
inches, From To
Total Depth: 103 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/25/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Red-brown silt/clay with weathered light gray coarse sandstone and dark yellow orange siltstone. Becoming dark yellowish orange claystone and sandy siltstone with yellowish gray to medium gray chert and some moderate to dusky red siltstone and medium to coarse sandstone at 10'.					Stickup = 2.50'. Hardyston Fm. 0-78'.
20						
40						Hard hammer at 43'. Grinding at 48'. Sericite (?) at 50'.
60						
80	Dark yellow brown medium sandstone and sandy siltstone. Sand is well sorted and rounded. Yellowish gray chert present. Fining downward.					Little return 78-103'. Hole immediately collapsed to ~74' BGS. Leithsville Fm. 78-103'.
100	Light to medium dark gray crystalline dolomite.					
120						

Well/Piezometer Construction



* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-4
Surface Elevation (Ft/MSL): 329.72 (ft.)
Borehole Diameter: 6 inches, From 0' To 78'
inches, From To
Total Depth: 78 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 05/26/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/24/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Red-brown soil with weathered gneiss fragments.					Stickup 2.53'.	5' of 6" steel casing	0
	Red-orange silt with quartz, feldspar, and gneiss grains.						6" Open rock hole	
20	Pale orange-yellow-gray siltstone and claystone, yellow-brown very fine-medium sandstone.					Few black chert at 15'. Hardyston Fm. 15-49'.		20
	Black chert abundant 35-40'.							
40	Yellow-brown medium-coarse sandstone with quartz conglomerate.							40
	Medium-dark gray fine-grained crystalline dolomite.					Dolomite at 49' BGS. Still blowing lots of orange-brown silt. Slower drilling 59-78'. Weathered Leithsville Fm. 49-54'. Competent Leithsville Fm. 54-78'.		
60								60
							Top of Collapse 75.13' 8/2/23 Collapse	
80			Dry				T.D. 78'	80
100								100
120								120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-5
Surface Elevation (Ft/MSL): 323.84 (ft.)
Borehole Diameter: 6 inches, From 0' To 70'
inches, From To
Total Depth: 70 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary
Date Drilled: 05/26/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Dark brown soil.					TOC Elevation = 325.37'. Stickup = 1.53'. Weathered gneiss colluvium 2-29'.	6" Steel casing	0
	Orange-brown silt/clay with weathered gneiss.						6" Open rock hole	
20						Little return 23-28'. Silt/clay choking hammer.		20
	Dark red-brown silt/clay with weathered gneiss with yellowish-gray silt/claystone friable.					Hardyston Fm. 29-46.5'.		
40	Dark yellow-orange and yellow-gray siltstone. Few weathered gneiss. Some red-brown very fine sandstone.							40
	Medium-dark gray crystalline dolomite, few calcareous shale interbeds and few dark gray chert.					Tan return fracture? 51-52'.		
60						Tan return fracture? 56-59'.	Top of Collapse 66.77' 8/2/23	60
						Brown-tan return fracture? 64'.	Collapse	
80						Tan return 67-70'.	T.D. 70	80
						Leithsville Fm. 46.5-70'.		
100						Tan return seemed to be clay-coated gray dolomite.		100
120								120

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Bethlehem Landfill

Borehole Number: CA-5B
Surface Elevation (Ft/MSL): 336.87 (ft.)
Borehole Diameter: 6 inches, From 0' To 103'
inches, From To
Total Depth: 103 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 07/11/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/31/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Moderate brown sandy loam to sandy clay loam with weathered hornblende-K-feldspar chlorite (?) gneiss.					Stickup = 2.81'. 0-29' weathered gneiss colluvium	5' of 6" steel casing 6" Open rock hole Top of Collapse 16.82' 8/2/23 Collapse	0
10								10
20								20
30	Medium to very light gray siltstone with grayish orange fine sandstone and red to black clay and sand. Little medium gray chert. Sandier siltstone at 45', more sand and coarser at bottom.					29-53.5' Hardyston Fm.		30
40								40
50								50
60	Light olive gray dolomite interbedded with sandy dolomite.					53.5-103' Medium gray crystalline dolomite. Leithsville Fm.		60

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Bethlehem Landfill

Borehole Number: CA-5B
Surface Elevation (Ft/MSL): 336.87 (ft.)
Borehole Diameter: 6 inches, From 0' To 103'
_____ inches, From _____ To _____

Total Depth: 103 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 07/11/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/31/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
60	Same as above.						Collapse	60
70	Moderate brown very fine sandstone at 75'.						6" open-rock hole	70
80						@85' trace amounts of medium gray chert.		80
90								90
100			Dry				T.D.103'	100
110								110
120								120

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Bethlehem Landfill

Borehole Number: CA-5C
Surface Elevation (Ft/MSL): 342.82 (ft.)
Borehole Diameter: 6 inches, From 0' To 153'
_____ inches, From _____ To _____
Total Depth: 153 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/31/23-06/01/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Tan to dark brown silt/clay with weathered gneiss.					Stickup = 2.93'. Weathered gneiss colluvium 0-26'.	5' Total of 6" steel casing 6" Open rock hole	0
20								20
	Tan to brown-orange silt/clay with light gray to black siltstone, occasional and clay clods, quartzite, chert.					Hardyston Fm. 26-121'.		
40								40
						Broken zone at 50'. Hard hammering at 52'.		
60								60
						Hard hammering at 68'.		
80								80
						No return 90-103'. Intermittent hammering. Hammer intermittent or not present throught 26-121'. Return spotty due to silt/clay choking air return.		
100							Top of Collapse 117.5' 8/2/23	100
120							Collapse	120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-5C
Surface Elevation (Ft/MSL): 342.82 (ft.)
Borehole Diameter: 6 inches, From 0' To 153'
_____ inches, From _____ To _____
Total Depth: 153 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/31/23-06/01/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above. Medium-dark gray crystalline dolomite.					Hard hammer 122-155'. Return with dolomite not noted until end hole cleanout with rig water. Dolomite return delayed by silt/clay choking. Competent Leithsville Fm. 121-153'.	Collapse 6" Borehole T.D. 153'	120
140								140
160								160
180								180
200								200
220								220
240								240

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Bethlehem Landfill

Borehole Number: CA-6
Surface Elevation (Ft/MSL): 296.81 (ft.)
Borehole Diameter: 10 inches, From 0' To 98'
6 inches, From 98' To 125'
Total Depth: 125 (ft.)
Depth to Static Ground Water Level (SWL): 91.97 (ft.)
Date SWL Measured: 06/05/23 (mm/dd/yy)

Drilling Method: Air Rotary – T4
Date Drilled: 06/02/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. – Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. – Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Dark brown silty clay, gneiss fragments.					Stickup = 1.44'. TOC Elevation = 298.25'.	10" Borehole	0
	Dark orange–tan silt/clay. Light gray claystone. Black sandstone. Some chlorite (?) gneiss.					Hardyston Fm. ~4–91'.	6" Steel casing	
20	Dark orange–tan silt/clay, with light gray claystone.						6" Borehole	20
40						Solid hammer at 38'. Dark brown return 42–50'.		40
60						Clay return as moist balls 57.5'. Leithsville Fm. 91–125'.		60
80	Silt and clay. Light gray claystone. Black sandstone, chert, some medium–dark gray dolomite.							80
100	Medium–dark gray crystalline dolomite.					Platy dolomite chips at 95'. Tan return 108–109'. Tan return. Tan–coated dolomite 120–125'.	4 Bags of Holeplug at base of 10" hole.	100
120			Blown yield = <0.5 gpm				T.D. 125'	120

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Bethlehem Landfill

Borehole Number: CA-7
Surface Elevation (Ft/MSL): 253.30 (ft.)
Borehole Diameter: 10 inches, From 0' To 57'
6 inches, From 57' To 78'
Total Depth: 78 (ft.)
Depth to Static Ground Water Level (SWL): 59.13 (ft.)
Date SWL Measured: 06/14/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/05/23 - PVC set 06/08/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Brown-red silt/clay weathered gneiss fragments.					Steel Stickup = 2.36'. TOC Elevation = 255.66'.	10" Borehole Annulus open between 2"-6"	0
	Brown silt/clay, broken dolomite fragments.							
20	Medium-dark gray crystalline dolomite. Broken. Potential large boulders.					Solid hammer at 12.5'. Fractured 18-23'. Hammer faltered at 26', and 28-30'. Intermittent hammering at 30'.	6" Steel casing with drive shoe	20
	Red-brown silt/clay, fine-dark gray crystalline dolomite pieces throughout. White with red chert.		Silt/clay moist clodded at 43'					
40	Light-medium gray silty shale.					Leithsville Fm. 4-78'.	2" PVC solid riser	40
	Round fine sandstone pebbles, red siltstone.						Sandpack 47-76'	
	Red brown silt/clay, rounded quartz pebbles.						Holeplug seal	
60	Medium-dark gray crystalline dolomite, fractured.		Blowing mud clods at 66' WBZ			Solid hammer at 57'. Orange-tan return 66-74'.	6" Borehole	60
							2" PVC screen and cap with U-pack	
							#2 Filter sand	
80			Blown Yield <1 gpm			Orange-brown mud return 74-78'.	Natural collapse 78-76'	80
							T.D. 78'	
100								100
120								120

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Bethlehem Landfill

Borehole Number: CA-8
Surface Elevation (Ft/MSL): 288.62 (ft.)
Borehole Diameter: 10 inches, From 0' To 32'
6 inches, From 32' To 100'
Total Depth: 100 (ft.)
Depth to Static Ground Water Level (SWL): 88.92 (ft. BGS)
Date SWL Measured: 05/30/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/26/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Brown-red soil.					Stickup = 2.05'
	Orange silt with granitic gneiss, weathered.					TOC Elevation = 290.67'
	Orange-brown silt/clay with medium-dark gray crystalline dolomite.					Weathered Leithsville Formation 7-19'. Competent rock at 19'. Competent Leithsville Fm. 19-100'.
20	Medium-dark gray crystalline dolomite.					
40						
60						
80						Brief tan return at 75.5'.
			WBZ 90-91'			Tan silt-coated dolomite 90-91' with moist mud.
100						
120			Final blown yield = 0.5 gpm			

Well/Piezometer Construction: 10" Borehole; 6" Steel casing; Holeplug at bottom backfilled with cuttings; 6" Open-rock hole; T.D. 100'

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Bethlehem Landfill

Borehole Number: CA-9
Surface Elevation (Ft/MSL): 327.12 (ft.)
Borehole Diameter: 10 inches, From 0' To 38'
6 inches, From 38' To 145'
Total Depth: 145 (ft.)
Depth to Static Ground Water Level (SWL): 87.77 (ft.)
Date SWL Measured: 06/14/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/30/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Dark brown soil. Tan silt/clay with weathered gneiss.					Stickup = 1.47'. TOC Elevation = 328.59'.
						Competent rock at 16'.
20	Medium-dark gray crystalline dolomite, some light gray shiny (sericite?) shales, some light yellow-tan claystones.					Tan return at 22'. Tan return 33-35'.
40						Leithsville Fm. 16-145'. Brief tan return at 49'.
60	Medium-dark gray crystalline dolomite and crystalline aragonite. Little ligt-medium gray shiny shale. Trace pyrite.					Pyrite at 55'.
80	Medium-dark gray crystalline dolomite. Little light-medium gray to light yellow shiny (sericite?) shale, some appear sandy when broken.					Tan return at 72'. Tan return 78-79'. Tan return, soft 84-104'. Orange-tan return 104-105'.
100	Same as above with some yellow-gray to red-brown silstones and fine grained sandstone.					Orange return 108-114'. Slickensides 104-105'. Wet mud clods at 118'.
120	Medium-dark gray crystalline dolomite. Some light gray-tan crystalline dolomite (weathers tan). Trace shiny (sericite?) shale.					

Well/Piezometer Construction: 10" Borehole; 6" Steel casing; Holeplug at bottom, backfilled with cuttings; 6" Borehole

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Bethlehem Landfill

Borehole Number: CA-9
Surface Elevation (Ft/MSL): 327.12 (ft.)
Borehole Diameter: 10 inches, From 0' To 38'
6 inches, From 38' To 145'
Total Depth: 145 (ft.)
Depth to Static Ground Water Level (SWL): 87.77 (ft.)
Date SWL Measured: 06/14/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/30/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above.						6" Borehole →	120
140			Final blown yield = ~1 gpm				T.D. 145'	140
160								160
180								180
200								200
220								220
240								240

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Bethlehem Landfill

Borehole Number: CA-11
Surface Elevation (Ft/MSL): 361.06 (ft.)
Borehole Diameter: 6 inches, From 0' To 50'
_____ inches, From _____ To _____
Total Depth: _____ (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 07/11/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/31/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Dark brown silt/clay with weathered gneiss.					Stickup = 1.34'.	5' Total of 6" steel casing	0
	Orange-brown silt/clay with free quartz grains, red-black medium- coarse grained sandstone. Little light gray-yellow shiny (sericite?) shale, jasper, white chert, black chert.						6" Open rock hole	
20						Grinding at 24'. Hardyston Fm. ~4-24'.		20
	Medium-dark gray crystalline dolomite, tan coatings/weathering surfaces on some pieces.					Hammer faltering 32-35'. No hammering 40-42'. Little return 46-50'. Leithsville Fm. 24-50'.	Top of Collapse 34.44' 8/2/23 Collapse	
40								40
			Dry				T.D. 50'	
60								60
80								80
100								100
120								120

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Bethlehem Landfill

Borehole Number: CA-11B
Surface Elevation (Ft/MSL): 368.25 (ft.)
Borehole Diameter: 6 inches, From 0' To 78'
_____ inches, From _____ To _____
Total Depth: 78 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/01/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Orange-tan silt/clay with chlorite gneiss fragments, broken.					Stickup = 1.48'.	5' Total of 6" steel casing	0
20	Brown silt with light gray siltstone, light gray claystone, red shale. Few free quartz grains, occasional chert, trace Jasper.					Hammer intermittent or non-existent from 7-59'. Return intermittent from silt/clay choking. Large piece of moderate brown coarse-medium sandstone at 15'. Hardyston Fm. 7-59'.	6" Open rock hole Top of Collapse 22.4' 8/2/23 Collapse	20
40								40
60	Medium-dark gray crystalline dolomite.					Solid constant hammering 59-78'. Leithsville Fm. 59-78'.		60
80			Dry			Hole drilled with 40' temporary 6" steel casing from 65-78'. Casing removed immediately after drilling. Temporary casing added at surface later.	T.D. 78'	80
100								100
120								120

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Bethlehem Landfill

Borehole Number: CA-11C
Surface Elevation (Ft/MSL): 371.02 (ft.)
Borehole Diameter: 6 inches, From 0' To 129'
inches, From To
Total Depth: 129 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/01/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Orange-tan silt/clay with chlorite, gneiss.					Stickup = 2.61'.	5' of 6" Steel casing	0
	Brown silt with light gray siltstone and claystone, red-black sandstone, red shale, few free quartz grains, and occasional chert, trace Jasper.					Contact unclear. Based on color change.	6" Open rock hole	
20						Hammer intermittent or not present 4-122'.		20
						Return intermittent due to silt/clay choking return.		
40						Hardyston Fm. 4-122'.		40
60								60
80								80
100							Top of Collapse 115.0' 8/2/23 Collapse	100
120								120

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Bethlehem Landfill

Borehole Number: CA-11C
Surface Elevation (Ft/MSL): 371.02 (ft.)
Borehole Diameter: 6 inches, From 0' To 129'
_____ inches, From _____ To _____

Total Depth: 129 (ft.)
Depth to Static Ground Water Level (SWL): Dry (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/01/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above.					Hard hammering 122-129'.	Collapse	120
	Medium-dark gray crylstalline dolomite.					Little return at end of hole due to silt/clay choking. Dolomite return noted at end.	6" open-rock hole	
						Leithsville Fm. 122-129'.	T.D. 129'	
140								140
160								160
180								180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-12
Surface Elevation (Ft/MSL): 259.12 (ft.)
Borehole Diameter: 10 inches, From 0' To 57'
6 inches, From 57' To 78'
Total Depth: 78 (ft.)
Depth to Static Ground Water Level (SWL): 30.31 (ft.)
Date SWL Measured: 07/11/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/22/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Collin Littlefield
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0						8" Protective casing Stickup = 1.81'
	Moderate brown to dark brown loamy fill with dolomite fragments.					Intermittent hammering.
						Hard at 11'.
20	Light-medium brown clayey silt loam with weathered gneiss and dolomite.					
	Becoming more clayey.					Rock surface at 34'. Consistent hammering.
40	Weathered olive gray siltstone and phylitic shale.					Soft at 46'.
						Harder 52-54' Inc. water while developing.
60	Olive gray to blue gray siltstone.					Iron staining at 63'.
						Leithsville Fm. 18-78'.
80			WBZ a@57' Yield increasing with depth. ~10 gpm T=17.3 pH=7.53 SpC=361 at 57'			
100						
120						

Well/Piezometer Construction: 0.5' Top of 6" casing; 8" Protective Casing; 4" PVC well liner; 10" diameter open-rock hole; Drill cuttings; 6: Heavy-walled casing; Holeplug; 6" open-rock hole; 4" PVC Screen 58-78'; T.D. 78'

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-13
Surface Elevation (Ft/MSL): 317.48 (ft.)
Borehole Diameter: 10 inches, From 0' To 44'
6 inches, From 44' To 135'
Total Depth: 135 (ft.)
Depth to Static Ground Water Level (SWL): 83.96 (ft.)
Date SWL Measured: 06/14/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/30/23-05/31/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0						Stickup = 2.08'. TOC Elevation= 319.56'.
	Orange-brown silt/clay with weathered hornblende gneiss fragments. Some free quartz grains. Little red-black weathered sandstone and medium brown siltstone. Trace Jasper?					Grinding, intermittent hammering at 7'. Grinding at 23'. No return 23-28'. Tan return fracture? 28-43'.
40	Medium-dark gray crystalline dolomite. Little tan-brown siltstone.					Hardyston Fm. 0-29'. Broken zone at 47'.
60						Leithsville Fm. 29-135'.
80	Light tan to light gray crystalline dolomite.					Dolomite color change likely gradational change ~70-78'.
100			WBZ at 102'			Broken zones 104', 107', and 112'.
120						

Well/Piezometer Construction: 10" Borehole; 6" Steel casing; Cuttings; Bentonite Fill; 6" Borehole; 2" PVC solid riser; 2" PVC slotted screen with cap 95-135'

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(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-13
Surface Elevation (Ft/MSL): 317.48 (ft.)
Borehole Diameter: 10 inches, From 0' To 44'
6 inches, From 44' To 135'
Total Depth: 135 (ft.)
Depth to Static Ground Water Level (SWL): 83.96 (ft.)
Date SWL Measured: 06/14/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 05/30/23-05/31/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Tan to light gray crystalline dolomite.						6" Borehole 2" PVC slotted screen with cap T.D. 135'	120
	Tan to light gray crystalline dolomite, some medium-dark gray crystalline dolomite.					Color change likely gradational.		
140			Final blown yield ~1 gpm					140
160								160
180								180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-14
Surface Elevation (Ft/MSL): 283.77 (ft.)
Borehole Diameter: 10 inches, From 0' To 18'
6 inches, From 18' To 78.5'
Total Depth: 78.5 (ft.)
Depth to Static Ground Water Level (SWL): 52.72 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/08/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0						Steel stickup = 1.10'. TOC Elev. = 284.87'.
	Red-brown silt/clay gneiss boulders. Some yellow-green crystalline minerals (chlorite?). Angular quartz grains. Black chert.					Colluvium 0-27'.
20						Hardyston Fm. ~7-~70'.
	Red-black sandstone, quartz fragments, yellow claystone, jasper, few phyllite/shiny (sericite?) shale.					
40	Light gray shiny (sericite?) shale. Some yellow claystone. No HCl reaction. Few free quartz grains. Very few Jasper.					Samples had a few jasper grains at 45 and 50'.
60			Mud return at 69'			First WBZ at 69', picking up more yield with depth.
	Light-dark gray shiny (sericite?) shale. No HCl reaction. Brittle.					Leithsville Fm. (?) ~70-78.5'.
80			Final blown yield = 10 gpm			
100						
120						

Well/Piezometer Construction:
10" Borehole
6" Steel casing
Holeplug at bottom backfilled with cuttings
6" Borehole
T.D. 78.5'

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-14A
Surface Elevation (Ft/MSL): 268.52 (ft.)
Borehole Diameter: 10 inches, From 0' To 18'
6 inches, From 18' To 50'
Total Depth: 50 (ft.)
Depth to Static Ground Water Level (SWL): 36.10 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/08/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Dark brown soil.					Stickup = 2.68'.
	Dark burnt orange silt/ clay with chlorite (?)/ Hornblende gneiss boulders.					Jasper noted at 9'.
20	Gneiss boulders, angular quartz, jasper (rounded), red-black silt clods.					
	Light gray phyllite/shiny (sericite?) shale, few medium-dark gray dolomite.					Tan return at 22'.
						Brief tan return at 33'.
40	Medium-dark gray crystalline dolomite, hard. Light-medium gray in 40' and 45' samples.		Dry			Leithsville Fm. 22-50'.
60						
80						
100						
120						

Well/Piezometer Construction: 10" Borehole; 6" Steel casing; Holeplug at bottom backfilled with cuttings; 6" Borehole; T.D. 50'

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-15
Surface Elevation (Ft/MSL): 313.72 (ft.)
Borehole Diameter: 10 inches, From 0' To 18'
6 inches, From 18' To 128.5'
Total Depth: 128.5 (ft.)
Depth to Static Ground Water Level (SWL): 86.12 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/07/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0						Stickup = 1.51'. Hammering through boulders. TOC Elev. = 315.23'.	10" Borehole	0
	Brown-black silt/clay, Hornblende-serpentine (?)/chlorite (?) gneiss boulders. Occasional free quartz grains.							
20	Dark burnt orange to red-orange silt/clay. Fewer gneiss fragments.					Intermittent to no hammer with choked/little return throughout all drilling.	6" Steel casing pushed to 74' BGS	20
40						Transition/contact difficult to discern due to lack of return.		40
	Dark burnt orange to red-orange silt/clay. Light gray-white claystone, free quartz grains. Black chert.							
60						Blowing tan, very fine dust at 66'.		60
	Very few medium-dark gray dolomite chips ~78'.					Hardyston Fm. ~46-128.5'.	6" Borehole	
80								80
						Solid hammering, brief at 90.5'.		
100						Hard grinding 100-103'.		100
	Black chert, brittle light gray siltstone/very fine sandstone. Brown silt/clay.					Transition/contact at 103' difficult to discern due to lack of return.		
120								120

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State College, PA 16801
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Bethlehem Landfill

Borehole Number: CA-15
Surface Elevation (Ft/MSL): 313.72 (ft.)
Borehole Diameter: 10 inches, From 0' To 18'
6 inches, From 18' To 128.5'
Total Depth: 128.5 (ft.)
Depth to Static Ground Water Level (SWL): 86.12 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/07/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above with crystalline quartzite noted at 128.5'.		Dry				6" Borehole → T.D. 128.5'	120
140								140
160								160
180								180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: CA-15A
Surface Elevation (Ft/MSL): 320.47 (ft.)
Borehole Diameter: 6 inches, From 0' To 179'
_____ inches, From _____ To _____
Total Depth: 179 (ft.)
Depth to Static Ground Water Level (SWL): 85.72 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/06/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Dark brown soil.					Stickup 2.35'.	5' Total of 6" steel casing	0
	Tan-orange silt/clay gneiss fragments from boulders/colluvium.							
20	Dark burnt orange to red silt/clay. Light gray brittle claystone. Black silt/clay clods.					Little return throughout. Intermittent hammer throughout - weak.	Top of Collapse 11.85' 8/2/23 Collapse 6" Borehole	20
40						Contact transition difficult to discern due to lack of return.		40
60	Tan-orange silt/clay. Light gray claystone. Few free angular quartz grains. Dark gray-black clay clods throughout.					No hammering 33-34', 54-59', 61-76.5', 84-86', 108-118', 136-137', and 139-141'.		60
80	Tan silt/clay free angular-subangular quartz grains. Red-brown siltstone to very fine sandstone. Few dark gray shale and chert. No HCl reactions. More chert and free quartz with depth.					Solid, constant hammering 77-84', 88-90', 91', 97-98', 101', 103-104', 119', 124', and 132-134'.		80
100	Black sandstone noted at 104'.					Hardyston Fm. ~10-179'.		100
120								120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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State College, PA 16801
(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-15A
Surface Elevation (Ft/MSL): 320.47 (ft.)
Borehole Diameter: 6 inches, From 0' To 179'
_____ inches, From _____ To _____
Total Depth: 179 (ft.)
Depth to Static Ground Water Level (SWL): 85.72 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/06/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above.					No hammering 414-144', 152-154', and 151-165'.	Collapse	120
	Tan to tan-orange silt/clay dust. Few rock chips of dark gray-black chert.					Intermittent, weak hammering throughout.	6" Borehole	
140								140
	Tan silt/clay dust. Free sugangular quartz grains. Dark gray-black chert. Pinkish tan siltstone and fine sandstone. Red-black fine to medium-grained sandstone.					Solid constant hammering 148-152', 158-160', 165-170', and 171-177'.		
160								160
						Few medium-dark gray dolomite chips on hammer when pulled. Mostly chert, claystone and, siltstone.		
180							T.D. 179'	180
						Little to no return throughout.		
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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(814) 234-0813

Bethlehem Landfill

Borehole Number: CA-15B
Surface Elevation (Ft/MSL): 293.15 (ft.)
Borehole Diameter: 10 inches, From 0' To 107.5'
inches, From To
Total Depth: 107.5 (ft.)
Depth to Static Ground Water Level (SWL): 61.90 (ft.)
Date SWL Measured: 6/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/07/23 (constructed 6/21/23) (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - Matt Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0						Stickup = 2.38'.		0
	Burnt orange silt/clay with Hornblende gneiss boulders, some free quartz gneiss.						10" Borehole; 8" Steel Casing to 61.5'	
20								20
	Brown-orange silt/clay with light gray to tan claystone fragments.							
40								40
	Light gray shiny (sericite?) shale. Some pieces sandy when broken. Some areas react with HCl when powdered, with gray-yellow claystone. Some white to yellow chert. Few red to black sandstones.						Holeplug 55-67.5'	
60								60
						Hardyston Fm. 27-82'. Leithsville Fm. (?) 82-107.5'.	4" PVC screen with cap 67.5-107.5'	
80			WBZ at 82'					80
	Medium-dark gray shiny (sericite?) shale. Non-calcareous. Appear shaley-platy when broken, with white-yellow chert.		WBZ at 97'			Yield increasing with depth. Large angular gravel-sized pieces of white-red chert at bottom.	8" Borehole; #2 Filter sand 66-107.5'	
100						Hole collapsed to 83' BGS on 6/14/23. Collapse re-drilled as 8" hole during construction.	T.D. 107.5'	100
120			Final blown yield 90-100 gpm					120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: NE-1

Surface Elevation (Ft/MSL): 428.15 (ft.)

Borehole Diameter: 10 inches, From 0' To 16'
8 inches, From 16' To 72'
6 inches, From 72' To 150'

Total Depth: 150 (ft.)

Depth to Static Ground Water Level (SWL): 69.80 (ft.)

Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4

Date Drilled: 06/09/23, 06/12-14/23 (mm/dd/yy)

Drilled By: Eichelbergers, Inc. - Chris Wealand

Drillers License Number: 0198

Logged By: Meiser & Earl, Inc. - C. Littlefield, T. Lowrey, M. Bell

County: Northampton

Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
0	Dark yellowish orange clayey silt loam.					10" steel casing stickup =2.59' TOC Elevation = 430.74'	10" Borehole 10" Dia. Steel casing	0
20	Reddish brown silt loam.						8" Borehole	20
	Very pale orange to grayish orange sandy loam.						8" Dia. Steel casing	
40	Light brown to dark yellowish orange claystone with very fine reddish sandstone.					Borehole collapsed to 106' after drilling and cleaning out borehole.	2" Sch, 40 flush-threaded PVC riser	40
60	Moderate brown medium-grained sandstone with pale yellowish siltstone, orange quartz/chert fragments, yellowish brown return.					8" steel casing unable to be pulled by rig and left in place. Return wet 60-150'	6" Borehole	60
80							Holeplug	80
100	Reddish brown clay and weathered arkosic sandstone.						Collapse #2 Sand 2" Sch. 40 PVC 0.02 slot screen with end cap	100
120							Collapse	120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: NE-1
Surface Elevation (Ft/MSL): 428.15 (ft.)
Borehole Diameter: 10 inches, From 0' To 16'
8 inches, From 16' To 72'
6 inches, From 72' To 150'
Total Depth: 150 (ft.)
Depth to Static Ground Water Level (SWL): 69.80 (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/09/23, 06/12-14/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - C. Littlefield, T. Lowrey, M. Bell
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments	Well/Piezometer Construction	Depth (Ft.)
120	Same as above.		2 gpm WBZ at 122'				6" Borehole	120
	Brown fine-grained sandstone and opaque quart/chert fragments; black chert fragments 145-150'; tan to yellowish brown return.						Collapse	
140			Blown yield 4-5 gpm at 150'					140
160							T.D.150	160
180								180
200								200
220								220
240								240

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

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Bethlehem Landfill

Borehole Number: NE-1A
Surface Elevation (Ft/MSL): 429.22 (ft.)
Borehole Diameter: 6 inches, From 0' To 54'
_____ inches, From _____ To _____
Total Depth: 54 (ft.)
Depth to Static Ground Water Level (SWL): 20.73 (S) 26.52 (M) (ft.)
Date SWL Measured: 06/22/23 (mm/dd/yy)

Drilling Method: Air Rotary - T4
Date Drilled: 06/19-20/23 (mm/dd/yy)
Drilled By: Eichelbergers, Inc. - Chris Wealand
Drillers License Number: 0198
Logged By: Meiser & Earl, Inc. - C. Littlefield
County: Northampton
Township or Municipality: Lower Saucon Township

Depth (Ft.)	Lithologic Description	Plot	Ground Water * Observations	Samples No.	Samples Rec** Att	Comments
0	Dark yellowish orange clayey silt loam.					Intermittent hammering 0-16'.
20	Reddish brown clay loam.					Sandy at 26'.
	Very pale orange to grayish orange sandy loam.					
40	Light brown to dark yellowish orange claystone with very fine reddish sandstone.		Damp Water at 47'			Lost return at 32'. More hammering but remains very soft.
	Moderate brown medium sandstone with pale yellow siltstone.					Constructed Piezometers inside 6" steel.
60	Total drilled depth 56'.					
80						
100						
120						

Well/Piezometer Construction:
Stickup ='2.84'
6" Borehole
6" Steel Casing
2" Sch. 40 PVC flush-threaded riser
#2 Filter sand
2" Sch. 40 0.02 slotted PVC screen
Holeplug
#2 Filter sand pack
2" Sch. 40 PVC 0.02-slotted screen with cap
Collapse 54-56'
S
M
T.D. 54'

Depth (Ft.): 0, 20, 40, 60, 80, 100, 120

* ▽ Encountered Ground Water ▼ Composite Static Water Level ** Recovered/Attempted

Meiser & Earl, Inc. / Hydrogeologists
2730 Carolean Industrial Drive, Suite 100
State College, PA 16801
(814) 234-0813

SECTION 5

NPDES Permit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

11/09/2015

Lee Zimmerman
IESI Bethlehem Landfill
2335 Applebutter Road
Bethlehem, PA 18015

Re: PAG-03 General Permit Approval
IESI Bethlehem Landfill
NPDES Permit No. PAR502205
Authorization ID No. 1073431
Lower Saucon Township, Northampton County

Dear Mr. Zimmerman:

The Department of Environmental Protection (DEP) has reviewed your Notice of Intent (NOI) to operate under the PAG-03 General NPDES Permit and has determined that you are eligible for coverage under the statewide General Permit. Your permit is enclosed.

Please study the General Permit carefully and direct any questions you have to this office. Particular attention should be devoted to Part A (Effluent Limitations, Self-Monitoring and Reporting Requirements) and the best management practices and monitoring requirements applicable to your facility in **Appendix C** of the permit. A "master" copy of the Discharge Monitoring Report (DMR) form is enclosed and should be reproduced for ongoing submissions to DEP.

Also enclosed is the Annual Inspection Form (3800-PM-WSFR0083v), which must be completed in accordance with Part C 3.c (Comprehensive Site Compliance Evaluations and Recordkeeping) of the General Permit. The Form must be used to document annual inspections and must be retained on-site. The Form should not be sent to DEP unless the facility covered by the General Permit is an "Appendix J" facility, in which case the Form should be sent to DEP annually if stormwater sampling and analysis is not conducted in any year.

Please note that your coverage under this statewide permit will not expire. Your coverage under the PAG-03 General Permit is automatically extended for the duration of the final renewed, reissued or amended PAG-03 General Permit. When the statewide General Permit is renewed, the permit will be published in the Pennsylvania Bulletin. Following publication of the final renewed General Permit, you must comply with the terms and conditions of the renewed General Permit or otherwise submit an application for an individual NPDES permit. You are not required to submit an NOI to renew your coverage unless you receive notification from DEP to do so. When you no longer intend to discharge under the PAG-03 General Permit, please submit a request to DEP to terminate your permit coverage.

Please complete the enclosed Laboratory Accreditation Form and submit it with your initial DMR (unless the facility covered by the General Permit is an "Appendix J" facility and is submitting the Annual Inspection Form instead of a DMR). You are not required to submit this Form again during the remainder of the permit term unless a change is made to the laboratory or methods used to analyze parameters in your permit.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions, please contact Cody Welgosh at 570.826.2355.

Sincerely,

Bharat Patel, P.E.
Environmental Program Manager
Clean Water Program

Enclosures

cc:

Central Office, Division of Operations, Monitoring and Data Systems
Delaware River Basin Commission
Northeast Monitoring and Compliance
File

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

PAG-03
AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR DISCHARGES OF STORMWATER ASSOCIATED WITH INDUSTRIAL ACTIVITIES

NPDES PERMIT NO: PAR502205

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 *et seq.* ("the Act") and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 *et seq.*,

IESI Bethlehem Landfill
2335 Applebutter Road
Bethlehem, PA 18015

is authorized to discharge stormwater from a facility located at:

IESI Bethlehem Landfill
2335 Applebutter Road
Bethlehem, PA 18015
Lower Saucon Township, Northampton County

to receiving water(s) named:

Unnamed Tributary to East Branch Saucon Creek in Watershed(s) **2-C**

This authorization is subject to effluent limitations, Best Management Practices (BMPs), monitoring and reporting requirements and other terms, conditions, criteria and special requirements for the discharge of stormwater from point sources composed entirely of stormwater associated, in whole or in part, with industrial activity, as described in this General Permit, to surface waters of the Commonwealth, including to municipal separate storm sewers and nonmunicipal separate storm sewers.

Authorizations under the previous PAG-03 replaced by this General Permit are automatically continued under this General Permit for the remaining duration of the previously approved coverage. If the permittee is unable to comply with the terms of this General Permit, the permittee must submit an application for an individual permit within 90 days of publication of this final General Permit.

All monitoring requirements and BMPs specified in Appendix C on page no(s) 1-2 of this General Permit apply to this discharge. The enclosed discharge monitoring report(s) (DMRs) must be submitted as required under Part A.3. of this General Permit and kept on-site as specified in this General Permit.

APPROVAL FOR COVERAGE TO DISCHARGE UNDER THIS GENERAL NPDES PERMIT SHALL COMMENCE 11/9/2015. IF THE GENERAL PERMIT IS RENEWED, REISSUED OR MODIFIED DURING THE TIME OF COVERAGE, THE FACILITY OR ACTIVITY COVERED BY THE APPROVAL FOR COVERAGE MUST COMPLY WITH THE FINAL RENEWED, REISSUED OR MODIFIED GENERAL PERMIT.

The aforementioned approval is authorized by:

Bharat Patel, P.E.
Environmental Program Manager
Clean Water Program
Northeast Regional Office
Department of Environmental Protection

SECTION 6

PPC Plan

BETHLEHEM LANDFILL COMPANY

A DIVISION OF WASTE CONNECTIONS

PPC PLAN

REVISED AUGUST 2023

Officer Certification

This is to certify that I have personally examined this report and am familiar with the information submitted in it and all attached documents. I am aware of all the requirements for this report and facility. To the best of my knowledge, information and belief, the information submitted is true, accurate and complete.

Name of Officer: Astor A. Lawson

Signature: 

Title: District Manager

Date: 09/08/2023

Bethlehem Landfill Company

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN

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Bethlehem Landfill Company

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN

A. FACILITY DESCRIPTION

1. Description of Activity

The Bethlehem Landfill disposal facility is an existing, permitted, double-lined landfill located on Applebutter Road in Lower Saucon Township, Northampton County, Pennsylvania. The total property on which the facility is located encompasses approximately 206 acres, of which approximately 184 acres has been permitted by the Pennsylvania Department of Environmental Protection in 1986.

The Bethlehem Landfill was formerly owned and operated by the City of Bethlehem. It began operating on 31 acres in 1941. It was sold to Eastern Environmental Services, Inc., Mt. Laurel, New Jersey, on July 18, 1998. On April 1, 1999, Waste Management, Inc., acquired the facility from Eastern Environmental Services. IESI Corporation acquired the landfill on July 1, 1999. On June 1, 2016 Waste Connections, Inc. acquired the site.

Phase I, the first lined area, was used from August 1986 to December 1989. One 6-acre cell is single-lined and the other 4-acre cell is double-lined. Phase II, consisting of approximately 14 acres, began operations in December 1989. A 5.6-acre cell is double-lined and an 8.3-acre cell is unlined and was used for relocation of previously disposed waste from older portions of the site. Phase III, consisting of approximately 33.4 acres, began operations in October 1994. Phase IV, disposal area began to accept waste in July 2003 and was approximately 46 acres. The Southeastern Realignment (SER) current disposal area began to accept waste in September 2017 on approximately 29 acres of new liner compliant footprint. The Northern Realignment was recently approved for disposal by PADEP. This area will be the new disposal area in 2024.

A ground water abatement system consisting of 13 wells was installed in 1995 to mitigate the migration of leachate from previously unlined disposal operations at the site. Currently there are 10 active abatement wells. Water levels and pumping rates are recorded and maintained on file in the office. The facility also has a landfill gas management system consisting of extraction wells located throughout the intermediate and capped area of the landfill and an enclosed ground flare. The capped disposal area is maintained under negative pressure to provide odor controls and significantly reduce the potential for hazards from methane generated by the decomposition of the MSW.

Leachate and abatement well ground water is conveyed through a sewer line to the City of Bethlehem Wastewater Treatment Plant approximately 1.5 miles west of the site. The landfill has a back-up agreement with the City of Allentown, which would allow hauling to their treatment plant in the event that the Bethlehem plant is unavailable. This back-up arrangement has not been used thus far. A 390,000-gallon glass-lined storage tank and an approximately 1,10,000 gallon double lined impoundment are also available for emergency storage of leachate if necessary.

The facility is located within 4 miles of the Bethlehem/Hellertown Exit off of Interstate 78 and has an adequate quantity of suitable on-site cover material; Bethlehem Landfill is constructed to comply with the EPA subtitle D standards. Following filling to design elevations, final cover, complete with geo-membrane capping, will be placed and the final slopes will be re-vegetated.

In order to control discharge of storm water to the adjacent areas, the entire facility has a storm water management plan design which collects all sediment-laden runoff from the landfill and conveys it to one of five sedimentation basins that discharge to its natural drainage ways. The discharges from the basins are sampled semi-annually following significant rainfall events.

All of the improvements necessary to comply with the permit are in place and, as the site grows, additional lined cells or pads, access roads, storm water channels, etc., will be added to the operation.

Attachment #1 is a site location map on a clip from the 7 1/2 minute USGS maps in the vicinity.

Surface Water Management

The Bethlehem Landfill incorporates a storm water management system that isolates the disposal areas from rainfall to reduce leachate generation and prevent contamination of surface water. This system is designed to collect runoff by the use of contoured land surfaces, collection pipes, storm water channels, and swales to direct surface runoff to sedimentation basins prior to discharge to provide detention time to allow sedimentation of soil particles. At the present time the facility has 5 functional gravity discharge sedimentation basins which are shown on the general site plan included in Attachment #2. All of the sedimentation basins are constructed to discharge on the south side of the site and discharge to an unnamed tributary to the East Branch of the Saucon Creek. A portion of the site, which was part of the original landfill area, is already capped and re-vegetated and drains off toward the north toward the Lehigh River. The capping system, which is already in place on the original landfill area, Phases I, II, III, IV and a portion of SER, consists of a synthetic liner, and 2' of soil with vegetative cover to significantly reduce leachate generation. As the current landfill disposal areas reach final elevation, those sections will also be capped similarly.

Landfill Gas Monitoring Program

During development of the pads, gas collection wells are constructed to facilitate the removal of landfill gases. The Bethlehem Landfill operates an active gas extraction system, which mechanically draws gases via a blower system out of the landfill through the wells. Gas extraction points include drilled wells and horizontal collectors and other odor control locations such as clean-out pipes.

Landfill gas is collected and routed to the permanent ground flare system where the gases are burned. The Bethlehem Landfill also incorporates a system of gas monitoring probes that surround the landfill. These probes are monitored quarterly to monitor for off-site gas migration. If necessary, remedial actions will be implemented promptly.

Ground Water Monitoring Program

The Bethlehem Landfill administers a ground water monitoring system. This system incorporates 41 monitoring points consisting of 29 monitoring wells, 10 ground water abatement wells, and 2 surface water points as seen in attachment 3. Well locations were selected so that up gradient and downgradient water quality could be monitored. The location of the monitoring wells, well construction and number of wells installed were approved by PADEP prior to installation. Samples are obtained from these monitoring points and are analyzed quarterly.

Radioactive Material Monitoring Program

Bethlehem Landfill maintains radiation monitoring equipment that scans each load of waste that enters the scale for radioactive material. This program is in accordance with the site's Radioactive Monitoring Plan that was approved by PADEP in April 2003 and updated periodically.

Waste Relocation

During construction activities, the relocation of existing waste may be necessary. Attachment #4 is the site's Waste Relocation Procedures.

Waste Acceptance and Handling

Vehicles hauling solid waste to the facility must follow the procedures and practices described in this section to ensure that the type of waste materials accepted at the facility and the manner in which waste materials are handled is carefully monitored and controlled.

Upon arrival at the facility, the gross vehicle weight (the weight of the vehicle and its contents) is measured after the vehicle has been properly stabilized on the scale. Once the gross weight is determined, the vehicle proceeds to the landfill disposal area to unload its contents. After unloading, vehicles proceed back to the scale house and weighed again prior to exiting the facility to determine the weight of the contents, which were unloaded. The net weight difference is determined for recordkeeping and billing purposes.

Prior to disposing their load at the landfill area, each solid waste transporter informs the weighmaster of the origin and type of waste being hauled. If the waste is a residual waste, the driver is required to provide a manifest signed by the generator. The weighmaster verifies that the form has been completed properly and that the waste type listed is one of the acceptable waste categories. All residual waste must have prior PADEP approval before disposal.

After making these determinations, the weighmaster also signs the manifest form and allows the transporter to proceed to the landfill disposal area. The landfill equipment operator visually inspects the contents of each load of solid waste, as it is unloaded. If the equipment operator observes that the contents may be unacceptable waste, the operator will check with the weighmaster by radio. If the waste is not acceptable, the operator will reject the load and follow the landfill's Waste Rejection Procedure found in Attachment #5.

Whenever there is a question regarding the classification or acceptability of any material, the weighmaster is directed to check with the compliance manager and/or landfill manager before allowing the load to proceed to the working face.

2. Description of Existing Emergency Response Plans

This Plan supersedes previous PPC Plans to conform to current report format requirements, indicate the change of ownership, and be consistent with current operating procedures. This updated PPC Plan will also be implemented in conjunction with the SPCC Plan for petroleum product spills.

3. Material and Waste Inventory Wastes

Leachate is the primary waste generated on-site. Leachate is collected through a network of leachate collection pipes located in each disposal cell. Leachate conveyance to the City of Bethlehem Wastewater Treatment Plant (WWTP) is either by gravity drain or through a pumping station to the sewer system. The collection pipes outside of the landfill liner system are double-walled to provide for secondary containment. Ground water pumped from the 10 abatement wells is discharged into the leachate collection system. The leachate piping passes through leachate management chambers at various locations on the site. The wastewater exits the landfill and is conveyed part way by gravity and the rest of the way in a force main along Applebutter Road to the City of Bethlehem WWTP.

The landfill generates gases from the normal decomposition of the waste, which has been placed into the lined disposal areas of the facility. This gas consists primarily of methane and carbon dioxide. Trace components consist of hydrogen sulfide and other gases, which lend the gas its characteristic odor. The gas is extracted from the decaying waste by the gas collection system and is used as a fuel source and burned in the on-site flare station. Condensate collected in the gas collection system is pumped into the leachate collection system.

Waste oil and antifreeze are generated by the equipment maintenance activities. Both are placed into containers labeled "waste oil or used anti-freeze" and stored at the maintenance garage. Waste oil is used as a fuel source for the maintenance building heater or taken off-site for recycling. Used anti-freeze is also collected by an off-site recycling facility. Spent parts cleaner is also collected by an off-site recycling facility.

General maintenance and office wastes are collected and deposited at the landfill working face.

Materials

Landfill equipment is fueled by an outside contractor and by the on-site fuel tanker truck (3,000 gallon capacity). A 500 gallon above ground diesel storage tank supplies fuel to the generators also located on the east side of the maintenance building. A 500 gallon gasoline tank also located on the east side of the maintenance shop is used to fuel company vehicles.

In the event of fuel spillage, absorbent materials are available on the fuel truck and in the maintenance building to absorb as much of the fuel as possible and prevent the spread of the spill. Each above

ground storage (AST) tank has a double wall secondary containment capable of containing 110% of the tank's capacity. The tanker truck is parked on an HDPE constructed pad to provide containment in the event of a leak. Concrete jersey barriers and bollards are strategically placed around the fuel storage tanks to prevent accidental contact from equipment pulling up to refuel.

Five-gallon gasoline containers for small gasoline engines are stored in the maintenance shop within a ventilated flammable materials storage cabinet. Miscellaneous cleaners and maintenance products are also stored in the maintenance shop and in the office building. Bulk storage of hydraulic oil, lubrication oil, transmission oil is stored in 275 gallon tank and antifreeze in a <250 gallon container with secondary containment are located in the maintenance shop for routine vehicle maintenance. A welding torch with an oxygen tank and an acetylene tank is also kept in the maintenance shop. The quantities of the cleaners and maintenance products are minimal that if leakage does occur it will be contained within the shop or office, where cleanup is easily accomplished. Should a leak occur, absorbent material is immediately placed on any oil or fuel spills. After the spill is absorbed, the spent absorbent shall be disposed within the landfill working area subject to the Bethlehem Landfill Waste Acceptance and Classification Plan requirements. There are no floor drains in the maintenance shop.

4. Pollution Incident History

Bethlehem Landfill maintains a complete file of on-site incidents that may affect operations or the environment.

B. IMPLEMENTATION OF CONTINGENCY PLAN/NOTIFICATION & RESPONSE

1. Organizational Structure of Facility for Implementation

District Manager - Responsible for implementation of provisions of the PPC Plan.

Regional Engineer - Assists District Manager in implementation of PPC Plan and performs revision of the Plan and assures accuracy of Plan.

Operations Manager – Assists the District Manager in implementation of the PPC Plan.

In the case of an emergency, the District Manager shall immediately implement the applicable provisions of this plan. During an emergency, the District Manager shall assess the actual and potential hazards to public health and safety, public welfare and the environment that are occurring or may occur. During this evaluation, steps will be taken to help mitigate and or prevent fires, spills or other hazards from occurring, recurring or spreading to other solid waste at the facility. These measures may include, where applicable, stopping operations, collecting and containing released materials or wastes, and removing or isolating containers. For the purpose of this section, the term "emergency" includes fire, spills or other events that threaten public health and safety, public welfare or the environment and personal injury.

If the effect of the incident has extended or is likely to extend off-site and requires an emergency response team or if aid is required from outside agencies to mitigate the incident, the State and County

Emergency Response Agencies, National Response Center and the PA Department of Environmental Protection will be notified immediately and advised of the following information:

(a) Name of the person reporting the incident and telephone number where that person can be reached;

(b) Name, address and permit number of the installation;

(c) Date, time and location of the incident;

(d) A brief description of the incident, nature and quantity of materials or wastes involved, extent of any injuries, and possible hazards to public health, welfare and the environment that exist or may occur;

(e) The nature of injuries, if applicable, and;

(f) Procedures implemented to alleviate the emergency.

As noted above, the District Manager shall contact (if required) the Pennsylvania Emergency Response Commission (PERC), the Northampton County Emergency Management Agency (NCEMA), the PA Department of Environmental Protection (PADEP) and the National Response Center (NRC). The Pennsylvania Emergency Management Agency (PEMA) and the Northampton County Emergency Management Agency are the operational agencies, respectively.

In the event of a storm water incident that causes a breech in a designed storm water control and impacts the surrounding area or obstructs public roadways; contact emergency clean-up crew and notify the PADEP Water Management Program.

2. Facility Emergency Coordinators

The following individuals are available on-site or on-call with the authority to implement emergency response procedures:

a. Primary Emergency Coordinator:
Astor Lawson – District Manager
Bethlehem Landfill Co.
2335 Applebutter Rd.
Bethlehem, PA 18015
Work: 610-317-3200
Mobile: 805-471-7948

b. Second Emergency Coordinator
Rob Motto – Operations Sup
Bethlehem Landfill Co.
2335 Applebutter Road
Bethlehem, PA 18015
Work: 610-317-3200
Mobile: 570-391-2897

The emergency coordinators listed above are reachable at the landfill office during operating hours or through their mobile phone numbers during non-operating hours. The chain of command will be properly updated when new personnel fill these positions.

3. Duties and Responsibilities of the Coordinator

The Emergency Coordinator or authorized Bethlehem Landfill employee will contact the following agencies as appropriate in the case of an emergency:

Agency/Personnel	Telephone Number
Police – Fire – Ambulance Emergency	911
Pennsylvania Emergency Management Agency (PEMA)	1-800-372-7362
Northampton County Emergency Management Agency	610-759-2600
National Response Center	800-424-8802
CHEMTREC	800-424-9300
TEEM Environmental	800-890-7745
Stericycle	866-783-7422 or 610-286-6996
PADEP Wilkes-Barre Regional Office	570-826-2516 or 2511
PADEP Bethlehem District Office	610-861-2070
Lower Saucon Township	610-865-3291
EPA 24 Hour Number	215-597-9898
PA Fish Commission	717-626-0228
PA State Police - Bethlehem	610-861-2026
Mobile Dredging & Pumping	800-635-9689
NAPA Construction	484-239-1627
Bethlehem Sewage Treatment Plant	610-865-7168
Lehigh County Authority – Ind. Pretreatment	610-395-9782 610-390-9855
Rapid Response Inc.	877-460-1038

Exelon – Bethlehem Renewable Energy	484-651-3822 / 410-274-9520
Kline's Services	717-898-8158
Best Line Equipment Rental – generator/pumps Schoenersville Rd, Bethlehem, PA	484-223-3814
Emergency System Services – generators Quakertown, PA	215-536-4973
Deifenderfer Electric Co.	610-434-9595 888-288-7291

The emergency response procedures and remedial activities will be administered and directed by the Emergency Coordinator assigned by the appropriate agency.

If the facility stops operations in response to a fire, explosion, emission, or discharge, the Emergency Coordinator must ensure that adequate monitoring is conducted for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

Immediately after an emergency, the Emergency Coordinator, with PADEP approval, must provide for treating, storing, or disposing of residues, contaminated soil, etc. from an emission discharge, fire, or explosion at the installation. Public responders and facility personnel, under the direction of the Emergency Coordinator shall take remedial measures as required to address the situation.

The Emergency Coordinator must ensure that in the affected areas on the facility, no material or waste incompatible with the emitted or discharged residue is processed, stored, treated, or disposed of until cleanup procedures are completed; and all emergency equipment listed in the plan is cleaned and fit for its intended use before operations are resumed.

Within 5 working days of the incident, the facility must submit a written report on the incident to the PADEP, Lower Saucon Township and the City of Bethlehem Wastewater Treatment Facility of the effect if the incident has extended or is likely to extend off-site or if aid is required from outside agencies to mitigate the incident. The report must include the following:

a. name, address and telephone number of person filing the report;

b. name, address and telephone number of the installation;

c. the date, time and location of the incident;

d. a detailed description of the incident;

e. a description of type and quantity of materials involved;

f. an assessment of any contamination of land, water or air that has occurred due to the incident;

g. estimated quantity and disposition of recovered materials or waste that resulted from the incident;

h. and a description of what actions the installation intends to take to prevent a similar occurrence in the future.

4. Chain of Command

Astor Lawson – District Manager

Rob Motto – Operations Supervisor

C. SPILL/LEAK PREVENTION AND RESPONSE

1. Pre-Release Planning

There are five main areas at the Bethlehem Landfill where potential spills and/or leaks may occur. These areas are: the equipment storage/maintenance garage area, landfill working pad, landfill side slopes, gas flare station, and leachate piping system including leachate management chambers. These areas are shown on Attachment #2.

Equipment Storage/Maintenance Garage Area

Spills that could occur in the equipment storage area would be of a relatively minor volume, primarily associated with small equipment leaks or spills and would be handled as outlined in the Housekeeping Program section of this Plan. A spill in this area would be immediately contained using the proper absorbent materials to prevent during precipitation could result in liquid being carried off by storm water. Materials would be of relatively low toxicity and would be in the form of oil or fuels. Pollutants carried by storm water would flow to Sedimentation Trap A where containment can be effected.

Landfill Working Pad

Most spills that could occur on the working pad would also be of minor volume and would be handled as above. However, the potential exists for a significant amount of fuel to be released from the pad equipment or from hauling vehicles. Absorbent material is available to absorb the fuel and an attempt will be made to collect leakage in containers before it contacts the ground.

It is possible that an unpermitted waste could be received in a mixed municipal or approved residual waste load. In general, the Weighmaster and/or Operations Supervisor at the scale house will turn unapproved waste away from the site upon review. However, if unapproved waste is tipped onto the working area of the landfill, with few exceptions, it will be loaded back into the hauling vehicle for

removal from the site by the hauler. The procedure for how to handle unacceptable waste is addressed in Attachment #5.

Spills on the working face are managed to be contained within the landfill and collected in the leachate collection system.

Landfill Side Slopes

The development of a leachate seep in the exterior side slope of the landfill is another potential source of leakage. Daily inspections are performed on the landfill to identify and remediate seeps to prevent off-pad migration (see Inspection/Monitoring section of this Plan). Leachate seeps identified during inspections are excavated and backfilled with coarse stone or aggregate to provide drainage back into the leachate collection system. Removed overburden will be placed in the active working face of the landfill.

Leachate Piping System and Leachate Management Chambers

All off-pad leachate piping is contained in HDPE piping providing secondary containment. This provides a means for insuring the piping system's integrity. The leachate piping system passes through leachate management chambers or pump houses
where valves, junctions, meters, and sediment traps are located. Leakage from any of those structures will be contained within the chamber until it can be properly removed and reintroduced into the leachate collection system. An emergency leachate storage tank and lined impoundment are located adjacent to LMC-10. In the event the City of Bethlehem's Wastewater treatment plant cannot accept leachate for disposal, the entire leachate flow can be diverted with a valve in LMC-9 into the emergency storage tank. This tank has a capacity of about 390,000 gallons. Additional emergency leachate storage was built to expand the emergency storage capacity by another 1,100,000 gallons. Total emergency leachate storage capacity is 1,490,000 gallons. Bethlehem Landfill also has a contract with Allentown Wastewater Treatment Plant as an emergency back-up disposal site.

Gas Flare Station

The gas flare station burns landfill gas collected at the site to prevent the migration of gas and the associated odors from the site. The gas flare has an automated control system which monitors flare temperature, gas flow rate, methane concentration, and oxygen concentration on a continuous basis. If any of the parameters are outside normal operating range, the system automatically shuts down the flare, turns off the blowers drawing gas from the landfill, and closes the main valve between the landfill collection system and the flare. A flare shutdown will prompt the auto dialer to call personnel that will respond to the flare outage to troubleshoot for repairs and re-light the flare. The flare has a paper recorder chart and data logger to record flow, temperature etc. Offsite migration of gas through the air is monitored by routine inspections around the landfill perimeter.

2. Material Compatibility

The Bethlehem Landfill utilizes HDPE liner and pipe for the collection and conveyance of leachate. HDPE is chosen for its high strength, toughness, seam strength and, most importantly, its chemical resistance. Municipal and residual wastes are accepted for disposal after the wastes are determined to be compatible in accordance with the Landfill's Form R requirements. Residual waste is accepted for disposal only after approval from the PADEP.

3. Inspection and Monitoring Program

Inspection and monitoring of a landfill site is an extremely important aspect of a well-run facility. The effort spent implementing a comprehensive inspection and monitoring program will undoubtedly be worthy of the time spent, as many potential and detrimental conditions will be prevented.

Landfill inspections

The site has implemented a comprehensive landfill inspection and monitoring program to ensure the integrity of the landfill liner system, leachate collection and treatment system and daily operational procedures. Daily inspections of the landfill facility include, but are not limited to:

1. Proper waste acceptance and inspection procedures. These are transmitted in the Landfill's Waste Acceptance and Classification Plan and are performed by a review/approval process, at the scale house and active working face.

2. Daily pad operations inspections, which include waste quantities, cover load count, trash cell size, unauthorized waste, operating pad equipment, pad litter, and pad condition.

3. Daily facility inspections which include the abatement wells, leachate management chambers, presence of leachate seeps, erosion control, litter, road maintenance, and truck wash operations and gas flare.

4. Equipment maintenance, which includes operating time, fluids and specific parts and operating systems on each piece of equipment.

5. Visual inspection of site haul roads for accessibility, potential hazard areas, and erosion.

Monthly inspections include, but are not limited to:

1. Facility inspections, which include presence of leachate seeps, erosion control, litter, sedimentation basins, cap and final cover and site safety inspection.

2. Scale inspection includes the scale deck, load cells, and scale foundation.

Flare station/blower inspections

Inspections of the flare system operations are conducted during normal work hours and are as follows:

1. Weekly inspections are performed in relation to weather conditions, site conditions, and gas piping system, blower and flare system.

2. Blower and motor bearing lubrication is checked and performed as needed based on the number of hours of operation of those components of the flare.

3. Flame arresters are inspected and cleaned on an annual or as needed basis by an outside contractor.

Documentation is maintained on inspections. Any deficiencies identified in facility operations are corrected as soon as practical.

As needed, the District Manager reviews site operations and completed inspection sheets with the staff and revises the PPC Plan as necessary.

The landfill buffer area contains monitoring wells and gas monitoring stations located around the perimeter of the landfill. The ground water monitoring wells are sampled quarterly to determine the local ground water quality. Quarterly gas monitoring is performed at perimeter gas monitoring wells to identify any off-pad migration. Surface emission monitoring is performed quarterly on all capped and intermediate cover sections of the landfill to check cap and cover integrity.

All monitoring wells are kept locked at all times and are maintained in good condition. The monitoring wells are inspected once each month for maintenance. The area around the wells is kept free of vegetation, litter, or debris to ensure that the wells can be inspected and are readily accessible.

After heavy rains a post rain event inspection will be conducted to evaluate the erosion and sedimentation controls. Post storm water inspections are completed using the Inspection Form exhibited in Attachment #6. After hours inspections occur as deemed necessary.

Preventative Maintenance

The operating personnel perform daily visual inspection of the equipment and perform all daily or routine maintenance activities including, but not limited to, lubrication, track cleaning and replacement of air filter elements. The Site Mechanic keeps a complete checklist and daily log of all daily maintenance and adjustment activities. Daily "walk around" inspections are critical in detecting or preventing maintenance problems and potential safety hazards.

The mechanic performs routine inspections, oil changes, adjustments, and most scheduled maintenance and repair services. An outside contractor may perform special repairs and service.

The Landfill Gas Technician and outside contractors perform comprehensive preventative maintenance programs to insure the integrity of all aspects of the ground water abatement system, leachate collection system, gas flare and ancillary equipment. This program incorporates the following:

a. Periodic inspections of identified equipment and systems;

b. Periodic testing of equipment and systems (such as routine calibration of environmental monitoring equipment);

c. Appropriate adjustment, repair, or replacement of parts and;

d. Complete record keeping of the preventative maintenance activities, inspection and test results, calibration dates, repairs, replacements, and adjustments to the applicable equipment and systems.

5. Housekeeping Program

As was noted under the Inspection and Monitoring section, authorized personnel inspect berms, lines, valves, basins, and other structures for structural adequacy, and evaluate overall site operations and revise this plan as necessary.

In the equipment storage area and Maintenance Garage, oil or fuel spills are covered immediately with absorbent material. After the spill is absorbed, the spent absorbent is placed within the landfill working area subject to landfill's disposal criteria. Prior to disposal of the absorbent, any such waste is stored, if necessary, and its compatibility with the liner determined prior to disposal.

In order to maintain a good housekeeping program certain activities and practices are carried out on a regular basis to reduce the possibility of accidental spills and safety hazards to facility personnel: neat and orderly storage of chemicals; prompt removal of small spillage; regular refuse pickup and disposal; maintenance of dry, clean floors, and maintain open walkways, pathways, or roads.

6. Security

Security procedures are employed at the installation to prevent accidental or intentional entry into the site that could result in a violation of PADEP regulations, or injury to persons include the following:

a. Facility informational sign promulgating the name, address, telephone number, and operating hours of the installation;

b. Lockable gate at the facility entrance road during off hours;

c. Fencing around the entire installation;

d. Locks on the buildings, monitor wells and abatement well sheds;

e. Site lighting.

7. External Factor Planning

Certain external factors will have some impact on the operations. Heavy rains will cause excessive runoff. Five sedimentation basins are in place to control runoff from active areas. Storm water control channels and pipes are used to divert storm water to the basins. After heavy rains a post rain event inspection will be conducted to evaluate the erosion and sedimentation controls.
In the case of a power outage, the Phase III leachate collection and conveyance system will continue to operate because it is a gravity system, Phase IV and the SER areas have a sump containment that is requires pumping. During extended periods of power outages; control panels for the pumping stations are retrofitted with a main power disconnect and portable generator connector located in the SE corner of the office parking lot to ensure that leachate can be removed from the disposal cell. The ground water abatement wells will stop pumping. However, this should not affect the potential for offsite migration of contaminated ground water since ground water levels will not change significantly even without pump operations during the period of a few hours or even a day or two, which would be typical for a power outage. The gas flare system would shut down, and the main header valve would automatically close, which would prevent discharge of unburned gases from the gas collection system during the duration of the power outage. The auto dialer would call out to inform the listed personnel of the power outage. During extended periods of power outages; a generator would be rented that has the capacity to power the flare.

Heavy snows will greatly reduce the amount of waste disposed at the site and also temporarily limits the movement of equipment and personnel around the site. However, the landfill possesses the necessary heavy equipment needed to clear heavy snow from operating areas. This activity begins as soon as operators are able to arrive at the site. Heavy snows will not affect other operations.

8. Health, Safety and Employee Training

In order to protect the health and safety of operating personnel, the safety standards specified in this section are observed.

a. First Aid. The Landfill Manager or designate is responsible for informing all employees of the facility's first aid procedures. First aid kits are located and maintained in the main office, scale house, maintenance garage, and on the maintenance service truck.

b. Clothing. All operating personnel at the active areas of the landfill operation wear protective clothing and equipment. Operating personnel are issued a hard hat, protective clothing, foot protection, gloves, safety glasses, ear protection, respiratory protection (fitted) as applicable, and rain gear. The operating personnel are expected to wear protective clothing and shoes at all times on-site. Safety equipment (glasses, hard hat, and orange vest) is worn within the limits of the active disposal areas, except in the

cab of the operating equipment. Ear protection and respiratory protection (dust masks) may be required when operating heavy equipment without a cab or when working around heavy equipment or dusty conditions for extended periods. Personnel are trained in proper use of any personal protective equipment. This is performed initially for each employee followed by annual refreshers.

c. Accident Records. A report is prepared by the appropriate supervisor for each significant mishap that occurs on the landfill site involving personal injury requiring medical attention to personnel or visitors and/or damage to equipment or facilities.

The accident records are maintained on a permanent basis in the Operation Supervisor's office to determine responsibility for accidents, to dispose of any claims, and to identify conditions that cause accidents.

d. Safety Training. All of the administrative and operating personnel are adequately trained in the operations of a sanitary landfill. The training is sufficient to ensure that the facility personnel are able to respond effectively to emergencies. Waste Connections Corporate Safety Manager and Site staff are responsible for developing and implementing a comprehensive safety program.

Safety rules and procedures are prepared in written form, and distributed to each employee. This program includes monthly safety meetings to educate and refresh employee awareness in all areas. This monthly structured safety plan was developed to provide uniform training nationally to educate employees on landfill safety related topics.

D. COUNTERMEASURES

1. Countermeasures To Be Taken by Facility

In the event of a gas release from the gas flare station the following countermeasures are taken:

a. Gas feed to the station will be stopped, if practical and necessary (the automatic control system is designed to shut down the flare and close the main header valve.);

b. Thorough inspection of the equipment will be performed to determine the cause of the release;

c. Immediate repair of the faulty or damaged equipment.

In the event of a leachate spill to the environment the following countermeasures are taken:

a. Locate and stop the source of spill, if possible;

b. Contact the Emergency Coordinator or highest available authority on the chain of command;

c. Contain the spill with the use of soil by loaders or dozers, if possible, or any absorbents that may be available;

d. The use of outside vendors for clean-up and waste removal, as noted in Section D.2, may be necessary.

e. Notify the proper authorities as described in the List of Agencies to be Notified

In the event of a leachate spill within a leachate management chamber, the following countermeasures are taken:

a. Shut off the leachate flow upstream of the affected LMC;

b. Remove the leachate from the LMC into the landfill's tank truck or other mobile tank. The leachate may be reintroduced into the conveyance system at a downstream, unaffected location or transported either to the leachate storage tank on the site or directly to the City of Bethlehem Sewage Treatment Plant or City of Allentown Sewage Treatment Plant, which is the back-up leachate disposal facility;

c. Drain the piping needing repair and perform the necessary repair;

In the case of a leak in the leachate conveyance pipe, the following countermeasures are taken:

a. Shut off the leachate flow upstream of the leak;

b. Mobilize equipment for containment, if necessary, utilizing the facility's equipment or outside contractors as necessary;

c. Drain the piping needing repair and perform the necessary repairs;

d. Excavate any contaminated soil and arrange for their removal and disposal within the active disposal area of the landfill, if available, or other approved disposal facility;

e. Backfill any excavated areas with clean soils.

In the event that leachate cannot be conveyed to the Bethlehem Wastewater Treatment Plant due to problems with the conveyance system or plant, the following countermeasures are implemented:

a. The valves in LMC-9 and LMC-10 are adjusted to close the main valve which releases leachate to the downstream conveyance system and open the valve which diverts flow into the storage tank;

b. The valve on the drain line from the storm water inlet within the tank's containment area is closed so rainwater is contained within the containment area rather than being discharged to the storm sewer as occurs under normal conditions;

c. Unless the conveyance or treatment constraint is known to be a short-term limitation, a liquid waste hauler will be contacted and arrangements made for hauling leachate to the Allentown Wastewater Treatment Plant with which the landfill has a backup disposal agreement.

In the event that unknown wastes are encountered during excavation for construction of new landfill cells, DEP Wilkes-Barre Regional Office will be notified (570-826-2516) within 24 hours. The Waste Relocation Plan included in Attachment #4 will be utilized. A Waste Sampling Plan will be prepared, if necessary, to assess the characteristics of the suspect material and determine an appropriate means of disposal. The Waste Sampling Plan prepared in August 1999 in connection with the discovery of suspect wastes during excavation for Cell 3-D will be utilized as a guide.

In the event of fires at general or specific locations, the following procedure should be used as a guide, but in each case, best judgment should be used:

General Fire Procedures

a. The employee who discovers the fire should immediately notify the Emergency Coordinator as to the location and type of fire emergency;

b. The Emergency Coordinator should ensure that all other personnel are notified of the fire using the two-way communication system;

c. The Emergency Coordinator should notify the emergency agencies through 911, and communicate the following information:

- Location of fire,
- Type of fire,
- Name of caller, and
- Phone number used to call.

d. The Emergency Coordinator should notify all other persons, in order of the Chain of Command, of all pertinent information regarding the fire;

e. The Emergency Coordinator should see that the scale house personnel stop all waste vehicles from entering the landfill area until otherwise notified and maintain access around the scale for ingress of emergency vehicles.

Specific Fire Procedures

1. Fire in a Refuse Vehicle:

   a. Follow above general fire procedures;

   b. Attempt to remove the vehicle from open refuse area. Have the vehicle proceed to the nearest designated hot load area, and have the driver eject the load. At the hot load area, located adjacent to the working face, water from the on-site tank truck and stockpiled area shall be applied to the burning debris to control and contain the fire until the fire company arrives;

   c. If the vehicle, not the refuse, is on fire and if the driver must evacuate the vehicle, a judgment should be made as to whether it is possible to control the fire until the fire company arrives. If not, the immediate area surrounding the burning vehicle should be evacuated.

2. Fire at the Working Face

   a. Remove all vehicles from the working face;

   b. With available dry chemical extinguishers, attempt to suppress the fire, then proceed to dig out burning refuse with available heavy equipment;

   c. Push (dig) burning refuse onto an isolated area with cover material, spread out, and use either water, dry chemical fire extinguishers, or cover material to extinguish the fire;

   d. If the fire is large, move the burning material out of the daily operating area and onto covered areas for containment. This can be accomplished with available equipment and extra cover material;

   e. If necessary, portable pumps may be used to convey water from the existing sediment basins or the stream located south of the basins to the fire areas. The water can be mixed with dirt or cover material and used to extinguish the fire. One of the major problems in all refuse fires is re-flaring of smoldering fires. To prevent this, completely dig the smoldering refuse out of the landfill, mix with dirt, spread onto a covered area, and saturate with water.

3. Fire at the Public Drop Off Center

   a. Follow general fire procedures;

   b. If a fire in a roll off container occurs, the fire should be at least partially extinguished by water or dry chemical extinguisher before moving the container to the hot load area.

Once the material is dumped at the hot load area, the fire can be completely extinguished;

c. If a fire occurs in a vehicle at the convenience center, follow instructions outlined in Fire in a Refuse Vehicle.

4. Fire in a Building

a. Follow general fire procedures;

b. Sound the fire alarm, if one exists. Evacuate the building and account for personnel;

c. Notify the fire department. If the fire is small, and smoke inhalation is not a concern, attempt to extinguish the fire with a nearby fire extinguisher.

2. Countermeasures To Be Undertaken By Contractors

The Bethlehem Landfill can immediately notify the following outside contractors. For emergency liquid trucking and other emergency response work services, the Bethlehem Landfill contacts CHEMTREC and/or TEEM Environmental of Old Forge, PA, Rapid Response Inc. Northampton, PA an environmental response contractor. Liquid trucking is also provided by Mobile Dredging & Pumping and/or Kline's Services. In the event that an infectious waste stream was found intermixed in a waste stream Stericycle would be contacted for clean-up transportation and disposal.

NAPA Construction	484-239-1627
TEEM Environmental	800-890-7745
Mobile Dredging & Pumping	800-635-9689
Stericycle	866-783-7422
Rapid Response Inc.	877-460-1038
Kline's Services	717-898-8158

3. Evacuation Plan for Facility Personnel

In the event of an emergency necessitating evacuation of the site, the Emergency Coordinator sounds a verbal alarm over the two-way radio system. All employees meet at a specified location, which will usually be in the paved parking area on the site immediately west of the main gate.

If wind direction does not allow it, a different location will be specified over the radio. Once assembly has occurred, a roll call shall be taken to insure that everyone has safely left the site. In such an

emergency, the police and fire company shall also be notified through the 911 systems. The evacuation routes are specified on the facility maps in Attachment # 2.

4. Emergency Equipment

The following list of emergency equipment will be maintained at the site:

EQUIPMENT DESCRIPTION	LOCATION	INTENDED USE
Absorbent Materials	Fuel Truck and Maintenance Shop	Fuel Spill Cleanup
Air Compressor	Maintenance Shop	--
PPE – TYVEK coveralls	Office – Maintenance Shop	PPE
Hard hat	Office – Maintenance Shop	PPE
Bulldozer	Maintenance Shop/work face	Excavation
Camera	Office	Photos of emergency situation
Chain saw	Maintenance Shop	Emergency clearing
Fire Extinguishers	All equipment, Office, Maintenance Shop	Fire Extinguishing
First Aid Supplies	Maintenance Shop, Office, Scale, Maintenance Truck	First Aid
Fuel Supply (Diesel)	Outside Maintenance Shop	Diesel Fuel
Gloves	Office – Maintenance Shop	Hand Protection
Jacks	Maintenance Shop	Lift equipment
Lighting equipment, portable	Maintenance Shop or Fill Area	Light
Phones – Portable	District, Landfill & Compliance Manager	Emergency Notification
Phone System	Office, Scale house, Maintenance Shop	Emergency Notification
Radio	Equipment, Scale house, Office, Maintenance Shop	Communication
Dust mask	Office - Maintenance	Dust
Submersible Pump	Maintenance Shop	Pump water
Tank truck	Maintenance Area	Transport water/dust control
Tool box	Maintenance Shop	Tools
Water Truck	Maintenance Shop	Fire, Dust Control
Welding/cutting equipment	Maintenance Shop	Welding/Cutting

E. EMERGENCY SPILL CONTROL NETWORK

1. Arrangements with Local Emergency Response Agencies and Hospitals

The list of local emergency response agencies and hospitals is included in the following section.

2. Notification Lists

A complete list of agencies and phone numbers has been developed in the case of an emergency or spill. This list is described below.

The nearest hospital is St. Luke's Hospital, 801 Ostrum Street, Bethlehem, PA, located approximately 6 miles from the landfill. The phone number at the hospital is (610) 954-4000. Their emergency unit is available 7 days a week, 24 hours a day. The emergency phone number at the hospital is (610) 954-4500. Additionally, St. Luke's' Anderson Campus is an option. Their address is: 1872 St. Luke's Blvd., Easton, PA 18045. Phone number is 1-866-STLukes.

Directions to St. Luke's Hospital
(from the Landfill)

Turn right onto Applebutter Road
At stop sign, turn left onto Shimersville Road
At next stop sign, turn right onto Route 412
Follow Route 412 through Bethlehem
Continue on Route 412 until you reach Route 378
Proceed straight across Route 378 at the traffic light
Continue on Delaware Avenue for approximately 1 mile
Turn right onto St. Luke's Place Road
Hospital is straight ahead on Ostrum Street

In case of fire, personal injury, or leachate release to the environment, the following entities shall be contacted:

Fire, Police, and Ambulance (for emergencies)
911

City of Bethlehem Public Works (Sewage, Water)
Emergency Service: (610) 865-7074
Nights/Weekends/Holidays: (610) 865-7074

Northampton County Emergency Management Agency
(610) 759-2600

City of Bethlehem Wastewater Treatment Plant
(610) 865-7168

Agencies to be notified immediately by telephone under the following conditions:

In the event of solid waste fire, leachate release to the environment, or other emergency dealing with solid waste or the gas flare system:

DEP Bureau of Waste Management Wilkes-Barre Regional Office	(570) 826-2516 or (570) 826-2511
DEP Bureau of Waste Management Bethlehem District Office	(610) 861-2070

In the event of a leachate release to the environment or any emergency that causes or has the potential to cause ground or surface water contamination or release of sediment due to erosion and sedimentation control failure:

DEP Bureau of Waste Management Wilkes-Barre Regional Office	(570) 826-2516 or (570) 826-2511
U.S. Environmental Protection Agency Region III 165 Arch Street Philadelphia, PA 19106	(215) 597-9825

In the event of actual or potential contamination of surface waters:

PA Fish Commission Southeastern Regional Office PO Box 8 Elm, PA 17521	(717) 626-0228

In the event of a hazardous waste spill:

National Response Center Washington, DC	(800) 424-8802

Petroleum spills would also prompt implementation of the SPCC Plan and the notification procedures detailed within that plan.

3. Downstream Notification Requirement For Storage Tanks

The 390,000-gallon leachate storage tank was constructed with a berm and underlying synthetic liner for secondary containment purposes. In the event of an overfill of the tank an overflow pipe was installed to discharge directly to a 1,100,000 gallon lined leachate lagoon next to the tank. The secondary containment is sufficient for controlling a spill should the leachate storage tank fail. For this reason it is not necessary to provide a downstream notification list.

F. STORM WATER MANAGEMENT PRACTICES

The Bethlehem Landfill incorporates a storm water management system that isolates the active landfill working face from run-on and surface water drainage to reduce leachate generation and prevent contamination of surface water. This system is designed to divert surface water away from the landfill by the use of contoured land surfaces, collection pipes, storm water channels and swales and to retain this water in five sedimentation basins prior to discharge.

Rainwater falling on the active portions of the landfill will infiltrate into the leachate collection system of the landfill. This will then be conveyed to the Bethlehem Wastewater Treatment Plant. Rainwater, which may contact the waste, does not flow to the storm water collection system.

The Landfill design also incorporates a final capping system consisting of a synthetic liner and drainage layer plus two feet of vegetative soil on the surface of each completed pad to significantly reduce leachate generation.

Post storm water inspections are conducted using the Inspection Form exhibited in Attachment #6.

G. SEDIMENT AND EROSION PREVENTION

Any area of the landfill property undergoing development is subject to potential erosion of soil. When a new pad area is initially excavated and/or prepared, soil may be exposed for an extended period prior to construction of the liner system and elimination of potential erosion. The final step in preparation of the soil base is compaction which significantly reduces erosion. In addition, silt fencing and staked hay or straw bales are placed along the toe of slopes, in temporary drainage swales and around drainage pipe and catch basin inlets.

Portions of the landfill where waste is actively being placed are subject to potential erosion. As waste is placed it is covered with six inches of soil at the end of each day. Since this cover material changes on a daily basis, effective erosion control is difficult. Eroded soil is primarily prevented from leaving the confines of the active area by the local contours. Side slopes of the active areas, which will not receive additional cover for some time, are seeded and covered with mulch to stabilize the area. Swales between active areas and areas with intermediate soil cover are formed into rip-rap channels to divert run-off away from the active portions.

Closed portions of the landfill are constructed using synthetic cap with a final 24 inches of soil cover. This is stabilized from erosion by producing a final vegetation cover. If erosion develops before vegetation becomes established, the damage is repaired and revegetated. Slopes are benched at regular intervals to form a drain swale that allows water to flow to a series of down drains. Run-off from the side slopes and the down drains is conveyed by swales covered with rip-rap. These swales channel water to sedimentation basins.

Soil is always exposed to run-off. Bethlehem Landfill uses portable erosion & sedimentation controls such as silt fencing. As an additional control measure, the entire area drains to Sedimentation Basins. These basins capture all run-off from the borrow areas and allow silt to settle out prior to discharge of the water through the stand pipe.

In the unlikely event that mud or rocks are carried to adjacent roads from a large storm event, the landfill will contact the township, Penn DOT officials and mobilize a clean-up crew immediately.

H. ADDITIONAL REQUIREMENTS FOR SARA III, SECTION 313 FACILITIES

This facility possesses chemicals regulated by SARA Title III, Section 313 and files annual reports as required.

I. CERTIFICATION FOR NON-STORM WATER DISCHARGES

This certifies that the Bethlehem Landfill does not discharge non-storm waters to the storm water collection and discharge system. The landfill can verify the above based on the configuration of the leachate collection system and storm water management pipes, channels, and basins. The discharge from each of the five sedimentation basins is sampled semi-annually with the results reported to PADEP

The only non-storm water discharge is from the leachate collection system. Leachate generated on site is conveyed to the City of Bethlehem WWTP.

J. CONFINED SPACE ENTRY

Because there is occasionally a need for personnel to enter confined spaces such as manholes or leachate management chambers, a confined space entry program has been developed by the landfill. The procedure is followed whenever someone enters a confined space on Bethlehem Landfill property. Certified outside contractors are used for all confined space entry work, Bethlehem Landfill employees are instructed to not enter any confined space or structure not designed for human occupancy.

K. REVISIONS TO THE PLAN

June 2008:
1. Inclusion of the PEPCO Bethlehem Renewable Energy Facility information.
2. Update to site conditions; office and scale relocation. New Attachment #2
3. Name and phone change for Safety/TCO; Jared Stevulak to Keith Overcash.
4. Add Rapid Response Inc. to emergency list.

Feb. 2010.
1. Update emergency equipment type and location
2. Update Material Inventory

June 2010
1. Add Stericycle to the emergency contact list
2. Add Joe Latona Contractor for emergency contact for heavy equipment
3. Update material storage capacity

Feb. 2012
1. Eliminate reference to Basin #7
2. Remove reference to Site Supervisor Gene Bonomo
3. Update facility site information
4. Add Kline's Services

Dec. 2012
1. Include Post Storm water Inspection and Inspection Form
2. Add emergency procedures to pump Phase IV pumping stations
3. Add Bestline Services – generator and pump rentals
4. Add Emergency Systems Services – Generator rental services.
5. Add Diefenderfer Electric – electric services

May 2015
1. Delete S. Donato, as Landfill Manager add Lee Zimmerman
2. Delete K. Overcash, Safety Manager replace with M. Shelden, Operations Manager
3. Minor edits for clarification

Dec. 2015
1. Delete Lee Zimmerman as District Manager add Allen Schleyer
2. Added Cap Removal to Attachment 4
3. Added Trenching to Attachment 4
4. Added St. Luke's Anderson Campus
5. Added Road Clean-up.

Jun. 2016
1. Delete Mike Shelden add Nick Rogers.
2. Delete Al Schleyer as District Manager add Donald Hallock.

Jul. 2017
1. Delete Mike Shelden and Karen Dancho and update Tony Holva and Diane Beatty to Distribution list.
2. Changed Groundwater wells from 46 to 42.
3. Replaced "tipper area" with "disposal area"
4. Page 10, 17 replace attachment #5 with #4
5. Delete Latona add NAPA
7. Updated post rain event form
8. Updated evacuation plan

Aug. 2018
1. Changed IESI Bethlehem Landfill PA Corp. to Bethlehem Landfill Company
2. Changed Nick Rogers Cell phone #

Sep. 2019
1. Changed District Manager to Astor Lawson
2. Changed Operations Supervisor to Phillip Garcia
3. Removal of BRE LFGTE plant as LFG source

Aug. 2023
1. Changed Operation Supervisor to Rob Motto
2. Updated Site Plan and Evacuation Plan

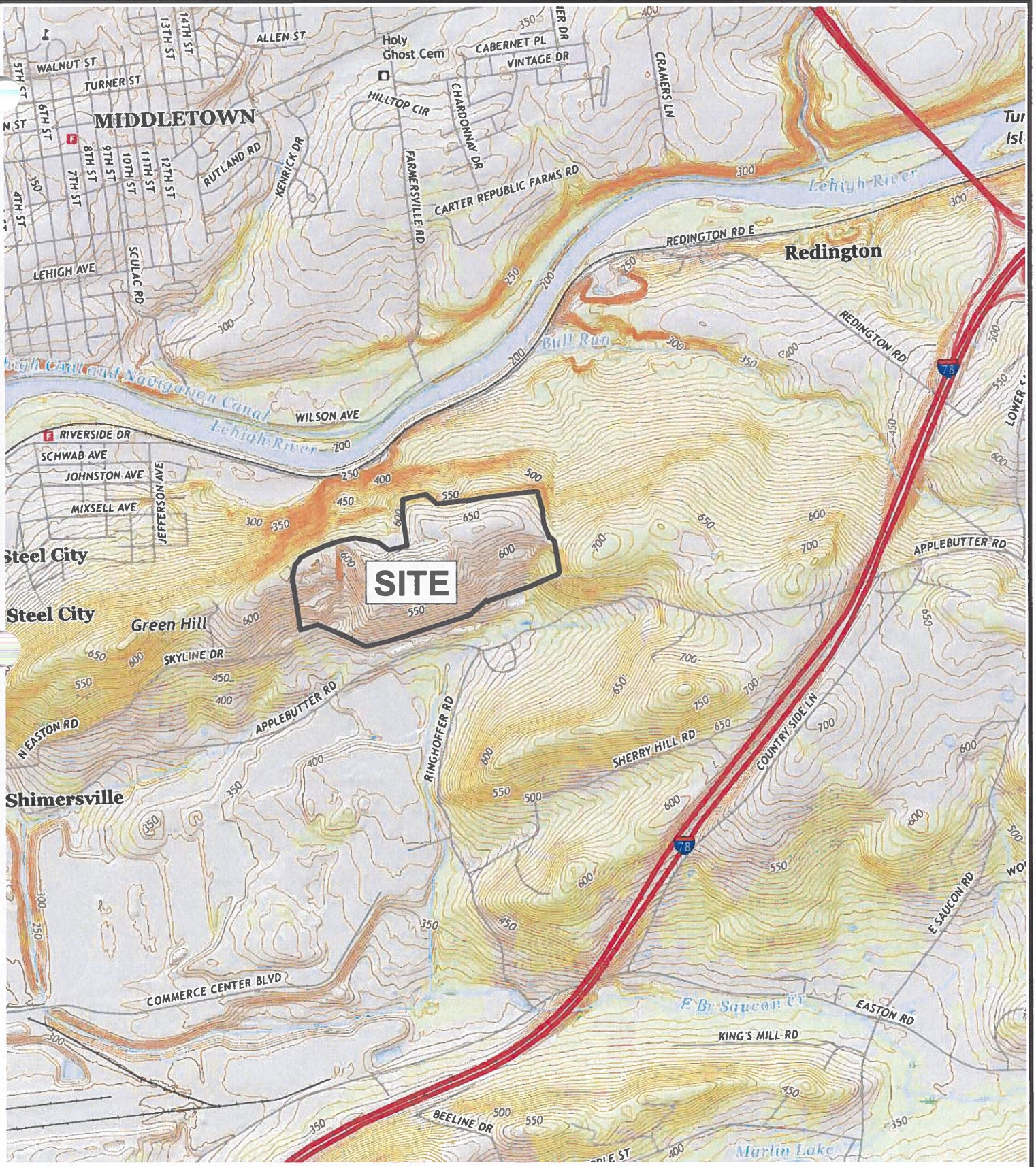
PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 1

SITE LOCATION MAP

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

1162.6USGS23-01.dwg



MAP SOURCE: NAZARETH & HELLERTOWN USGS QUADS SCALE: 1" = 2000'

martin and martin incorporated
37 south main street • suite A
chambersburg, pennsylvania . 17201
phone: (717) 264-6759

SITE MAP

LOWER SAUCON TWP. NORTHAMPTON CO.

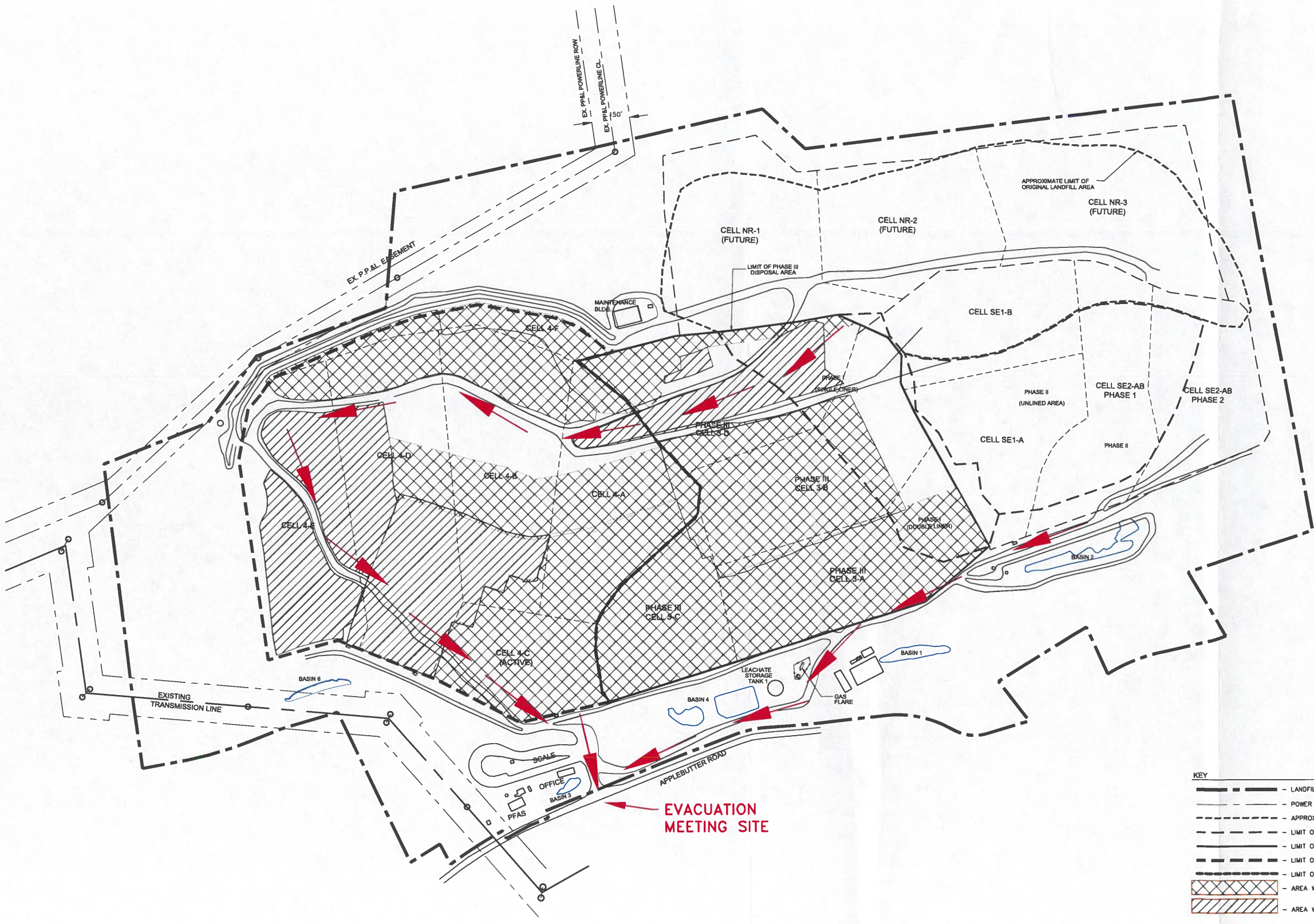
Bethlehem Landfill Company
WASTE CONNECTIONS INC.
Connect with the Future

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 2

EVACUATION ROUTE

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA



KEY

- LANDFILL PROPERTY LINE
- POWER LINE R/W
- APPROX. LIMIT OF ORIG. LANDFILL AREA
- LIMIT OF PHASE I & II DISPOSAL AREA
- LIMIT OF PHASE III DISPOSAL AREA
- LIMIT OF PHASE IV DISPOSAL AREA
- LIMIT OF SOUTHEASTERN REALIGNMENT DISPOSAL AREA
- AREA WITH MEMBRANE CAP
- AREA WITH TEMPORARY CAP
- EVACUATION ROUTE

NOTE:
DRONE DATA CAPTURE DATE: 3-17-23 BY: FIRMATEK, LLC
10010 SAN PEDRO AVE., SUITE 850, SAN ANTONIO, TX 78216
(210) 651-4990 WWW.FIRMATEK.COM

DISPOSAL AREA INFORMATION (PHASE III AND EARLIER) TAKEN FROM PHASE III PERMIT DRAWINGS BY GANNETT FLEMING DATED NOV. 9, 1993

PROPERTY LINE DATA TAKEN FROM PLAN BY KEYSTONE CONSULTING ENGINEERS, INC. DATED 3-31-98 & REVISED THRU 12-13-2000.

NO.	REVISION	DATE

SEAL

SHEET TITLE
LANDFILL SITE MAP (PPC PLAN)

LOWER SAUCON TWP.

NORTHAMPTON CO.

Bethlehem Landfill Company
WASTE CONNECTIONS INC.
Casmer and/or Fastene
PENNSYLVANIA

martin and martin incorporated
37 south main street • suite A
chambersburg, pennsylvania . 17201
phone: (717) 264-6759

PROJ. NO.	1162.1	DWN. BY:	MSH	200' 0 200' 400'
DSN. BY:	MSH	CHK. BY:	RMB	

CADD FILE:
1162_1PPC23-01.DWG

DATE:
AUGUST 2023

SCALE:
1" = 200'

DRAWING NO.
1

FILE:

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 3

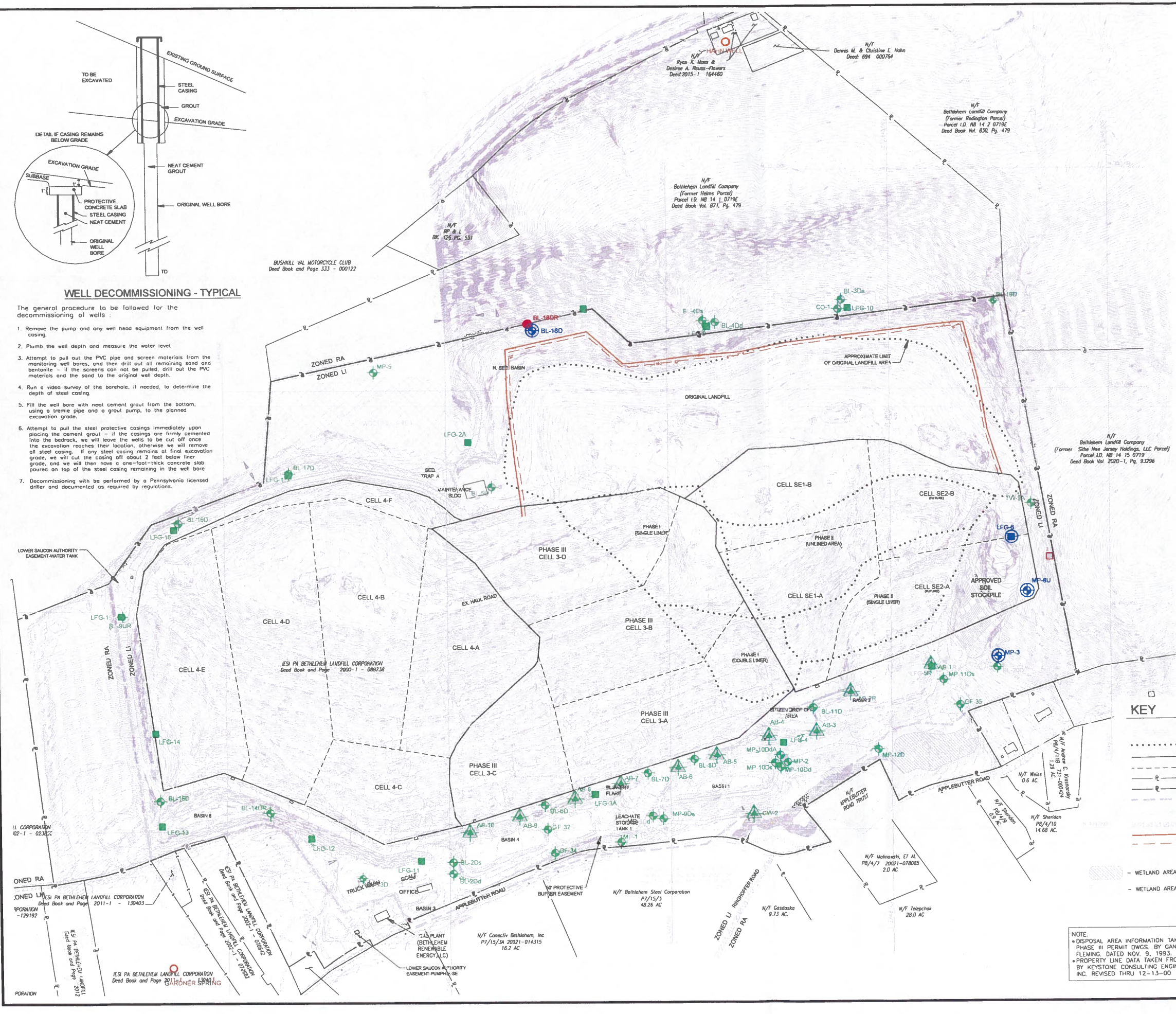
SITE MONITORING PLAN

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

WELL DECOMMISSIONING - TYPICAL

The general procedure to be followed for the decommissioning of wells :

1. Remove the pump and any well head equipment from the well casing.
2. Plumb the well depth and measure the water level.
3. Attempt to pull out the PVC pipe and screen materials from the monitoring well bores, and then drill out all remaining sand and bentonite – if the screens can not be pulled, drill out the PVC materials and the sand to the original well depth.
4. Run a video survey of the borehole, if needed, to determine the depth of steel casing.
5. Fill the well bore with neat cement grout from the bottom, using a tremie pipe and a grout pump, to the planned excavation grade.
6. Attempt to pull the steel protective casings immediately upon placing the cement grout – if the casings are firmly cemented into the bedrock, we will leave the wells to be cut off once the excavation reaches their location, otherwise we will remove all steel casing. If any steel casing remains at final excavation grade, we will cut the casing off about 2 feet below liner grade, and we will then have a one-foot-thick concrete slab poured on top of the steel casing remaining in the well bore
7. Decommissioning with be performed by a Pennsylvania licensed driller and documented as required by regulations.



MONITORING KEY

- EXISTING MONITORING WELL
- EXISTING MONITORING WELL (TO BE ABANDONED DURING CONSTRUCTION)
- PROPOSED MONITORING WELL
- EXISTING ABATEMENT WELL
- EXISTING ABATEMENT WELL (TO BE ABANDONED DURING CONSTRUCTION)
- PROPOSED ABATEMENT WELL
- EXISTING LANDFILL GAS MONITORING PROBE
- EXISTING LANDFILL GAS MONITORING PROBE (TO BE ABANDONED DURING CONSTRUCTION)
- PROPOSED LANDFILL GAS MONITORING PROBE
- ACT 101 MONITORING POINT

KEY

- EXISTING CONTOURS (2' INTERVAL)
- LIMIT OF ORIGINAL LANDFILL, PHASE I AND PHASE II DISPOSAL AREAS
- LIMIT OF DISPOSAL PHASE III, PHASE IV AND SOUTHEASTERN REALIGNMENT
- CELL DIVISION
- PROPERTY LINE
- LANDFILL PROPERTY LINE (224 ACRE CONSOLIDATED DEED)
- EXIST. PERMIT BOUNDARY AS TAKEN FROM MARCH 1994 PERMIT DRAWINGS
- EXISTING PP&L POWER LINE
- ZONING BOUNDARY LINES
- PROPOSED ANCHOR TRENCH AT NORTHERN REALIGNMENT
- PROPOSED DISPOSAL LIMIT AT NORTHERN REALIGNMENT
- WETLAND AREAS (DELINEATED 2014)
- WETLAND AREAS (1991)
- RIPARIAN CORRIDOR BUFFER (TO INCLUDE FLOODPLAIN AND WETLAND AREAS AS DEPICTED ALSO)
- STREAM PROTECTION EASEMENT

NOTE:
- DISPOSAL AREA INFORMATION TAKEN FROM PHASE III PERMIT DWGS. BY GANNETT FLEMING, DATED NOV. 9, 1993.
- PROPERTY LINE DATA TAKEN FROM PLAN BY KEYSTONE CONSULTING ENGINEERS, INC. REVISED THRU 12-13-00

NOTES:
- EXISTING PERMIT LIMIT FOLLOWS THE PROPERTY LINE UNLESS OTHERWISE SHOWN.
- SOME SITE INFORMATION FOR THIS DRAWING COMPILED FROM DRAWINGS FURNISHED BY GANNETT FLEMING, INC. of HARRISBURG, PENNSYLVANIA AND AMERICAN RESOURCE CONSULTANTS, INC. OF DOYLESTOWN, PENNSYLVANIA

MAPPING COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 02/03/20 AND 2-9-19.
BY: SOUTHERN RESOURCES MAPPING CORPORATION 5105 HWY. 171 NORTHPORT, ALABAMA 35473 PHONE: (205) 333-9900
MAPPING HAS BEEN FIELD VERIFIED.

SEAL

NO.	REVISION	DATE

- NORTHERN REALIGNMENT -

SITE / GROUNDWATER MONITORING PLAN

LOWER SAUCON TWP. NORTHAMPTON CO.

Bethlehem Landfill Company
WASTE CONNECTIONS INC.
PENNSYLVANIA

mmi mortin and martin incorporated
37 south main street • suite A
chambersburg, pennsylvania 17201
phone: (717) 264-6759

PROJ. NO. 1162.4 | DWN BY: MSH | CHK BY: KNB/RMB | DSN BY: JM/RMB

0' 200' 400'

CADD FILE: 1162_4NR20-04.DWG

DATE: DEC 2020

SCALE: 1" = 200'

DRAWING NO. LF-4

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 4

WASTE RELOCATION PLAN

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

BETHLEHEM LANDFILL

Waste Relocation Procedures

PART 1 - GENERAL PROCEDURES

OVERSIGHT

The OWNER will retain an independent third party consultant to monitor, document and verify the waste relocation operations.

LITTER CONTROL

The necessary litter fences will be constructed and placed to ensure positive control of litter from the excavated refuse. The excavated area litter should not be a problem during the trucking or pushing of refuse. It should have the consistency of a mulch rather than freshly disposed of trash. Should the consistency change, the appropriate action will be taken. Litter will be removed from the fences weekly, or more frequently as necessary.

DUST CONTROL

During dry, dusty periods of the year, and at any time when required, a water truck will be utilized to apply water to any areas which are generating dust.

ODOR MANAGEMENT

Whenever possible, waste relocation operations will be carried out in the period from October 15 to April 15. This should help minimize odor problems in 2 ways; first, the cooler weather appears to reduce odors; secondly, the exposed refuse will be covered with soil and or tarps to contain odors. If, during other time frames, and at any time, odors do become a problem, odor suppressants, lime or other controls will be applied. Odors will be monitored by daily "odor checks" at the working face and the site perimeter by landfill personnel. If any odors are detected at or near the site perimeter, the landfill shall immediately address it, indicating in the log the location and the steps taken to control the odors. Any such occurrences shall be noted in the landfill's daily operations log.

CAP REMOVAL

Under the supervision of the CQA Inspector, personnel will expose the cap liner system at the perimeter of the cap where it will be cut/removed. The cap will be cut and the edge covered and marked for future cap tie-in or removal efforts. The cover soils will be removed for use in landfill activities. The cap liner system will then be removed from the area, which area will be limited to that which can be managed within a day or two. Intermediate cover beneath the membrane will remain in place. The landfill will have a water truck capable of spraying odor

control liquids as needed to control odors. The landfill gas system will remain operational during the cap removal and placement of the new "piggyback" liner system.

NOISE

The relocation of trash will be generally limited to the operating hours of the facility per the permit, and will be consistent with the landfill ordinance of Lower Saucon Township. The noise associated with this activity will be consistent with other operations on site.

LEACHATE MANAGEMENT

The leachate pockets or seeps found during the trash removal and relocation to the lined pads will be handled through the site's leachate collection system. Precautions will be taken to ensure that no leachate will flow or migrate from the working area. Bethlehem Landfill or its contractors will use the equipment on site to ensure there is no migration. If necessary to contain leachate, a pit or sump will be dug at the active face of each relocation area, from which leachate will be pumped into a tank truck for hauling to the leachate collection system. The pit will either be a concrete sump or be membrane lined, as may be necessary.

TRENCHING

Excavations (trenching) required to abandon/add gas wells will be done one at a time to prevent infiltration of rainfall.

STORMWATER MANAGEMENT

The stormwater runoff will be diverted around the working face of all pads and refuse removal areas under construction. Precautions will be taken to ensure there is not runoff from areas outside the working area infiltrating into exposed trash.

TRAFFIC

Waste relocation procedures will proceed by the hauling of refuse from the relocation areas to the lined pads. This traffic will not be directed to the scale area, nor will it utilize the access roads or public roads. Therefore, traffic should not be a problem at the site. In order to accommodate the additional volume of activity at the working face, an additional compactor, and truck for delivery of cover material may be utilized.

SCHEDULE OF RELOCATION

The schedule for relocation of the old trash will coincide with the earthwork schedule necessary to prepare subsequent pads for construction.

PART 2 - EXECUTION

2.01 HEALTH AND SAFETY REQUIREMENTS

A. Project personnel shall become thoroughly familiar with and follow the Waste Relocation Plan.

B. The Project Manager for the projects will be Bethlehem Landfill.

C. Project management will be the responsibility of the Project Manager. The Project Manager will coordinate and manage all major activities. Day to day activities will be coordinated and managed as directed by the Project Manager. The CONTRACTOR should be in constant communication with the Project Manager.

D. The CONTRACTOR will work closely with the Project Manager to assure that all work is carried out in the safest manner possible. The CONTRACTOR will be responsible for assuring the overall implementation and enforcement of the plan, air monitoring, accident or incident investigation/reporting, contractor/employee compliance, and similar activities.

E. The CONTRACTOR and his workers must be knowledgeable about hazards to which they may be exposed during this project, as required by the OSHA Hazard Communication (HAZ-COM) Standards and the OSHA Hazardous Waste Operations and Emergency Response Standard. All OSHA, and other applicable regulations shall be followed by CONTRACTOR.

F. All on-site personnel, if required to wear respirators, will be fit tested and instructed in the proper use, cleaning, storage and limitations of their respirators.

G. All CONTRACTOR's personnel shall adhere to the safety practices for their respective specialties. Workers shall also exercise caution when working in adverse weather, on rough or slippery terrain, when operating on or around machinery and when vision and mobility are impaired due to the use of protective gear. The integrity of protective clothing shall be maintained and workers shall realize the increased difficulty in communicating when wearing a respirator (if its use is necessary). The following shall also be noted:

1. In unknown situations, always assume the worst and plan responses accordingly.

2. Use the buddy system; establish and maintain communication by use of hand signals, radios or other means as necessary.

3. Minimize contact with excavated or other potentially hazardous materials or liquids. Do not place equipment on tanks, drums or on the ground. Never sit or climb on tanks, drums or other vessels and containers.

4. Use disposable protective items when possible to minimize risks during work.

5. Smoking, eating and drinking are not allowed after entering the work zone and before personal decontamination.

6. Work breaks should be planned to prevent stress related accidents, fatigue or hot/cold environments.

7. Workers shall review and follow all site specific rules such as those dealing with the use of personal safety equipment (safety glasses), the use of climbing devices (ladders), sign in/sign out procedures, access, etc.

8. Conflicting situations between work requirements and safety procedures must be resolved by the CONTRACTOR and OWNER.

9. Unauthorized breaches of specified safety protocol will not be allowed. Personnel unwilling to comply with established safety procedures will not be allowed to continue to work at the site.

10. Be observant of the surroundings and also of others. Extra precautions are necessary when using protective gear due to reduced vision and hearing.

11. Use of contact lenses by workers are not allowed during any activities.

12. The wearing of a respirator will require the removal of all facial hair except small mustaches that are within the sealing surface of the respirator.

13. Changes in contingency plans will be posted to notify all personnel of any modifications to safety protocol related to changing site conditions.

14. When in doubt, withdrawal and re-assessment is the preferred course of action when encountering any potentially hazardous situation.

15. Be aware that chemical contaminants may mimic or enhance symptoms of other illnesses or intoxication.

16. The CONTRACTOR will maintain a daily log of meetings, facts, incidents, data, etc. relating to the project. Records will remain at the site during the duration of the project.

17. Observance of applicable OSHA, EPA and general good safety, health and specific equipment use practices is mandatory.

H. It is anticipated that all work will be performed using Level D personnel protective equipment as described below. Level D personnel protective equipment consists of the following unless otherwise recommended by the CONTRACTOR and approved by the OWNER.

1. Coveralls (disposable coveralls may be desirable);
2. Safety boots or substantial shoes/boots (as applicable);
3. Safety glass or goggles;
4. Hard hat and,
5. Work gloves

2.02 ODOR CONTROL

A. In the decomposition of solid waste, gases are produced creating possible pungent odors when exposed to the ambient air. The CONTRACTOR shall maintain safe working conditions in the presence of the gases and minimize odors migrating off-site which will cause public concern. Odor control from the project is critical.

B. The CONTRACTOR shall employ methods of odor control that must include, but not be limited to, the following:

1. Minimize the exposed area (maximum of 1 acre) of refuse during relocation operations;
2. Apply cover (tarps, foam, and appropriate thickness of cover material, etc.) over any exposed trash at the end of each day and during project delays;
3. The use of odor suppressants. At least two "foggers" or equivalent (e.g. sprayer on arm of trackhoe) must be provided by the CONTRACTOR. The foggers must be strategically placed and used as directed by the OWNER.
4. The placement of lime on odor producing areas.

C. Based on previous projects, all soil needed for cover should be available from the relocation area by the stripping/re-use procedure. Any additional soil material needed must be taken from the soil stockpile as directed by the OWNER.

2.03 LEACHATE/STORMWATER MANAGEMENT

A. In general, the CONTRACTOR shall:

1. Collect all leachate in the refuse excavation area in such a manner as not to endanger public health, property or any portion of the work under construction or completed. The collected leachate must be pumped and/or

transported to the tie-in point provided by the OWNER. Stormwater must be routed to the appropriate Sediment Basin.

2. The CONTRACTOR must provide and maintain pumps, sumps, suction and suitable discharge lines, temporary storage and other dewatering system components necessary to convey leachate away from any excavation, as approved by OWNER.

3. Prior to beginning refuse relocation excavation activities, make visual observations or utilize survey data to establish a method of routing stormwater from the work areas to the Sediment Basin and containing leachate within to be reviewed for approval by the OWNER. Earthen dikes may be constructed surrounding the work area, and located to minimize the area inside the dikes, thus reducing potential leachate generation. The area immediately outside the dike will be sloped away from the dike to direct stormwater away from exposed refuse to the site stormwater management system and appropriate Sediment Basin.

4. Maintain, at all times, proper and effective sedimentation and erosion control around the Refuse Excavation Area and the Soil Stockpile Area as approved by State and Local Authorities. This shall include, but not be limited to placement of silt fencing and/or other means of silt retention during construction, containment of all excavations and stockpiles, directing, and channeling of all stormwater to Sediment Basins, and all other methods to prevent silty run-off from reaching a receiving water course.

2.04 LITTER CONTROL

A. The uncovering of the existing refuse may cause litter to be blown away from the working area. The CONTRACTOR shall use litter fences and/or windscreens downwind of the immediate work area to contain blowing litter for pick-up and disposal.

B. A temporary cover shall be placed over exposed waste to prevent blowing litter as well as minimize odors. As indicated previously, cover (tarps, foam, an appropriate thickness of cover material, etc.) shall minimally be placed over all exposed waste at the end of each operating day.

C. Litter may also be scattered during on site transportation of the refuse to the new landfill Pad(s). If this does occur, the CONTRACTOR shall construct additional litter fences or cover the loads. The CONTRACTOR will be responsible for continuously policing the roadway to control litter.

D. Any refuse which is blown, tracked, etc. away from the working area must be collected by the CONTRACTOR by the end of each day and disposed in the active Pad(s) or another location approved by the OWNER.

2.05 "SUSPECT" MATERIAL ENCOUNTERED DURING REFUSE EXCAVATION

A. Due to the inherent nature of excavating old refuse, the CONTRACTOR shall be constantly aware of the potential for encountering, not only leachate, but special wastes termed "suspect" materials which may need special consideration for handling and disposal. "Suspect" materials may include, but not be limited to, containers or drums (crushed or whole), liquids or leachate, strange-shaped or typically industrially generated items, uncommon odors, significant levels of volatile organic compounds (VOC's) detected by instrumentation, soil uncommon to a sanitary landfill, powders, or material that looks like it could be an asbestos containing material (e.g., transit board, asbestos roofing or shingles, or pipe lagging).

B. If the CONTRACTOR unearths "suspect" material, appropriate personal protective equipment must be utilized assuming the worst case scenario. The OWNER's representative shall be notified immediately. The OWNER will notify the PADEP Wilkes-Barre Regional Office within 24 hours.

C. Upon encountering "suspect" material, the area in question shall be initially assessed by the OWNER. If the area is large, it may be cordoned off and prepared for on site sampling. Dikes shall be formed around the area as appropriate to prevent infiltration of leachate of contamination of other fill by the "suspect" material. If the area is small, isolated and in the way of progress, the material shall be placed in a container for further evaluation and sampling.

D. "Suspect" materials will be evaluated and handled as necessary. The CONTRACTOR may be directed to place "suspect" wastes in the appropriate containers or cordon off the area. Sampling, testing and evaluating the "suspect" material may be performed by the OWNER. If the "suspect" materials must be disposed off-site, the transportation and disposal costs will be the responsibility of the OWNER. If the "suspect" material may be disposed of on-site, the CONTRACTOR will relocate the waste in accordance with these Technical Specifications. No additional compensation will be paid for material disposed on-site.

Bethlehem Landfill
2335 Applebutter Road
Bethlehem, PA 18015-6004

INCIDENT REPORT

DATE: _____ **COMPANY:** _____

TIME: _____ **DRIVER:** _____

LOCATION OF INCIDENT: _____

_____

DESCRIPTION OF INCIDENT:

_____

_____

_____

_____

_____

_____

_____

_____

_____

FOLLOW-UP ACTION TAKEN: _____

_____

_____

_____

COMMENTS: _____

_____

_____

PERSON REPORTING: _____ **TITLE:** _____

SITE MANAGER REVIEW: _____

DRIVER SIGNATURE: _____

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 5

WASTE REJECTION PROCEDURE

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

BETHLEHEM LANDFILL

Waste Rejection Procedure

PART 1 - GENERAL PROCEDURES

SCALEHOUSE

The first area that waste screening takes place once a load comes on site is at the scale house. The scale attendant is responsible for checking with the driver of each load to find out what the load consists of. If the material consists of asbestos, residual waste or contaminated soil, a manifest is required to be given to the scale house prior to disposal. In addition, outside of the scale house is an observation dock that is used to visually screen the load.

If after reviewing the manifest and visually inspecting the load, it is determined that the waste is unacceptable for disposal, the compliance manager and/or landfill manager need to be contacted immediately.

LANDFILL WORKING FACE

The equipment operators and spotters routinely observe the waste as it is dumped from the transporters truck onto the floor of the working face. If the equipment operator or spotter observes waste that is unacceptable for disposal at the facility, they will not cover the waste and immediately contact the scale house and the landfill manager and or compliance manager.

PART 2 – REPORTING

Upon spotting unaccepting waste, the scale attendant equipment operator or spotter is to immediately notify the compliance manager and or landfill manager. After which a waste rejection form needs to be competed and the event needs to be noted on the daily operation log. The generator, DFP and Township are also to be immediately contacted by telephone to alert them to the unacceptable waste.

After clean-up, an incident report needs to be submitted to the DEP and Lower Saucon Township following the procedures noted in the notification procedure of the PPC Plan.

PART 3 – CLEAN-UP

If an unacceptable wastestream is found after the load has been deposited onto the floor of the working face, a clean-up effort will need to take place. An example of this type of situation would be a municipal waste load that has unloaded and an equipment operator spots red biohazard bags present amongst the waste. The load is to be visually inspected, not handled, to prevent injury. The hauler will be retained onsite to find out who the generator of the material is. Once the generator is found, they will be immediately contacted.

Once this material is deposited onto the working face of the landfill site, personnel will take responsibility to ensure that the material is properly handled during the clean-up effort. The material will be segregated from the rest of the waste and the proper personnel will be contacted to handle the material. For example, if this material is determined to be a hazardous waste then an environmental clean-up contractor needs to be contacted, and if it is an infectious waste then a licensed infectious waste hauler needs to be contacted. Please see the notification list in Section B.3. of the PPC Plan.

WASTE ACCEPTANCE CRITERIA
IESI BETHLEHEM LANDFILL

Type of Analysis	Parameter		Maximum Value	Basis
SW 846, Method 1010 or 1020	**CHARACTERISTIC OF IGNITABILITY**		Non-Ignitable (>140F)	1
SW 846, METHOD 1110	**CHARACTERISTIC OF CORROSIVITY**		3.3 cpHc12.5	1
REACTIVE SULFIDE	**CHARACTERISTIC OF REACTIVITY**		<500mg.H2S/kg (EPA Action Level)	1
REACTIVE CYANIDE	**CHARACTERISTIC OF REACTIVITY**		<250 mg.HCN/kg (EPA Action Level)	1
TCLP	**CHARACTERISTIC OF TOXICITY**			
	Metals			
	Arsenic	< or =	3.75 mg/l	4
	Barium	< or =	75.0 mg/l	4
	Cadmium	< or =	0.75 mg/l	4
	Chromium	< or =	3.75 mg/l	4
	Lead	< or =	3.75 mg/l	4
	Mercury	< or =	0.10 mg/l	3
	Selenium	< or =	0.75 mg/l	4
	Silver	<	3.75 mg/l	4
	Volatile Organics			
	Benzene	< or =	0.375 mg/l	4
	Carbon tetrachloride	< or =	0.375 mg/l	4
	Chloroform	< or =	4.5 mg/l	4
	1,2-Dichloroethane	< or =	0.375 mg/l	4
	1,1-Dichloroethylene	< or =	0.525 mg/l	4
	Methyl ethyl ketone	< or =	150.0 mg/l	4
	Pyridine	< or =	3.75 mg/l	4
	Tetrachloroethylene	< or =	0.525 mg/l	4
	Trichloroethylene	< or =	0.375 mg/l	4
	Vinyl chloride	< or =	0.15 mg/l	4
	Chlorobenzene	< or =	75.0 mg/l	4
	Semi-Volatile Organics			
	Cresol	< or =	150.0 mg/l	5
	o-Cresol	< or =	150.0 mg/l	4
	m-Cresol	< or =	150.0 mg/l	4
	p-Cresol	< or =	150.0 mg/l	4
	1,4-Dichlorobenzene	< or =	5.625 mg/l	4
	2,4-Dinitrotoluene	< or =	0.0975 mg/l	4
	Hexachlorobenzene	< or =	0.0975 mg/l	4
	Hexachloro-1,3-butadiene	< or =	0.375 mg/l	4
	Hexachloroethane	< or =	2.25 mg/l	4
	Nitrobenzene	< or =	1.5 mg/l	4
	Pentachlorophenol	< or =	75.0 mg/l	4
	2,4,5-Trichlorophenol	< or =	300.0 mg/l	4
	2,4,6-Trichlorophenol	< or =	1.5 mg/l	4
	Herbicides/Pesticides			
	Chlordane	< or =	0.0225 mg/l	4
	Endrin	< or =	0.015 mg/l	4
	Heptachlor	< or =	0.006 mg/l	4
	Lindane	< or =	0.3 mg/l	4
	Methoxychlor	< or =	7.5 mg/l	4
	Toxaphene	< or =	0.375 mg/l	4
	2,4-D	< or =	7.5 mg/l	4
	2,4,5-TP (Silvex)	< or =	0.75 mg/l	4

WASTE ACCEPTANCE CRITERIA
IESI BETHLEHEM LANDFILL

Type of Analysis	Parameter		Maximum Value	Basis
TCLP	**NON-CHARACTERISTIC METALS**			
	Aluminum	<	10,000 mg/l	2
	Antimony	< or =	50 mg/l	6
	Beryllium	< or =	0.50 mg/l	6
	Boron	<	10,000 mg/l	2
	Copper	<	103.5 mg/l	3
	Iron	< or =	10,000 mg/l	2
	Manganese	< or =	10,000 mg/l	2
	Molybdenum	< or =	10,000 mg/l	2
	Nickel	<	113 mg/l	3
	Tin	<	10,000 mg/l	2
	Titanium	<	10,000 mg/l	2
	Thallium	< or =	10 mg/l	6
	Zinc	<	74 mg/l	3
TCLP	**NON-CHARACTERISTIC HYDROCARBONS**			
	Aromatic Halogenated	<	1,000 mg/l	2 (I)
	Aliphatic Halogenated	<	1,000 mg/l	2 (I)
	Aromatic	<	10,000 mg/l	2 (I)
	Aliphatic	<	10,000 mg/l	2 (I)
ASTM WATER LEACHING PROCEDURE	**MISCELLANEOUS**			
	Ammonia-Nitrogen	<	10,000 mg/l	2
	COD	<	30,000 mg/l	3 (II)
	Cyanide	<	32.5 mg/l	3
	Fluoride	<	10,000 mg/l	2
	Oil and Grease	<	10,000 mg/l	2
	Total Petroleum Hydrocarbons	<	10,000 mg/l	2
	Chloride	<	10,000 mg/l	2
	TOX	< or =	1,000 mg/l	6 (III)
	Nitrate	<	10,000 mg/l	2
	Nitrite	<	10,000 mg/l	2
	Sulfate	<	10,000 mg/l	2
	pH	<	3.3<pH<12.5	1
TOTAL ANALYSIS	**MISCELLANEOUS**			
	Total Solids (Lower Limit)	> or =	20.00%	Regulation
	Total Dissolved Solids		No Limit	7
	Total Volatile Solids		No Limit	7
	Free Liquids		No Free Liquids	Regulation
	PCBs (VII)	<	50 mg/kg (RCRA LIMIT)	1
	Oil and Grease	< or =	10,000 mg/kg	6 (IV)
	Total Petroleum Hydrocarbons	< or =	10,000 mg/kg	6 (IV)
	Total Phenols	< or =	10,000 mg/kg	6 (IV)
	BTEX			
	Benzene	< or =	7.50 mg/kg	4 (V)
	Toluene	< or =	10,000 mg/kg	6 (IV)
	Ethyl Benzene	< or =	10,000 mg/kg	6 (IV)
	Xylene	< or =	10,000 mg/kg	6 (IV)
	OTHER			
ASTM WATER LEACHING PROCEDURE MISCELLANEOUS	Total Solids / BOD-5	<	No Limit / 15,000 mg/l	7 / 3 (II)
	Volatile and Semivolatile Organics (vi)	<	15,000 mg/l	2 (I)
	Acids and Bases (vi)	<	10,000 mg/l	2 (I)
	Strong Oxidizers (vi)	<	10,000 mg/l	2 (I)
	Metals, Salts, Nutrients	<	10,000 mg/l	2 (I)
	Products and Various Substances (vi)	<	10,000 mg/l	2 (I)

PREPAREDNESS, PREVENTION AND CONTINGENCY PLAN (PPC PLAN)

ATTACHMENT # 6

POST RAIN EVENT INSPECTION

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

BETHLEHEM LANDFILL
POST RAIN EVENT INSPECTION

DATE:	ESTIMATED RAINFALL:
INSPECTOR:	REVIEWED:*

ROAD MAINTENANCE

ROAD	MAINTENANCE NEEDED			REPAIRS NEEDED
	WATERED	SWEPT	WASHED	
Loop @ scale area				
Paved Entrance				
Haul road to West/top of landfill				
Haul road to East/North				
Applebutter Road				
Perimeter Berm				

LEACHATE SEEPS	PRESENT		SEEP DESCRIPTION SCHEDULE FOR REPAIRS
	YES	NO	
1. West slope			
2. South slope			
3. North slope			

NOTES: ANY LEACHATE SEEP FLOWING OFF THE LANDFILL MUST BE CORRECTED IMMEDIATELY.

EROSION Slopes/Benches	EROSION		TRASH EXPOSED		DISCHARGE ISSUES	DESCRIPTION SCHEDULED REPAIRS
	YES	NO	YES	NO		
1. North Slope East of shop						
2. North Slope West of shop						
3. South Slope East of Flare						
4. South Slope West of Flare						
5. West Slope						

BASINS, PIPES & CHANNELS	EROSION		ACCUMULATED SEDIMENT		DISCHARGE ISSUES	DESCRIPTION SCHEDULED REPAIRS
	YES	NO	YES	NO		
Basin 1						
Basin 2						
Basin 3						
Basin 4						
Basin 6						

ANCHOR TRENCH - DRAINS FLOWING &/OR UNOBSTRUCTED?

	FLOWING		UNOBSTRUCTED		DESCRIPTION SCHEDULED REPAIRS
	YES	NO	YES	NO	
SOUTH PERIMETER TOE DRAINS					

*** MUST BE REVIEWED BY ONE OF THE FOLLOWING: DISTRICT MANAGER, OPERATIONS MANAGER, COMPLIANCE MANAGER, ENGINEERING MANAGER**

SECTION 7

Reclamation Plan

BETHLEHEM LANDFILL COMPANY (BLC)

PHASE V EXPANSION

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN

SUPPORTING DOCUMENTATION

SECTION 7

RECLAMATION PLAN

The reclamation plan for the Phase V Expansion includes a cap system to encapsulate the municipal solid waste at the Bethlehem Landfill. The proposed cap system will be identical to the previous cap system placed/proposed as part of the previously approved and developed expansions at the Bethlehem Landfill. For reference, we have attached hereto the approved closure plan for the Northern Realignment. An identical closure plan shall be prepared for the Phase V Expansion to be made part of the PADEP Solid Waste Permit Application.

Those areas not developed with landfill support facilities and outside the disposal footprint shall be reclaimed as detailed on the Preliminary Phase V Land Development Plan. Proposed reclamation includes landscaping, conversion of existing impervious area to pervious grass and grass cover.

ATTACHMENT 28-1

LANDFILL CLOSURE PLAN

BETHLEHEM LANDFILL COMPANY
NORTHAMPTON COUNTY, PENNSYLVANIA

BETHLEHEM LANDFILL
PADEP PERMIT NO. 100020

APPLICATION FOR
NORTHERN REALIGNMENT
July 2020

BETHLEHEM LANDFILL
APPLICATION FOR PERMIT MODIFICATION
NORTHERN REALIGNMENT

ATTACHMENT 28-1

CLOSURE PLAN

TABLE OF CONTENTS

BETHLEHEM LANDFILL
APPLICATION FOR PERMIT MODIFICATION
NORTHERN REALIGNMENT

ATTACHMENT 28-1

CLOSURE PLAN

Introduction

The purpose of this closure plan is to provide steps to develop a low permeability cap over areas containing municipal solid waste at the Bethlehem Landfill. At a minimum, the cap system shall 1.) reduce rain infiltration into the municipal solid waste, 2.) reduce leachate production, 3.) minimize and prevent erosion, and 4.) control runoff. The concepts within this closure plan include the design of an impermeable cap and closure activities which comply with state regulations.

This closure plan identifies and describes the activities that will be necessary to complete closure activities at the Bethlehem Landfill. The closure plan includes generalized discussions of the final cover and vegetative system, surface drainage run-on and runoff control, groundwater monitoring system and sampling program, landfill gas management system, leachate collection and management system, facility access control, and other measures necessary to accomplish site work to integrate the site into the surrounding area.

It is the intent of this document to describe an integrated plan for closing the Northern Realignment area. In support of this plan, drawings for the Northern Realignment landfill design show existing topography and fill grades as well as the typical landfill cap cross-section.

1.0 Schedule/Staging

The staging sequence is based upon reaching final elevations in areas of the Northern Realignment cells. The size of each closure area will be such that the closure stage can be completed within one construction season and to be able to control stormwater. Before any closure activities are scheduled to begin, drainage controls will first be constructed in a sequential manner starting at low elevations to control stormwater.

Premature Closure Procedure

The design and sequencing of the Northern Realignment disposal area has been conceptualized to allow for proper stormwater drainage to exist during the entire operating life of this disposal area. In the event that the landfill must close prior to reaching its total design height, placement of solid waste will cease and the existing grades will be adjusted to achieve good drainage and to reduce the potential for erosion. A revised closure plan will be prepared-at such time to address premature closure.

Final Closure

It is anticipated that one or more areas of the landfill will receive intermediate cover during each yearly construction season. The construction will include earthwork to accomplish final grading. Installation of the final cover system may proceed at approximately the same time as construction of landfill cells, if possible, to take advantage of economics of scale. The work includes seeding of the barren soil, and road removal and reconstruction on the final grade. Removal of structures and support equipment will also be performed during this time as their usefulness ends, unless the equipment or structures are needed to support post closure activities or subsequent landfill expansion.

Equipment that is removed from the site will be transported to the lined containment area surrounding the leachate storage tank and steam cleaned prior to leaving the site. The equipment will either be reused, salvaged or disposed of off-site at a facility(ies) permitted to accept the material(s).

The scalehouse will be removed from the site after closure of the landfill, if not being used for a citizen convenience center. The office and maintenance buildings will remain onsite at least through the post closure care period. Structures to be removed after the post closure period will be either relocated off-site or demolished and disposed of off-site at facility(ies) permitted to accept the material(s). Utilities will be disconnected and removed per utility supplier recommendations concurrent with the removal of the structures.

Final closure of the site is estimated for the year 2058, thirty-one (31) years after the last closure stage is implemented. This estimate is based on allowing one year to complete construction of the capping system and erosion and sediment controls and for final inspections by authorities, and allowing a thirty year post closure care period as required by federal regulations (40 CER 258).

2.0 Closure Components

For the purpose of this closure plan, closure activities will include construction of the final cover system (including vegetation), construction of structures to control surface run-on and runoff, installation of the final landfill gas (LFG) management system and measures to be implemented to ensure site compatibility with surrounding areas.

The plan ensures that closure will be completed in a manner that minimizes the need for future maintenance. This plan includes the following closure activities:

- constructing final sideslopes with E&S control to reduce soil erosion;
- use of a multi-layered final cover system to reduce groundwater recharge via infiltration of rainfall and to reduce soil erosion due to surface runoff;

- selection of a shallow rooted vegetative cover to reduce erosion and provide evapotranspiration;
- construction of site access control systems;
- plan for periodical sampling and analyzing samples from groundwater monitoring wells and LFG monitoring wells as described in Form 7, Hydrogeologic Information and Form K, Gas Management to this Permit Application; and
- providing a plan for performing periodic scheduled facility inspections to observe the performance of closure systems.

2.1 Final Cover System

Closure activities for the lined areas of the landfill will include construction of a final cover system. The closure activities include capping of areas in which municipal solid waste disposal activities have taken place.

Final Cover System Design

The cover system for the landfill phases will consist of the following from bottom to top:

- existing on-site fill as intermediate cover;
- geotextile;
- 40 mil LDPE or HDPE geomembrane liner;
- composite geonet
- 18 inches of common fill;
- 6 inches of topsoil to support vegetation; and,
- vegetative cover.

The total depth of the proposed cover system from the top of the initial layer of intermediate cover will be about 2 feet.

The cover system is designed to minimize the potential infiltration and/or percolation of rainfall and run-on/runoff and provide a layer of soil material that will support vegetative growth. The system will also minimize erosion of the cover and minimize maintenance activities related to the final cover.

The final cover system has been designed with surface grading that will promote surface runoff, even given the probability that minor settlement will continue to occur as deposited municipal wastes consolidate and degrade. The final cover system is also designed to minimize possible adverse effects as a result of freeze/thaw cycles.

Vegetative growth is an important aspect of the final cover system for the facility because the vegetative cover increases soil stability and helps control erosion caused by surface runoff and wind.

2.2 Drainage Controls

Surface run-on and runoff controls to be implemented during closure will include controlling the final cover surface slopes to reduce erosion. Sideslopes of the lined fill areas are designed at a maximum of 3 horizontal to 1 vertical. These grades will be maintained to minimize fill material for grade adjustments required for drainage. These slopes, combined with drainage structures and erosion control benches, will minimize infiltration of rainfall/runoff and limit excessive erosion of the cover system.

Other surface drainage structures considered appropriate for installation include drainage ways and ditches to intercept runoff on sideslopes and to convey runoff away from completed sections of the landfill. These structures control surface runoff by directing it into perimeter drainage courses that channel runoff to the sedimentation basins. Sequencing the closure to begin at the lower elevations is crucial to the success of the final closure. The construction of the impermeable cover will generate runoff that must be diverted to control down slope erosion.

The cap system will employ a drainage layer (geonet) above the impermeable membrane to remove precipitation that has infiltrated the vegetative layer. Revegetation of the final cover system should result in improved drainage control. The vegetative root structure increases soil stability and reduces soil erosion resulting from runoff. In addition, the vegetative growth increases evapotranspiration, particularly in summer months, thus reducing infiltration of rainfall and the potential for leachate generation.

A summary discussion of overall stormwater management and control practices is presented with Form I of this Permit Application.

2.3 Groundwater Monitoring System

A detailed groundwater monitoring program for the landfill is described in Form 7 of this permit application. The annual and quarterly sampling program will continue throughout the closure period for chemical parameters to be approved by PaDEP. Samples will be taken from all PaDEP approved monitoring points and analyzed for the required parameters. Continual sampling is necessary to provide data on the integrity of the liners and leachate collection system. The sampling of monitoring wells will continue throughout the post closure care period.

2.4 Landfill Gas Control and Monitoring System

Landfill gas (LFG) control will be accomplished to prevent migration, explosion and fire hazards at on or off-site structures, to prevent damage to the vegetative growth on and off-site, and to minimize the potential for odors being released off-site. LFG control and monitoring will be conducted as described in Form K, Gas Management.

2.5 Leachate Collection and Treatment System

The entire liner and leachate collection system, including all appurtenances such as leachate sumps, pumps, force mains, and storage lagoons, will be constructed prior to final site closure. After closure, access to manholes, and other leachate collection system components, will be restricted to allow only authorized personnel access to the leachate collection system. Since the entire system, except for the slope riser pumps, is designed to function under gravity flow, maintenance should consist of occasional inspections for pipe blockage and cleaning.

The closure of the landfill will result in the construction of the final cover system over the entire area of landfilling. This cover system should substantially reduce leachate generation because it is designed to minimize infiltration of precipitation into the disposed refuse. As a result, the quantity of leachate requiring treatment after the landfill is closed will be reduced below the peak generation rates anticipated during actual operations.

Construction documents will provide details and locations of pipe cleanouts. Cleanouts will be located at locations and distances adequate to maintain sufficient access to the leachate collection and conveyance piping. Immediately prior to final capping, the leachate collection piping will be flushed clean.

2.6 Access Control

Closure of the landfill, if the Northern Realignment disposal area is the final phase, will result in the elimination of municipal waste landfilling operations at the site. During the period of landfilling operations, site access control will be primarily achieved by the existing 8-foot chain link fence surrounding the site. Locking gates at access points will be used to minimize unauthorized entry onto the site. At closure, however, the requirement to control access will most likely be reduced. If additional areas are permitted for solid waste disposal, then the site will continue per the Operation and Maintenance Plan.

Future use of the site will require that access to leachate collection components (sumps, manholes and storage tank) and LFG wells be restricted to authorized personnel only. Options for access control include installation of fencing around leachate collection system components and locking cover mechanisms for leachate collection manholes and groundwater and gas monitoring wells.

2.7 Soil Erosion and Sedimentation Control

The control of soil erosion will be an on-going activity during the construction and operating life of the landfill. With the implementation of final closure, the emphasis will change to permanent soil and erosion control measures. Form I, Erosion and Sedimentation Control, contains a detailed plan for soil erosion and sediment control.

The staged schedule of closure has been developed to demonstrate a concern for erosion and sediment control. Post-Closure runoff will be controlled by construction of diversions and stabilization of slopes by vegetation. Therefore, land areas following installation of drainage diversions will generally be limited in size to an area that can be constructed in one season. This will allow the new grasses to become established prior to the next stage of construction up slope. This staged construction will continue up slope until the entire designated landfill acreage is capped and closed.

Following completion of closure and the establishment of vegetation of the capped slopes, the soils at the bottom of the site's basins will be removed and replaced with amended soils (topsoil/sand/mulch mix). Additionally, trees placed during site development in accordance with the Northern Realignment Landscape Plan shall be maintained. These restoration BMPs (Soil Amendments & Landscape Restoration) will serve to promote runoff retention and meet post construction volume reduction requirements for the Northern Realignment.

2.8 Financing

Costs of closure construction and post closure maintenance are summarized in the attached bond worksheets.

2.9 Post-Closure Contact

The contact during the post-closure period will be the site general manager at the time of closure.

BONDING WORKSHEETS
FOR
Landfills and Disposal Impoundments

July 2020

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AND WASTE MANAGEMENT

General Information

Permits: Please list all permits, approvals, licenses, registrations, other bonds, etc. for this facility.

I.D.#[1]	Authority[2]	Summary[3]
100020	DEP Waste Management Northeast Region	Solid Waste Permit
4800027	DEP – Air Program Northeast Region	Title V Permit
PAR502205	DEP – Water Quality Northeast Region	NPDES Permit

1. *List the permit I.D. number, registration number, etc. If there is no number, put in "none".*
2. *List the issuing authority's name, address and telephone number*
3. *List any closure features or monitoring requirements. As examples: For storage tanks, list the number, type and size of tanks. For NPDES permits list the number of outfalls to be monitored and ponds/plants to be maintained and/or closed.*

Date Prepared		I.D. Number
7/20	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	100020

BONDING WORKSHEET A
DECONTAMINATING THE FACILITY

Project Summary[1]: Dispose of minor volumes of waste and contaminated soils at an off-site location. Decontaminate all equipment and treat decontamination liquid on-site. Refer to Attachment A for the calculations with assumptions.

1.	Maximum volume of solid waste required to be moved or disposed as part of closure (includes cost for solidification).	20 cy
2.	Estimated volume of contaminated soils or materials (from accidents, spills, prior remediations).	20 cy
3.	Total volume of waste (line 1 + line 2).	40 cy
4	Unit cost to dispose off-site (include any analyses or transportation cost).	$32.50/cy
5	Total cost to dispose of waste (line 3 x line 4).	$1,300
6	Estimated volume of contaminated liquid generated during decontamination.	4,000 gal
7.	Unit cost to treat/dispose of contaminated liquids (including any transportation)	$1.45/1,000 gal
8.	Total cost to dispose of contaminated liquids (line 6 x line 7).	$5.80
9.	Estimated volume of fill material	N/A
10.	Unit cost of acquiring, transporting, placing and stabilizing (i.e. revegetating) fill material (include costs for off-site purchase if soil not available on-site).	N/A
11.	Total cost to fill (line 9 x line 10).	N/A
12.	Equipment decontamination cost	$1,521 LS

Total cost – all Worksheet A **$ 2,827**
(Put final total on summary cost sheet – line 1)

[1] *List the areas/equipment that will need to be decontaminated and include any assumptions made. Multiple sheets should be used to estimate the costs for different areas.*

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET B
CAP AND FINAL COVER PLACEMENT

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the facility open and in need of closure. Provide a description of the scenario with references to site development stages.

My approved cap and final cover design consists of (top to bottom):

24 inches (min.) Final Cover Soil
Drainage Composite (Geonet with Nonwoven Geotextile Heat Bonded to Both Sides)
40-mil Textured Flexible Membrane
Nonwoven Geotextile (Optional)
12 inches (min.) Intermediate Cover Soil

1. Volume of fill required for area not at final/intermediate grade, but would require filling prior to capping: 16,130 CY
2. Maximum area to be capped and covered (this should include all areas at final grade and not capped, intermediate grades and areas to be filled to get to intermediate grades then capped): 18.3 acres
3. Closure design, surveying and development of construction drawings (use $750.00/acre of number 2). $ 13,725

   a. Construction and maintenance of access roads. $included in capping bid LS

Material Volumes/Areas:

4. Earthen Materials

a.	Structural Fill	N/A CY	(Specification[1])	N/A
b.	Intermediate Cover	N/A CY	(Specification[1])	N/A
c.	Clay Cap Material	N/A CY	(Specification[1])	N/A
d.	Final Cover Soil	59,036 CY	(Specification[1])	6-inch max; 40% <#10
e.	Sand/Stone	N/A CY	(Specification[1])	N/A
f.	Other	Cap Tie in CY	(Specification[1])	N/A

5. Synthetic Materials

a.	Geotextile	797,148	Sq.Ft.	(Type)	Nonwoven
b.	FML	797,148	Sq.Ft.	(Type)	40-mil Textured
c.	Drainage Layer	797,148	Sq.Ft.	(Type)	Double Composite
d.	Other	N/A	Sq.Ft.	(Type)	N/A

6. Cap Penetrations: Estimate the number of cap penetrations that will need to be installed for closure of the facility including, but not limited to gas extraction wells, cleanouts, valve pits, etc. 16

[1] *Provide a brief description of the material specification (i.e. ¾" minus, 12" minus – 12" lifts, etc.)*

Material Unit Costs:

7. Unit cost to place or regrade material to reach final grades (this may include additional waste placement to reach grade) $5.08 $/CY

Are sufficient soils available in permitted on-site borrow areas to complete job? (Attach maps that identify sources and stockpiles) Yes-stockpiled on-site

8. Earthen Materials	Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						
b. Intermediate Cover	☒	☐	☒	☒	☐	☒
Unit cost to place[2] $5.08 $/CY						
c. Clay Cap Material	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						
d. Final Cover Soil	☒	☐	☒	☒	☒	☐
Unit cost to place[2] $7.86 $/CY						
e. Sand/Stone	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						
f. Other	☐	☐	☐	☐	☐	☐
Unit cost to place[2] $7,209/ac(cap tie in) $/CY						

9. Synthetic Materials

a. Geotextile
Unit cost to place[3] $0.163 $/sq. ft.

b. FML
Unit cost to place[3] 0.271 $/sq. ft.

c. Drainage Layer
Unit cost to place[3] 0.401 $/sq. ft.

d. Other
Unit cost to place[3] N/A $/sq. ft.

[2] *The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.*

[3] *The unit price should include the material cost, transportation cost, handling cost and installation cost.*

10. Cap Penetration Unit Cost

List the unit cost to fabricate and install each cap penetration

Unit cost to place $200 $/each

11. Unit cost to construct E & S structures (i.e. channels, letdowns, etc.) $11,272 $.acre

12. Revegetation Cost

(Seeding rate used: 58 lbs/acre)

(Lime rate used: Not specified tons/acre)

(Fertilizer rate used: Not specified tons/acre)

(Mulch rate used: +/- 1 1/2 tons/acre)

Unit cost to revegetate[3] $1,818 $/acre

13. Cost Summary

a.	Fill (line 1 x line 7)		$ 81,940
b.	Construction Drawings (line 3)		$ 13,725
c.	Construction Roads (line 3a)		$ N/A
d.	Structural Fill (line 4a x line 8a)		$ N/A
e.	Intermediate Cover (line 4b x line 8b)		$ in 13g
f.	Clay Cap Material (line 4c x line 8c)		$ N/A
g.	Final Cover (line 4d x line 8d)		$ 464,023
h.	Sand/Stone (line 4e x line 8e)		$ N/A
i.	Other (line 4f x line 8f)		$ 129,762
j.	Geotextile (line 5a x line 9a)		$ in 13k
k.	FML (line 5b x line 9b)		$ 665,619
l.	Drainage Layer (line 5c x line 9c)		$ in 13k
m.	Other (line 5d x line 9d)		$ N/A
n.	Penetrations (line 6 x line 10)		$ in 13k
o.	E & S Structures (line 2 x line 11)		$ 206,278
p.	Revegetation (line 12 x line 2)		$ 33,269
		Subtotal	**$ 1,594,616**
	CQA costs (use 5% of subtotal)		$ 79,731
		Total	**$ 1,674,347**

(Place this total on Summary Cost Worksheet – line 2)

Date Prepared		I.D. Number
7/20	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	100020

BONDING WORKSHEET C
GROUNDWATER MONITORING SYSTEM

1.	Number of wells in the approved monitoring plan.	29	
	a. Shallowest well depth	75	ft.
	b. Deepest well depth	181	ft.
	c. Average well depth	103	ft.
	d. Number with dedicated pumps	30	
2.	Unit cost to upgrade an existing well with a dedicated pump	$1,600	$/well
3.	Unit cost to install a well (assume average well depth, and include drilling, installation, developing and pump installation)	$4,000	$/well
4.	Number of wells to be installed (wells in the approved plan that haven't been installed)	0	
5.	Number of wells to be replaced over the life of the monitoring period (use 10% of line 1 and round up)	3	
6.	Number of pumps to be replaced/repaired (use 25% of line 1 over the monitoring period)	7	
7.	Unit cost to purge and sample a well (assume average well depth, and include methane monitoring, record keeping and shipping)	$105	$/well
8.	Unit cost to analyze sample(s)		
	a. Quarterly (25 PA Code §273.284, §277.284 or §288.254)	$253.25	$/well
	b. Annually (25 PA Code §273.284, §277.284 or §288.254)	$470.25	$/well
9.	Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, statistical analysis and data review)	$13	$/well
10.	Cost to purge, sample and analyze – quarterly (line 7 + line 8a + line 9)	$371	$/well
11.	Cost to purge, sample and analyze – annually (line 7 + line 8b + line 9)	$588	$/well
12.	Number of years of sampling (30 + time to close)	31	years

13. Cost Summary –Groundwater Monitoring System

a.	System upgrade ([line 1 – line 1d] x line 2)	$ 0
b.	Wells to be Installed (line 3 x line 4)	$ 0
c.	Wells to be replaced (line 3 x line 5)	$ 12,000
d.	Pumps to be replaced (line 2 x line 6)	$ 11,200
e.	Cost of Quarterly Monitoring (line 1 x "4" x line 10 x line 12)	$ 942,084
f.	Cost of Annual Monitoring (line 1 x line 11 x line 12)	$ 528,612
	Subtotal	**$ 1,470,696**

Adjustment for resampling, assessments, etc.

a.	Use 0% of subtotal if no assessments in last 2 yrs.	
b.	Use 5% of subtotal if assessment in last 2 yrs.	
c.	Use 10% if currently in assessment, abatement or increase monitoring	$ 147,069

Total **$ 1,617,765**

(Place this total on Summary Cost Worksheet – line 3)

Date Prepared		I.D. Number
7/20	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	100020

BONDING WORKSHEET D
SURFACE WATER MONITORING

Solid Waste Surface Water Sampling

1.	Number of surface points monitored for Solid Waste Permit	2	
2.	Unit cost to sample a surface point (record keeping and shipping)	100	$/point
3.	Unit cost to analyze sample(s)		
	a. Quarterly (25 PA Code §273.284 or §288.254)	175	$/point
	b. Annually (25 PA Code §273.284 or §288.254)	350	$/point
4.	Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review)	included in 3	$/point
5.	Cost to sample and analyze – quarterly (line 2 + line 3a + line 4)	275	$/point
6.	Cost to sample and analyze – annually (line 2 + line 3b + line 4)	450	$/point
7.	Number of years of sampling (30 + time to close)	31 years	

NPDES Surface Discharge Sampling

8.	Number of outfalls monitored	5	
9.	Monitoring frequency (i.e. monthly, quarterly, etc)	Semi-annual	
10.	Number of samples to be taken per point/year	2	
11.	Unit cost to sample a surface point (record keeping and shipping)	$90	$/point
12.	Unit cost to analyze sample(s) (including data review and completing DMR)	$170	$/point
13.	Number of years of sampling (30 + time to close)	31 years	
14.	Cost Summary –Surface Water Monitoring		
	a. Cost of Quarterly Surface Water Monitoring (line 1 x "4" x line 5 x line 7)	$ 51,150	
	b. Cost of Annual Surface Water Monitoring (line 1 x line 6 x line 7)	$ 27,900	
	c. Cost of NPDES Monitoring (line 8 x line 10 x [line 11 + line 12] x line 13)	$ 80,600	
	d. NPDES renewals over post-closure period (includes application development, fees, etc.) use 10% of line 14c	$ 8,060	
	Subtotal$	**$ 167,710**	

Adjustment for resampling, assessments, etc.

a. Use 0% of subtotal if no assessments in last 2 yrs.

b. Use 5% of subtotal if assessment in last 2 yrs.

c. Use 10% if in assessment, abatement or increased monitoring $ 16,771

Total $ 184,481

(Place this total on Summary Cost Worksheet – line 4)

Date Prepared		I.D. Number
7/20	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	100020

BONDING WORKSHEET E
PRIVATE WATER SUPPLY MONITORING

1.	Number of private water supplies monitored.	2	
2.	Unit cost to sample a well (include methane monitoring, record keeping and shipping)	in 3	$/well
3.	Unit cost to analyze sample(s) quarterly (Act 101 Section 1103)	1150	$/well
4.	Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review)	20	$/well
5.	Total cost for quarterly sampling (line 2 + line 3 + line 4)	1,170	$/well
6.	Number of years of sampling (30 + time to close)	31	years
7.	Cost Summary –Private Water Supply Monitoring		
	a. Cost of quarterly monitoring (line 5 x 4 x line 6)	$ 290,160	

Total $ 290,160

(Place this total on Summary Cost Worksheet – line 5)

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET F
GAS MONITORING SYSTEM

1. Number of probes in the approved monitoring plan. 15
   a. Shallowest probe depth +/- 15 ft.
   b. Deepest probe depth +/- 55 ft.
   c. Average probe depth +/- 35 ft.
   d. Number of probes installed 10
2. Unit cost to install a probe (including, drilling, and installation) $1,575 $/probe
3. Number of probes to be installed (probes in the approved plan that haven't been installed 0
4. Number of probes to be replaced over the life of the monitoring period (use 5% of line 1 and round up) 1
5. Unit cost to monitor a probe (include record keeping) 50 $/probe
6. Number of probes and structure monitoring events per year 4
7. Number of years of monitoring (30 + time to close) 31 years
8. Cost Summary –Gas Monitoring System
   a. System completion (line 3 x line 2) $ $ 0
   b. Probe replacement (line 2 x line 4) $ $ 3,150
   c. Probe Monitoring (line 1 x line 5 x line 6 x line 7) $ 93,000

Subtotal **$ 94,575**

Adjustment for resampling, assessments, etc.

a. Use 0% of subtotal if no assessments in last 2 yrs.
b. Use 5% of subtotal if assessment in last 2 yrs.
c. Use 10% if in assessment or increased monitoring

Total **$ 104,032**

(Place this total on Summary Cost Worksheet – line 6)

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET G
GAS COLLECTION SYSTEM

1. Number of wells in the approved monitoring plan. 170
   a. Shallowest well depth 30 ft.
   b. Deepest well depth 120 ft.
   c. Average well depth 75 ft.
   d. Number of wells installed 69
   e. Number of pumping wells 69
2. Cost for flare or other control device installation $ 0 (already installed) LS
3. Unit cost to install a well (including, drilling, installation, and connection to active system) $10,875 $/well
4. Unit cost to install a gas well requiring liquid removal (including, drilling, installation, and connection to active system) $12,075 $/well
5. Number of wells to be installed (wells in the approved plan that haven't been installed) 30(-6 w/pumps)
6. Number of gas wells requiring liquid removal to be installed 6
7. Estimate the length of collection piping to be installed 10,000 LF
8. Unit cost to install collection piping (include excavation, pipe bedding, pipe, backfilling, regrading, revegetating, surveying and QA/QC) $26.50 $/LF
9. Number of wells to be replaced/repaired over the life of the monitoring period (use 10% of line 1 and round up) 17
10. Unit cost to monitor well and balance system monthly (include monitoring of methane, oxygen, carbon dioxide or nitrogen, temperature, pressure, and NSPS record keeping) $24 $/well
11. Unit cost to conduct surface monitoring (NSPS) $3,400 $/event
12. Control System Information Existing
    a. number and size of blowers 2-50HP estimate
    b. flare dimensions and capacity 50' x 11' (4,000cfm)
    c. current flow rate +/-3,000
    d. other features None
13. Cost of electricity to run system $25,000 $/year
14. Cost to maintain system (including daily check, weekly charts, maintenance, etc.) $17,500 $/year
15. Cost of annual blower maintenance (including greasing, bearing check and alignment) $5,000 $/year

16. Cost of stack testing (once per five years) $13,000 $/event
17. Estimate the volume of condensate generated per year N/A gallons
18. Cost of condensate management (including pumping, testing and treatment/disposal) N/A $/year
19. Number of years to run system (30 + time to close) 31 years
20. Cost Summary –Gas Collection System See below

System Installation

a.	Additional well installation (line 5 x line 3)	$ 261,000
b.	Additional pumping well installation (line 4 x line 6)	$ 72,450
c.	Cost of collection piping (line 7 x line 8)	$ 265,000
d.	Well replacement (line 3 x line 9)	$ 184,875
e.	Enclosed ground flare system (line 2)	$ 0
	System Installation Subtotal (sum lines a to e)	$ 783,325
f.	Cost of monitoring/balancing (line 1 x "12" x line 10 x line 19)	$ 1,517,760
g.	Cost of surface monitoring (line 11 x "1.5" x line 19)	$ 158,100
h.	Electric Cost (line 13 x line 19)	$ 775,000
i.	System maintenance cost (line 14 x line 19)	$ 542,500
j.	Blower maintenance cost (line 15 x line 19)	$ 155,000
k.	Stack testing cost (line 16 x [line 19/5])	$ 80,600
l.	Condensate management cost (line 18 x line 19)	$ N/A
	System Monitoring and Maintenance Subtotal (sum lines f to l)	$ **3,228,960**

Adjustment for miscellaneous maintenance items (including; knockout pot maintenance, thermocouple replacement, flame detector replacement, flame arrester maintenance, flare maintenance, enrichment/startup gas replacement, pneumatic valve maintenance, sump maintenance, panel board maintenance, etc.)

a. Use 0% of subtotal if system[1] < 2yrs old
b. Use 5% of subtotal if system[1] is > 2 yrs old, but < 5yrs old
c. Use 10% if system[1] is > 5 yrs old

$xc= 322,896

Total (Installation subtotal + M & M subtotal + Misc. Maintenance) $ **4,339,181**

(Place this total on Summary Cost Worksheet – line 7)

[1] *The age of the system would be considered from the date that the active system went on-line. Expansions of the systems are assumed to occur, however, this does not change the age of the system unless a majority of the existing system is replaced/upgraded.*

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET H
OTHER MONITORING AND REPORTING

Please list the annual costs to maintain the following permits/registrations that apply. Additional space is provided for items applicable to your facility, but not listed.

1. Title V or other air permit (include the annual permit fee, cost to complete emissions inventory and emissions fees) $ 1,400
2. NSPS Annual Report preparation cost $ N/A
3. Local permit or Host Agreement requirements $ N/A
4. UST/AST registration $ N/A
5. Other _____ $ _____
6. Other _____ $ _____
7. Other _____ $ _____
8. Other _____ $ _____
9. Other _____ $ _____
10. Number of years of monitoring/maintenance (30 + time to close) 31 years

Total (sum of lines 1 to 9 x line 10) **$ 43,400**

(Place this total on Summary Cost Worksheet – line 8)

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET I
LEACHATE MANAGEMENT

Leachate Management System Narrative: Provide a detailed description of the leachate management system. You need to include all features of the system including but not limited to landfill sumps (with number and size of pumps and controllers), length of conveyance system, number and type of storage facilities, and treatment/disposal method. A schematic should be attached as back up.

1. Number of years of leachate management (30 years + closure period) — 31
2. Annual leachate volume generated — 14,300,000 gallons
3. Annual cost to manage leachate volume (include pump and pipe maintenance, electricity and monitoring)[1] — $ 15,250

Discharge to POTW

4. Unit cost to discharge leachate to a POTW — $1.45/1000 gallon $/gal

On-site Treatment (including pretreatment)

5. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, sludge disposal, etc.) — 0 $/gal
6. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) — $ 1,500

Interim Trucking of Leachate

7. Unit cost to transport and dispose of leachate — N/A $/gal
8. NPDES Permit (cost to prepare application, fees and sampling/analysis) — $ N/A
9. Cost to construct on-site treatment or pretreatment system or connection to POTW — $ N/A
10. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, etc.) — N/A $/gal
11. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) — $ N/A

[1] *Does not include storage of leachate which is contained on Worksheet K*

12. Cost Summary:

a.	Cost to manage/convey leachate (line 1 x line 3) $	$ 472,750
	If discharge to POTW	
b.	Discharge to POTW cost (line 1 x line 2 x line 4)	$ 642,785
	If have on-site treatment	
c.	Treatment cost (line 1 x line 2 x line 5)	$ N/A
d.	NPDES maintenance cost (line 1 x line 6)	$ 46,500 city testing
	If you currently truck leachate	
e.	Cost of trucking leachate for three years (line 1 x "3" x line 10 x line 12)	$ N/A
f.	NPDES permit (line 8)	$ N/A
g.	Cost to construct on-site treatment system or connection to POTW (line 9)	$ N/A
h.	Treatment cost ([line 1 – 3] x line 2 x line 10)	$ N/A
i.	NPDES maintenance cost ([line 1 – 3] x line 11)	$ N/A
	If you currently store leachate in impoundments	
j.	Size of pond(s)	N/A acres
k.	Estimate volume of material to be removed (including liner system and minimum of 12" of soil)	N/A CY
l.	Unit cost to dispose of materials (Worksheet A, line 4)	N/A $/CY
m.	Cost to dispose of materials (line k x line l)	$ N/A
n.	Volume of structural backfill	N/A CY
o.	Cost for backfill (line n x Worksheet B, line 8a)	$ N/A
p.	Revegetation cost	$ N/A LS
	Subtotal	**$ 1,162,035** (sum of a – i) +m+o+p)

Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

a. Add 10% of subtotal if pumps are used to convey leachate.
b. Add 5 % of subtotal if flow volume to POTW is restricted.
c. Add 10% of subtotal if leachate is stored in ponds
d. Add 10% of subtotal if onsite treatment
e. Add 15% if trucking leachate
f. Add 10% if current leachate generation exceeds 5MG/year

Final adjustment factor: 20 %

g. Adjustment (subtotal x factor) $ 232,407

Total (subtotal + adjustment) **$ 1,394,442**

(Place this total on Summary Cost Worksheet – line 9)

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET J
BORROW AREA CLOSURE

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the borrow area open and in need of closure. Provide a description of the scenario with references to site development stages.

1. Size of borrow area: 20 acres
2. Volume of material required for regrading: 32,260 CY
3. Unit cost to regrade (provide equipment and rates): 0.42 $/CY

Are sufficient soils available to complete job?
(list deficit amount and attach maps that identify sources and stockpiles)

4. Earthen Materials			Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	N/A	CY	☐	☐	☐	☐	☐	☐
b. Unit cost to place[1]	N/A	$/CY						
c. Topsoil	8,065	CY	☒	☐	☒	☐	☐	☒
d. Unit cost to place[1]	$9.16	$/CY						

5. Revegetation Cost

(Seeding rate used: 58 lbs/acre)
(Lime rate used: Not specified tons/acre)
(Fertilizer rate used: Not specified tons/acre)
(Mulch rate used: +/- 1 1/2 tons/acre)

Unit cost to revegetate: $1,818 $/acre

6. E & S Controls: $50,000 *
7. Bond Maintenance Cost (required if off-site borrow area): $ N/A LS
8. Other costs (provide detail): $ N/A

*** Replacement of soils in base of Basins 1, 2, 4 and 6 with amended soils (topsoil/sand/mulch mix).**

[1] *The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.*

9. Cost Summary

a.	Fill/Regrading (line 2 x line 3)	$ 13,549
b.	Structural Fill (line 4a x line 4b)	$ N/A
c.	Topsoil (line 4c x line 4d)	$ 73,875
d.	Revegetation (line 1 x line 5)	$ 36,360
e.	E & S Controls (line 6) *	$ 50,000
f.	Bond maintenance (line 7)	$ N/A
g.	Other (line 8)	$ N/A
	Subtotal	$ 173,784
	CQA/Project Management costs (use 5% of subtotal)	$ 8,689.20
	Total	**$ 182,473.20**

(Place this total on Summary Cost Worksheet – line 10)

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET K
FACILITY MAINTENANCE COSTS

1.	Size of facility	201 permitted	acres
2.	Size of waste placement footprint	+/-140	acres
3.	Size of borrow areas on site	20	acres
4.	Size of leachate ponds on site	N/A-tanks	acres
5.	Size of sedimentation ponds on site	6	acres
6.	Length of stormwater conveyance ditches	11,000	LF
7.	Number of years of site management (30 years + closure period)	31	years
8.	Annual Cost to repair cap and final cover[1]		
	a. Acres (use 1% of line 2)	1.40	acres
	b. Unit cost[2] to repair final cover	$3,846	$/acre
	c. Unit cost[2] to repair cap	$3,000	$/acre
	d. Unit cost[2] to repair vegetation	$100	$/acre
	e. Total unit cost (line b + line c + line d)	$6,946	$/acre
9.	Annual Cost to repair and maintain E&S facilities[1]		
	a. Channel repair length (use 3% of line 6)	330	LF
	b. Sedimentation pond repair volume (use 20% of line 5)	1.2	acres
	c. Unit cost[2] to repair channels	$15	$/LF
	d. Unit cost[2] to repair ponds	$2,498	$/acre
	e. Total annual cost (line a x line c) + (line b x line d)	7,950	$/YR
10.	Annual Cost to repair and maintain leachate ponds[1]		
	a. Leachate pond repair volume (use 20% of line 4)	N/A	acres
	b. Unit cost[2] to repair leachate pond(s)	N/A	$/acre
11.	Annual cost to repair and maintain leachate tanks		
	a. Number and size of tanks	1 - +/- 380,000 gallons	
	b. Annual unit cost1 to maintain tanks	$ 1,000	
12.	Annual cost to repair fences and gates (attach details)	$ 3,000 $/YR	

[1] *After the site is stabilized, the Department may allow a reduction in these requirements.*
[2] *Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.*

13. Annual cost to maintain site roads

a.	Length of site roads[2]	6,000	LF
b.	Annual length of site roads to be repaired (2% of line 13a)	120	LF
c.	Unit cost to repair roads[1]	$7.08	$/LF

14. Cost Summary – Facility Maintenance

a.	Cost to repair cap/cover (line 7 x line 8a x line 8e)	$ 301,456
b.	Cost to maintain E&S facilities (line 7 x line 9e)	$ 246,450
c.	Cost to maintain leachate ponds (line 7 x line 10a x line 10b)	$ 0
d.	Cost to maintain leachate tanks (line 7 x line 11a x line 11b)	$ 31,000
e.	Cost to repair fences and gates (line 7 x line 12)	$ 93,000
f.	Cost to maintain site roads (line 7 x line 13b x line 13c)	$ 26,338
g.	Cost to maintain MSE Berm (31 x $10,000/yr.)(4F+SE)	$ 465,000
	Subtotal	**$ 1,163,244**

1. Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs. Costs not incurred annually should be determine and divided among the years between events. The costs should also include replacements of pumps and meters, electricity used (pumps, heat tracing, etc.) valve replacement and sludge disposal.
2. This should include access to all maintenance and monitoring areas including but not limited to the disposal area, ponds, leachate conveyance system, tanks, discharge locations, gas extraction system wells, gas probes, groundwater monitoring system and surface water monitoring points.

Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

a. Add 5% of subtotal if final slopes or benches have been modified from what is specified in 25 PA Code §273.234(f)

b. Add 5% of subtotal if more than 30 % stormwater channels are unlined

c. Add 5% of subtotal if the length of site access roads exceeds 5 miles

d. Add 10% for mowing

Final adjustment factor: 10 %

e. Adjustment (subtotal x factor) $ 116,324

Total (subtotal + adjustment) **$ 1,279,568**

(Place this total on Summary Cost Worksheet – line 11)

[1] *After the site is stabilized, the Department may allow a reduction in these requirements.*

[2] *Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.*

CALCULATION BRIEF
BONDING WORKSHEET K
BETHLEHEM LANDFILL

OBJECTIVE: **Determine the total bond amount required for Northern Realignment**

MSE Berm Maintenance

The Subtotal includes a lump sum for the Cell 4F MSE Wall, Southeaster Realignment and the Northern Realignment Wall. The following is a summary of the estimated costs, based on those approved for the 4F, MSE Wall.

MSE Wall inspection = $1,000/year x 3 = $3,000

MSE Wall maintenance and repairs (includes removing saplings, filling animal burrows and correcting potential drainage issues including silted channels, etc.) = $4,000/year x 3 = $12,000/year

Total Cost for MSE Wall Inspection/Maintenance/Repair = ($3,000/year + $12,000/year) X 31 years = $465,000

Date Prepared: 7/20

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 100020

BONDING WORKSHEET L
SUMMARY COST WORKSHEET

Cost Summary - Landfills

1.	Decontaminating the Facility	$ 2,827
2.	Capping/Closure	$ 1,674,347
3.	Groundwater Monitoring System	$ 1,617,765
4.	Surface Water Monitoring	$ 184,481
5.	Private Water Supply Monitoring	$ 290,160
6.	Gas Monitoring	$ 104,032
7.	Gas Collection and Maintenance	$ 4,335,181
8.	Other Monitoring	$ 43,400
9.	Leachate Management	$ 1,394,442
10.	Borrow Area Closure	$ 182,473
11.	Maintenance Costs	$ 1,279,568
12.	Other Costs[1] _____	$ N/A
13.	Other Costs[1] _____	$ N/A
	Subtotal	**$ 11,108,676**

Inflation

14.	Inflation rate (projected inflation for the next three years based on the inflation for the prior three years).	5.73 %
15.	Inflation cost for facility (subtotal x line 14)	$ 636,527

Contingency and administrative fees

16.	Administrative fees (5%) (subtotal x 0.05)	$ 555,433
17.	Project Management (5%) (subtotal x 0.05)	$ 555,433
18.	Contingency fee amount (subtotal x rate of contingency fee from Table 1)	$ 1,110,867

Total (subtotal + line 15 + line 16 + line 17 + 18) **$ 13,966,936**

[1] You should include any costs that would be incurred by the Department, but were not included in these sheets. Provide separate sheets for documentation.

SECTION 8

Lehigh Valley Planning Commission Application

LVPC
Lehigh Valley Planning Commission

Subdivision and Land Development Review Application

961 Marcon Boulevard, Suite 310
Allentown, Pennsylvania 18109-9397
(610) 264-4544

Site Information

Project Name: Bethlehem Landfill Co. - Phase V Expansion

Street Address: 2335 Applebutter Road

Municipality: Lower Saucon Township

Tax Parcel ID: P7/5/33-0719, N8/14/10719E, N8/14/20719E, N8/14/1A0719, N8/14/1B0719, N8/14/150719

Internal Use Only:

Date Received: _____

Date Accepted: _____

Project Details

Project Type: *Check all that apply.*

☐ Subdivision ☒ Lot Consolidation ☐ Lot Line Adjustment ☒ Land Development ☐ Sketch Plan (if required)

☒ Stormwater Review ☐ Stormwater Resubmission

Gross Acreage: 503.46 **Disturbed Acreage:** 171 **Net Impervious Cover (Square Feet):** _____

Non-Residential	Gross Building Square Feet:	Residential	Proposed Number of Units:
☐ Commercial		☐ Apartment	
☐ Warehouse		☐ Assisted-Living	
☐ Other Industrial		☐ Condominium	
☐ Office		☐ Single-Family Detached	
☐ Retail		☐ Townhouse	
☐ Open Space + Recreation		☐ Twin	
☐ Public + Quasi-Public		☐ Planned Residential	
☐ Institutional		☐ Other	
☐ Agricultural			
☐ Other			

Contact Information

Applicant Name: Bethlehem Landfill Company

Email: david.pannucci@wasteconnections.com

Phone: 610-317-3200

Engineer/ Surveyor Name: Martin & Martin, Inc. - Joseph McDowell, PE

Email: jmcdowell@martinandmartininc.com

Phone: 717-264-6759

Record Property Owner

Name: Bethlehm Landfill Company

Address: 2335 Applebutter Road
Bethlehem, PA 18015

Email: david.pannucci@wasteconnections.com

Phone: 610-317-3200

The undersigned Applicant represents that it has the authority to make this application and to the best of its knowledge and belief, all information provided herein is true, correct and complete in all respects. The undersigned Applicant (i) understands that incomplete applications will not be accepted (ii) agrees to remit the required review fee and (iii) agrees that LVPC may distribute and reproduce all submitted material for technical review purposes.

Applicant / Authorized Agent Signature: David Pannucci **Date:** 9/8/2023

Review Fee Calculation

Non-Development *(Lot Consolidation, Lot Line Adjustment or Subdivision)**

☒ Lot Consolidation or Lot Line Adjustment ($200): **$ 200**

☐ Recreational or Agricultural Use ($200): _____

Non-Residential Use, No Development Proposed:

☐ Subdivision, Project Area 3 Acres or Less ($415): _____

☒ Subdivision, Project Area More than 3 Acres (*Rounded Up to Nearest Whole Acre*):

171 Acres - 3 Acres = **168** X $20 Per Acre = **$ 3,360** + $415 = **$ 3,775**

Residential Use, No Development Proposed:

☐ Subdivision, 6 or Fewer Proposed Lots ($265): _____

☐ Subdivision, 7 or More Proposed Lots:

_____ Proposed Lots - 6 Lots = _____ X $20 Per Lot= _____ + $265 = _____

**Non-development fee not required for concurrent land development review*

Residential Development*:

☐ 6 or Fewer Proposed Units ($265): _____

☐ 7 or More Proposed Units:

_____ Proposed Units - 6 = _____ X $20 Per Unit= _____ + $265 = _____

**Mixed-Use Development: Residential and non-residential fees are required.*

Non-Residential Development *(Gross Building Square Feet Rounded Up to Nearest 1,000)**

☐ Less than 5,000 Square Feet ($415): _____

☐ 5,000 Square Feet or More:

_____ Square Feet - 5,000 = _____ X $15 Per 1,000 Square Feet = _____ + $415 = _____

**Mixed-Use Development: Residential and non-residential fees are required.*

Stormwater Management *(Disturbed Area Rounded Up to Nearest Whole Acre)**

If the subdivision or land development is subject to a stormwater ordinance which has been enacted pursuant to a county-adopted watershed management plan, a stormwater review fee shall be submitted with the preliminary plan application. A stormwater review is required for 10,000 square feet or more of impervious cover for either the current proposal or cumulative for phased development.

☐ Less than 2 Acres Disturbed ($1,175): _____

☐ 2 to 40 Acres Disturbed:

_____ Disturbed Acres - 2 = _____ X $45 Per Acre = _____ + $1,175 = _____

☒ More than 40 Disturbed Acres: $1,175 + $4,000 Escrow = **$ 5,175** **

**Resubmission: Subject to applicable fees indicated herein.*

***Escrow Accounts: When the account falls below $250, review ceases until balance is funded to a minimum of $1,000.*

Total Required Fee: $ 9,150

Complete this application and checklist, and submit with all required materials.

Plan Submission Checklist

- ■ Complete application
- ■ One complete set of **signed and sealed** plans
- ■ Additional complete set of signed and sealed plans for stormwater review, if required
- ■ Project Description
- ■ Review fee (cash or check)
- ☐ Stormwater management report/ calculations, if required
- ☐ Traffic impact study, if required

Print Clear

(Rev. 3/1/23)

Lehigh Valley Planning Commission

SUBDIVISION/LAND DEVELOPMENT FEE SCHEDULE

LEHIGH VALLEY PLANNING COMMISSION

961 Marcon Boulevard, Suite 310, Allentown, Pennsylvania 18109-9397
(610) 264-4544

	Type of Subdivision or Land Development	Base Fee	Additional Fees
SUBDIVISION & LAND DEVELOPMENT REVIEWS			
1	Lot Line Adjustment, Lot Consolidation; Agricultural or Recreational lot involving no proposed buildings;	$200	None
2	Residential - 6 or fewer lots and dwelling units	$265	None
3	Residential - 7 or more lots and dwelling units	$265	$20.00 for each lot and dwelling unit over 6.
4	Non-Residential with proposed building(s) totaling 4,999 sq. ft. or less	$415	None
5	Non-Residential with proposed building(s) totaling 5,000 sq. ft. or more	$415	$15.00 for every 1,000 sq. ft. or part thereof for 5,000 sq. ft. or more.
6	Non-Residential with no building(s) presently proposed - total size is 3 acres or less	$415	None
7	Non-Residential with no building(s) presently proposed - total size is more than 3 acres	$415	$20.00 for each acre or part thereof over 3 acres.
STORMWATER REVIEWS: If the subdivision or land development is subject to a stormwater ordinance which has been enacted pursuant to a county-adopted watershed management plan, a stormwater review fee shall be submitted with the preliminary plan application.			
8	Subdivision or land development proposes 10,000 sq. ft. or more of impervious cover. Disturbed area does not exceed 2 acres.	$1,175	None
9	Subdivision or land development proposes 10,000 sq. ft. or more of impervious cover. Disturbed area between 2 acres and 40 acres.	$1,175	$45 per disturbed acre or part thereof exceeding 2 acres up to 40 acres.
10	Subdivision or land development proposes 10,000 sq. ft. or more of impervious cover. Disturbed area exceeds 40 acres.	$1,175	Escrow fee of $4,000. When escrow falls below $250, the review process will cease until the account balance is fully funded at a minimum of $1,000.

Current Fees Adopted 2/16/2023, Effective 3/1/2023

SECTION 9

Insurance Certificate

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 8/2/2023

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Certificate Unit	
Edgewood Partners Insurance Center 4675 MacArthur Court Suite 750 Newport Beach CA 92660	PHONE (A/C, No, Ext): (949)-474-1550	FAX (A/C, No):
	E-MAIL ADDRESS: WCNCerts@epicbrokers.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : ACE American Insurance Company	22667
INSURED Bethlehem Landfill Company 3 Waterway Square Place, Suite 110 The Woodlands, TX 77380	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** 1975154927 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY	Y		HDO G47346356	8/1/2023	8/1/2024	EACH OCCURRENCE	$ 2,000,000
	[ ] CLAIMS-MADE [X] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$ 2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 5,000,000
	[X] POLICY [ ] PRO-JECT [ ] LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	[ ] OTHER:							$
A	AUTOMOBILE LIABILITY			ISA H10757332	8/1/2023	8/1/2024	COMBINED SINGLE LIMIT (Ea accident)	$ 5,000,000
	[X] ANY AUTO						BODILY INJURY (Per person)	$
	[ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	[ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	[ ] UMBRELLA LIAB [ ] OCCUR						EACH OCCURRENCE	$
	[ ] EXCESS LIAB [ ] CLAIMS-MADE						AGGREGATE	$
	[ ] DED [ ] RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			WLR C50723069 (AOS)	8/1/2023	8/1/2024	[X] PER STATUTE [ ] OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [N] N/A (Mandatory In NH)						E.L. EACH ACCIDENT	$ 1,500,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,500,000
							E.L. DISEASE - POLICY LIMIT	$ 1,500,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

AWT Environmental P.O. Box 128, Sayreville NJ 08871, to the extent required by written contract, is an additional insured with respect to General Liability.

CERTIFICATE HOLDER

Bethlehem Landfill Company
Attn: Jennifer Canone
2335 Applebutter Road
Bethlehem PA 18015

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Brenda M. Agen

SECTION 11

Wetlands Analysis

BETHLEHEM LANDFILL COMPANY (BLC)

PHASE V EXPANSION

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN

SUPPORTING DOCUMENTATION

SECTION 11

WETLANDS

Wetlands were previously identified within the Bethlehem Landfill permit area in 1991, per the Phase III Permit. Roemer Ecological Services, Inc. reviewed the site most recently in 2014 (see attached) and determined that the wetlands area has decreased in size since 1991. Additional correspondence is also included herein (7/28/15 letter) relating to the 2014 Wetland Delineation responding to Lower Saucon Township Staff comments associated with the Southeastern Realignment Project at the Bethlehem Landfill. Delineated jurisdictional wetlands (Wetlands A, B and C) within the current Bethlehem Landfill Solid Waste Permit Area are not impacted by the proposed Phase V Expansion.

A wetlands delineation and study was performed for the additional parcels of land either previously approved to be consolidated or proposed to be consolidated with the original landfill parcel discussed above. This analysis was performed to identify wetlands and waterways to comply with the Environmental Protection Standards of the Lower Saucon Township Zoning Ordinance. These wetlands are identified on the Preliminary Land Development and Lot Consolidation Plans as Wetland D thru J. Triad Engineering, Inc. performed the delineation in 2020. The Wetland Delineation Report is attached hereto. Please note, the Triad Report identifies Wetlands A-G which does not correlate with the Phase V Preliminary Land Development Plan identifiers. These wetlands were relettered for consistency with previous mapping and analysis for the Bethlehem Landfill as Wetlands D thru J since Wetlands A, B and C were previously delineated prior to the 2020 analysis.

ROEMER ECOLOGICAL SERVICES, INC.
2334 TRACEYS STORE ROAD, PARKTON, MARYLAND 21120-9640
Telephone (443) 310-7581

Wetland Delineation
Mitigation Planning
Environmental Inventories

Permit Coordination
Impact Statements
Expert Testimony

28 July 2015

Rick Bodner, P.E.
Martin and Martin, Inc.
37 South Main Street, Suite A
Chambersburg, Pennsylvania 17201

Re: Response to Lower Saucon Township wetland comments on the Southeastern Realignment property for IESI PA Bethlehem Landfill Corporation in Lower Saucon Township, Northampton County, Pennsylvania.

Dear Mr. Bodner:

This letter responds to comments from Lower Saucon Township regarding wetlands adjacent to the proposed Southeastern Realignment for the IESI PA Bethlehem Landfill Corporation project in Lower Saucon Township, Northampton County. The Township has concerns about the extent of wetland, an Exceptional Value designation, Environmental Assessment questions, and potential bog turtle habitat. These relate to your application for a Pennsylvania Department of Environmental Protection Waste Management permit.

During my 10 April 2014 wetland delineation I carefully studied the boundary mapped in 1991 and found no evidence that wetland existed where it is shown outside the limits that I flagged. The broad strip of wetland mapped along the streams in 1991 is conspicuously absent. The watercourses have abrupt, steep banks, and except for the small wetland I flagged on an adjacent terrace, the streams at the bottom are the sole jurisdictional features.

The soil profiles in the vicinity of the wetlands I flagged are well-established and the soil horizons across the wetland/upland boundaries have ordinary transitional characteristics. The trees that grow here appear to be at least 20 years old. I found nothing to suggest that the soil has been manipulated by landfill activities.

I conclude that the 1991 delineation is inaccurate using the 1987 *Corps of Engineers Wetland Delineation Manual*, and would be with or without the current regional supplement. My 18 April 2014 letter summarized my wetland delineation. Jurisdictional boundary verifications have not been a high regulatory priority in the Philadelphia District of the US Army Corps of Engineers during my 29 years of experience. This is likely to be true for this permit application, which involves no direct impact to wetlands or waterways.

The wetlands and unnamed tributaries to the East Branch Saucon Creek are classified as Wild Trout Waters, and as a consequence wetlands on the property may be classified as Exceptional Value per PA Code Title 25, Chapter 105. Permits for the landfill in 1993 and 2003 were granted, and if no wetland or waterway encroachments are proposed, this designation would appear to have no bearing on your application.

The Environmental Assessment is used, in part, to assess a wetland's functions and values. The work proposed in your permit application is within the footprint of the existing landfill. The seven questions enumerated have little relevance because no direct wetland or waterway impacts are proposed. Consequently, the following abbreviated responses should suffice:

a. The vegetation in these wetlands was disturbed significantly when the area was used as a homestead prior to landfill construction. The wetlands do not appear to have been manipulated since the landfill was expanded. The primary herbaceous growth is a weedy invasive species. The wetland habitats are unexceptional.
b. The wetlands are not sanctuaries and are not used to study the aquatic environment.
c. The wetlands will not be altered or destroyed.
d. The wetlands are not adjacent to large waterways or bodies of water, so wave action erosion and storm damage are not factors.
e. The wetlands are at the upper reaches of the landscape and storm water from the north is largely controlled by stormwater management basins.
f. Minor groundwater recharge may occur on the periphery of these wetlands, but groundwater discharge appears to be more significant here.
g. The Cowardin classification according to National Wetland Inventory is Temporarily Flooded Palustrine Emergent that supports the herbaceous species *Phragmites australis*. This plant occurs in pockets, but the herb Nepalese Browntop (*Microstegium vimineum*) is much more extensive.

Potential bog turtle habitat is conspicuously absent. None of the three mandatory criteria are met. The mineral soils are firm and do not provide a suitable substrate for burrowing. There is no persistent trickling source of water that would prevent wintertime freezing. The vegetation bog turtles need for thermoregulation and nesting is absent.

Sincerely,

John Roemer IV
President

ROEMER ECOLOGICAL SERVICES, INC.
2334 TRACEYS STORE ROAD, PARKTON, MARYLAND 21120-9640
Telephone (410) 357-9420 FAX (410) 357-9421

Wetland Delineation
Mitigation Planning
Environmental Inventories

Permit Coordination
Impact Statements
Expert Testimony

14 June 2014

Kevin Bodner
Martin and Martin, Inc.
37 South Main Street, Suite A
Chambersburg, Pennsylvania 17201

Re: Wetland investigation on the Southeastern Realignment property for IESI PA Bethlehem Landfill Corporation in Lower Saucon Township, Northampton County, Pennsylvania.

Dear Mr. Bodner:

This letter describes my wetland delineation on approximately 25 acres that comprise developed and undeveloped land within an existing permitted area for the proposed Southeastern Realignment for the IESI PA Bethlehem Landfill Corporation project in Lower Saucon Township, Northampton County. I examined the land with you on 10 April 2014. Your client proposes to modify the landfill, and you asked me to flag the wetlands and waterways to determine if there would be potential impacts to these regulated features.

I am familiar with the property from the Martin & Martin, Inc. plan entitled *Southeastern Realignment* dated April 2014, an unlabeled Martin & Martin, Inc. plan excerpt that was printed on 25 March 2014, and aerial photos. Roughly half of the land has been graded and has roadways and two large sediment/ stormwater management basins. The entire area is circumscribed by a fence. From a historical perspective, the eastern part of the property appears to have been pasture with a few trees during the 1950s, '60s, and '70s, based on my interpretation of aerial photographs.

The land in the study area is mowed routinely, has scrub vegetation, and/or is forested. Fences, roadways, and survey markers identify the limits of the study area. Sediment basin #2 discharges to a perennial stream.

Wetlands are defined by soils, vegetation, and hydrologic factors. I used guidance from the 1987 *Corps of Engineers Wetland Delineation Manual* and the 2012 regional supplement for the Eastern Mountains and Piedmont to evaluate this land. Federal and Commonwealth agencies require use of these documents for jurisdictional purposes. A Routine Determination with an onsite inspection was performed for this property.

Wetlands Delineation Study

New Bethlehem Landfill Properties
Lower Saucon Township
Northampton County, Pennsylvania

Triad Project No. 03-20-0087

Prepared For:
Bethlehem Landfill Company
2335 Applebutter Road
Bethlehem, Pennsylvania 18015

Prepared By:
Triad Engineering, Inc.
1075-D Sherman Avenue
Hagerstown, Maryland 21740

July 20, 2020

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Wetlands Delineation Study

New Bethlehem Landfill Properties
Lower Saucon Township, Northampton County, Pennsylvania

Triad Project No. 03-20-0319

1.0 INTRODUCTION

Presented herein is a report summarizing the results of a Wetlands Delineation Study conducted by Triad Engineering, Inc. (Triad) for the new Bethlehem Landfill properties. The purpose of this study was to identify and delineate potentially jurisdictional waters of the U.S. and/or waters of the Commonwealth, including wetlands, at the site. This report outlines the results of our office analysis and field work.

2.0 SITE DESCRIPTION

The approximate 288.23-acre site is comprised of three parcels of land (Parcel ID: N8 14 15 0719, N8 14 2 0719E, and N8 14 1 0719E) in Lower Saucon Township, Northampton County, Pennsylvania. The site is located south of the Lehigh River and to the east of the Bethlehem Landfill between Applebutter Road and Riverside Drive. The Bethlehem Landfill is addressed as 2335 Applebutter Road, Bethlehem, Pennsylvania 18015. The approximate center of the site is located at 40°37'46.29"N Latitude and 75°17'49.99"W Longitude (WGS-84).

The site is in the Lehigh River Watershed (HUC8-02040106). Most of the site is in the Lehigh River-Delaware River Sub-watershed (HUC12-020401060813) while the southern portion of the site is in the Saucon Creek Sub-watershed (HUC12-020401060811). There is a tributary to the Lehigh River in the northeastern portion of the site named Bull Run, which is designated as CWF (Cold Water Fishes) protected water use per PA Code § 93.3. Bull Run consisted of a dry channel and it appeared that it only flows during storm events. In the southeastern portion of the site there is an unnamed tributary (UNT) to East Branch Saucon Creek, which is also designated as CWF protected water use per PA Code § 93.3. The East Branch Saucon Creek is a tributary to Saucon Creek, which is designated as HQ-CWF (High Quality-Cold Water Fishes) protected use.

There is relic infrastructure in the northern portion of the site, which is reportedly from when the Bethlehem Steel Corporation occupied the site. The Steel City Gun Club is currently in the northeastern portion of the site. A high voltage electric line crosses the western portion of the site. Parallel gas pipelines extend across the eastern portion of the site and there is a liquid natural gas (LNG) facility in the southeastern portion of the site. Overall, the site primarily consists of forest cover except for the LNG facility, pipelines, and shooting ranges.

A Pennsylvania Natural Diversity Inventory (PNDI) search identified the potential presence of *Ellisia nyctelea*. *Ellisia nyctelea* has distinct characteristics, e.g. its leaves are distinctive and help

to distinguish it from many other kinds of plants. *Ellisia nyctelea* flowers May thru June. In Pennsylvania, it grows on damp, shady stream banks with rich alluvial soils and sometimes in disturbed ground. During the site reconnaissance, observations were made for this target species; however, none were encountered and little or no preferred habitat was found.

The site is underlain by the following geological formations.

- Clv: Leithsville Formation (Cambrian) - Medium- to dark-gray, crystalline dolomite, light-olive-gray in places, weathering to light gray and yellowish brown; massive bedded; oolitic; pink to gray, mottled chert and dark-gray chert; thin shale and dolomitic shale interbeds; scattered sand grains; upper part is very shaly.

- Cha: Hardyston Formation (Cambrian) - Typically light-gray, fine- to medium-grained quartzite, and feldspathic sandstone; color ranges from nearly white to dark gray; massive bedded; Scolithus present in upper part; quartz-pebble conglomerate occurs at base.

- gn: Felsic to mafic gneiss (Precambrian) - Felsic to mafic gneiss - Light, medium grained; predominantly quartz and feldspar of igneous origin.

- hg: Hornblende gneiss (Precambrian) - Dark, medium grained; includes some rocks of probable sedimentary origin.

3.0 METHODOLOGY

This evaluation was performed in general accordance with the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (Y-87-1), dated January 1987, and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (ERDC/EL TR-129), dated April 2012.

Wetlands identified during this investigation have been classified in general accordance with the Cowardin system. The Cowardin system is a comprehensive classification system of wetlands and deepwater habitats that was developed for the U.S. Fish and Wildlife Service. The Cowardin system is hierarchical and includes several layers of detail for wetland classification including: a subsystem of water flow; classes of substrate types; subclasses of vegetation types and dominant species; as well as flooding regimes and salinity levels for each system.

4.0 OFFICE ANALYSIS

The applicable portions of the Nazareth and Hellertown, Pennsylvania U.S. Geological Survey (USGS) 7.5-Minute Series Topographic Maps are included as **Figure 1**. The USGS Maps identify Bull Run in the northeastern portion of the site and a stormwater management pond as part of the LNG facility in the southeastern portion of the site as the only surface water features at the site. The Lehigh River is located north of the site beyond Riverside Drive and the railway.

The National Wetlands Inventory (NWI) Mapper website maintained by the U.S. Fish and Wildlife Service (FWS) was utilized to identify potential wetland habitats at the site. The NWI Map that was produced for the site is included as **Figure 2**. The NWI Map identifies the same features as the USGS Map.

A U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Custom Soil Resource Report Map for the site is included as **Figures 3**. The Custom Soil Resource Report identifies the mapped soils at the site as:

Map Unit Symbol	Map Unit Name	Hydric Rating
GlB	Gladstone gravelly loam, 3 to 8 percent slopes	0
GlC	Gladstone gravelly loam, 8 to 15 percent slopes	0
GmB	Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery	5
GmD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	5
GmF	Gladstone gravelly loam, 25 to 55 percent slopes, very bouldery	5
GnD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	0
Mb	Middlebury silt loam	5
RzF	Ryder-Rock outcrop complex, 25 to 75 percent slopes	0
UbB	Udorthents, limestone, 0 to 8 percent slopes	0
UfB	Udorthents, sanitary landfill	2
UkaB	Urban land, 0 to 8 percent slopes	0
WaB	Washington silt loam, 3 to 8 percent slopes	1
WaD	Washington silt loam, 15 to 25 percent slopes	1

Hydric Rating indicates the percentage (0 – 100%) of a map unit's components (i.e. soil types) that meet the criteria for hydric soils. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) No. 42095C0268E, effective 7/16/2014, there is mapped 100-year floodplain in the

northern and northeastern portions of the site in association with the Lehigh River and Bull Run. Most of the site is shown in an area of minimal flood hazard (Zone X). A copy of the applicable portion of the FIRM is included as **Figure 4**.

5.0 ON-SITE INSPECTION

Patrick Upham and Tim Kellerman of Triad conducted the field work for this Wetlands Delineation Study on May 12-14, 2020. Photographs documenting site conditions on May 14, 2020 are included as **Appendix 1**.

6.0 FINDINGS

Waters of the U.S. and/or waters of the Commonwealth, as one and the same, were identified in the northeastern portion of the site consisting of Bull Run and in the southeastern portion of the site consisting of an UNT to East Branch Saucon Creek and abutting areas of palustrine forested (PFO) and palustrine emergent (PEM) wetlands. In the north-central portion of the site, several isolated watercourses and associated areas of PFO wetlands were identified that would constitute waters of the Commonwealth, but not Waters of the U.S. Bull Run, the UNT to East Branch Saucon Creek, and the isolated watercourses are physically characterized by the presence of a bed and banks and an ordinary high-water mark (OHWM). The wetlands have hydrophytic vegetation with greater than 50% of the dominant plant species having a facultative (FAC), facultative wetland (FACW), or obligate (OBL) indicator status; hydric soils, i.e., Depleted Matrix (F3) or Depleted Dark Surface (F7); and wetland hydrology. These areas were demarcated in the field with flagging by Triad and subsequently located as part of field run survey by Byers and Runyon Surveying. Wetland Determination Data Forms are included as **Appendix 2** and a Wetlands Delineation Plan is included as **Appendix 3**.

7.0 CONCLUSIONS

Triad performed a Wetlands Delineation Study, which identified jurisdictional waters of the U.S. and waters of the Commonwealth at the site. Any proposed activities that will impact these areas or the floodway will require notifying and obtaining authorization from the Pennsylvania Department of Environmental Protection (PADEP) and/or the USACE, except the following.

1. Activities waived at 25 PA Code § 105.1 2(a)(2) – Waiver 2 – Water Obstructions in a Stream or Floodway with a Drainage Area of 100 Acres or Less; and

2. Activities authorized by the PASPGP-5 without notification to the USACE District, provided the proposed regulated activities comply with all terms, conditions, limits, best management practices, and processing procedures identified and required by the PASPGP-5, and all applicable PADEP Chapter 105 authorizations.

8.0 LIMITATIONS

This investigation and report have been prepared specific to the site by Triad for the use of the addressee under the terms and limitations of our proposal and professional services agreement. The work on this project has been carried out in accordance with reasonable and acceptable environmental practices. No other warranty, either written or implied, is applicable to this project.

Our opinions and conclusions were based on observations from a point in time; however, the environmental parameters associated with wetlands and waterways are continually changing. Therefore, site conditions are likely to vary over time from those encountered during the evaluation. Since wetlands and waterways are ecological transition zones, the accuracy with which they can be delineated is limited. In addition, the evaluation of wetland parameters is subjective and regulatory personnel may interpret conditions differently based on their experience level and perspective and/or a different point in time. On this basis, our opinions and conclusions expressed herein represent our best professional judgment and are reflective of the site conditions at the time of our investigation.

According to the Code of Federal Regulations (CFR), the USACE has the authority to determine what is regulated under Section 9 and 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Similarly, the Pennsylvania Department of Environmental Protection (DEP) has authority under their Wetlands Protection Act contained in Chapter 105. On this basis, it is your option to have the USACE and/or the PADEP confirm these findings.

We appreciate the opportunity to provide our services on this project. Should you have any questions concerning this report, please contact the undersigned at 301-797-6400.

Prepared by:

TRIAD ENGINEERING, INC.

Patrick M. Upham
Environmental Scientist

Timothy J. Kellerman
Senior Environmental Scientist

TRIAD ENGINEERING, INC.

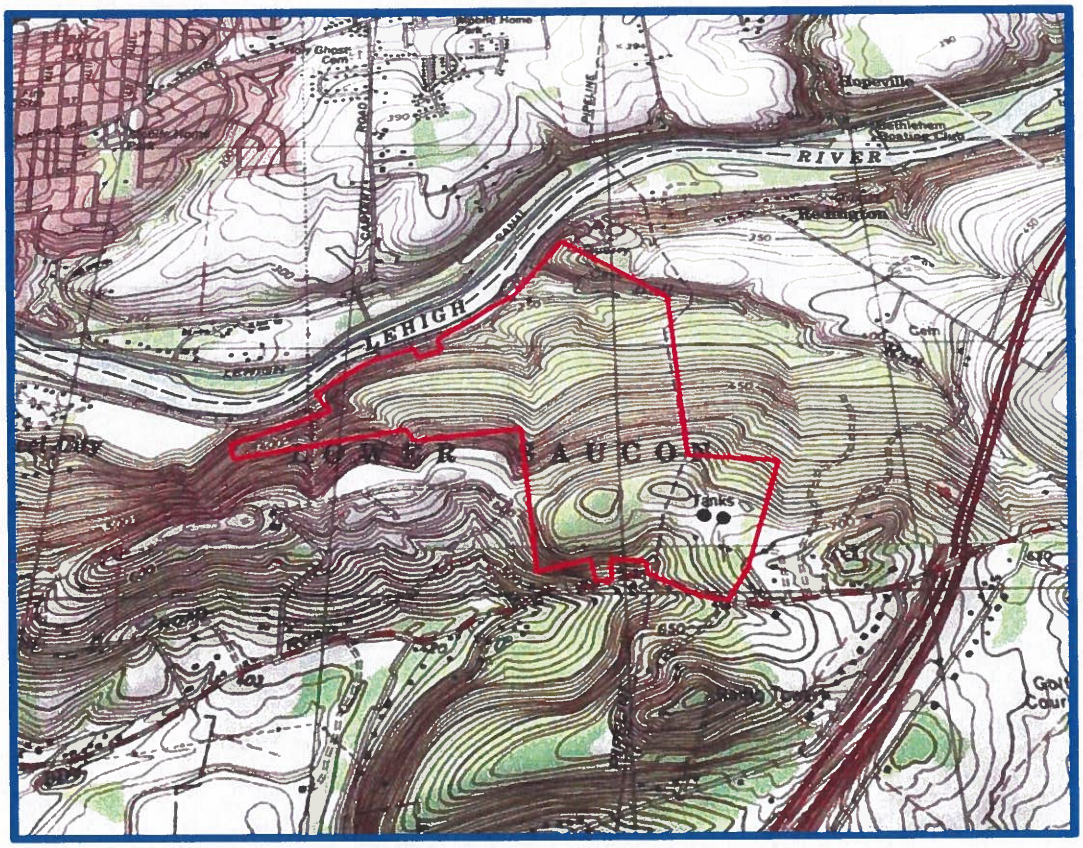
FIGURES

FIGURE 1

Bethlehem Landfill Northeast Extension
Lower Saucon Township, Northampton County, Pennsylvania

Triad Project No. 03-20-0319

USGS Topographic Map



Source: U.S. Geological Survey 7.5-Minute Series Topographic Map

N

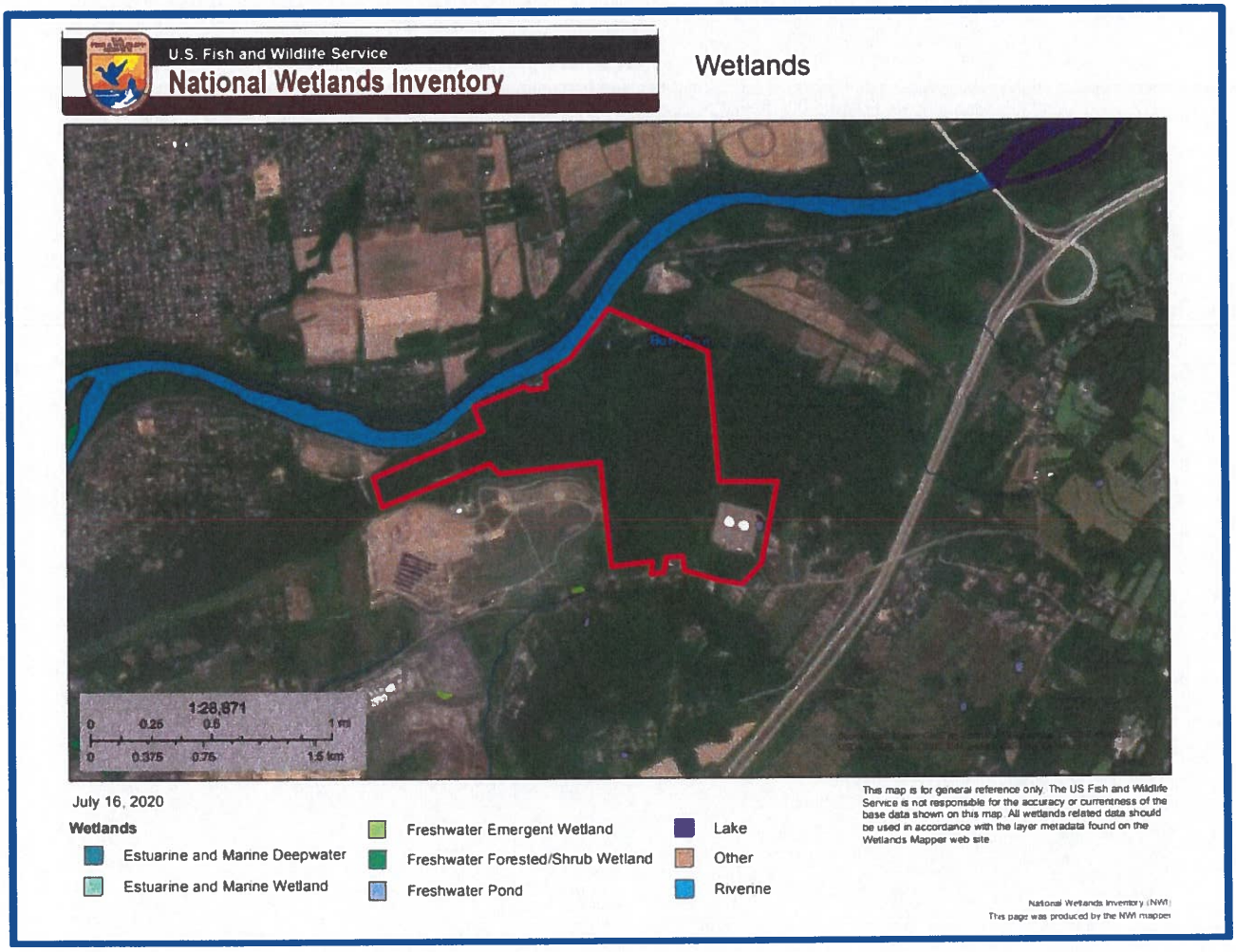
TRIAD ENGINEERING, INC.

FIGURE 2

Bethlehem Landfill Northeast Extension
Lower Saucon Township, Northampton County, Pennsylvania

Triad Project No. 03-20-0319

National Wetlands Inventory Map



Source: https://www.fws.gov/wetlands/data/mapper.html

Not to Scale

N

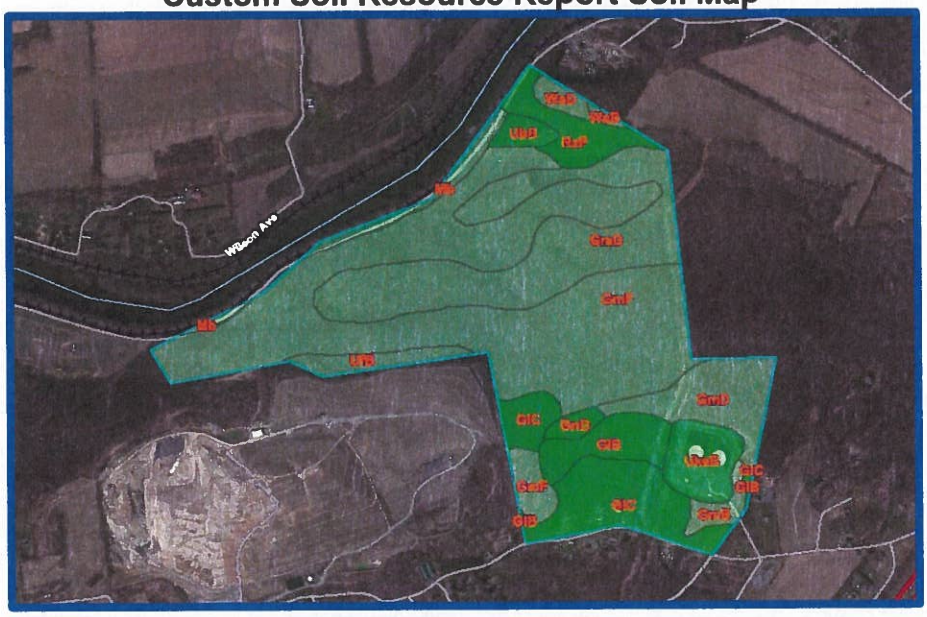
TRIAD ENGINEERING, INC.

FIGURE 3

Bethlehem Landfill Northeast Extension
Lower Saucon Township, Northampton County, Pennsylvania

Triad Project No. 03-20-0319

Custom Soil Resource Report Soil Map



Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GfB	Gladstone gravelly loam, 3 to 8 percent slopes	0	13.0	4.1%
GfC	Gladstone gravelly loam, 8 to 15 percent slopes	0	30.8	9.6%
GnB	Gladstone gravelly loam, 0 to 8 percent slopes, very bouldery	0	4.7	1.5%
GnD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	0	80.0	25.1%
GnF	Gladstone gravelly loam, 25 to 55 percent slopes, very bouldery	0	140.9	44.2%
GnD	Gladstone-Parker gravelly loams, 15 to 25 percent slopes	0	2.8	0.9%
Mc	Middlebury silt loam	0	7.2	2.3%
RsF	Ryder-Rock outcrop complex, 35 to 75 percent slopes	0	12.0	3.8%
UbB	Udorthents, limestone, 0 to 8 percent slopes	0	3.9	1.2%
UfB	Udorthents, sanitary landfill	0	6.7	2.1%
UraB	Urban land, 0 to 8 percent slopes	0	12.6	4.0%
WaB	Washington silt loam, 3 to 8 percent slopes	1	1.0	0.3%
WaC	Washington silt loam, 15 to 25 percent slopes	1	3.4	1.1%
Totals for Area of Interest			319.0	100.0%

Source: USDA NRCS Custom Soil Resource Report

N

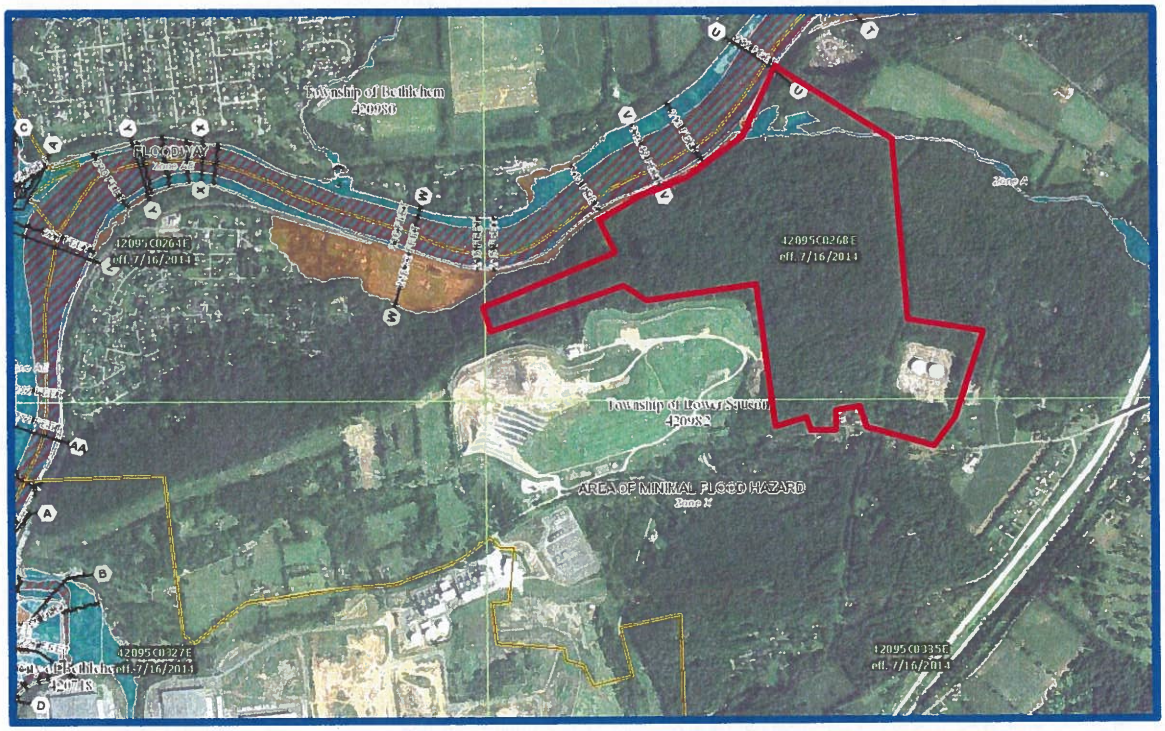
TRIAD ENGINEERING, INC.

FIGURE 4

Bethlehem Landfill Northeast Extension
Lower Saucon Township, Northampton County, Pennsylvania

Triad Project No. 03-20-0319

Flood Insurance Rate Map



Source: Federal Emergency Management Agency

N

TRIAD ENGINEERING, INC.

TRIAD ENGINEERING, INC.

APPENDIX 1

Photograph # 1 - View of a stormwater ravine in the northeastern portion of the site. Photograph location is not shown on the plan because it is beyond the limits of the inset.

Photograph # 2

TRIAD ENGINEERING, INC.

PROJECT NO. **03-20-0319**	Page 1 of 10
DATE: **5-12-14, 2020**	
CLIENT: **Martin & Martin, Inc.**	
PROJECT NAME: **Bethlehem Landfill Northeast Expansion** **Lower Saucon Township, Northampton County, Pennsylvania**	

Photograph # 3

Photograph # 4

Photograph # 5

Photograph # 6

Photograph # 7 - View of Bull Run culvert inlet in the southeastern portion of the site. Photograph location is not shown on the plan because it is beyond the limits of the inset.

Photograph # 8 - View of Bull Run in the southeastern portion of the site. Photograph location is not shown on the plan because it is beyond the limits of the inset.

Photograph # 9 - View of Bull Run in the southeastern portion of the site. Photograph location is not shown on the plan because it is beyond the limits of the inset.

Photograph # 10

Photograph # 11

Photograph # 12

Photograph # 13

Photograph # 14

Photograph # 15

Photograph # 16

Photograph # 17

Photograph # 18

Photograph # 19

Photograph # 20 - View of a dry gully in the northwestern portion of the site. Photograph location is not shown on the plan because it is beyond the limits of the inset.

TRIAD ENGINEERING, INC.

APPENDIX 2

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-1

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Erosion and drift deposits from overland flow.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Juglans nigra		Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2. Rosa multiflora		Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Microstegium vimineum		Y	FAC
2. Alliaria petiolata		Y	FACU
3. Polygonum virginianum		Y	FAC
4. Impatiens capensis		Y	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.43% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 4/3	100					GRL	
8-12	10YR 4/6	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-2

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Microstegium vimineum		Y	FAC
2. Alliaria petiolata		Y	FACU
3. Arisaema triphyllum		Y	FACW
4. Rubus phoenicolasius		Y	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 4/3	100					GRL	
8-12	10YR 5/3	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-3

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: Long: Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): ____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-3

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus pennsylvanica		Y	FACW
2. Platanus occidentalis		Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	

Herb Stratum (Plot size:)			
1. Arisaema triphyllum		Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/1	100					GRL	
2-10	10YR 4/1	70	10YR 4/6	30	RM	M	GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-4

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?**	Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____		
Wetland Hydrology Present?	Yes ✓ No _____		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-4

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Symplocarpus foetidus		Y	OBL
2. Arisaema triphyllum		Y	FACW
3. Polygonum virginianum		Y	FAC
4. Viola cucullata		Y	FACW
5. Microstegium vimineum		Y	FAC
6. Impatiens capensis		Y	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 8	10YR 3/1	100					GRL	
8-12	10YR 5/8	70	10YR 6/1	30	C	PL	GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ✓ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-5

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-5

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus rubra		Y	FACU
2. Liriodendron tulipifera		Y	FACU
3. Carya glabra		Y	FACU
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2. Viburnum prunifolium		Y	FACU
3. Hamamelis virginiana		Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	

Herb Stratum (Plot size:)			
1. Podophyllum peltatum		Y	FACU
2. Arisaema triphyllum		Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	

Woody Vine Stratum (Plot size:)			
1. Toxicodendron radicans		Y	FAC
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 4	10YR 4/3	100					GRL	
4-12	10YR 5/4	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-6

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-6

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	

Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	

Herb Stratum (Plot size: _____)			
1. Symplocarpus foetidus		Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 8	10YR 3/1	100					GRL	
8-								Rock

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-7

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-7

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus rubra		Y	FACU
2. Liriodendron tulipifera		Y	FACU
3. Fagus grandifolia		Y	FACU
4. Tilia americana		Y	FACU
5.			
6.			
7.			
8.			
	0%	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	

Herb Stratum (Plot size:)			
1. Actaea pachypoda		Y	UPL
2. Alliaria petiolata		Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	

Woody Vine Stratum (Plot size:)			
1. Toxicodendron radicans		Y	FAC
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14.29% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 6	10YR 4/3	100					GRL	
6-12	10YR 5/3	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-8

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-8

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	

Herb Stratum (Plot size:)			
1. Impatiens capensis		Y	FACW
2. Poa palustris		Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 10	10YR 3/1	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-9

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: Long: Datum: WGS 84

Soil Map Unit Name: GmF - Gladstone gravelly loam, 0-8 percent slopes, very bouldery NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✓
Hydric Soil Present?	Yes ____ No ✓	
Wetland Hydrology Present?	Yes ____ No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ✓	Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-9

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer negundo		Y	FAC
2. Fraxinus pennsylvanica		Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin		Y	FAC
2. Viburnum prunifolium		Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Rubus phoenicolasius		Y	FACU
2. Alliaria petiolata		Y	FACU
3. Polygonum virginianum		Y	FAC
4. Impatiens capensis		Y	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Celastrus orbiculatus		Y	FACU
2. Parthenocissus quinquefolia		Y	FACU
3. Toxicodendron radicans		Y	FAC
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 11 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 54.55% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 10	10YR 4/3	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-10

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GIC - Gladstone gravelly loam, 8-15 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No _____	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ✓	No _____	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-10

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lindera benzoin			FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Phragmites australis		Y	FACW
2. Symplocarpus foetidus		Y	OBL
3. Eleocharis palustris		Y	OBL
4. Impatiens capensis		Y	FACW
5. Carex vulpinoidea		Y	OBL
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 10	10YR 5/2	70	10YR 4/6	30	RM	M	GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont

Project/Site: Bethlehem Landfill City/County: Bethlehem/Northampton Sampling Date: 14 May, 2020

Applicant/Owner: Bethlehem Landfill Company State: PA Sampling Point: DP-11

Investigator(s): Triad Engineering, Inc. Section, Township, Range: Lower Saucon

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 3 to 8

Subregion (LRR or MLRA): MLRA 147 Lat: _____ Long: _____ Datum: WGS 84

Soil Map Unit Name: GIC - Gladstone gravelly loam, 8-15 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No ✓	Depth (inches): _____
Water Table Present?	Yes _____	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: DP-11

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1. Lonicera tatarica			FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	0%	= Total Cover	
Herb Stratum (Plot size:)			
1. Lolium perenne		Y	FACU
2. Solidago sp.		Y	FACU
3. Rubus phoenicolasius		Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0%	= Total Cover	
Woody Vine Stratum (Plot size:)			
1. Lonicera japonica		Y	FACU
2.			
3.			
4.			
5.			
6.			
	0%	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: DP-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 10	10YR 4/3	100					GRL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

TRIAD ENGINEERING, INC.

APPENDIX 3

WETLANDS DELINEATION PLAN
(OVERALL SITE PLAN)

NORTHAMPTON CO
LOWER SAUCON TWP

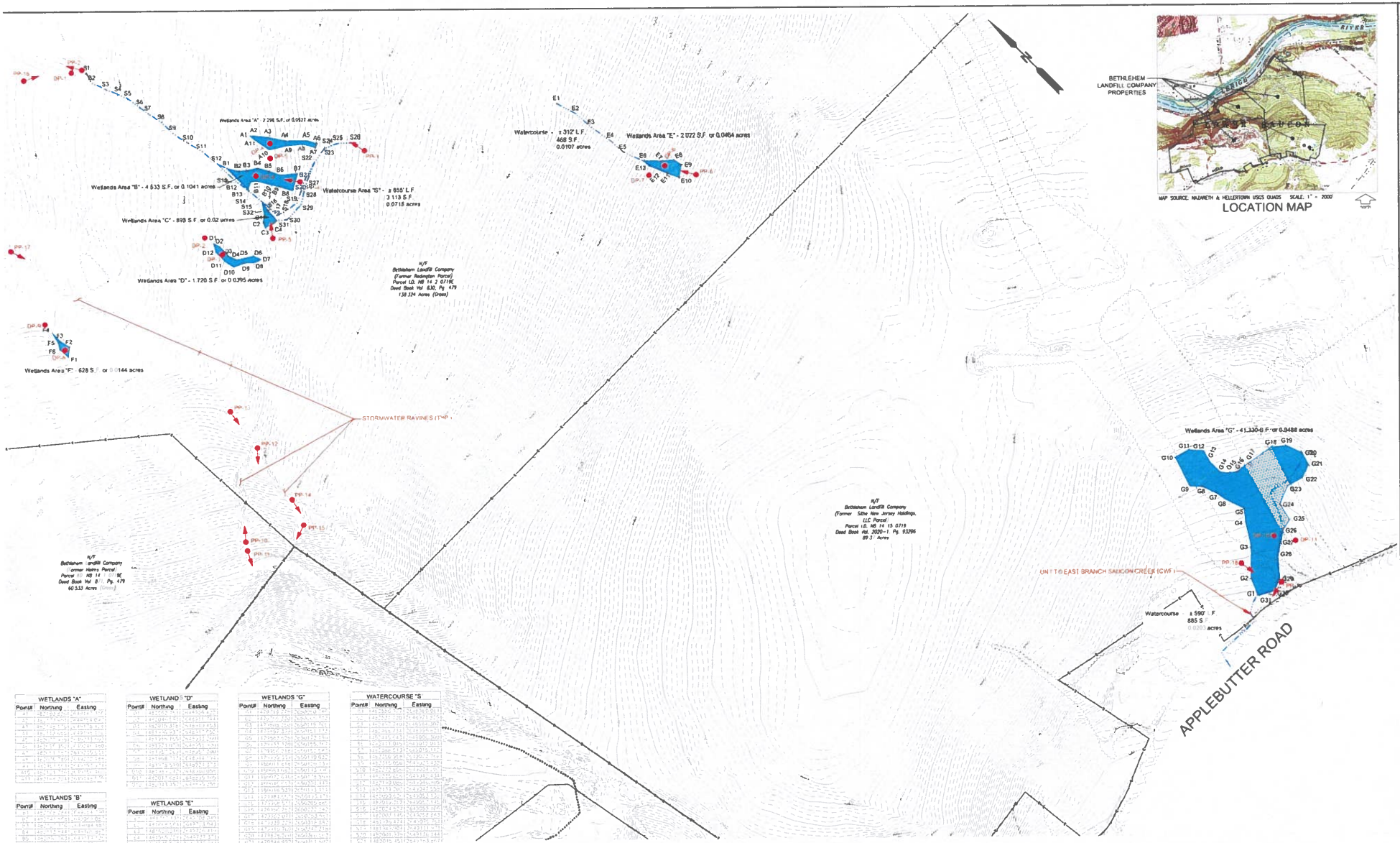
Bethlehem Landfill Company
WASTE CONNECTIONS INC

NO. | REVISION | DATE

SEAL

martin and martin incorporated
37 south main street • suite A
chambersburg, pennsylvania 17201
phone: (717) 264-6759

CADD FILE: 1162_4WDP20-01.DWG
DATE: JULY 2020
SCALE: 1" = 300'
DRAWING NO. 1



WETLANDS "A"		
Point#	Northing	Easting

WETLANDS "B"		
Point#	Northing	Easting

WETLANDS "C"		
Point#	Northing	Easting

WETLAND "D"		
Point#	Northing	Easting

WETLANDS "E"		
Point#	Northing	Easting

WETLANDS "F"		
Point#	Northing	Easting

WETLANDS "G"		
Point#	Northing	Easting

WATERCOURSE "S		
Point#	Northing	Easting

LEGEND
- WATERCOURSE
- PFO WETLANDS
- PEM WETLANDS
- DP-1 - DATA PLOT LOCATION
- PP-2 - PICTURE POINT LOCATION AND DIRECTION

NOTES:
1. PROPERTY BOUNDARY ACREAGE REFERENCES BETHLEHEM LANDFILL COMPANY PARCEL I.D. NB 14 1 0719E & PARCEL I.D. NB 14 2 0719E FROM BOUNDARY SURVEY CITY OF BETHLEHEM BY KEYSTONE CONSULTING ENGINEERS, INC. DATE MARCH 31 1998
NB-14-1-0719E LANDFILL COMPANY PARCEL I.D. NB 14 1E 0719 FROM NORTHAMPTON COUNTY PROPERTY RECORDS (MAP 6, BLOCK C)
2. TOPOGRAPHY COMPILED FROM AERIAL PHOTOGRAPHY EXPOSED 03/03/20 AND 2/4/19 BY SOUTHERN RESOURCES MAPPING CORPORATION 5105 HWY. 171 NORTHPORT, ALABAMA 35473
3. OWNER: BETHLEHEM LANDFILL COMPANY 7335 APPLEBUTTER ROAD BETHLEHEM, PA 18015
4. WETLANDS AND WATERCOURSES SHOWN HEREON WERE DELINEATED BY TRAD ENGINEERING INC. ON MAY 12-14, 2020 AND SUBSEQUENTLY FIELD SURVEYED BY BYERS AND RUMLYN SURVEYING, LLC ON MAY 29 AND JUNE 1-2, 2020.

martin and martin incorporated
37 south main street • suite A
chambersburg, pennsylvania 17201
phone: (717) 264-6759

WETLANDS DELINEATION PLAN
Bethlehem Landfill Company
WASTE CONNECTIONS INC
LOWER SAUCON TWP. NORTHAMPTON CO.

NO.	REVISION	DATE

SEAL

PROJ. NO. 1162.6 DES. BY: MSH DWN. BY: CHK. BY:

CADD FILE: 1162_4WDP20-02.DWG
DATE: JULY 2020
SCALE: 1" = 100'
DRAWING NO. 2

SECTION 12

Deed/Surrounding Property Notifications

BETHLEHEM LANDFILL COMPANY (BLC)

PHASE V EXPANSION

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN

SUPPORTING DOCUMENTATION

SECTION 12

DEED

The proposed project area of development, 171 acres, is located within the proposed Bethlehem Landfill consolidated lot containing 503.46 acres. Bethlehem Landfill Company owns all parcels to be consolidated consisting of the following tax parcels – P7/5/330719, N8/14/10719E, N8/14/20719E, N8/14/1A0719, N8/14/150719, N8/14/1B0719.

The approved Northern Realignment Land Development and Lot Consolidation Plan proposed consolidation of Tax Parcels P7/5/330719, N8/14/10719E and N8/14/20719E. The Phase V Expansion proposed further consolidation to this approved lot as detailed on the Lot Consolidation Plan. Upon Final approval of the Phase V Expansion and recording of the Lot Consolidation Plan, a Deed of Consolidation will be prepared and filed.

Contained herein, are the current deeds for the parcels to be consolidated as summarized below for reference:

DEED TABLE

#	Name Reference	Tax Map ID	Deed Reference
1.	Original LF Lot	P7/5/330719	2000-1 Pg. 088738
2.	Helms Lot	N8/14/10719E	2022-1 Pg. 269095 Prop. #1
3.	Redington Lot	N8/14/20719E	2022-1 Pg. 269095 Prop. #2
4.	Flowers Lot	N8/14/1A0719	2022-1 Pg. 150680
5	Hahn Lot	N8/14/1B0719	2023-1 Pg. 020448
6.	Tank Farm Property	N8/14/150719	2020-1 Pg. 093296

ORIGINAL LANDFILL LOT

AFFIDAVIT FILED

(Bethlehem)

DEED OF CONSOLIDATION

THIS INDENTURE made the 13th day of July in the year of our Lord Two Thousand (2000) between **IESI PA BETHLEHEM LANDFILL CORPORATION**, a Delaware corporation, formerly known as Eastern Waste of Bethlehem, Inc. (hereinafter called the "**Grantor**"), of the one part, and **IESI PA BETHLEHEM LANDFILL CORPORATION**, a Delaware corporation (hereinafter called the "**Grantee**"), of the other part,

WHEREAS, The City of Bethlehem, a municipal corporation and political subdivision of the Commonwealth of Pennsylvania, by Deed dated July 17, 1998, and recorded in the Office for the Recording of Deeds in and for Northampton County, Pennsylvania (the "**Recorder of Deeds Office**") in DBV 1998-1, page 093368, granted and conveyed unto Eastern Waste of Bethlehem, Inc. ("Eastern Waste") the property identified as Premises "A" on Schedule "1" attached hereto and made a part hereof, containing approximately 206.455 acres on Applebutter Road, Lower Saucon Township, Northampton County, Pennsylvania and identified as Northampton County Uniform Parcel Identification Nos.: Map P7, Block 5, Lots 31, 33 and 34; Map P8, Block 1, Lot 1; and Map N8, Block 14, Lot 16.

WHEREAS, Randy Dalrymple and Dianne Lynn Dalrymple, husband and wife, by Deed dated August 18, 1998, and recorded in the Recorder of Deeds Office, in DBV 1998-1, page 110131, granted and conveyed unto Eastern Waste the property identified as Premises "B" on Schedule "1" attached hereto and made a part hereof, being designated as Northampton County Uniform Parcel Identification No.: Map P7, Block 5, Lot 32 and known as 2305 Applebutter Road, Lower Saucon Township, Northampton County, Pennsylvania.

WHEREAS, Richard C. Fox, by Deed dated December 18, 1998, and recorded in the Recorder of Deeds Office, in DBV 1998-1, page 176936, granted and conveyed unto Eastern Waste, the property identified as Premises "C" on Schedule "1" attached hereto and made a part hereof, being designated as Northampton County Uniform Parcel Identification No.: Map P7, Block 5, Lot 29, located on the north side of Easton Road, Lower Saucon Township, Northampton County, Pennsylvania.

WHEREAS, IESI PA Corporation, a Delaware corporation, acquired all of the stock of Eastern Waste and changed the name of Eastern Waste to IESI PA Bethlehem Landfill Corporation.

WHEREAS, CitiFinancial Services, Inc., a Pennsylvania corporation, by Deed dated July 13, 2000, intended to be recorded in the Recorder of Deeds Office immediately prior to the recording of this Deed of Consolidation, granted and conveyed unto IESI PA Bethlehem Landfill Corporation the property identified as Premises "D" on Schedule "1" attached hereto and made a part hereof, being designated as Northampton County Uniform Parcel Identification No.: Map P7, Block 5, Lot 31B and known as 2297 Applebutter Road, Lower Saucon Township, Northampton County, Pennsylvania.

WHEREAS, Premises "A", "B", "C" and "D" abut each other.

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SCHEDULE "1"

PREMISES "A"

DESCRIPTION OF LANDS
NOW OR FORMERLY OF THE CITY OF BETHLEHEM
"LANDFILL TRACT"

ALL THAT CERTAIN tract or parcel of land with improvements thereon located along the northerly side of Applebutter Road (SR 2012) east of the Borough of Freemansburg in the Township of Lower Saucon, County of Northampton and Commonwealth of Pennsylvania, bounded and described in accordance with a survey conducted by Keystone Consulting Engineers, Inc. as shown as the "Landfill Tract" on the plan entitled, "Plan Showing Boundary Survey - Along Lands Now or Formerly of City of Bethlehem," Drawing No. CB-98-012, dated: March 31, 1998, last revised: July 16, 1998, as follows to wit;

BEGINNING at an iron pin set in the ultimate northerly right-of-way of Applebutter Road (SR 2012 - 60 feet wide), said point being the southeasterly corner of lands now or formerly or Ronald E. and Rhoda J. Mullikin, distant 30.00 feet from the centerline of the aforesaid Applebutter Road, and located approximately 1896 feet west of the intersection of Applebutter Road and Ringhoffer Road (TR 400);

thence along said Mullikin lands the following three (3) courses and distances: 1) North 25° 23' 58" West, 155.79 feet to an iron pin set; 2) North 34° 40' 01" West, 409.17 feet to an iron pin found; 3) along the arc of a curve to the left having a radius of 150.00 feet and a central angle of 71° 42' 30", an arc length of 187.73 feet to an iron pin found;

thence continuing along said Mullikin lands and further along lands now or formerly of Joseph M. and Margaret L. Milan and lands now or formerly of Joseph P. and Mary Ann Mosiado, South 73° 37' 29" West, 376.87 feet to an iron pin found;

thence along lands now or formerly of Richard D. and Cynthia S. Gardner South 68° 20' 51" West, 123.21 feet to an iron pin found in the center of the 33.00 feet wide right-of-way of Green Hill Road (TR 399);

thence crossing the northerly side of said Green Hill Road, along lands now or formerly of Richard C. Fox, the following two (2) courses and distances: 1) North 07° 18' 18" West, 395.14 feet to an iron pin found; 2) North 08° 05' 04" West, 874.29 feet to an iron pin found at a corner of lands now or formerly of Bushkill Valley Motorcycle Club, Inc.;

thence along said Motorcycle Club lands, the following three (3) courses and distances: 1) North 35° 59' 56" East, 327.50 feet to an iron pin set; 2) North 69° 31' 56" East, 545.05 feet to an iron pin found; 3) North 04° 35' 26" East, 462.72 feet to a PK nail set in a stone corner found at a corner of other lands, formerly of Michael L. Helms, et. al., now of the City of Bethlehem;

thence along the "Old Helms Tract," now of the City of Bethlehem, the following four (4) courses and distances: 1) North 77° 33' 48" East, 808.42 feet to an iron pin found; 2) North 77° 06' 37" East, 676.45 feet to an iron pin set along the south side of a dirt road; 3) South 46° 53' 23" East, 231.00 feet to an iron pipe found; 4) North 82° 57' 18" East, 1708.69 feet to an iron pin set at a corner of lands formerly of Bethlehem Steel Corporation now of the City of Bethlehem;

thence along the "Old Bethlehem Steel Corporation Tract," now of the City of Bethlehem, South 10° 18' 22" East, 255.75 feet to an iron pin set at a corner of lands now or formerly of Jersey Central Power and Light Company;

thence along said Jersey Central Power and Light Company lands, South 10° 17' 49" East, 1497.80 feet to an iron pipe found in the line of lands now or formerly of Andrew I. Nuss;

thence along said Nuss lands, South 71° 31' 29" West, 139.17 feet to an iron pipe found at a corner of lands now or formerly of Bronius and Elena Sudzinskas;

thence along said Sudzinskas lands, South 71° 35' 06" West, 240.74 feet to an iron pin found at a corner of lands now or formerly of Virignia A. MacDonald;

thence along said MacDonald lands the following two (2) courses and distances: 1) South 71° 15' 06" West, 142.59 feet to an iron pin set; 2) South 30° 43' 54" East, 293.47 feet to an iron pin set in the ultimate northerly right-of-way of Applebutter Road (SR 2012), said point being distant 30.00 feet from the centerline of said road;

thence along the ultimate northerly right-of-way of Applebutter road (SR 2012), parallel and 30.00 feet distant from the centerline thereof, the following three (3) courses and distances: 1) along the arc of a curve to the right having a radius of 404.09 feet, a central angle of 10° 26' 22", an arc length of 73.63 feet and a chord bearing south 72° 07' 54" West, a chord length of 73.52 feet to an iron pipe found; 2) South 77° 21' 06" West, 197.15 feet to an iron pipe found; 3) along the arc of a curve to the left having a radius of 665.70 feet and a central angle of 19° 13' 43", an arc length of 223.41 feet to an iron pin set in the line of lands now or formerly of Charles F. Folk;

thence along said Folk lands the following three (3) courses and distances: 1) North 24° 48' 15" West, 204.85 feet to an iron pin set; 2) South 58° 11' 45" West, 407.75 feet to an iron pin set; 3) South 38° 03' 15" East, 198.55 feet to an iron pin set in the aforementioned ultimate northerly right-of-way of Applebutter Road (SR 2012);

thence along the ultimate northerly right-of-way of Applebutter Road (SR 2012), parallel and 30.00 feet distant from the centerline thereof, the following ten (10) courses and distances: 1) South 73° 28' 59" West, 175.13 feet to an iron pipe found; 2) along the arc of a curve to the right having a radius of 173.43 feet and a central angle of 42° 56' 08", an arc length of 129.96 feet to an iron pipe found; 3) North 63° 34' 53" West, 42.99 feet to an iron pipe found; 4) along the arc of a curve to the left having a radius of 430.00 feet and a central angle of 33° 07' 53", an arc length of 248.65 feet to an iron pipe found; 5) South 83° 17' 15" West, 196.06 feet to an iron pipe found; 6) along the arc of a curve to the right having a radius of 3970.00 feet and a central angle of 02° 25' 30", an arc length of 168.03 feet to an iron pipe found; 7) South 85° 42' 45" West, 103.75 feet to an unmarked point within an historical structure; 8) along the arc of a curve to the left having a radius of 480.00 feet and a central angle of 16° 43' 41", an arc length of 140.14 feet to an iron pipe found; 9) South 68° 59' 04" West, 219.28 feet to an iron pin set; 10) South 67° 42' 43" West, 580.59 feet to an iron pipe found in the line of lands now or formerly of Randy and Dianne Lynn Dalrymple;

thence along said Dalrymple lands the following three (3) courses and distances: 1) North 25° 59' 15" West, 139.03 feet to an iron pipe found; 2) South 70° 25' 44" West, passing through an iron pipe found on line at 61.34 feet, a total distance of 183.83 feet to a PK nail set in concrete; 3) South 25° 23' 58" East, 156.57 feet to an iron pin set in the ultimate northerly right-of-way of Applebutter Road (SR 2012);

thence along the said ultimate northerly right-of-way of Applebutter Road (SR 2012), parallel and 30.00 feet distant from the centerline thereof, along the arc of a curve to the left having a radius of 1630.00

feet, a central angle of 01° 45' 40", a chord bearing South 60° 50' 57" West and a chord distance of 50.10 feet, an arc length of 50.11 feet to an iron pin set at the point and place of BEGINNING.

CONTAINING 206.455 acres of land, more or less.

SUBJECT to the easements, restrictions and rights-of-way of record.

As amended by Quit-Claim Deed by and between the Township of Lower Saucon and the City of Bethlehem dated July 15, 1998, and recorded in the Office for the Recorder of Deeds in and for Northampton County, Pennsylvania, on July 17, 1998 in DBV 1998-1, page 093364.

And as futher amended by Quit-Claim Deed by and between the City of Bethlehem and Eastern Waste of Bethlehem, Inc. dated May 27, 1999 and recorded in the Office for the Recorder of Deeds in and for Northampton County, Pennsylvania, on _____ in DBV _____, page _____.

BEING KNOWN AS Northampton County Uniform Parcel Identification Nos.: Map P7, Block 5, Lots 31, 33 and 34; Map P8, Block 1, Lot 1; and Map N8, Block 14, Lot 16.

SCHEDULE "1"

PREMISES "B"

ALL THAT CERTAIN messuage or tenement and piece or parcel of land situate in the Township of Lower Saucon, County of Northampton and State of Pennsylvania, bounded and described as follows, to wit:

BEGINNING at a post in a public road along lands now or formerly of Amandus Uhler; thence northwardly along lands now or late of William P. Lerch one hundred eighty-six (186) feet to lands now or formerly of said William P. Lerch and William Swartz; thence along lands of said William P. Lerch and William Swartz eastwardly one hundred eighty-three (183) feet to lands of the said William A. Swartz; thence southwardly one hundred eighty-six (186) feet to the aforesaid public road and land now or late of Amandus Uhler; thence westwardly one hundred eighty-three (183) feet to the place of beginning.

ALSO KNOWN AS NORTHAMPTON COUNTY PARCEL IDENTIFIER:
MAP: P7 BLOCK: 5 LOT: 32

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SCHEDULE "1"

PREMISES "C"

ALL THAT CERTAIN Lot or piece of ground situate, lying and being in Lower Saucon Township, Northampton County, Pennsylvania, bounded and described as follows, to wit:

BEGINNING at a point in Green Hill Road in line of land now or late of Charles Lerch; thence leaving said Green Hill Road and running along land now or late of said Charles Lerch, North four degrees fifteen minutes West (N 4° 15' W) one thousand two hundred twelve and seventy-five hundredths (1212.75) feet to a point; thence along line of land now or late of Erwin Freeman North seventy-two degrees thirty minutes East (N 72° 30' E) four hundred and thirty-seven and twenty-five hundredths (437.25) feet to a point; thence partly along land now or late of Charles Swartz and partly along land now or late of Charles Lerch south four degrees East (S 4° E) twelve hundred forty-two and forty-five hundredths (1242.45) feet to a point in Green Hill Road; thence along said road in a southwesterly direction five hundred and thirty feet, more or less, to the place of beginning.

BOUNDED on the North by land now or late of Erwin Freeman, on the South by Green Hill Road, on the East partly by land now or late of Charles Swartz and partly by land now or late of Charles Lerch, and on the West by land now or late of Charles Lerch.

BEING KNOWN AS Northampton County Uniform Parcel Identification No.: Map P7, Block 5, Lot 29.

SCHEDULE "1"

PREMISES "D"

ALL THAT CERTAIN tract or parcel of land with improvements thereon located along the northerly side of Applebutter Road (SR 2012) east of the Borough of Freemansburg in the Township of Lower Saucon, County of Northampton and Commonwealth of Pennsylvania, bounded and described in accordance with a survey conducted by Keystone Consulting Engineers, Inc. and shown as Lot 2 on the plan entitled, "Plan Showing Property Boundaries To Be Consolidated By IESI PA Bethlehem Landfill Corp.," Drawing No. CB-00-090, dated: June 30, 2000, revised: July 11, 2000, as follows to wit:

BEGINNING at an iron pin set in the northerly right-of-way of Applebutter Road (SR 2012 - 60 feet wide), said point being the southeasterly corner of lands now or formerly of Ronald E. and Rhoda J. Mullikin (lot 2 of lands indicated to be consolidated on the above mentioned plan), distant 30.00 feet from the centerline of the aforesaid Applebutter Road, and located approximately 1896 feet west of the intersection of Applebutter Road and Ringhoffer Road (TR 400);

thence along the northerly right-of-way of said Applebutter Road, parallel and offset 30.00 feet north of the centerline thereof, along the arc of a curve to the left having a radius of 1630.00 feet, a central angle of 06° 50' 40", a chord bearing of South 56° 32' 48" West, a chord distance of 194.59 feet an arc length of 194.71 feet to an iron pin to be set in the line of lands now or formerly of Carlos H. Cordova;

thence along said Cordova lands the following two (2) courses and distances: 1) North 28° 30' 24" West, 90.54 feet to an iron pin found; 2) South 57° 59' 39" West, 136.51 feet to an iron pin found at a corner of lands now or formerly of Joseph M. and Margaret L. Milan;

thence along said Milan lands, North 25° 41' 41" West, 659.40 feet to an iron pin found in the line of lands now or formerly of Eastern Waste of Bethlehem, Inc.;

thence along said Eastern Waste lands, the following four (4) courses and distances: 1) North 73° 37' 29" East, 148.00 feet to an iron pin found; 2) along the arc of a curve to the right having a radius of 150.00 feet and a central angle of 71° 42' 30", an arc length of 187.73 feet to an iron pin found; 3) South 34° 40' 01" East, 409.17 feet to an iron pin set; 4) South 25° 23' 58" East, 155.79 feet to the iron pin set in the northerly right-of-way of Applebutter Road at the point and place of BEGINNING.;

CONTAINING 4.577 acres of land, more or less.

SUBJECT to any easements, restrictions, rights-of-way or other pertinent facts of record.

BEING THE SAME PREMISES as previously conveyed to Ronald E. and Rhoda J. Mullikin on the 27th day of November, 1989 and recorded in Northampton County Deed Book Volume 787, page 94.

BEING KNOWN AS Northampton County Uniform Parcel Identification No.: Map P7, Block 5, Lot 31B.

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THIS IS THE CONSOLIDATED DESCRIPTION OF SHEDULE #1
PREMISES A, B, C, & D

ALL THAT CERTAIN tract or parcel of land with improvements thereon located along the northerly side of Applebutter Road (SR 2012) east of the Borough of Freemansburg in the Township of Lower Saucon, County of Northampton and Commonwealth of Pennsylvania, bounded and described in accordance with a survey conducted by Keystone Consulting Engineers, Inc. as shown on the plan entitled, "Plan Showing Property Boundaries To Be Consolidated By IESI PA Bethlehem Landfill Corp.," Drawing No. CB-00-090, dated: June 30, 2000, revised: July 11, 2000, as follows to wit:

BEGINNING at an iron pin set in the northerly right-of-way of Applebutter Road (SR 2012 - 60 feet wide), said point being the southeasterly corner of lands now or formerly of Ronald E. and Rhoda J. Mullikin (lot 2 of lands indicated to be consolidated on the above mentioned plan), distant 30.00 feet from the centerline of the aforesaid Applebutter Road, and located approximately 1896 feet west of the intersection of Applebutter Road and Ringhoffer Road (TR 400);

thence along the northerly right-of-way of said Applebutter Road, parallel and offset 30.00 feet north of the centerline thereof, along the arc of a curve to the left having a radius of 1630.00 feet, a central angle of 06° 50' 40", a chord bearing of South 56° 32' 48" West, a chord distance of 194.59 feet an arc length of 194.71 feet to an iron pin to be set in the line of lands now or formerly of Carlos H. Cordova;

thence along said Cordova lands the following two (2) courses and distances: 1) North 28° 30' 24" West, 90.54 feet to an iron pin found; 2) South 57° 59' 39" West, 136.51 feet to an iron pin found at a corner of lands now or formerly of Joseph M. and Margaret L. Milan;

thence along said Milan lands the following two (2) courses and distances: 1) North 25° 41' 41" West, 659.40 feet to an iron pin found; 2) South 73° 37' 29" West, 191.82 feet to an iron pin to be set at a corner of lands now or formerly of Joseph P. and Mary Ann Masiado, said point being North 31° 55' 40" West, 3.92 feet from an iron pipe found in the line of said Masiado lands;

thence along said Masiado lands the following two (2) courses and distances: 1) South 73° 37' 29" West, 37.04 feet to an iron pin found; 2) South 68° 20' 51" West, 4.08 feet to a corner of lands now or formerly of Richard D. and Cynthia S. Gardner, said point being North 17° 50' 15" West, 3.77 feet from an iron pipe found in the line of said Gardner lands;

thence along said Gardner lands, South 68° 20' 51" West, 119.13 feet to an iron pin found in the extended centerline of Green Hill Road (TR 399 – 33 feet wide);

thence continuing along said Gardner lands, and along the center of said Green Hill Road, the following four (4) courses and distances: 1) South 68° 48' 32" West, 68.88 feet to a point; 2) South 72° 52' 06" West, 115.94 feet to a point; 3) South 76° 49' 07" West, 81.57 feet to a point; 4) South 79° 42' 41" West, 49.77 feet to a railroad spike found burried 0.4 feet in the pavement at a corner of lands now or formerly of James O. and Sandra G. Gardner;

SCHEDULE "2"

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thence continuing in said Green Hill Road, along said James Gardner lands, South 79° 26' 48" West, 135.91 feet to a railroad spike found burried 0.4 feet in the pavement at a corner of lands now or formerly of Frederick R. and Linda Klotz;

thence along said Klotz lands, following in and substantially along the easterly side of an 8 feet wide stone row, the following two (2) courses and distances: 1) North 07° 44' 25" West, passing through an iron pipe found at 269.51 feet, a total distance of 273.98 feet to an iron pin to be set, said pin being North 83° 31' 12" East, 0.61 feet from an iron pin found in the tract line between two "Klotz" tracts; 2) North 06° 44' 56" West, 941.28 feet to an iron pin to be set at a corner of lands of the Bushkill Valley Motorcycle Club, Inc.;

thence along said Motorcycle Club lands, the following four (4) courses and distances: 1) following approximately parallel and 14 feet more or less to the north of an existing stone wall, North 68° 24' 56" East, 442.37 feet to an iron pin found; 2) North 35° 59' 56" East, 327.50 feet to an iron pin set; 3) North 69° 31' 56" East, 545.05 feet to an iron pin found; 4) North 04° 35' 26" East, 462.72 feet to a PK nail set in a stone corner found at a corner of other lands, formerly of Michael L. Helms, et. al., now of the City of Bethlehem;

thence along the "Old Helms Tract," now of the City of Bethlehem, the following four (4) courses and distances: 1) North 77° 33' 48" East, 808.42 feet to an iron pin found; 2) North 77° 06' 37" East, 676.45 feet to an iron pin set along the south side of a dirt road; 3) South 46° 53' 23" East, 231.00 feet to an iron pipe found; 4) North 82° 57' 18" East, 1708.69 feet to an iron pin set at a corner of lands formerly of Bethlehem Steel Corporation now of the City of Bethlehem;

thence along the "Old Bethlehem Steel Corporation Tract," now of the City of Bethlehem, South 10° 18' 22" East, 255.75 feet to an iron pin set at a corner of lands now or formerly of Jersey Central Power and Light Company;

thence along said Jersey Central Power and Light Company lands, South 10° 17' 49" East, 1497.80 feet to an iron pipe found in the line of lands now or formerly of Andrew I. Nuss;

thence along said Nuss lands, South 71° 31' 29" West, 139.17 feet to an iron pipe found at a corner of lands now or formerly of Bronius and Elena Sudzinskas;

thence along said Sudzinskas lands, South 71° 35' 06" West, 240.74 feet to an iron pin found at a corner of lands now or formerly of Virignia A. MacDonald;

thence along said MacDonald lands the following two (2) courses and distances: 1) South 71° 15' 06" West, 142.59 feet to an iron pin set; 2) South 30° 43' 54" East, 293.47 feet to an iron pin set in the northerly right-of-way of Applebutter Road (SR 2012), said point being distant 30.00 feet from the centerline of said road;

thence along the northerly right-of-way of Applebutter road (SR 2012), parallel and 30.00 feet distant from the centerline thereof, the following three (3) courses and distances: 1) along the arc of a curve to the right having a radius of 404.09 feet, a central angle of 10° 26' 22", an arc length of 73.63 feet and a chord bearing South 72° 07' 54" West, a chord length of 73.52 feet to an iron pipe found; 2) South

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77° 21' 06" West, 197.15 feet to an iron pipe found; 3) along the arc of a curve to the left having a radius of 665.70 feet and a central angle of 19° 13' 43", an arc length of 223.41 feet to an iron pin set in the line of lands now or formerly of Charles F. Folk;

thence along said Folk lands the following three (3) courses and distances: 1) North 24° 48' 15" West, 204.85 feet to an iron pin set; 2) South 58° 11' 45" West, 407.75 feet to an iron pin set; 3) South 38° 03' 15" East, 198.55 feet to an iron pin set in the aforementioned northerly right-of-way of Applebutter Road (SR 2012);

thence along the northerly right-of-way of Applebutter Road (SR 2012), parallel and 30.00 feet distant from the centerline thereof, the following ten (10) courses and distances: 1) South 73° 28' 59" West, 175.13 feet to an iron pipe found; 2) along the arc of a curve to the right having a radius of 173.43 feet and a central angle of 42° 56' 08", an arc length of 129.96 feet to an iron pipe found; 3) North 63° 34' 53" West, 42.99 feet to an iron pipe found; 4) along the arc of a curve to the left having a radius of 430.00 feet and a central angle of 33° 07' 53", an arc length of 248.65 feet to an iron pipe found; 5) South 83° 17' 15" West, 196.06 feet to an iron pipe found; 6) along the arc of a curve to the right having a radius of 3970.00 feet and a central angle of 02° 25' 30", an arc length of 168.03 feet to an iron pipe found; 7) South 85° 42' 45" West, 103.75 feet to an unmarked point within an historical structure; 8) along the arc of a curve to the left having a radius of 480.00 feet and a central angle of 16° 43' 41", an arc length of 140.14 feet to an iron pipe found; 9) South 68° 59' 04" West, 219.28 feet to an iron pin set; 10) South 67° 42' 43" West, 580.59 feet to an iron pipe found in the line of lands formerly of Randy and Dianne Lynn Dalrymple, now of Eastern Waste of Bethlehem, Inc. (lot 1 of lands indicated to be consolidated on the above mentioned plan) and a corner of lands previously dedicated as right-of-way for Applebutter Road;

thence along said lands dedicated as right-of-way for right-of-way for Applebutter road, the following four (4) courses and distances: 1) South 25° 59' 15" East 30.06 feet to a railroad spike to be set at a corner of lands formerly of Bethlehem Steel Corporation; 2) along said lands formerly of Bethlehem Steel, South 67° 42' 43" West, 80.78 feet to an iron pin found buried in the pavement; 3) further along said lands formerly of Bethlehem Steel, South 60° 52' 38" West, 104.17 feet to a railroad spike to be set; 4) North 25° 23' 58" West, passing through an iron pipe found at 28.40 feet, a total distance of 33.57 feet to an iron pin set in the northerly right-of-way of said Applebutter Road (SR 2012 - 60 feet wide);

thence along the northerly right-of-way of Applebutter Road, parallel and 30.00 feet north of the centerline thereof, along the arc of a curve to the left having a radius of 1630.00 feet, a central angle of 01° 45' 40", a chord bearing South 60° 50' 57" West and a chord distance of 50.10 feet, an arc length of 50.11 feet to an iron pin set at the point and place of BEGINNING.

CONTAINING 224.471 acres of land, more or less.

BEING NORTHAMPTON COUNTY UNIFORM PARCEL IDENTIFICATION NUMBERS: N8-1446-0719, P7-5-29-0719, P7-5-31-0719, P7-5-32-0719, P7-5-33-0719, P7-5-34-0719, P8-1-1-0719, P7-5-31B

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WHEREAS, IESI PA Bethlehem Landfill Corporation, as owner of Premises "A", "B", "C" and "D", now desires to consolidate the Premises into one parcel.

WITNESSETH, that the said Grantor, for and in consideration of the above-recited premises, does hereby grant, sell and convey unto Grantee, its successors and assigns,

ALL THAT CERTAIN tract or parcel of ground, with the buildings and improvements erected thereon, SITUATE in the Township of Lower Saucon, County of Northampton, Commonwealth of Pennsylvania, as shown on a plan of property for IESI PA Bethlehem Landfill Corporation prepared by Keystone Consulting Engineers, Inc. and dated June 30, 2000, being bounded and described as follows:

See Schedule "2" attached and made a part hereof.

TOGETHER with all and singular the buildings, improvements, ways, streets, alleys, passages, waters, watercourses, rights, liberties, privileges, hereditaments and appurtenances, whatsoever thereunto belonging, or in any wise appertaining, and the reversions and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, property, claim and demand whatsoever of it, the said Grantor, in law or in equity, or otherwise howsoever, of, in, and to the same and every party thereof.

TO HAVE AND TO HOLD the said lot or parcel of ground with the improvements erected thereon, hereditaments and premises hereby granted, or mentioned, and intended so to be, with the appurtenances, unto the said Grantee, its successors and assigns, to and for the only proper use and behoof of the said Grantee, its successors and assigns, forever.

AND the said Grantor, for itself, its successors and assigns, does by these presents, covenant, grant and agree to and with the said Grantee, its successors an assigns, that it the said Grantor, all and singular the hereditaments and premises herein above described and granted, or mentioned and intended so to be, with the appurtenances, unto said Grantee, its successors and assigns, against it, the said Grantor, its successors and assigns, and against all and every person and persons whomsoever lawfully claiming or to claim the same or any part thereof, by, from or under it, them, or any of them shall and will WARRANT and forever DEFEND.

IN WITNESS WHEREOF, the Grantor has caused these presents to be executed the day and year first above written.

(CORPORATE SEAL)

ATTEST: _____
Name: Edward L. Apuzzi
Title: Assistant Secretary

IESI PA BETHLEHEM LANDFILL CORPORATION

By: _____
Name: Christopher V. Della Pietra
Title: Vice President

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STATE OF NEW JERSEY :
: SS.
COUNTY OF HUDSON :

On this 13th day of July, 2000, before me, the undersigned officer, personally appeared Christopher V. Della Pietra, who acknowledged himself to be the Vice President of IESI PA Bethlehem Landfill Corporation, and that he as such Vice President, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the Corporation by himself as Vice President.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Amy N. Figiel
Notary Public

AMY N. FIGIEL
NOTARY PUBLIC OF NEW JERSEY
Commission Expires 4/18/2005

RECORDER OF DEEDS
NORTHAMPTON COUNTY
PENNSYLVANIA

INSTRUMENT NUMBER
2000025510
RECORDED ON
Jul 14, 2000
1:55:18 PM

AFFORDABLE HOUSING	$11.05
AFFORDABLE HOUSING - ADMIN FEE	$1.95
RECORDING FEES	$33.00
STATE WRIT TAX	$0.50
COUNTY RECORDS IMPROVEMENT FEE	$1.00
DEEDS RECORDS IMPROVEMENT FEE	$1.00
TOTAL	$48.50

The address of the above named Grantee is:

2335 Applebutter Road
Bethlehem, PA 18015-9004

Christopher V. Della Pietra

I hereby CERTIFY that this document is recorded in the Recorder's Office of Northampton County, Pennsylvania.

Ann L. Achatz

BE\285082\1

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REDDINGTON & HELMS LOTS

COUNTY OF NORTHAMPTON

RECORDER OF DEEDS
NORTHAMPTON COUNTY GOVERNMENT CENTER
669 WASHINGTON STREET
EASTON, PENNSYLVANIA 18042-7486
Area Code (610) 829-6210

Andrea F. Suter - Recorder
Dorothy J. Edelman - Lead Deputy
Barbara L. Manieri - Deputy

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***Total Pages - 7**

Instrument Number - 2022031584
Recorded On 9/30/2022 At 11:38:03 AM

NCGIS Registry UPI Certification
On September 29, 2022 By HW

* Instrument Type - DEED
Invoice Number - 1044290
* Grantor - BETHLEHEM CITY
* Grantee - BETHLEHEM LANDFILL COMPANY
User - JMKE
* Customer - COMMONWEALTH LAND TITLE PHILADELPHIA COMMERCIAL - 1700 MARKE

*FEES	
STATE TRANSFER TAX	$100.00
STATE WRIT TAX	$0.50
JCS/ACCESS TO JUSTICE	$40.25
RECORDING FEES	$17.00
AFFORDABLE HOUSING	$14.02
AFFORDABLE HOUSING - ADMIN FEE	$2.48
COUNTY RECORDS IMPROVEMENT FEE	$2.00
DEEDS RECORDS IMPROVEMENT FEE	$3.00
UPI CERTIFICATION FEE	$20.00
SAUCON VALLEY AREA SCHOOL REALTY TAX	$50.00
LOWER SAUCON TOWNSHIP	$50.00
TOTAL PAID	$299.25

***RECORDED BY:**
COMMONWEALTH LAND TITLE PHILADELPHIA
COMMERCIAL - 1700 MARKE
1700 MARKET ST STE 2110
PHILADELPHIA, PA 19103

I hereby CERTIFY that this document is recorded in the Recorder's Office Of Northampton County, Pennsylvania

Andrea F. Suter
Recorder of Deeds

THIS IS A CERTIFICATION PAGE

Do Not Detach

THIS PAGE IS NOW THE FIRST PAGE OF THIS LEGAL DOCUMENT

00IM05

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* - Information denoted by an asterisk may change during the verification process and may not be reflected on this page.

PREPARED BY AND
UPON RECORDING RETURN TO:
Christine R. Deutsch, Esquire
Deutsch Commercial Real Estate Law LLC
1515 Market Street, Suite 1200
Philadelphia PA 19102-1932
215-854-6338

PHT 200929

Commonwealth Land Title Insurance Company
1700 Market Street
Suite 2100
Philadelphia, PA 19103

DEED

Parcel Numbers: N8 14 2 0719E (**"Property 1"**)
N8 14 1 0719E (**"Property 2"**)

THIS INDENTURE made the 26th day of September in the year of our Lord two thousand twenty-two (2022), but effective only as of the 29th day of September in the year of our Lord two thousand twenty-two (2022)

BETWEEN CITY OF BETHLEHEM, a Pennsylvania municipal corporation and third class city in the Commonwealth of Pennsylvania (hereinafter called the **"Grantor"**), of the one part, and **BETHLEHEM LANDFILL COMPANY** (f/k/a Eastern Waste of Bethlehem, Inc.), a Delaware corporation (hereinafter called the **"Grantee"**), of the other part,

WHEREAS, Grantor and Eastern Waste of Bethlehem, Inc., a Delaware corporation, are parties to an Option Agreement dated July 17, 1998 (the **"Option Agreement"**) recorded in the Office of the Recorder of Deeds of Northampton County, Pennsylvania (the **"Recorder's Office"**) on July 20, 1998 as Instrument No. 1998028073 in Miscellaneous Book Volume 1998-1, Page 093410 for certain real property more particularly described therein and known as Parcel Nos. N8 14 2 0719E and N8 14 1 0719E; and

WHEREAS, Eastern Waste of Bethlehem, Inc. changed its name to IESI PA Bethlehem Landfill Corporation on July 12, 1999 by filing with the Secretary of State of Delaware (the **"Secretary"**) a Restated Certificate of Incorporation; and

WHEREAS, IESI PA Bethlehem Landfill Corporation changed its name to Bethlehem Landfill Company, *i.e.*, the Grantee, on June 8, 2018 by filing with the Secretary a Certificate of Amendment of Certificate of Incorporation; and

WHEREAS, Grantee has exercised its rights under the Option Agreement, and this conveyance is occurring upon the terms set forth in the Option Agreement;

NOW THEREFORE, WITNESSETH that the said Grantor for and in consideration of the sum of Ten Thousand Dollars ($10,000.00) lawful money of the United States of America and other good and valuable consideration, unto it well and truly paid by the said Grantee, at or before the sealing and delivery hereof, the receipt whereof is hereby acknowledged, has granted, bargained and sold, released and confirmed, and by these presents does grant, bargain and sell, release and confirm unto the said Grantee, its successors and assigns,

ALL THAT CERTAIN lot or piece of ground more particularly described on **Exhibit "A"** attached hereto and made a part hereof.

UNDER AND SUBJECT, nevertheless, to restrictions, covenants, easements and conditions of record, to the extent valid and enforceable and still applicable to the above described premises.

TOGETHER with all and singular the improvements, ways, streets, alleys, passages, driveways, waters, water-courses, rights, liberties, privileges, hereditaments and appurtenances, whatsoever unto the hereby granted premises belonging, or in any wise appertaining, and the reversions and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest, property, claim and demand whatsoever of it, the said Grantor, as well at law as in equity, of, in, and to the same.

TO HAVE AND TO HOLD the said lots or pieces of ground above described, with the hereditaments and premises hereby granted, or mentioned and intended so to be, with the appurtenances, unto the said Grantee, its successors and assigns, to and for the only proper use and behoof of the said Grantee, its successors and assigns forever.

UNDER AND SUBJECT, as aforesaid.

AND the said Grantor, for itself, its successors and assigns, does covenant, promise and agree, to and with the said Grantee, its successors and assigns, by these presents, that it, the said Grantor and its successors, all and singular the hereditaments and premises hereby granted or mentioned and intended so to be, with the appurtenances, unto the said Grantee, its successors and assigns, against it, the said Grantor and its successors, and against all and every person and persons whomsoever lawfully claiming or to claim the same or any part thereof, by, from or under them or any of them, shall and will, subject as aforesaid, **WARRANT** and forever **DEFEND**.

[Signature page follows]

IN WITNESS WHEREOF, the party of the first part hereunto has caused these presents to be duly executed by its authorized officers, with its corporate seal hereunto affixed, the day and year first above written.

ATTEST:

9/26/22
George H. Yasso, Controller

CITY OF BETHLEHEM

BY: J. William Reynolds
J. William Reynolds, Mayor

(SEAL)

COMMONWEALTH OF PENNSYLVANIA :
:SS
COUNTY OF NORTHAMPTON :

On this, the 26th day of September 2022, before me, a Notary Public in and for the State and County aforesaid, the undersigned officer, personally appeared J. William Reynolds, who acknowledged himself to be the Mayor of City of Bethlehem, a Pennsylvania municipal corporation and City of the Third Class, and that he, as such officer, being authorized to do so, executed the foregoing instrument for the purposes therein contained by signing the name of the City by himself as such officer.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Sheila Rhett
NOTARY PUBLIC

My Commission Expires: MAY 7, 2025

Commonwealth of Pennsylvania - Notary Seal
Sheila Rhett, Notary Public
Northampton County
My commission expires May 7, 2025
Commission number 1276529
Member, Pennsylvania Association of Notaries

The address of the above named Grantee is:

Bethlehem Landfill Company
Attn: Tax Department
3 Waterway Square Place, Suite 110
The Woodlands, Texas 77380-3488

On behalf of the Grantee

EXHIBIT "A"

LEGAL DESCRIPTION FOR FORMER REDINGTON PROPERTY (PROPERTY 1)

ALL THAT CERTAIN tract of land situate in Lower Saucon Township, Northampton County, Pennsylvania, bounded and described in accordance with Boundary Survey of the Bethlehem Landfill prepared by Martin and Martin Incorporated dated 7/26/21 and last revised 9/18/21, as follows, to wit:

Beginning at an existing iron pin along the North side of Riverside Drive; thence along the North side of Riverside Drive N 60°36'18" E a distance of 337.57' to an existing rail monument; thence along the North side of Riverside Drive thence N 50°55'57" E a distance of 367.66' to an existing rail monument; thence across Riverside Drive N 46°43'43" E a distance of 418.47' to an existing iron pin on the South side of Riverside Drive; thence along the South side of Riverside Drive N 36°59'17" E a distance of 302.24' to an existing iron pin; thence continuing along the South side of Riverside Drive N 33°49'44" E a distance of 678.55' to a point along lands now or formerly of RZB, LLC; thence along lands now or formerly of RZB, LLC S 57°50'45" E a distance of 941.41' to an existing iron pin at lands now or formerly of Bruce & Ginger Petrie; thence along lands now or formerly of Bruce & Ginger Petrie S 56°42'20" E a distance of 736.81' to an existing rail monument; thence continuing along said lands S 07°48'00" E a distance of 2188.25' to an existing iron pin along lands now or formerly of Bethlehem Landfill Company; thence along lands now or formerly of Bethlehem Landfill Company S 89°58'54" W a distance of 1981.45' to a point along lands now or formerly of IESI PA Bethlehem Landfill Corporation; thence along lands now or formerly of IESI PA Bethlehem Landfill Corporation N 10°24'59" W a distance of 256.01' to an existing iron pin at lands now or formerly of the City of Bethlehem; thence along lands now or formerly of the City of Bethlehem N 02°13'49" W a distance of 395.81' to a point; thence continuing along lands now or formerly of the City of Bethlehem N 49°49'52" W a distance of 1453.37' to an existing iron pin; which is the point of beginning, having an area of 5,940,137 square feet, 136.3668 acres.

BEING, as to Property 1, the same premises that were conveyed to City of Bethlehem by Bethlehem Steel Corporation by Deed dated April 24, 1991and recorded in the Recorder's Office on May 30, 1991 in Deed Book 830 Page 479 et seq.

AND

LEGAL DESCRIPTION FOR FORMER HELMS PROPERTY (PROPERTY 2)

ALL THAT CERTAIN tract of land situate in Lower Saucon Township, Northampton County, Pennsylvania, bounded and described in accordance with Boundary Survey of the Bethlehem Landfill prepared by Martin and Martin Incorporated dated 7/26/21 and last revised 9/18/21, as follows, to wit:

Beginning at an existing iron pin along the North side of Riverside Drive; thence crossing Riverside Drive and along lands now or formerly of the City of Bethlehem S 49°49'52" E a distance of 1453.37' to a point; thence continuing along lands now or formerly of the City of Bethlehem S

02°13'49" E a distance of 395.81' to an existing iron pin; thence along lands now or formerly of IESI PA Bethlehem Landfill Corporation S 82°57'22" W a distance of 1708.03' to an existing iron pin; thence continuing along lands now or formerly of IESI PA Bethlehem Landfill Corporation N 47°07'42" W a distance of 231.00' to an existing iron pin; thence along said lands S 77°07'49" W a distance of 676.45' to an existing iron pin; thence continuing along said lands S 77°33'27" W a distance of 808.25' to an existing P.K. Nail in Rock along lands now or formerly of Bushkill Valley Motorcycle Club, Inc.; thence along lands now or formerly of Bushkill Valley Motorcycle Club, Inc. N 07°27'46" W a distance of 165.06' to an existing iron pin; thence continuing along said lands N 66°29'46" E a distance of 1249.01' to a point in a stone row at lands now or formerly of Pennsylvania Power and Light Company; thence along lands now or formerly of Pennsylvania Power and Light Company N 37°25'29" W a distance of 341.22' to an existing iron pin along the South side of Riverside Drive; thence along Riverside Drive N 46°19'02" E a distance of 206.72' to an existing iron pin; thence along said road with a curve turning to the right with an arc length of 457.45', with a radius of 1339.70', with a chord bearing of N 56°19'26" E, with a chord length of 455.23' to an existing iron pin; thence continuing along said road N 63°19'21" E a distance of 550.40' to an existing iron pin; thence crossing over Riverside Drive N 24°23'55" W a distance of 20.56' to an existing iron pin; thence along the North side of Riverside Drive N 65°48'45" E a distance of 283.86' to an existing iron pin; which is the point of beginning, having an area of 2,695,959 square feet, 61.8907 acres.

EXCEPTING FROM THE ABOVE DESCRIPTION OF PROPERTY 2:

DENNIS M. & CHRISTINE E. HAHN, TRACT 1, LOT 1
Beginning at an existing iron pin along the South side of Riverside Drive; thence along the South side of Riverside Drive N 68°17'36" E a distance of 119.97' to an existing iron pin along the Western side of Chestnut Street; thence along the Western side of Chestnut Street S 49°10'05" E a distance of 134.60' to an existing iron pin; thence S 68°18'39" W a distance of 182.24' to an existing iron pin along lands now or formerly of Ryan X. Mass & Desiree A. Reuss-Flowers; thence along lands now or formerly of Ryan X. Mass & Desiree A. Reuss-Flowers N 21°36'52" W a distance of 119.38' to an existing iron pin along the South side of Riverside Drive; which is the point of beginning, having an area of 18,042 square feet, 0.4142 acres.

DENNIS M. & CHRISTINE E. HAHN, TRACT 1, LOT 2
Beginning at an existing iron pin along the Western side of Chestnut Street; thence S 49°16'53" E a distance of 135.13' to an existing iron pin along the Northern side of Centre Street; thence along the Northern side of Centre Street S 68°13'44" W a distance of 250.86' to an existing iron pin; thence leaving the Northern side of Centre Street N 21°40'32" W a distance of 119.94' to an existing iron pin; thence N 68°15'16" E a distance of 188.24' to an existing iron pin along the Western side of Chestnut Street; which is the point of beginning, having an area of 26,321 square feet, 0.6043 acres.

RYAN X. MASS & DESIREE A. REUSS-FLOWERS
Beginning at an existing iron pin along the South side of Riverside Drive; thence along lands now or formerly of Dennis M. & Christine E. Hahn S 21°36'52" E a distance of 119.38' to an existing iron pin; thence S 68°07'00" W a distance of 119.57' to an existing iron pin; thence N 21°33'30" W a distance of 119.47' to an existing iron pin along the South side of Riverside Drive; thence

along the South side of Riverside Drive N 68°09'39" E a distance of 119.45' to an existing iron pin along the South side of Riverside Drive; which is the point of beginning, having an area of 14,272 square feet, 0.3276 acres.

BEING, as to Property 2, the same premises that were conveyed to City of Bethlehem by Michael L. Helms, David L. Helms, Mary W. Helms VanStone and Deborah E. Helms by Deed dated December 31, 1991and recorded in the Recorder's Office on August 17, 1992 in Deed Book 871 Page 479 et seq.

FLOWERS LOT

Premises: **2390 Riverside Drive, Bethlehem**
Lower Saucon Township
Northampton County, PA
Parcel No. **N8 14 1A 0719**

SPECIAL WARRANTY DEED

This Indenture, made the 18 th day of MAY in the year of our Lord Two Thousand Twenty-Two (2022)

Between ***Ryan K. Maas and Desiree A. Reuss-Flowers***

(hereinafter called the Grantors), parties of the first part,

And ***Bethlehem Landfill Company, a Delaware corporation***

(hereinafter called the Grantee), party of the other part,

Witnesseth that in consideration of the sum of Two Hundred Eighty Thousand and 00/100----------($280,000.00) Dollars, in hand paid, the receipt whereof is hereby acknowledged, the said grantors do hereby grant and convey to the said grantee, its successors and assigns forever,

ALL THAT CERTAIN lot or piece of ground situate in Lower Saucon Township, County of Northampton, Commonwealth of Pennsylvania.

BEGINNING at the northwest corner of Lot No. 2 on the General Plan laid out by Abraham S. Shimer (near Redington); thence, along said Lot 2, South 16 degrees East, 120 feet to a corner on the north side of a 12 feet wide alley; thence, along said alley, South 74 degrees West, 120 feet to a corner on Lot No. 5 on said plan; thence, along said Lot No. 5, North 16 degrees West, 120 feet to a corner on the south side of Railroad Street; thence, along said Railroad Street, North 74 degrees East, 120 feet to the place of Beginning.

THE above-described lot or piece of ground consists of Lots No. 3 and 4, on the above-mentioned Plan of Lots as lait out by the said Abraham S. Shimer.

BEING KNOWN as 2390 Riverside Drive, Bethlehem, Lower Saucon Township, Pennsylvania.

BEING Tax Parcel No. N8 14 1A 0719

First American Title Insurance
National Commercial Services
NCS-1125324-CO

BEING THE SAME PREMISES which Patti D. Wagner, by Deed dated August 20, 2015, and recorded on August 26, 2015, in the Office of the Recorder of Deeds of Northampton County, Commonwealth of Pennsylvania, in Record Book Volume 2015-1, page 164460, Instrument No. 2015021917, granted and conveyed unto Ryan K. Maas and Desiree A. Reuss-Flowers, in fee.

Together with all and singular the improvements, ways, streets, alleys, driveways, passages, waters, water-courses, rights liberties, privileges, hereditaments and appurtenances, whatsoever unto the hereby granted premises belonging, or in anywise appertaining, and the reversions and remainders, rents, issues, and profits thereof; and all the estate, right, title, interest property, claim and demand whatsoever of the said Grantors, as well at law as in equity of the said Parties of the First Part of, in and to or out of the said premises, and every part and parcel thereof.

To have and to hold the said above-described lot or piece of ground, together with the hereditaments and premises hereby granted, or mentioned and intended so to be, with the appurtenances, unto the said Grantee, its successors and assigns, to and for the only proper use and behoof of the said Grantee, its successors and assigns,

And the said Grantors for themselves and their heirs and assigns, do by these presents covenant, grant and agree to and with the said Grantee, and its successors and assigns, that they, the said Grantors, and their heirs and assigns, all and singular the hereditaments and premises hereinabove described and granted, or mentioned, and intended so to be, with the appurtenances, unto the said Grantee, its successors and assigns, against them, the said Grantors and their heirs and assigns, and against all and every other person or persons whomsoever, lawfully claiming or to claim the same, or any part thereof, ***SHALL AND WILL SPECIALLY WARRANT AND FOREVER DEFEND.***

In witness whereof, the said Grantors have hereunto set their hands and seals the day and year first above written.

Signed, Sealed and Delivered
In the presence of:

_____ _____
Ryan K. Maas

_____ _____
Desiree A. Reuss-Flowers

Commonwealth of Pennsylvania]
] ss.:
County of Northampton **]**

On this, the 17 day of May, **2022**, before me, the undersigned officer, personally appeared ***Ryan K. Maas and Desiree A. Reuss-Flowers,*** known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purpose therein contained.

In witness whereof I have hereunto set my hand and official seal.

_____
Notary Public

Commonwealth of Pennsylvania - Notary Seal
ROBERT H. JACOBS, Notary Public
Northampton County
My Commission Expires October 11, 2025
Commission Number 1278871

I hereby certify that the precise address of the Grantee herein is:

2335 Applebutter Rd
Bethlehem, PA 18015-6004

_____
Ciara McCarthen

Hahn Property

COUNTY OF NORTHAMPTON

RECORDER OF DEEDS
NORTHAMPTON COUNTY GOVERNMENT CENTER
669 WASHINGTON STREET
EASTON, PENNSYLVANIA 18042-7486
Area Code (610) 829-6210

Andrea F. Suter - Recorder
Dorothy J. Edelman - Lead Deputy
Barbara L. Manieri - Deputy

Book - 2023-1 Starting Page - 20448
***Total Pages - 5**

Instrument Number - 2023002430
Recorded On 1/31/2023 At 10:54:52 AM

NCGIS Registry UPI Certification
On January 31, 2023 By SRM

* Instrument Type - DEED
Invoice Number - 1052325
* Grantor - HAHN, DENNIS M
* Grantee - BETHLEHEM LANDFILL COMPANY
User - MKTE
* Customer - FIRST AMERICAN TITLE INSURANCE COMPANY - NCS DENVER

*FEES	
STATE TRANSFER TAX	$2,900.00
STATE WRIT TAX	$0.50
JCS/ACCESS TO JUSTICE	$40.25
RECORDING FEES	$13.00
AFFORDABLE HOUSING	$14.02
AFFORDABLE HOUSING - ADMIN FEE	$2.48
COUNTY RECORDS IMPROVEMENT FEE	$2.00
DEEDS RECORDS IMPROVEMENT FEE	$3.00
UPI CERTIFICATION FEE	$10.00
SAUCON VALLEY AREA SCHOOL REALTY TAX	$1,450.00
LOWER SAUCON TOWNSHIP	$1,450.00
TOTAL PAID	$5,885.25

***RECORDED BY:**
FIRST AMERICAN TITLE INSURANCE COMPANY -
NCS DENVER
1380 17TH ST
DENVER, CO 80202-1508

I hereby CERTIFY that this document is recorded in the Recorder's Office Of Northampton County, Pennsylvania

Andrea F. Suter
Andrea F. Suter
Recorder of Deeds

THIS IS A CERTIFICATION PAGE

Do Not Detach

THIS PAGE IS NOW THE FIRST PAGE
OF THIS LEGAL DOCUMENT

00ITOA

Book: 2023-1 Page: 20448

* - Information denoted by an asterisk may change during the verification process and may not be reflected on this page.

EXHIBIT
BLC 13
exhibitsticker.com

PARCEL ID N8 14 1B 0719

Premises: 2396 Riverside Drive, Bethlehem, Pennsylvania 18015

PREPARED BY AND RETURN TO:
FLORIO, PREUCCI, STEINHARDT, CAPPELLI, TIPTON & TAYLOR, LLC
91 Larry Holmes Drive
Suite 200
Easton, Pennsylvania 18042

DEED

THIS INDENTURE, made the 25 day of January, 2023, by and between

DENNIS M. HAHN and CHRISTINE E. HAHN, husband and wife, of the County of Northampton in the Commonwealth of Pennsylvania, of the one part (hereinafter called the "Grantors"),

AND

BETHLEHEM LANDFILL COMPANY, a corporation organized and existing under the General Corporation Law of the State of Delaware, of the other part (hereinafter called the "Grantee").

WITNESSETH, that the Grantors for and in consideration of the sum of Two Hundred Ninety Thousand Dollars and 00/100 ($290,000.00), lawful money of the United States of America, unto them well and truly paid by the said Grantee at or before the sealing and delivery hereof, the receipt whereof is hereby acknowledged, has granted, bargained and sold, released, and confirmed. and by these presents, does grant, bargain and sell, release, and confirm unto the said Grantee and to the heirs and assigns of such survivor,

TRACT NO. 1

ALL THOSE CERTAIN two lots or pieces of ground situate, lying and being in the Township of Lower Saucon in the County and State aforesaid being Lot Nos. 1, 2, 19 and 20 on the general plan of Lots laid out by the said Abraham S. Shimer, bounded and described as follows, to wit:

LOT NO. 1 - consisting of Lots Nos. 1 and 2 on the said plan, BEGINNING at the Southwest corner of Rail Road and Chestnut Streets; thence along Chestnut Street, South sixteen degrees East, one hundred and twenty feet to a corner; thence along a public alley, South seventy-four degrees West, one hundred and twenty feet to a corner on Lot No. 3, thence along said Lot No. 3, North sixteen degrees West, one hundred and twenty feet to Rail Road Street; thence along said Rail Road Street, North seventy-four degrees East, one hundred and twenty feet to the place of beginning. CONTAINING fourteen thousand four hundred square feet of ground.

LOT NO. 2 - consists of Lots No. 19 and 20, on the said plan, BEGINNING at the Northeast corner of Lot No. 20; thence along Chestnut Street, South sixteen degrees East, one hundred and twenty feet to a corner on Centre Street; thence along said Centre Street, South seventy-four degrees West, one hundred and twenty feet to a corner on Lot No. 18; thence along said Lot No. 18 North sixteen degrees West, one hundred and twenty feet to the aforesaid alley; thence along said alley, North seventy-four degrees East, one hundred and twenty feet to the place of beginning. CONTAINING fourteen thousand four hundred square feet of ground.

TRACT NO. 2

ALL THOSE CERTAIN two building lots situate lying and being in the Township of Lower Saucon in the County and State aforesaid, bounded and described as follows, to wit:

LOT NO. 1 - BEGINNING at a corner on the South side of Rail Road Street on the plot or draft of building lots laid out by Abraham S. Shimer; thence along Chestnut Street South forty-three degrees and a half East one hundred and thirty-six feet to a public alley; thence along the North side of said public alley South seventy-four degrees West forty-eight feet to a corner on Lot No. 1; thence along said Lot No. 1 North sixteen degrees West one hundred and twenty feet to the place of beginning. CONTAINING two thousand eight hundred and eighty square feet of ground more or less.

LOT NO. 2 - BEGINNING at a corner of said Chestnut Street and the aforesaid public alley; thence along the South side of said alley South seventy-four degrees West fifty-two feet to a corner on Lot No. 20; thence along said Lot No. 20 South sixteen degrees East one hundred and twenty feet to a corner on Centre Street; thence along the North side of said Centre Street North seventy-four degrees East one hundred feet to a corner on said Chestnut Street; thence along the West side of said Chestnut Street North forty-three degrees and a half West one hundred and thirty-six feet to the place of beginning. CONTAINING nine thousand one hundred and twenty square feet of ground, more or less.

BEING the same premises which Davis J. Crowell, III, and Yvette M. Crowell, husband and wife, by Deed dated October 09, 1985 and recorded January 13, 1986 in Northampton County at Deed Book 694 Page 764, granted and conveyed unto Dennis M. Hahn and Christine E. Hahn, husband and wife, in fee.

BEING PARCEL NO. N8-14-1B-0719

UNDER AND SUBJECT to covenants, easements, restrictions and reservations appearing in the chain of title or otherwise visible upon the land.

TOGETHER WITH a perpetual easement to draw water from a well on an adjoining property, as appears more specifically by reference to a Deed of Easement from Davis J. Crowell, Jr. and Elizabeth V. Crowell, husband and wife, to Dennis M. Hahn and Christine E. Hahn, husband and wife, said Deed of Easement dated October 9, 1985, and recorded in the Recorder of Deeds Office in Northampton County, Pennsylvania in Deed Book 694, Page 766.

TOGETHER with all and singular the buildings, improvements, ways, streets, alleys, driveways, passages, waters, water-courses, rights, liberties, privileges, hereditaments, and appurtenances whatsoever unto the hereby granted premises belonging, or in any appertaining, and the reversions and remainders, rents, issues, and profits thereof; and also, all the estate, right, title, interest, property, claim, and demand whatsoever of them, the said Grantors, as well at law as in equity, of, in and to the same and every part thereof.

TO HAVE AND TO HOLD the said lot or piece of ground described with the buildings and improvements thereon erected, hereditaments and the premises hereby granted, or mentioned and intended so to be, with the appurtenances, unto the said Grantee, its heirs and assigns, to and for the only proper use and behoof of the said Grantee, its heirs and assigns of such survivor forever.

AND the Grantors for themselves, their heirs, executors, and administrators, do covenant, promise, and agree, to and with the said Grantee and the survivor of them, and the heirs and assigns of such survivor, by these presents that they, the said Grantors and their heirs, all and singular the hereditaments and premises hereby granted or mentioned and intended so to be, with the appurtenances, unto the said Grantee and the survivor of them, and the heirs and assigns of such survivor, against them, the said Grantors and their heirs, and against all and every person and persons whomsoever lawfully claiming or to claim the same or any part thereof, by, from, or under him, her or them, or any of them, shall and will SUBJECT as aforesaid, WARRANT and forever DEFEND.

IN WITNESS WHEREOF IN WITNESS WHEREOF, the parties of the first part have hereunto set their hands and seals on the day and year first above written.

GRANTORS:

Dennis M. Hahn

Christine E. Hahn

Commonwealth of Pennsylvania

County of LEHIGH)
) ss.

On the 25th day of JANUARY, 2023, before me, the subscriber, a Notary Public for the Commonwealth of Pennsylvania, residing in the City of _____, personally appeared the above-named **Dennis M. Hahn and Christine E. Hahn**, husband and wife, and in due form of law acknowledged the above Indenture to be their voluntary act and deed, and desired the same might be recorded as such.

WITNESS my hand and notarial seal the day and year aforesaid.

Notary Public

Commonwealth of Pennsylvania - Notary Seal
Linda F. Jones, Notary Public
Lehigh County
My commission expires August 5, 2024
Commission number 1080213
Member, Pennsylvania Association of Notaries

The address of the above-named Grantee is:

3 Waterway Square Place, Suite 110
The Woodlands, TX 77380-3488
Attn: Legal Department

On Behalf of the Grantee

By: _____

Deed effective as of **January 30**, 2023

TANK FARM LOT

COUNTY OF NORTHAMPTON

RECORDER OF DEEDS
NORTHAMPTON COUNTY GOVERNMENT CENTER
669 WASHINGTON STREET
EASTON, PENNSYLVANIA 18042-7486
Area Code (610) 829-6210

Andrea F. Suter - Recorder
Dorothy J. Edelman - Lead Deputy
Barbara L. Manieri - Deputy

Book - 2020-1 Starting Page - 93296
***Total Pages - 6**

Instrument Number - 2020011044
Recorded On 4/30/2020 At 2:51:22 PM

NCGIS Registry UPI Certification
On April 30, 2020 By KW

* Instrument Type - DEED
Invoice Number - 950202
* Grantor - GENON REMA LLC
* Grantee - BETHLEHEM LANDFILL COMPANY
User - KSKE
* Customer - FIDELITY NATIONAL TITLE PHILADELPHIA COMMERCIAL - 1515 MARKE

*FEES	
STATE TRANSFER TAX	$85,000.00
STATE WRIT TAX	$0.50
JCS/ACCESS TO JUSTICE	$40.25
RECORDING FEES	$15.00
AFFORDABLE HOUSING	$14.02
AFFORDABLE HOUSING - ADMIN FEE	$2.48
COUNTY RECORDS IMPROVEMENT FEE	$2.00
DEEDS RECORDS IMPROVEMENT FEE	$3.00
UPI CERTIFICATION FEE	$30.00
SAUCON VALLEY AREA SCHOOL REALTY TAX	$42,500.00
LOWER SAUCON TOWNSHIP	$42,500.00
TOTAL PAID	$170,107.25

*RECORDED BY:
FIDELITY NATIONAL TITLE PHILADELPHIA
COMMERCIAL - 1515 MARKE
1700 MARKET ST STE 2100
PHILADELPHIA, PA 19103-3919

I hereby CERTIFY that this document is recorded in the Recorder's Office Of Northampton County, Pennsylvania

Andrea F. Suter
Recorder of Deeds

THIS IS A CERTIFICATION PAGE

Do Not Detach

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Book: 2020-1 Page: 93296

* - Information denoted by an asterisk may change during the verification process and may not be reflected on this page.

For APN/Parcel ID(s): N8 14 15 0719, P8 1 7 0719, and P8 1 7B 0719

SPECIAL WARRANTY DEED

THIS DEED,

MADE the 27th day of April, 2020, effective as of April 30, 2020

BETWEEN

GENON REMA, LLC, a Delaware Limited Liability Company, formerly known as NRG REMA, LLC, a Delaware Limited Liability Company, formerly known as Sithe New Jersey Holdings, LLC, having an address of c/o GenOn Holdings, Inc., 1360 Post Oak Blvd., Houston, TX 77056, herein designated as the GRANTOR,

AND

BETHLEHEM LANDFILL COMPANY, a Delaware corporation, having an address of 3 Waterway Square Place, Suite 110, The Woodlands, TX 77389, herein designated as the GRANTEE;

WITNESSETH, that the said Grantor, for and in consideration of the sum of EIGHT MILLION FIVE HUNDRED THOUSAND AND 00/100 DOLLARS ($8,500,000) in-hand paid, lawful money of the United States of America, the receipt whereof is hereby acknowledged, the said Grantor does hereby grant and convey to the Grantee, its successors and assigns:

ALL THAT CERTAIN TRACT OR PARCEL OF LAND with any and all improvements thereon, situate in the Township of Lower Saucon, County of Northampton, Commonwealth of Pennsylvania (the "Property"), more particularly described as follows:

All that certain piece or parcel of land with improvements located thereon, situated in the Township of Lower Saucon, County of Northampton and Commonwealth of Pennsylvania and described in accordance with a survey prepared by McTish, Kunkel & Associates dated 2/17/99, as revised, drawing number 06230-A, and more particularly bounded and described as follows, to wit:

BEGINNING at a railroad spike found in the centerline of Applebutter Road, S.R. 2012, (50 feet wide), at the Southwesterly corner of land now or late of Timothy L. and Lisa M. Walters, thence along said centerline of S.R. 2012, South 80 degrees 25 minutes 20 seconds West, 184.09 feet to a railroad spike found;
Thence along lands now or late of Robert J. and Linda Romig, the following 3 courses and distances:

1. Crossing S.R. 2012, North 04 degrees 26 minutes 05 seconds East, 200.00 feet to an iron pin set;
2. North 85 degrees 33 minutes 55 seconds West, 200.02 feet to an iron pin set;
3. South 04 degrees 26 minutes 05 seconds West, 200.00 feet to a railroad spike found in the aforementioned S.R. 2012;

Thence along said centerline of S.R. 2012, North 75 degrees 39 minutes 53 seconds West, 154.94 feet to a bolt found;
Thence along lands now or late of Manufacturers Light and Heat Company the following 3 courses and distances:

1. Crossing S.R. 2012, North 43 degrees 17 minutes 12 seconds East, 232.63 feet to a rebar found; passing through a rebar found a distance of 24.96 feet from the beginning of this line;
2. North 72 degrees 54 minutes 55 seconds West, 263.12 feet to a rebar found;
3. South 17 degrees 05 minutes 05 seconds West, 208.71 feet to a railroad spike found in the aforementioned S.R. 2012; passing through a rebar found a distance of 24.96 feet from the end of this line;

Thence in and along the centerline of S.R. 2012 the following 4 courses and distances:
1. North 72 degrees 54 minutes 55 seconds West, 139.55 feet to a railroad spike found;
2. North 71 degrees 57 minutes 18 seconds West, 83.99 feet to a railroad spike found;
3. North 70 degrees 14 minutes 08 seconds West, 435.24 feet to a railroad spike found;
4. North 82 degrees 39 minutes 04 seconds West, 107.16 feet to a railroad spike set;

Thence crossing S.R. 2012, along lands now or late of Todd and Tina Marie Seifert and Ricky K. Steely, North 06 degrees 26 minutes 14 seconds East, 200.01 feet to an iron pipe found; passing through a iron pipe found a distance of 80.16 feet from the beginning of this line;

Thence along said lands now or late of Ricky K. Steely the following 2 courses and distances:
1. North 83 degrees 27 minutes 22 seconds West, 376.26 feet to an axle found;
2. South 15 degrees 30 minutes 24 seconds East, 269.55 feet to a railroad spike set in the centerline of S.R. 2012; passing through an iron pipe found a distance of 24.43 feet from the end of this line;

Thence along said centerline of S.R. 2012, South 74 degrees 06 minutes 16 seconds West, 264.30 feet to a railroad spike set;

Thence along lands now or late of Andrew L. Nuss the following 2 courses and distances:
1. Crossing S.R. 2012, North 08 degrees 48 minutes 31 seconds West, 242.68 feet to a rebar found; passing through an iron pipe found a distance of 19.97 feet from the beginning of this line;
2. South 79 degrees 03 minutes 42 seconds West, 522.71 feet to a rebar found;

Thence along lands now or late of Eastern Waste of Bethlehem, Inc., North 08 degrees 51 minutes 41 seconds West, 1499.66 feet to a rebar found;
Thence along lands now or late of the City of Bethlehem, South 88 degrees 38 minutes 17 seconds East, 1982.20 feet to a rebar found;

Thence along lands now or late of Bruce and Ginger Petrie, South 89 degrees 06 minutes 09 seconds East, 839.78 feet to a rebar found;

Thence along lands now or late of Timothy L. and Lisa M. Walters the following 3 courses and distances:

1. South 11 degrees 51 minutes 13 seconds West, 1427.57 feet to a rebar found; passing through a rebar found a distance of 1066.48 feet from the beginning of this line;
2. South 31 degrees 19 minutes 23 seconds East, 412.00 feet to a rebar found;
3. South 33 degrees 38 minutes 09 seconds West, 24.97 feet to a railroad spike found in the centerline of Applebutter Road, S.R. 2012; the PLACE OF BEGINNING.

Being the same premises which Jersey Central Power and Light Company, a New Jersey corporation by Deed dated 11/19/1999 and recorded 12/6/1999 in Northampton County in Record Book Volume 1991-1 Page 180264 conveyed unto Sithe New Jersey Holdings, LLC, a Delaware limited liability company, in fee.

AND THE SAID Sithe New Jersey Holdings, LLC is now known as NRG REMA LLC, a Delaware limited liability company.

AND THE SAID NRG REMA LLC, a Delaware limited liability company, is now known as GenOn REMA, LLC, a Delaware limited liability company.

UNDER AND SUBJECT to the same rights, privileges, agreements, rights of way, easements, conditions, exceptions, restrictions and reservations as exist by virtue of prior recorded instruments, plans, deeds of conveyances, or visible on the ground.

TOGETHER with all and singular the buildings, improvements, ways, streets, alleys, passages, woods, waters, watercourses, rights, liberties, privileges, hereditaments and appurtenances to the same belonging or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof, and of every part and parcel thereof.

AND ALSO all the estate right, title, interest, use, possession, claim and demand whatsoever of the Grantor both in law and in equity, of, in and to the Property herein described and every part and parcel thereof with the appurtenances.

TO HAVE AND TO HOLD all and singular the Property herein described together with the hereditaments and appurtenances unto the Grantee, its successors and assigns, and to the Grantee's proper use and benefit forever.

AND the said Grantor will **SPECIALLY WARRANT AND FOREVER DEFEND** the Property herein conveyed.

[This page ends here. Signature Page to Follow]

Surrounding Property Notifications

List of surrounding properties to receive notification as per 145-33E (12). Verification to be provided within 15 days of submission.

	NAME	SITE ADDRESS	MAILING ADDRESS	PARCEL NO.
1	Patrick Hauze	4273 Madison Avenue	4273 Madison Avenue Bethlehem, PA 18015	N7SE4 40 4 0719
2	Cecilio Gonzalez	2647 QUINCY AVE	629 Faith Drive Catasauqua, PA 18032	P7NE1 7 1 0719
3	Saucon Grove LLC	2420 APPLEBUTTER RD	756 Main Street #178 Tatamy, PA 18085	P8 4 8 0719
4	Louis Didomenico	2452 APPLEBUTTER RD	2458 Applebutter Road Hellertown, PA 18055	P8 4 11 0719
5	Thomas Conley	2470 Applebutter Road	2470 Applebutter Road Hellertown, PA 18055	P8 4 14 0719
6	Greg Boardman	2472 APPLEBUTTER RD	101 Spruce Street Hellertown, PA 18055	P8 4 14A 0719
7	Michael Swint	2490 APPLEBUTTER RD	842 Folk Street Easton, PA 18042	P8 4 14B 0719
8	Joseph Severn	APPLEBUTTER RD	1612 Gail Lane Hellertown, PA 18055	P8 4 15 0719
9	Manufacturer's Light & Heat Co.	2517 APPLEBUTTER RD	RR 1 Hellertown, PA 18055	P8 1 6 0719E
10	Elizabeth Larsen	2533 Applebutter Road	2533 Applebutter Road Hellertown, PA 18055	P8 1 7A 0719
11	Iglesia Evangelica Apostoles	2550 Applebutter Road	2550 Applebutter Road Hellertown, PA 18055	P8 4 18A 0719E
12	Michele Affatoto	2400 Applebutter Road	714 Linden Street, Apt. 14 Bethlehem, PA 18018	P8 4 7 0719
13	Lisa M. Walters Trust	2557 Applebutter Road Hellertown, PA 18055	2557 Applebutter Road Hellertown, PA 18055	N8 14 14B-1A 0719
14	Bruce Petrie	2626 Redington Road 2600 Redington Road	2626 Redington Road Hellertown, PA 18055	N8 14 10 0719F N8 14 9H 0719F
15	Angela Malik	2563 APPLEBUTTER RD	2563 APPLEBUTTER RD HELLERTOWN, PA, 18055-3304	N8 14 12 0719
16	Christine Drakos	720 REDINGTON RD NO	1009 Blair Road Bethlehem, PA 18017	N8 14 11 0719
17	RZB LLC	2476 Riverside Drive	1009 Blair Road Bethlehem, PA 18017	N8 14 3 0719
18	Salvatore Gagliano	2530 Wolf Pack Run	2530 Wolf Pack Run Hellertown, PA 18055	N8 14 3A-1 0719
19	Robert Blasko	2510 Redington Road	2510 Redington Road Hellertown, PA 18055	N8 14 3A 0719
20	PP&L Co	RIVERSIDE DR	2 N. 9th Street Allentown, PA 18101	N7 18 2 0719
21	Pennsylvania Lines, LLC	RIVERSIDE DR	650 W. Peachtree Street NW Atlanta, GA 30308	N8 11 1 0719E
22	John Kelley	2238 Riverside Drive SCHWAB AVE	2238 Riverside Drive Bethlehem, PA 18015	N7SE4 9 1 0719 N7SE4 19 2 0719
23	Dorothy Kelley	SCHWAB AVE	2338 Riverside Drive Bethlehem, PA 18015	N7SE4 19 1 0719
24	Kyle Cambiotti	JOHNSTON AVE ERNY AVE	4284 Matthews Avenue Bethlehem, PA 18015	N7SE4 26 1 0719 N7SE4 29 4A 0719
25	Peter & Linda Danubio	ERNY AVE	C/O County Tax Claim Division 669 Washington St Easton, Pa, 18042	N7SE4 29 4 0719C
26	George Steckel	2230 MIXSELL AVE	4275 Jefferson Avenue Bethlehem, PA 18015	N7SE4 40 3 0719
27	Bethlehem Landfill Company	multiple	2335 Applebutter Road Bethlehem, PA 18015	multiple
28	Shannon A. Smith, Revocable Trust	2422 Applebutter Road 2426 Applebutter Road	2422 Applebutter Road Hellertown, PA 18055	P8 4 9 0719 P8 4 10 0719
29	Bushkill Valley Motorcycle Club	2248 RIVERSIDE DR	1312 Tatamy Road Easton, PA 18042	N7 18 1 0719
30	Jay S. Pichel	2391 Applebutter Road 2559 Applebutter Road	2561 Applebutter Road Hellertown, PA 18055	P8 1 2 0719 N8 14 14B-1 0719
31	Andrew & Tina Krasnansky	Applebutter Road 2430 Applebutter Road 2442 Applebutter Road	2430 Applebutter Road Hellertown, PA 18055	P8 4 11A 0719 P8 4 11B 0719 P8 4 11C 0719
32	Joseph Severn ET AL	Applebutter Road	C O Joseph Severn 1612 Gail Ln Hellertown, Pa, 18055-3005	P8 4 15 0719
33	Robert G. Raidline	2384 Applebutter Road Bethlehem, PA 18015	2384 Applebutter Road Bethlehem, PA 18015	P8 4 5 0719
34	Conectiv Bethlehem, LLC	2254 Applebutter Road Applebutter Road	c/o Calpine Bethlehem, LLC 717 Texas Ave., Suite 1000 Houston, TX 77002	P7 15 2 0719 P7 15 3A 0719
35	UGI BETHLEHEM LNG LLC f/ Lehigh Valley Industrial Park	Applebutter Road	300 WOODCLIFF DR STE 102 CANONSBURG, PA, 15317-	P7 22 53-56 0719

SECTION 13

Waiver Request List

BETHLEHEM LANDFILL COMPANY (BLC)
PHASE V EXPANSION
LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN
SUPPORTING DOCUMENTATION
SECTION 13 – LIST OF REQUESTED WAIVERS

Bethlehem Landfill Company (BLC) seeks the following waivers in association with the Phase V Expansion Preliminary Land Development Plan. The waivers requested are the minimum modifications necessary, will not be contrary to the public interest, and are consistent with the purpose and intent of the Township's ordinances. Literal enforcement of the provisions for which BLC is seeking waivers is unnecessary and would cause undue hardship on BLC. Waivers identical to those being requested in connection with this application were previously granted by Township Council in connection with the 2020 Land Development approval for the Northern Realignment, and other prior approvals for Bethlehem Landfill including the Phase IV Expansion and Southeastern Realignment.

Subdivision and Land Development Ordinance

1. Section 145-33.B(1) – Plan Scale

2&3.Sections 145-33.C(1), 145-33.C(2) and 145-34.C(3) – Existing Features within 500 feet including contouring

4. Section 145-33.F(1)(a), 145-34.C(g)(a) and Appendix B-7 – Standard notes for Drainage Facilities Easements
5. Section 145-34.D(5) – Easement Legal Agreements
6. Section 145-41.B(4) and 145-45.B(3), (4) and (9) – Rights-of-way and Cartway Width
7. Section 145-46.B(3) – Drainage Easements
8. Sections 145-30 and 34.D(6) – Insurance
9. Section 145-45.G(2) – Specifications for Driveways

Stormwater Management Ordinance

1. Section 137-18.E – Basin Orifice Size
2. *Section 137-18.G – Basin Access Ramp
3. Section 137-18.H – Basin Fencing
4. *Section 137-18.K – Outside Slope of a Berm Shall be no Steeper than a Ratio of 3H:1V
5. Section 137-18.L – Maximum basin Depth, Interior Slope, Fencing and 8-Hour Drainage Requirement
6. Section 137-18.N – Minimum Basin Bottom Slope 1%
7. Section 137-19.F(2) – To Permit Steeper Swale Bank Slopes

8&9.Sections 137-19.G(8) & (10) – Concrete Structure for Outlets

10. Section 137-19.G(14) – Storm Sewer Failure, Discharge Different Destination than Point of Study
11. Section 137-23. M – Maximum 3:1 Slope
12. Sections 137-26.D, E, 34, 36, 37 and 38 – Easement Legal Agreements
13. Sections 137-37.B and C – Drainage Easements
14. Appendix I – Storm Drainage Easement Maintenance Covenant, Infiltration Notes

Subdivision and Land Development Ordinance

1. **Waiver Requested:** Section 145-33.B(1) – Plan Scale

Justification: The Plan Sheets of the Phase V Land Development Plan depict the entire subject parcels. We request a waiver of plan scale to adequately depict the subject parcels.

An identical waiver request was granted by Township Council in connection with the Northern Realignment approval as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

2&3. **Waiver Requested:** Sections 145-33.C(1), 145-33.C(2) and 145-34.C(3) – Existing Features within 500 feet including contouring

Justification: Plan Sheets 3, 6 and 7 along with the aerial mapping in Section 16 provide the most up-to-date existing conditions for the site. This represents the 2020 aerial photometric mapping. We request a waiver from the requirement to depict any further existing features.

An identical waiver request was granted by Township Council in connection with the Northern Realignment approval as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

4. **Waiver Requested:** Section 145-33.F(1)(a), 145-34C(g)(a) and Appendix B-7 – Standard notes for Drainage Facilities Easements

Justification: Drainage/Stormwater easements are not proposed to be dedicated to the Township for the modified stormwater facilities associated with the project. As noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. As outlined in connection with the Phase V Expansion, PaDEP has perpetual access to the site to inspect all facilities within the property including the stormwater facilities. Pursuant to its PaDEP Solid Waste Permit, Bethlehem Landfill Company is obligated to maintain the site, including all stormwater management facilities contained within the PaDEP permit boundary, throughout the life of the landfill and during the bonded post closure period, during which time PaDEP will be inspecting the site regularly and Bethlehem Landfill Company will be required to monitor and report regularly. This ensures that the stormwater management facilities will be maintained, making Township easements unnecessary.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

5. **Waiver Requested:** Section 145-34.D(5) – Easement Legal Agreements

Justification: No drainage/stormwater easements are proposed to be dedicated to the Township for the modified stormwater facilities associated with the Phase V Expansion. As noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. As outlined in connection with the Phase V Expansion, PaDEP has perpetual access to the site to inspect all facilities within the property including the stormwater facilities. Pursuant to its PaDEP Solid Waste Permit, Bethlehem Landfill Company is obligated to maintain the site, including all stormwater management facilities contained within the PaDEP permit boundary, throughout the life of the landfill and during the bonded post closure period, during which time PaDEP will be inspecting the site regularly and Bethlehem Landfill Company will be required to monitor and report regularly. This ensures that the stormwater management facilities will be maintained, making Township easements unnecessary.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

6. **Waiver Requested:** Section 145-41B(4) and 145-45B(3), (4) and (9) – Rights-of-way and Cartway Width

Justification: No improvements are proposed as part of the Phase V Expansion along the existing roadways (Applebutter Road, Skyline Drive, Riverside Drive) which front the subject parcels. Further the project proposes no changes to access drives or routes to the landfill or increase in traffic as a result of the project. Thus, a waiver to the extent necessary is requested with regard to any right-of-way or cartway widening for those roadways fronting the landfill property.

An identical waiver request was granted by Township Council in connection with the Northern Realignment approval as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

7. **Waiver Requested:** Section 145-46.B(3) – Drainage Easements

Justification: No drainage/stormwater easements are proposed to be dedicated to the Township for modified stormwater facilities associated with the proposed project. As noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. As outlined in connection with the project, PaDEP has perpetual access to the site to inspect all facilities within the property including the stormwater facilities. Pursuant to its PaDEP Solid Waste Permit, Bethlehem Landfill Company is obligated to maintain the site, including all stormwater management facilities contained within the PaDEP permit boundary, throughout the life of the landfill and during the bonded post closure period, during which time PaDEP will be inspecting the site regularly and Bethlehem Landfill Company will be required to monitor and report regularly. This ensures that the stormwater management facilities will be maintained, making Township easements unnecessary.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

8. **Waiver Requested:** Sections 145-30 and 34D(6) – Insurance (Township and Township Engineer as Named Insureds)

Justification: Insurance is required by PaDEP regulations [25 Pa Code 271.371-377], and proof of said insurance coverage must be submitted annually with the site's Annual Operations Report [25 Pa Code 271.313]. Enclosed with the Land Development Submission is proof of insurance that has been provided to PaDEP in connection with the Solid Waste Permit. To the extent the SALDO requires the Township and Township Engineer to be named insureds, Bethlehem Landfill Company requests a waiver from this requirement.

An identical waiver request was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

9. **Waiver Requested:** Section 145-45.G(2) – Specifications for Driveways

Justification: The Plan does not show internal circulation drive(s) beyond a perimeter access drive and maintenance road. During landfill operations such drives are temporary – they are located within the disposal footprint and are used as 'haul roads' to the working face. The location changes frequently, making compliance with these provisions unnecessary and onerous.

An identical waiver request was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

Stormwater Management Ordinance

1. **Waiver Requested:** Section 137-18.E – Basin Orifice Size

   Justification: Bethlehem Landfill Company, serving as both owner and responsible party for maintenance of the Stormwater Basin, has the maintenance capability to ensure smaller orifices within the Basin Outlet Structures are kept clear of debris. The smaller dewatering orifices are necessary to meet release rates as required. An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior landfill land development plans including the Phase IV Expansion and Southeastern Realignment.

2. **Waiver Requested:** Section 137-18.G – Basin Access Ramp

   Justification: Bethlehem Landfill Company, serving as both owner and responsible party for maintenance of the Stormwater Basin, has numerous pieces of maintenance equipment capable of traversing and operating on the proposed basin slopes to perform necessary maintenance. Landfill equipment operates daily on slopes throughout the site that are comparable to the slopes of the proposed basin without issue or difficulty. Further, other existing basins onsite do not contain basin access ramps. An identical waiver was granted by Township Council in connection with the Northern Realignment for Bethlehem Landfill.

3. **Waiver Requested:** Section 137-18.H – Basin Fencing

   Justification: The landfill property perimeter requires security fencing which encompasses the existing basins, thus no additional fencing is necessary. This waiver has been previously granted for all existing basins, including Basin #2 most recently in connection with the Northern Realignment. To the extent Section 137-18.H is applicable; a waiver of this Section is requested.

   An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

4. Waiver Requested: Section 137-18.K – Outside Slope of a Berm Shall be no Steeper than a Ratio of 3H:1V

Justification: A waiver of this section is requested to permit a portion of the proposed outside slope of the proposed basin berms be designed and constructed utilizing 2:1 slopes to limit the disturbance of existing natural features. Conventional outside berm slopes of the prescribed 3H:1V (maximum) would unnecessarily impact a greater square-footage of natural features north of proposed Basin #8. By utilizing 2:1 slopes, the limit of disturbance is greatly reduced thereby preserving existing natural features including steep slopes and woodlands.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

5. Waiver Requested: Section 137-18.L – Maximum basin Depth, Interior Slope, Fencing and 8-Hour Drainage Requirement

Justification: Proposed Basins 7 and 8 propose depths and interior slopes exceeding the ordinance maximums prescribed. The design requirements outlined in Section 137-18L are criteria to avoid the need for safety fencing around the basins and to minimize the visual impact of those basins. As the proposed basin is fenced by the landfill perimeter fence these criteria in our view do not apply.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

6. Waiver Requested: Section 137-18.N – Minimum Basin Bottom Slope of 1%

Justification: A waiver of this Section is requested to permit existing and proposed Stormwater Basins to have a flat bottom. The existing and proposed Stormwater Basins prior to post closure will serve as Sedimentation Basins. A flat bottom is proposed to maximize the extent of storage within the Stormwater Basins and to maximize the treatment capabilities of Basins prior to post closure.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

7. Waiver Requested: Section 137-19.F(2) – To Permit Steeper Swale Bank Slopes

Justification: Bethlehem Landfill Company, serving as both owner and responsible party for maintenance of the proposed swales, has numerous pieces of maintenance equipment capable of traversing and operating on the proposed swale banks slopes to perform necessary maintenance. Landfill equipment operates daily on slopes throughout the site that are comparable to the bank slopes proposed without issue or difficulty. Further, other existing swales onsite have identical bank slopes.

An identical waiver was granted by Township Council in connection with the Northern Realignment for Bethlehem Landfill.

8. & 9. Waiver Requested: Sections 137-19.G(8) and (10) – Concrete Structure for Outlets

Justification: The risers within existing and proposed basins are concrete structures, per PennDOT's standards. Additionally throughout the landfill, piping with end walls/sections have been approved and installed which do not have foundations. Since all stormwater facilities shall be owned and maintained by Bethlehem Landfill Company, we seek a waiver of this requirement. To the extent a waiver to permit construction of stormwater facilities which do not meet PennDOT specifications is required, BLC requests that waiver.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

10. Waiver Requested: Section 137-19.G(14) –Storm sewer failure, discharge different destination than Point of Study.

Justification: A waiver of this section is requested to permit proposed storm sewer systems designed to collect runoff from the north slope of the Phase V landfill and direct said runoff to BMP's located northeast of the landfill. In order to minimize discharges to the north (Riverside Drive and the "Narrows") from the proposed development storm sewers are required. In the event of storm sewers failing the discharge would be to the north and not to management BMP's to the northeast (Basin #8). Failure of storm sewers proposed is unlikely due to size and slope of piping. We seek a waiver of this requirement.

Identical waiver requests were granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

11. Waiver Requested: Section 137-23. M - Maximum 3:1 Slope

Justification: A waiver of this section is requested to permit proposed grading to exceed a 1 vertical to 3 horizontal slope. Due to site constraints and existing steep slopes along the perimeter of the site, slopes steeper than the prescribed 3:1 maximum are required. Appropriate erosion control blankets and land cover are provided within the Erosion and Sediment Control Plan for the site. Additionally, slopes steeper than 3:1 exist within the currently permitted landfill. Further, as outlined within Note #13 of the General Notes on the Cover Sheet of the Land Development Plans, Bethlehem Landfill Company has a long-term, financially guaranteed obligation to maintain all slopes pursuant to PADEP regulations. Specifically, Bethlehem Landfill will be required to post a bond with PaDEP to insure site closure and post closure in accordance with PaDEP's applicable regulations. Said bonding can only be released upon approval of a major permit modification (including public notice and public comment) and the release of the bond would not constitute a waiver or release of liability.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

12. Waiver Requested: Sections 137-26.D, E, 34, 36, 37 and 38 – Easement Legal Agreements

Justification: A waiver of this Section is requested regarding easement agreements with the Township for the modified stormwater facilities associated with the Phase V Expansion. There are no drainage/stormwater easements to be dedicated to the Township for modified or proposed stormwater facilities. As noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. As outlined in connection with the Phase V Expansion Plans, PaDEP has a perpetual right-of-entry access to the site. Pursuant to its PaDEP Solid Waste Permit, Bethlehem Landfill Company is obligated to maintain the site, including all stormwater management facilities contained within the PaDEP permit boundary, throughout the life of the landfill and during the bonded post closure period, during which time PaDEP will be inspecting the site regularly and Bethlehem Landfill Company will be required to monitor and report regularly. This ensures that the stormwater management facilities will be maintained, making Township easements unnecessary.

Identical waiver requests were granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

13. Waiver Requested: Sections 137-37.B and C – Drainage Easements

Justification: Drainage/Stormwater easements are not proposed to be dedicated to the Township for the modified stormwater facilities associated with the Phase V Expansion. As noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. As outlined in connection with the Phase V Expansion, PaDEP has perpetual access to the site to inspect all facilities within the property including the stormwater facilities. Pursuant to its PaDEP Solid Waste Permit, Bethlehem Landfill Company is obligated to maintain the site, including all stormwater management facilities contained within the PaDEP permit boundary, throughout the life of the landfill and during the bonded post closure period, during which time PaDEP will be inspecting the site regularly and Bethlehem Landfill Company will be required to monitor and report regularly. This ensures that the stormwater management facilities will be maintained, making Township easements unnecessary.

An identical waiver was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

14. Waiver Requested: Appendix I – Storm Drainage Easement Maintenance Covenant, Infiltration Notes

Justification: No drainage/stormwater easements are proposed to be dedicated to the Township for the modified stormwater facilities associated with the Phase V Expansion. Thus, no stormwater maintenance agreement is necessary. Notes provided on the Land Development Plan require the perpetual maintenance of all Stormwater Facilities to the approved design by BLC. Furthermore, as noted in Note #12 of the General Notes on the Cover Sheet of the Land Development Plans, PADEP regulates, inspects and requires maintenance bonding for the stormwater facilities within the PADEP permit boundary. BLC requests a waiver from this Section for the same reasons it seeks a waiver from Sections 137-37.B, C, above.

An identical waiver request was granted by Township Council in connection with the Northern Realignment, as well as with prior Landfill Land Development Plans including the Phase IV Expansion and Southeastern Realignment.

SECTION 14

Blank

SECTION 15

Community Impact Study

BETHLEHEM LANDFILL COMPANY (BLC)

PHASE V EXPANSION

LAND DEVELOPMENT AND LOT CONSOLIDATION PLAN

SUPPORTING DOCUMENTATION

SECTION 15

COMMUNITY IMPACT STUDY

A. A Project Narrative Describing the Following:

1. The location of the project and the type of the project.

   Bethlehem Landfill Company
   2335 Applebutter Road
   Bethlehem, PA 18015

2. The project's extent in terms of numbers of units for residential projects and square feet for commercial, industrial and institutional development.

   The Phase V Expansion Project proposes 86 acres of new lined disposal area, a mechanically stabilized Earthen (MSE) Berm, disposal area perimeter access and maintenance drives, two (2) leachate storage tanks, and modifications/ additions to the existing Landfill Stormwater Management System serving the landfill.

3. The estimated population for residential developments upon completion, the estimated employment for industrial and commercial uses upon completion and the estimated employment and clients to be served for institutional developments upon completion.

   The proposed project shall extend the operation of the landfill maintaining existing employment. No additional employment is anticipated associated with the project.

B. Tax Revenue/Financial

The Bethlehem Landfill Company has in place an Amended and Restate Host Agreement with Lower Saucon Township that provides financial and other benefits in connection with the Phase V Expansion.

C. Analysis of services.

1. Water.

(a) What will the total daily gallonage required for the project be? Who will pay for infrastructure and service costs?

The proposed project will have no effect on current daily water usage at the Bethlehem Landfill. The project proposes no modifications to existing water services.

(b) Will the water be provided from public sources or onsite? If public, can the public system handle the increased demand?

No increased demand.

(c) By whom will the costs of improvements and usage be borne?

No water system improvements.

(d) If water is to be from an onsite source or a new water source, a hydrological study per the requirements of this chapter will have to be provided prior to preliminary plan approval. What impact will the total daily draw have upon adjoined property owners? What will be available for fire flows? What have wells within a one-thousand-foot radius been able to produce?

N/A. Public water is provided to the subject site from Lower Saucon Authority.

(e) Provide a listing of necessary applications for state or federal permitting.

No water approvals necessary.

2. Sewage. This data is provided in the land development planning module required by the DEP.

The proposed project does not include any infrastructure modifications to the existing public sewer mains and laterals serving the subject property. Sewage planning has been approved by the Township and PaDEP. No new planning module is required.

3. Streets and Traffic. Does the project fit into the existing Township street system? Who will bear the cost of street improvements? Are any private streets proposed? A traffic impact statement is required by the street section of this chapter and Chapter 180, Zoning. Provisions for pedestrian and bicycle transportation are also required.

No public streets are proposed as part of the project. A traffic impact analysis is included with this submittal which concludes the existing street system serving the site is adequate. Modifications to the internal access roads are proposed but no modification is proposed to the BLC access from Applebutter Road. This Applebutter Road access has been determined by PennDOT to remain valid for the Phase V Expansion. The costs of modification and continued maintenance of

the internal access roads shall be the responsibility of Bethlehem Landfill Company.

4. Parks and Recreation.

   (a) Proximity to existing Township parks.

   The nearest park to the proposed project is the Steel City neighborhood park which is +/-4,025 feet from the project area of development.

   (b) Where are lands proposed for dedication? Are they in compliance with the Township Comprehension Plan and the officially adopted Park and Recreation Plan? Are active or passive recreational facilities to be provided? What percentage (if any) of environmentally sensitive areas are included in the dedication area?

   No lands are proposed to be dedicated for recreational use. Conservation Easements that have been dedicated to and accepted by the Township are depicted on the land development plans.

   (c) If the development includes residential clusters, indicate how much land, made possible by the reduction in lot size, will be set aside for recreation and open space.

   N/A. No residential clusters proposed.

   (d) What recreation facilities will be needed by the proposed residents? How are these needs met? Are the projected needs in line with projections provided in the Township Park and Recreation Plan?

   N/A. No residences proposed.

5. Emergency Service: Police, Fire and Ambulance

   (a) How far is the project from police, fire and ambulance service?

   The project is located +/-7.5 miles from the Lower Saucon police station, +/-2.5 miles from the Steel City Volunteer Fire Company Station (#63)/ambulance.

   (b) Does the proposed street system fit into an existing patrol area?

   N/A. No streets proposed.

   (c) Are there streets or block lengths proposed which are longer than permitted by this chapter?

   N/A. No streets proposed.

(d) What provisions are proposed for fire protection?

Fire protection is provided from existing fire hydrants located along the frontage of the property and within the site. No additional fire hydrants are proposed. BLC maintains a Preparedness, Prevention and Contingency Plan for all emergencies onsite including fire protection, a copy of which is included in Section 7 of the Land Development and Consolidation Plan Supporting Documentation.

(e) If public water is proposed, will fire hydrants be provided in accordance with this chapter?

N/A. No water main extension proposed.

(f) Are sites designed in a manner to provide access and exposure for firefighting?

Yes, a perimeter access road is provided for access to all areas of the property and landfill.

(g) Are there secondary locations of access to the site or subdivision area?

Yes, secondary accesses are available, but are gated for safety.

6. Solid waste. What is the total estimated tonnage of waste to be collected within the proposed development? Who will be responsible for disposal and costs of disposal?

The Phase V Expansion Project will accommodate approximately 7.2 million tons of waste disposal. No waste will be generated by the project.

D. An analysis of the development's impact on the Township's natural resources, the environment and historic resources including but not limited to:

An Environmental Protection Analysis was performed in accordance with the Lower Saucon Township Zoning Ordinance, which concludes the Phase V Expansion complies with the Environmental Protection Standards. Compliance is achieved by utilizing the Excess Resource Utilization provisions of the Ordinance. A full detailed discussion is provided on Plan Sheets 12, 13 and 14 of the Preliminary Land Development and Lot Consolidation Plan for the Phase V Expansion.

The PADEP Solid Waste Permit Major Modification Application will include a full Environmental Assessment for the project evaluating any impacts to local/state/ federal environmental and historic resources. These assessments are ongoing and will be provided to the Township as part of the Solid Waste Permit Application.

(1) Streams – **Five (5) waterways have been delineated within the proposed consolidated landfill lot: three (3) waterways (Bull Run and two (2) unnamed tributaries ("UNTs") to Lower Saucon Creek), which are to remain protected by easements and buffers; and two (2) UNTs to Bull Run, impacts to which will be permitted via a PADEP/USACE Joint Permit.**

(2) Floodplains – **One (1) mapped floodplain, associated with Bull Run, is located on the consolidated landfill lot. No disturbance/development is proposed within the mapped floodplain.**

(3) Wetlands – **Ten (10) wetlands have been identified within the proposed consolidated landfill lot. These wetlands are identified on the Phase V Expansion Land Development Plans. Direct impacts are proposed for wetlands D thru I totaling 0.27 acres. The Phase V Expansion proposes no impacts to wetlands A, B, C or J. A PADEP/USACE Joint Permit will be obtained to allow for the impacts to wetlands D thru J.**

(4) Vernal Ponds – **No vernal ponds exist within the proposed consolidated landfill lot.**

(5) Steep Slopes – **Steep slopes exist within the area of the Phase V Expansion. A full analysis of the impacts to steep slopes is provided on Plan Sheet 12 and 14 of the Preliminary Land Development and Lot Consolidation Plan.**

(6) Carbonate Geology (Karst) Features – **A site specific study was performed to identify geology within the Phase V Expansion area. The proposed Phase V area of development/disturbance lies outside any carbonate geology areas. See Section 4 of the Phase V Land Development Supporting Documentation Binder for further discussion.**

(7) Rock Outcrops or Cliffs – **No rock outcrops or cliffs exist within the Phase V Expansion area.**

(8) Woodlands – **Woodlands exist within the area of the Phase V Expansion. A full analysis of the impacts to woodlands is presented on Sheet 12 and 13 of the Preliminary Land Development and Lot Consolidation Plan.**

(9) Significant Natural Resources Identified by the County and/or Township Comprehensive Plan or Natural Resources Plan – **All mapped natural resources have been identified on the Preliminary Phase V Land Development and Lot Consolidation Plan. Plan Sheets 12, 13 and 14 of said plan identify all impacts to those natural resources identified.**

(10) Air Quality – **An Air Quality Permit will be applied for and must be obtained from PADEP for the Phase V Expansion prior to any construction activities associated with the Phase V Expansion.**

(11) Historic or Archeological Resources – **The Redington Historic District along Riverside Drive is located within the proposed consolidated landfill lot but entirely within the Conservation Easement area on the Redington tract. No part of the Phase V Expansion area is within the area identified as the historic district. No other historical districts are located within the proposed consolidated landfill lot.**

E. Mitigation of negative impacts. Where negative impacts are identified, the analysis should specify how the negative impacts are reduced or eliminated by the developer.

The PADEP/USACE Joint Permit will require mitigation of impacts to wetlands and waterways noted above prior to permit issuance.

SECTION 16

Aerial Mapping

KEY

- BETHLEHEM CONSOLIDATED PROPERTY
- ADJOINING PROPERTIES
- PERMIT BOUNDARY
- LIMIT OF CONSTRUCTED LINER
- LIMIT OF CONSTRUCTED CAP (EAST OF LIMIT)

AERIAL PHOTOGRAPH DATE 2-9-19

200' 0' 200' 400'

PREPARED BY:
martin and martin incorporated
37 south main•street suite A
chambersburg, pennsylvania 17201

Bethlehem Landfill Company

WASTE CONNECTIONS INC.