Full Environmental Assessment Form
Part 1 - Project and Setting

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Dom-Mar Recycling and Transfer Facility		
Project Location (describe, and attach a general location map): Dolsontown Road, Town of Wawayanda, Orange County, New York (Tax Parcels: 6-1-3.31 and 6-1-3.32)		
Brief Description of Proposed Action (include purpose or need): DOM KAM LLC of Middletown, New York is seeking site plan and special use permit approval from the Planning Board to construct and operate a solid waste management facility, which will include a transfer station and recycling facility (Dom-Mar Recycling and Transfer Facility or Facility) on Dolsontown Road in the Town of Wawayanda, Orange County, New York. The project is located in an MC-1 Zone on a 44.3-acre property, comprised of two tax parcels (6-1-31 and 6-1-3.32) owned by the Applicant. The two lots will be consolidated as part of the proposed action. The proposed Facility will process and transfer municipal solid waste (MSW), construction and demolition debris (C&D), and industrial waste (IW) for disposal, sorting and packaging of Old Corrugated Containers (OCC), and simple floor sorting for hardfill, brush, clean wood, and picked metal from the C&D for further processing and recovery. The facility's proposed design capacity is 950 tons per day (tpd). The new Facility (comprising 10 ac.) will be comprised of the following: 42,000 SF Transfer area/collection truck drop-off lanes, 6,400 SF Administration building, scales and scale house, 35 parking spaces, and 6 trailer parking spaces. Full site development may include a 36,000 SF truck maintenance shop with truck wash and overnight truck parking, 12,000 SF fabrication shop, fueling station, roll off storage, C&D recycling storage bins, residential drop off area, and 82 vehicle parking spaces. Max project area may encompass 18.39 ac.		
Name of Applicant/Sponsor: Dom Kam, LLC (Michael Marangi)	Telephone: 845-343-5566 E-Mail: mike@marangidisposal.com	
Address: 366 Highland Avenue Ext.		
City/PO: Middletown	State: NY	Zip Code: 10940
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity		If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Council, Town Board, or Village Board of Trustees	☐Yes ☑No		
b. City, Town or Village Planning Board or Commission	☑Yes ☐No	Wawayanda Planning Board - Site Plan, Special Use Permit, Lot Consolidation, Waiver 152-17 G	Spring 2021
c. City, Town or Village Zoning Board of Appeals	☐Yes ☑No		
d. Other local agencies	☑Yes ☐No	Town of Wawayanda Building Permit; Sewer and Water Connections	Spring 2021
e. County agencies	☑Yes ☐No	Orange County Department of Health - water/sewer connections; GML 239 M	Spring 2021
f. Regional agencies	☐Yes ☑No		
g. State agencies	☑Yes ☐No	DEC Part 360 Permit, SPDES GP 0-20-001; Multi-Sector GP Industrial Activity	Spring 2021
h. Federal agencies	☐Yes ☑No		

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes ☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐Yes ☑No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes ☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes ☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☐Yes ☑No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☑Yes ☐No

If Yes, identify the plan(s):

Orange County Greenway - Site is located within a priority growth area. Wallkill River Watershed Management Plan - project will implement stormwater pollution prevention plan (SWPPP) and will obtain permits, as needed, prior to construction and any alteration of aquatic resources. Therefore, no significant adverse impacts to the watershed will occur.

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

The site is not identified as temporary or permanently protected open space in the Orange County Open Space Plan.

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No

If Yes, what is the zoning classification(s) including any applicable overlay district?

MC-1 Mixed Commercial 1

b. Is the use permitted or allowed by a special or conditional use permit? ☑ Yes ☐ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No

If Yes,

i. What is the proposed new zoning for the site? __________

C.4. Existing community services.

a. In what school district is the project site located? Middletown School District

b. What police or other public protection forces serve the project site?

Orange County Sheriff Office, New York State Troop F

c. Which fire protection and emergency medical services serve the project site?

New Hampton Fire District

d. What parks serve the project site?

Shannen Park

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Industrial - Waste Transfer Station and Recycling Center

b. a. Total acreage of the site of the proposed action? 44.3 acres

b. Total acreage to be physically disturbed? 18.4 acres Phase 1: 10 acres

c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 44.3 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No

i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % __________ Units: __________

d. Is the proposed action a subdivision, or does it include a subdivision? ☐ Yes ☑ No

If Yes,

i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)

ii. Is a cluster/conservation layout proposed? ☐ Yes ☐ No

iii. Number of lots proposed? ________

iv. Minimum and maximum proposed lot sizes? Minimum ________ Maximum ________

e. Will the proposed action be constructed in multiple phases? ☑ Yes ☐ No

i. If No, anticipated period of construction: ____ months

ii. If Yes:

- Total number of phases anticipated 2
- Anticipated commencement date of phase 1 (including demolition) 10 month 2025 year
- Anticipated completion date of final phase 12 month 2031 year Phase 2 is conceptual
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases:

The proposed sanitary pump station will be designed for a phased expansion. Stormwater management will be constructed per phase.

f. Does the project include new residential uses? ☐ Yes ☑ No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase				
At completion of all phases				

g. Does the proposed action include new non-residential construction (including expansions)? ☑ Yes ☐ No

If Yes,

i. Total number of structures 2

ii. Dimensions (in feet) of largest proposed structure: 42 height; 140 width; and 300 length

iii. Approximate extent of building space to be heated or cooled: 6,400 square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☑ Yes ☐ No

If Yes,

i. Purpose of the impoundment: Stormwater Pond

ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☑ Other specify: Stormwater Runoff

iii. If other than water, identify the type of impounded/contained liquids and their source. NA

iv. Approximate size of the proposed impoundment. Volume: 0.76 million gallons; surface area: 0.57 acres

v. Dimensions of the proposed dam or impounding structure: 2 ft height; 405 length

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete): Earth Fill

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? ☐ Yes ☑ No
(Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite)

If Yes:

i. What is the purpose of the excavation or dredging? ____

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards): ____
- Over what duration of time? ____

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

iv. Will there be onsite dewatering or processing of excavated materials? ☐ Yes ☐ No
If yes, describe. ____

v. What is the total area to be dredged or excavated? ____ acres

vi. What is the maximum area to be worked at any one time? ____ acres

vii. What would be the maximum depth of excavation or dredging? ____ feet

viii. Will the excavation require blasting? ☐ Yes ☐ No

ix. Summarize site reclamation goals and plan: ____

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☑ Yes ☐ No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description): See Attachment 1 Jurisdictional Determination Letter. No NYSDEC wetlands on site.
Proposed disturbance to 0.60 ac. of non-jurisdictional wetlands (wet meadow). No impacts to jurisdictional wetlands.

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:
The wetlands identified will be filled during the grading activities on site and redeveloped with pavement and buildings.

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☑No
If Yes, describe: ______

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☑No
If Yes:
- acres of aquatic vegetation proposed to be removed: ______
- expected acreage of aquatic vegetation remaining after project completion: ______
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): ______
- proposed method of plant removal: ______
- if chemical/herbicide treatment will be used, specify product(s): ______

v. Describe any proposed reclamation/mitigation following disturbance: ______

c. Will the proposed action use, or create a new demand for water? ☑Yes ☐No
If Yes:
i. Total anticipated water usage/demand per day: 2,500 gallons/day
ii. Will the proposed action obtain water from an existing public water supply? ☑Yes ☐No
If Yes:
- Name of district or service area: Town Water District 1
- Does the existing public water supply have capacity to serve the proposal? ☑Yes ☐No
- Is the project site in the existing district? ☑Yes ☐No
- Is expansion of the district needed? ☐Yes ☑No
- Do existing lines serve the project site? ☐Yes ☑No

iii. Will line extension within an existing district be necessary to supply the project? ☑Yes ☐No
If Yes:
- Describe extensions or capacity expansions proposed to serve this project: Extension of existing 12-inch waterline on Dolsontown Road
- Source(s) of supply for the district: City of Middletown

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☑No
If, Yes:
- Applicant/sponsor for new district: ______
- Date application submitted or anticipated: ______
- Proposed source(s) of supply for new district: ______

v. If a public water supply will not be used, describe plans to provide water supply for the project: ______

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: ______ gallons/minute.

d. Will the proposed action generate liquid wastes? ☑Yes ☐No
If Yes:
i. Total anticipated liquid waste generation per day: 2,500 gallons/day
ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each):
Sanitary wastewater and incidental Leachate will be directed to sewer.

iii. Will the proposed action use any existing public wastewater treatment facilities? ☑Yes ☐No
If Yes:
- Name of wastewater treatment plant to be used: City of Middletown Waste Water Treatment Plant
- Name of district: Town Sewer District
- Does the existing wastewater treatment plant have capacity to serve the project? ☑Yes ☐No
- Is the project site in the existing district? ☑Yes ☐No
- Is expansion of the district needed? ☐Yes ☑No

- Do existing sewer lines serve the project site? ☐Yes ☑No
- Will a line extension within an existing district be necessary to serve the project? ☑Yes ☐No

  If Yes:
  - Describe extensions or capacity expansions proposed to serve this project: Sanitary sewer pump station will collect onsite wastewater and discharge it via a force main to an existing sanitary sewer manhole located along Dolsontown Road.

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes ☑No

If Yes:
- Applicant/sponsor for new district: ______
- Date application submitted or anticipated: ______
- What is the receiving water for the wastewater discharge? ______

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

______

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: None.

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☑Yes ☐No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

______ Square feet or 8 acres (impervious surface) Phase 1: 5.5 acres

______ Square feet or 44.3 acres (parcel size)

ii. Describe types of new point sources. Stormwater Basin/Pond Outlet

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

Stormwater Basins/Ponds and discharged to an on-site stream, then to Monhagen Brook

- If to surface waters, identify receiving water bodies or wetlands: Wetlands adjacent to Monhagen Brook, and onsite tributary to Monhagen Brook.
- Will stormwater runoff flow to adjacent properties? ☐Yes ☑No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☐Yes ☑No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☑Yes ☐No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

Trucks associated with transfer station operations

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

Temporary sources during construction.

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

Paint shop

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐Yes ☑No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐Yes ☐No

ii. In addition to emissions as calculated in the application, the project will generate:
- ______Tons/year (short tons) of Carbon Dioxide (CO_2)
- ______Tons/year (short tons) of Nitrous Oxide (N_2O)
- ______Tons/year (short tons) of Perfluorocarbons (PFCs)
- ______Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- ______Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- ______Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐ Yes ☑ No

If Yes:

i. Estimate methane generation in tons/year (metric): ______

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): ______

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐ Yes ☑ No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☑ Yes ☐ No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☑ Morning ☐ Evening ☐ Weekend

☐ Randomly between hours of ______ to ______.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): 160 waste collection trucks, 88 semi-trailers

iii. Parking spaces: Existing 0 Proposed 35 Net increase/decrease 35

iv. Does the proposed action include any shared use parking? ☐ Yes ☑ No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe: Traffic Mitigation Summary Table is included in Attachment 2, previously included in Appendix F of the Dolsontown Corridor FGEIS.

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☑ Yes ☐ No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐ Yes ☑ No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐ Yes ☑ No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☑ Yes ☐ No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: No more than 1,000,000 kW/h per U.S. Energy Information Administration Commercial Buildings Energy Consumption Survey data.

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other): Orange and Rockland

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐ Yes ☑ No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: Per Town Code
- Saturday: Per Town Code
- Sunday: Per Town Code
- Holidays: Per Town Code

ii. During Operations:

- Monday - Friday: 4:00 AM - 7:00 PM
- Saturday: 5:00 AM - 4:00 PM
- Sunday: None
- Holidays: None

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☑ Yes ☐ No

See Attachment 6

If yes:

i. Provide details including sources, time of day and duration:

The facility will operate in compliance with Town Code Section 152, with exception for waiver sought for 152-G. Most work will occur inside buildings. Internal combustion engine equipment used at the Facility will be equipped with mufflers, noise is aimed away from receptors.

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☑ No

Describe: The site was previously developed as a dairy farm, residence and commercial use

n. Will the proposed action have outdoor lighting? ☑ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

Lighting design and information is shown on Sheet 9 of the Site Plan Drawing Set.

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☑ No

Describe: The site was previously developed as a dairy farm, residence and commercial use

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☑ Yes ☐ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

Facility doors will be kept closed except when vehicles are entering or existing buildings. Engines will idle no longer than five minutes. Burning of materials is not permitted at the Facility. Tipping areas will be swept daily. Facility will comply with Town Code Section 152 as applicable to odors.

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☑ Yes ☐ No

If Yes:

i. Product(s) to be stored one (1) 10,000 gallon diesel above ground tank; Two (2) 5,000 gallon diesel above ground tanks

ii. Volume(s) ______ per unit time year (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

10,000 gallon diesel aboveground tank for Truck Maintenance and Storage Facility, two 5,000 gallon diesel aboveground tanks for Transfer Station

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☑ Yes ☐ No

If Yes:

i. Describe proposed treatment(s):

Pest control application would be applied by licensed applicators using minimal levels of application required.

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☑ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☑ Yes ☐ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: TBD tons per TBD (unit of time)
- Operation : 0.06 tons per dat (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: TBD
- Operation: According to Environmental Engineering by Joseph A. Salvat, 4th Edition, 1992, solid waste generation is estimated at 1.5 lbs per worker in an office. The project will result in 80 total employees (all phases) = 120 lbs or 0.06 tons per day.

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: TBD
- Operation: Per Transfer Station Operations

s. Does the proposed action include construction or modification of a solid waste management facility? ☑ Yes ☐ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): transfer station and recycling center

ii. Anticipated rate of disposal/processing:

- 29,450 Tons/month, if transfer or other non-combustion/thermal treatment, or
- ________ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: ________________________________ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: ________________________

ii. Generally describe processes or activities involving hazardous wastes or constituents: ________________________

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: ________________________

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: ________________________

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility:

____

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☐ Industrial ☑ Commercial ☑ Residential (suburban) ☐ Rural (non-farm)

☐ Forest ☑ Agriculture ☐ Aquatic ☑ Other (specify): public services, community services (religious use), undeveloped

ii. If mix of uses, generally describe:

____

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	0.64	8.56	7.92
• Forested	0.67	0.39	-0.28
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	14.38	5.48	-8.90
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	0	1.86	1.86
• Wetlands (freshwater or tidal)	2.70	2.10	-0.60
• Non-vegetated (bare rock, earth or fill)	0	0	0
• Other Describe: ________________	0	0	0

c. Is the project site presently used by members of the community for public recreation? ☐ Yes ☑ No

i. If Yes: explain: ____________________

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐ Yes ☑ No

If Yes,

i. Identify Facilities:

____

____

e. Does the project site contain an existing dam? ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: ____________________ feet
- Dam length: ____________________ feet
- Surface area: ____________________ acres
- Volume impounded: ____________________ gallons OR acre-feet

ii. Dam's existing hazard classification: ____________________

iii. Provide date and summarize results of last inspection:

____

____

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation: ____________________

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

____

____

iii. Describe any development constraints due to the prior solid waste activities: ____________________

____

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

____

____

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☑ Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☐ Yes ☑ No

☐ Yes – Spills Incidents database Provide DEC ID number(s): ____________________

☐ Yes – Environmental Site Remediation database Provide DEC ID number(s): ____________________

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: ____________________

____

____

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☑ Yes ☐ No

If yes, provide DEC ID number(s): V00289, 336029

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

Off site, 0.3 miles from site: V00289 and 336029: Middletown Landfill/Dump; Voluntary Cleanup Program/State Superfund. Potential for groundwater, soil, and surface water contamination due to leaching of material from the landfill. Limited soil sampling does not indicate any significant contamination. Testing of nearby residential drinking water supply wells in May 2000 indicates no impacts from the nearby landfill. Additional subsurface investigation is planned.

v. Is the project site subject to an institutional control limiting property uses? ☐Yes ☑No

- If yes, DEC site ID number: ______
- Describe the type of institutional control (e.g., deed restriction or easement): ______
- Describe any use limitations: ______
- Describe any engineering controls: ______
- Will the project affect the institutional or engineering controls in place? ☐Yes ☐No
- Explain: ______

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? 67 feet

b. Are there bedrock outcroppings on the project site? ☐Yes ☑No
If Yes, what proportion of the site is comprised of bedrock outcroppings? ______%

c. Predominant soil type(s) present on project site:

MdB	37 %
Wd	56 %
Rba	3 %

d. What is the average depth to the water table on the project site? Average: 0-6.6 feet

e. Drainage status of project site soils:

☑ Well Drained:	3 % of site
☑ Moderately Well Drained:	37 % of site
☑ Poorly Drained	61 % of site

f. Approximate proportion of proposed action site with slopes:

☑ 0-10%:	100 % of site
☐ 10-15%:	____% of site
☐ 15% or greater:	____% of site

g. Are there any unique geologic features on the project site? ☐Yes ☑No
If Yes, describe: ______

h. Surface water features.
i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑Yes ☐No
ii. Do any wetlands or other waterbodies adjoin the project site? ☑Yes ☐No
If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.
iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑Yes ☐No
iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name 855.5-180 Classification C
- Lakes or Ponds: Name ______ Classification ______
- Wetlands: Name Federal Wetlands Approximate Size 2.7 acres
- Wetland No. (if regulated by DEC) ______

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☑Yes ☐No
If yes, name of impaired water body/bodies and basis for listing as impaired:
Monhagen Brook and tributaries for nutrients/phosphorus

i. Is the project site in a designated Floodway? ☐Yes ☑No

j. Is the project site in the 100-year Floodplain? ☐Yes ☑No

k. Is the project site in the 500-year Floodplain? ☐Yes ☑No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐Yes ☑No
If Yes:
i. Name of aquifer: See Attachment 3 Aquifer Letter

m. Identify the predominant wildlife species that occupy or use the project site:
Common Orange County Species

n. Does the project site contain a designated significant natural community? ☐ Yes ☑ No
If Yes:
i. Describe the habitat/community (composition, function, and basis for designation): ______
ii. Source(s) of description or evaluation: ______
iii. Extent of community/habitat:
- Currently: ______ acres
- Following completion of project as proposed: ______ acres
- Gain or loss (indicate + or -): ______ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☑ Yes ☐ No
If Yes:
i. Species and listing (endangered or threatened):
Indiana Bat - NYSDEC; Indiana Bat and Northern Long-eared Bat, Small Whorled Pogonia - USFWS

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☑ No
If Yes:
i. Species and listing: ______

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☑ No
If yes, give a brief description of how the proposed action may affect that use: ______

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☑ Yes ☐ No
If Yes, provide county plus district name/number: ORAN002

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☑ No
i. If Yes: acreage(s) on project site? ______
ii. Source(s) of soil rating(s): ______
Site has not been in agricultural use in the last 5 years or more.

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☑ No
If Yes:
i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature
ii. Provide brief description of landmark, including values behind designation and approximate size/extent: ______

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☑ No
If Yes:
i. CEA name: ______
ii. Basis for designation: ______
iii. Designating agency and date: ______

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☑ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: ____________________

iii. Brief description of attributes on which listing is based: ____________________

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☑ Yes ☐ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

See Attachment 4 and Attachment 5

If Yes:

i. Describe possible resource(s): ____________________

ii. Basis for identification: ____________________

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☑ Yes ☐ No

If Yes:

i. Identify resource: See Attachment 7

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): state and national register listed; municipal recreation; state recreation; state parks and historic sites

iii. Distance between project and resource: Varies, see Attachment 7 miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation: ____________________

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

Applicant/Sponsor Name David Lenox, PE Date 1/13/2024

Signature David Lenox Title Senior Engineer

PRINT FORM

Attachment 1

EnSol, Inc.

ENGINEERING + ENVIRONMENTAL

USACE Jurisdictional Determination Letter

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278-0090

January 5, 2022

Regulatory Branch

SUBJECT: Permit Application Number NAN-2021-00721-WOR
by Marangi Disposal

Greg Fleischer
Capital Environmental Consultants, Inc.
243 Fair Street, Suite 4
Kingston, New York 14301

Dear Mr. Fleischer:

On April 21, 2021, the New York District of the U.S. Army Corps of Engineers received a request for a Department of the Army jurisdictional determination for the above referenced project. The area within the project boundary consists of approximately 18.8 acres, in the Rondout Creek watershed, located on Dolsontown Road in the Town of Wawayanda, Orange County, New York.

In the letter received on April 21, 2021, your office submitted a proposed delineation of the extent of waters of the United States within the project boundary. On October 1, 2021, this office received a complete delineation.

Based on the material submitted, this site has been determined to contain jurisdictional waters of the United States based on: the presence of wetlands determined by the occurrence of hydrophytic vegetation, hydric soils and wetland hydrology according to criteria established in the 1987 "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1 that are either adjacent to or part of a tributary system; and the presence of a defined water body (e.g. stream channel, lake, pond, river, etc.) which is part of a tributary system.

These jurisdictional waters of the United States are shown on the drawing entitled “Wetland Delineation Map Dolsontown Road Wetland Delineation Report Marangi Disposal Town of Wawayanda, Orange County, State of New York”, Figure 5-1, prepared by EnSol, Inc, dated September, 2021. This drawing indicates that there are two (2) principal wetland areas within the project boundary which are part of a tributary system, and are considered to be waters of the United States. The area within the project boundary consists of the area encompassed by the “Delineation Area/Project Boundary: 18.80ac” line, as shown on the above referenced drawing. **It should be noted that jurisdictional waters of the United States exist outside of the project boundary and have not been formally reviewed by this office.**

The first wetland (Wetland D) is located on the southwestern portion of the project boundary and is approximately 0.52 acres within the project boundary. The second wetland (Wetland E) is located along the eastern and southeastern portions of the project boundary and is approximately 1.57 acres within the project boundary.

It should be noted that, in light of the U.S. Supreme Court decision (Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, No. 99-1178, January 9, 2001), the remainder of the wetlands shown on the above referenced drawing (Wetlands A, B, C and F) do not meet the current criteria of waters of the United States under Section 404 of the Clean Water Act. The Court ruled that isolated, intrastate waters can no longer be considered waters of the United States, based solely upon their use by migratory birds.

This determination regarding the delineation shall be considered valid for a period of five years from the date of this letter unless new information warrants revision of the determination before the expiration date.

This determination was documented using the Approved Jurisdictional Determination Form, promulgated by the Corps of Engineers in June 2007. A copy of that document is enclosed with this letter, and will be posted on the New York District website at:
http://www.nan.usace.army.mil/Missions/Regulatory/JurisdictionalDeterminations/RecentJurisdictionalDeterminations.aspx

This delineation/determination has been conducted to identify the limits of the Corps Clean Water Act jurisdiction for the particular site identified in this request. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed is a combined Notification of Appeal Process (NAP) and Request For Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the North Atlantic Division Office at the following address:

Naomi Handell, Regulatory Program Manager, CENAD-PD-OR
North Atlantic Division, U.S. Army Engineer Division
Fort Hamilton Military Community
General Lee Avenue, Building 301
Brooklyn, New York 11252-6700

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Park 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by March 6, 2022. It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this letter.

This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

It is strongly recommended that the development of the site be carried out in such a manner as to avoid as much as possible the discharge of dredged or fill material into the delineated waters of the United States. If the activities proposed for the site involve such discharges, authorization from this office may be necessary prior to the initiation of the proposed work. The extent of such discharge of fill will determine the level of authorization that would be required.

In order for us to better serve you, please complete our Customer Service Survey located at http://www.nan.usace.army.mil/Missions/Regulatory/CustomerSurvey.aspx.

If any questions should arise concerning this matter, please contact Brian A. Orzel, of my staff, at Brian.A.Orzel@usace.army.mil.

Sincerely,

Rosita Miranda
Date: 2022.01.05 16:38:29 -05'00'

Rosita Miranda
Chief, Western Section

Enclosures

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Marangi Disposal	File Number: NAN-2021-00721-WOR	Date: 5 JAN 2022
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/appeals.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Mr. Stephan A. Ryba Chief, Regulatory Branch (CENAN-OP-R) NY District, U.S. Army Corps of Engineers 26 Federal Plaza, Room 16-406 New York, NY 10278-0090 Telephone number: 917-790-8512	Ms. Naomi Handell Regulatory Program Manager (CENAD-PD-OR) U.S. Army Corps of Engineers Fort Hamilton Military Community General Lee Avenue, Building 301 Brooklyn, New York 11252-6700 Telephone number: 917-789-4841

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

______________________________ Signature of appellant or agent.	Date:	Telephone number:

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): January 5, 2022

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: NY District, Marangi Disposal, NAN-2021-00721-WOR-JD1

C. PROJECT LOCATION AND BACKGROUND INFORMATION: ,
State: New York County/parish/borough: Orange City: Wawayanda
Center coordinates of site (lat/long in degree decimal format): Lat. 41.4218° N, Long. 74.4160° W.
Universal Transverse Mercator:
Name of nearest waterbody: Monhagen Brook
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Wallkill River
Name of watershed or Hydrologic Unit Code (HUC): 02020007
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☒ Office (Desk) Determination. Date: December 13, 2021
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **Pick List**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **Wetland A is isolated, located approximately 500 feet from and 4 feet higher in elevation than Wetland D, the nearest waters of the United States, with no apparent hydrologic connection. Wetland B is isolated, located**

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

approximately 405 feet from and 4 feet higher in elevation than Wetland D, the nearest waters of the United States, with no apparent hydrologic connection. Wetland C is isolated, located approximately 215 feet from and 4 feet higher in elevation than Wetland D, the nearest waters of the United States, with no apparent hydrologic connection. Wetland F is isolated, located approximately 615 feet from and 8 feet higher in elevation than Wetland D, the nearest waters of the United States, with no apparent hydrologic connection.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):
☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):
☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):
☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. Non-RPWs[8] that flow directly or indirectly into TNWs.
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[9]
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

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[8]See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: **.**
☒ Other: (explain, if not covered above): **There are no features within Wetlands A, B, C or F which are or could be used by interstate or foreign travelers for recreational or other purposes. There are no areas from which fish or shellfish can be or are taken and sold in interstate or foreign commerce. There are no areas which are or could be used for industrial purpose by industries in interstate commerce. Consequently, there does not appear to be a reasonable nexus with interstate commerce. Also, the use, degradation or loss of Wetlands A, B, C or F will not affect other waters of the U.S. or affect interstate or foreign commerce.**

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☒ Wetlands: 0.613 acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☒ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: Middletown, NY.
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Orange County, NY.
☒ National wetlands inventory map(s). Cite name: Middletown, NY.
☒ State/Local wetland inventory map(s): Middletown, NY.
☒ FEMA/FIRM maps:36071C0266E.
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
or ☒ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): **January 5, 2022**

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: NY District, Marangi Disposal, NAN-2021-00721-WOR-JD2

C. PROJECT LOCATION AND BACKGROUND INFORMATION: ,

State: New York County/parish/borough: Orange City: Wawayanda
Center coordinates of site (lat/long in degree decimal format): Lat. 41.4218° N, Long. 74.4160° W.
Universal Transverse Mercator:
Name of nearest waterbody: Monhagen Brook
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Wallkill River
Name of watershed or Hydrologic Unit Code (HUC): 02020007

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: December 13, 2021
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      ☐ TNWs, including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: 2.09 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
      Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

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[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain: .

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. Non-RPWs[8] that flow directly or indirectly into TNWs.
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Water within Wetlands D and E flows within the channel of Monhagen Brook, an off-site, perennial tributary to the Wallkill River, which is a TNW. Aerial photography, the Middletown, NY USGS quadrangle map, and annual rainfall of 40 inches, indicate that the off-site stream flows all year.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **2.09** acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[9]
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):

- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

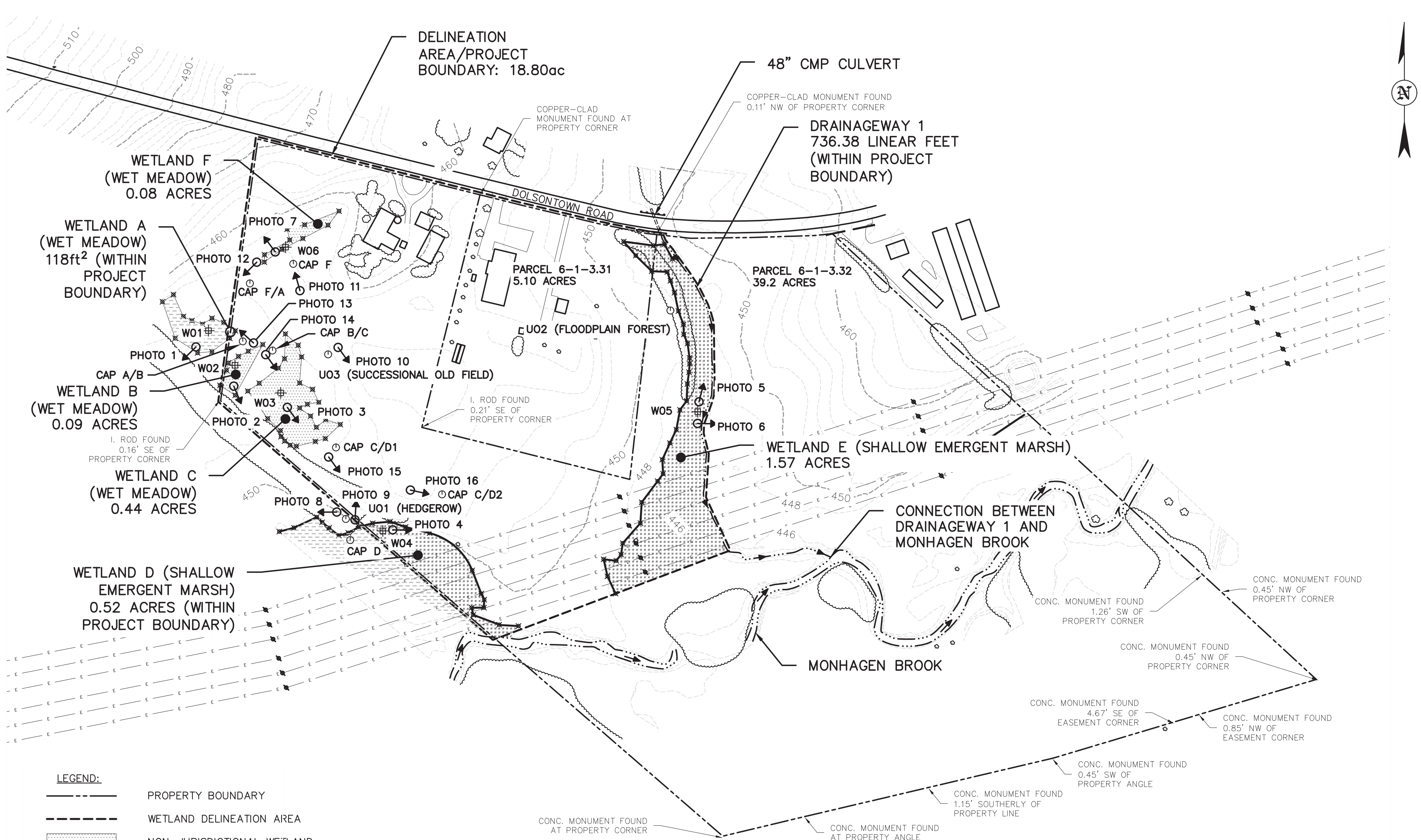
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name: Middletown, NY.
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Orange County, NY.
- ☒ National wetlands inventory map(s). Cite name: Middletown, NY.
- ☒ State/Local wetland inventory map(s): Middletown, NY.
- ☒ FEMA/FIRM maps:36071C0266E.
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date): .
  or ☒ Other (Name & Date): .
- ☐ Previous determination(s). File no. and date of response letter: .
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .



LEGEND:

—··—	PROPERTY BOUNDARY
— — —	WETLAND DELINEATION AREA
	NON-JURISDICTIONAL WETLAND
	JURISDICTIONAL WETLAND
	FIELD DELINEATED WETLAND (OUTSIDE OF PROJECT BOUNDARY)
	WETLAND DELINEATION FLAG
	WETLAND SAMPLE POINT
	UPLAND SAMPLE POINT
	STREAM
	TREE LINE
	TREE
—— E ——•	OVERHEAD POWER LINES AND POLES
	EXISTING BUILDING

NOTES:

1. TOPOGRAPHY, PROPERTY BOUNDARIES, AND WETLAND FLAG LOCATIONS WERE OBTAINED FROM A SURVEY CONDUCTED BY LANE&TULLEY ENGINEERING AND SURVEYING, P.C.
2. SAMPLE POINT LOCATIONS WERE RECORDED USING A GARMIN GPSMAP 64st HANDHELD GPS.
3. TABLES 5-1 AND 5-2 OUTLINE ACREAGE AND LINEAR FEET OF JURISDICTIONAL AND NON-JURISDICTIONAL FEATURES WITHIN THE WETLAND DELINEATION AREA.
4. THE WETLAND DELINEATION AREA CONSISTS OF THE PROPOSED PROJECT BOUNDARY. THE 18.8 ACRE AREA INCLUDES ALL OF PARCEL 6-1-3.31 AND A PORTION OF 6-1-3.32. THE COMBINED TOTAL PROPERTY AREA IS 44.3 ACRES.

SCALE: 150' 0' 150' 300'

WETLAND DELINEATION MAP

DOLSONTOWN ROAD WETLAND DELINEATION REPORT

MARANGI DISPOSAL

TOWN OF WAWAYANDA, ORANGE COUNTY, STATE OF NEW YORK

EnSol, Inc.
Environmental Solutions
661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920
FAX (716) 285-3928

FIGURE 5-1

SEPTEMBER 2021

PN: 20-0062

X:\AAApj\Marangi Disposal\029-A0001 TS Permit Application\Application Documents\Drawings\5-1 Wetland Delineation Map.dwg 9/8/2021 3:45 PM

Attachment 2

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ENGINEERING + ENVIRONMENTAL

Traffic Mitigation Summary

Colliers Engineering & Design

Roadway Improvement (Mitigation) Summary Table

Roadway/Intersection	Proposed Mitigation
Dolsontown Road *Required under 2032 No-Build Condition due to other development traffic and background growth	• *Construct a separate through lane on the westbound approach to NYS Route 17M yielding, a separate left turn lane, one through lane, and a shared through/right turn lane. • Construct a two-way left turn lane between a point 400'± east of NYS Route 17M to a point 700'± west of McVeigh Road. • Construct separate right turn lanes at the access to RDM Simon parcel. • Install a traffic signal at McVeigh Road
NYS Route 17M at Dolsontown Road/James P. Kelly Way	• Construct a second separate left turn lane on the NYS Route 17M northbound approach. • Widen the NYS Route 17M southbound approach to accommodate the additional northbound separate left turn lane. • Construct a separate right turn lane on the NYS Route 17M northbound approach. • Reconstruct the separate right turn lane on the James P. Kelly Way eastbound approach (shift south) and restripe the eastbound approach to align the through lane with the receiving lane on Dolsontown Road. • Replace traffic signal.

NYS Route 17M at US Route 6/Sunrise Park Road *Required under 2032 No-Build Condition due to other development traffic and background growth. To be installed under Slate Hill Commerce Center mitigation	• *Widen US Route 6 eastbound approach to provide an additional eastbound left turn lane and widen NYS Route 17M northbound north of intersection to provide a wider 2-lane receiver. • Construct a second separate left turn lane on the NYS Route 17M northbound approach and widen westbound US Route 6 to accommodate a 2-lane receiver • Widen the NYS Route 17M southbound approach to accommodate the additional northbound separate left turn lane. • Replace traffic signal.
NYS Route 17M at I-84 Interchange* *This improvement will mitigate delays currently experienced at this location, particularly during the afternoon peak hour and is to be installed under Slate Hill Commerce Center mitigation.	• Restripe NYS Route 17M northbound approach between the I-84 westbound entry ramp from NYS Route 17M northbound to the I-84 westbound exit ramp to NYS Route 17M northbound to develop a separate receiving lane for I-84 ramp traffic thereby eliminating the need for the ramp “Stop” condition.
NYS Route 17M Corridor	• If deemed feasible and justified by the NYSDOT, coordinating the NYS Route 17M signals at Abe Isseks Drive, Dolsontown Road, and US Route 6 may be advantageous. However, since the signal at Abe Isseks Drive with NYS Route 17M intersection is in the City of Middletown discussion between the City and the State will be required for implementation.

Attachment 3

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ENGINEERING + ENVIRONMENTAL

Aquifer Letter

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May 21, 2021

Mr. Michael Marangi
Dom-Kam, LLC
366 Highland Avenue Ext.
Middletown, NY 10940

Re: Proposed Dom-Mar Transfer Facility – Principal or Primary Aquifer
1128 Dolsontown Road, Town of Wawayanda, NY
Chazen Project No. 32034.00

Dear Michael,

This letter is prepared in response to discussion of whether the proposed Dom-Kam Transfer Facility site is situated over or near a location meeting qualifications of a Principal or Primary Aquifer as typically defined by the State of New York.

I am a professional geologist and hydrogeologist with landfill siting experience, water resource planning experience, and a long history identifying suitable sites for high-capacity private or municipal wells. I am a professional geologist in the State of New York, PG No. 412 and nationally-acknowledged Certified Professional Geologist No. 112286.

Technical and Operational Guidance Series document 2.1.3
Primary and Principal Aquifer Determinations

An aquifer is defined as a geologic formation offering economically-productive volumes of groundwater. Bedrock aquifers and overburden aquifers (typically sand and gravel) exist everywhere that existing wells are currently satisfying economically-critical water supply functions, whether low-capacity aquifers providing just 5 critical gallons per minute for homeowners or higher-capacity aquifers with public water system wells supporting flows over 100 gallons per minute.

Certain geologic formations have been recognized as Principal and Primary aquifers by the State of New York. The NYS Division of Water Technical and Operational Guidance Series (TOGS) guidance document relied upon to inform these designations is TOGS 2.1.3. The distinction between Primary and Principal aquifers is immaterial to this discussion since the Town of Wawayanda references them interchangeably relative to the matter at hand. Briefly, Primary aquifers are in active use, while Principal aquifers are reserve resources potentially supporting future water supply capacity.

By NYSDEC definition, the Principal and Primary aquifer designation is restricted to unconsolidated aquifers (e.g. sand and gravel). There are many highly-productive bedrock aquifers in New York State but TOGS 2.1.3 does not address them and they are not recognized as Principal or Primary aquifers. TOGS 2.1.3 lists three primary criteria for considering Principal or Primary aquifer designations:

1. Area: the area of the aquifer should cover five to ten square miles at a minimum.

2. Saturated Thickness: The saturated sediments of highly permeable material should be at least 20 feet thick and include some areas in excess of 50 feet of saturated thickness.

3. Obtainable Well Yields: Wells yielding 50 gallons per minute or more should be found distributed over two or more square miles of the Area defined above.

Principal Aquifers and the Proposed Dom-Kam Transfer Facility Site

The Town of Wawayanda local law section 152-17.B.(1) states that solid waste management facilities shall not be placed on primary or principal aquifers. The applicant prepared a SEQRA Full Environmental Assessment Form for submission to the Planning Board using the EAF Mapper Application to generate partially filled-in answers. The EAF Mapper Application suggests that the site is located over, or immediately adjoining, a principal aquifer.

A NYSDEC website page addressing principal aquifers directs views to review a 1:250,000 scale USGS map entitled "Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Lower Hudson Sheet." On this map there appears a small oblong area near the project site labeled "G". The legend defines "G" areas as having sand and gravel of unknown thickness or saturation. Attached please find a figure showing the project site. On this we have shown the approximate location of the oblong area labeled "G" with blue cross hatching. I am in agreement with comments already submitted by the project team suggesting that New York State regulators did not intend areas labeled "G" without color-defined yield estimates to be considered Principal aquifers, so the default EAF Mapper Application appears incorrect to me. The same map does show aquifer areas, colored in green and blue, with presumably verified yields, but none is near the project site.

From a hydrogeologic perspective I have also reviewed available geologic and spatial elements and believe the oval "G" area near the proposed Dom-Kam transfer facility fails the Principal aquifer TOGS 2.1.3 criteria, as follows:

1. Area: The area of the oval near the site is 73.2 acres (0.11 sq-mile). This is far below five to ten square miles.

2. Saturated Thickness:

    a. I examined the NYS well log database which identifies 10 wells within 2 miles of the site. Eight of the ten records include data describing both depths to bedrock, ranging from 43 to 120 feet, and the depth at which the driller encountered groundwater, all between 20 to 70 feet below grade and one with water reported at 2 feet. For these eight wells with both bedrock and water depth data, two wells have groundwater essentially at the bedrock surface (meaning saturated sediment thickness is zero); three have between 20 and 30 feet of saturated sediment, and; three wells have saturated thicknesses between 41 and 43 feet.

    b. At the site itself, geotechnical borings were advanced variably between 24 and 67 feet; none encountered bedrock, sediments appear predominantly to be Sand with frequent references to silt and some reference to gravel and boulders, and some are reported to be wet although without clarifying whether the wetness was saturated.

    c. Another resource I reviewed is the Orange County Water Authority aquifer map. Its mapping units have been added to the attached figure in green and red . South and east of the

NYSDEC "G" oval, the County's map suggests sand and gravel extending below the watertable along the Monhagen Brook (e.g. offering saturated thickness), extending under and thinning out at the southwest margin of the site. Sand and gravel above the water table (unsaturated) is shown west of the site. No sand and gravel, either above or below the water table, is reported in the NYSDEC "G" oval. The intermittent nature of saturated sediments suggested by the OCWa map this vicinity is consistent with our evaluation of saturated thicknesses from well log data.

From these various observations, saturated sediment thickness within 2 miles of the site appears to vary between 0 and approximately 20 feet of thickness and no areas exhibit 50 or more feet of saturated thickness.

3. Well Yields: The ten wells within two miles of the site noted in the NYS well log database are all bedrock wells. None provide direct perspective on potential sand and gravel well yields since all were advanced through the overburden into the underlying bedrock. The wells, however, were all advanced to variable final depths of 240 to 500 feet below grade, which is a costly exercise. So while not conclusively diagnostic, an absence of wells finished in sand and gravel suggests that sediments drilled through over the bedrock deemed insufficiently productive for drillers and property owners to choose to install overburden wells rather than bedrock wells.

Collectively, this review of the three TOGS 2.1.3 defining criteria for Principal or Primary aquifers suggest the "G" oval area identified on the map does not qualify as a Principal or Primary Aquifer. The "G" oval is not large enough, does not offer any confirmed saturated thickness, on the basis of likely inadequate saturated thickness and any evidence of a multitude of nearby 50 gpm gravel wells the "G" area also fails the yield criteria.

I suspect the oval area was drawn on the Unconsolidated Aquifers map because many primary and principal aquifers in eastern New York State coincide with Hoosick soils. There is a small area on the site and extending east of the site with this soil type (Figure 1). Hoosick soils are recognized by the Natural Resource Conservation Service (NRCS) as being derived from glacial outwash sediments and therefore frequently offering well-washed and high permeability geologic media which can be an excellent aquifer if the sediments extend below the water table. Hydrogeologists often seek out Hoosick soils as potential locations for groundwater supply exploration. But Hoosick soils should only be recognized as Principal or Primary aquifers if also satisfying the TOGS 2.1.3 criteria, which in this case it does not. The oval shapes of the Hoosick mapping unit and the suggested "G" mapping unit are very similar, suggesting the map analyst simply circled the Hoosick mapping unit to call attention to a feature perhaps worthy of future exploration. The analyst correctly recognized they had no substantiating data so only gave it a "G" designation, acknowledging its unknown thickness or degree of saturation. The review completed here, again, indicates the zone fails the Principal aquifer criteria.

____

Thank you for consideration of this matter. Stated plainly, I see no hydrogeologic evidence on the basis of well logs, soil maps, lateral size, existing aquifer maps, or site geotechnical logs to suggest the presence of a productive overburden aquifer warranting Principal aquifer status either under the site, or east of the site in the direction identified by the "G" mapped oval on the Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York - Lower Hudson Sheet map.

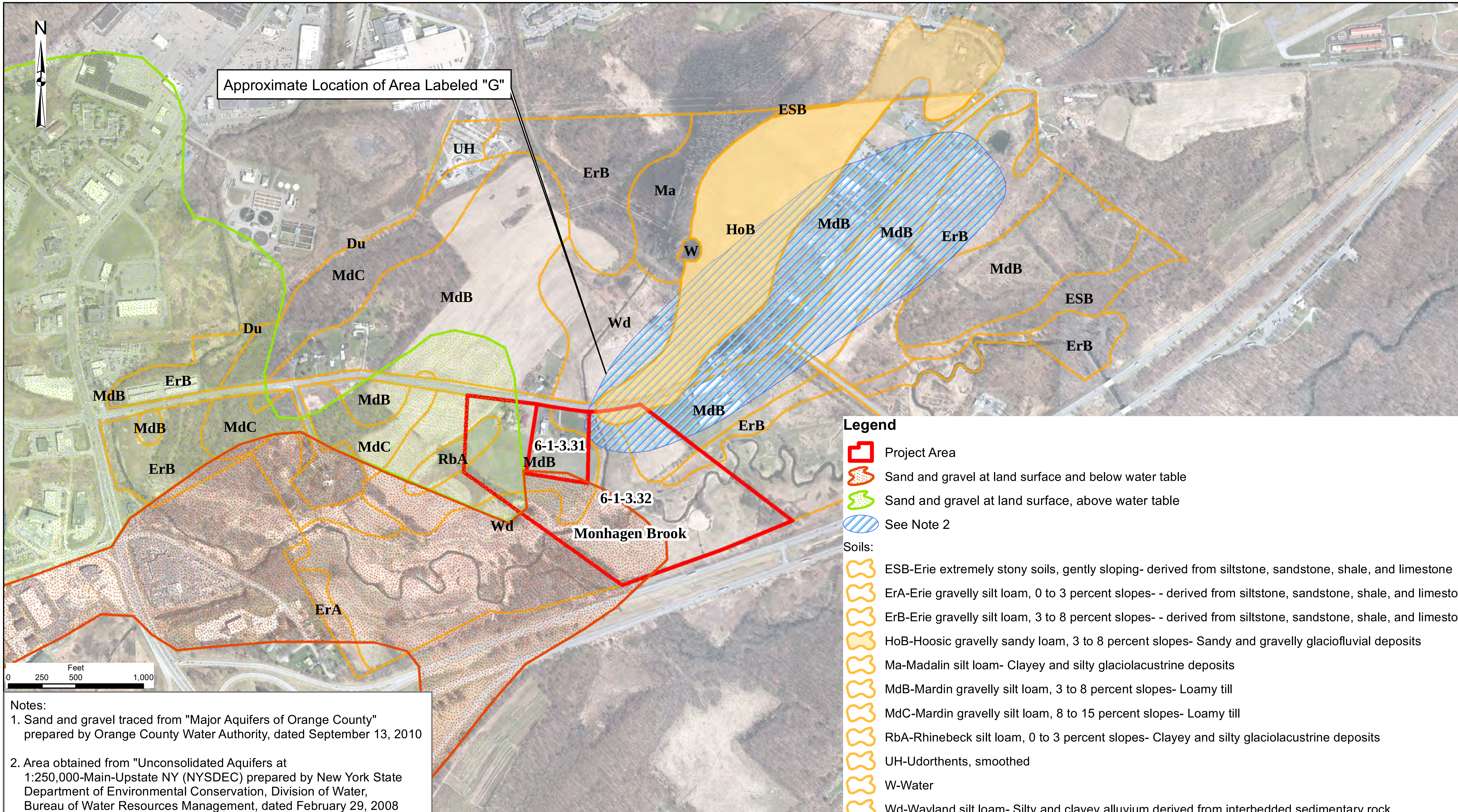
I would be happy to discuss this further as necessary. Please feel free to contact me at 914 456-1095 (cell) or rum@chazencompanies.com.

Sincerely,

Russell Urban-Mead, PG
Senior Hydrogeologist / VP Environmental Services

Attachment: Figure 1

cc: File



Legend

- Project Area
- Sand and gravel at land surface and below water table
- Sand and gravel at land surface, above water table
- See Note 2

Soils:

- ESB-Erie extremely stony soils, gently sloping- derived from siltstone, sandstone, shale, and limestone
- ErA-Erie gravelly silt loam, 0 to 3 percent slopes- - derived from siltstone, sandstone, shale, and limestone
- ErB-Erie gravelly silt loam, 3 to 8 percent slopes- - derived from siltstone, sandstone, shale, and limestone
- HoB-Hoosic gravelly sandy loam, 3 to 8 percent slopes- Sandy and gravelly glaciofluvial deposits
- Ma-Madalin silt loam- Clayey and silty glaciolacustrine deposits
- MdB-Mardin gravelly silt loam, 3 to 8 percent slopes- Loamy till
- MdC-Mardin gravelly silt loam, 8 to 15 percent slopes- Loamy till
- RbA-Rhinebeck silt loam, 0 to 3 percent slopes- Clayey and silty glaciolacustrine deposits
- UH-Udorthents, smoothed
- W-Water
- Wd-Wayland silt loam- Silty and clayey alluvium derived from interbedded sedimentary rock

Notes:

1. Sand and gravel traced from "Major Aquifers of Orange County" prepared by Orange County Water Authority, dated September 13, 2010
2. Area obtained from "Unconsolidated Aquifers at 1:250,000-Main-Upstate NY (NYSDEC) prepared by New York State Department of Environmental Conservation, Division of Water, Bureau of Water Resources Management, dated February 29, 2008

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North Country Office: 20 Elm Street, Suite 110, Glens Falls, NY. 12801, Phone: (518) 812-0513

Westchester County Office: 1 North Broadway, Suite 803, White Plains, NY. 10601, Phone: (914) 997-8510

DOM-MAR TRANSFER AND RECYCLING FACILITY

AQUIFER AND SOILS MAP

TOWN OF WAYWAYANDA, ORANGE COUNTY, NEW YORK

Drawn:	HEB
Date:	05/20/21
Scale:	1:8,000
Project:	32034.00
Figure:	FIG 1

Document Path: Z:\projects\32000-32099\32034-00_Marangi_Disposal_Facility\GIS\maps\00_Aquifer-Soil_05182021.mxd

Attachment 4

EnSol, Inc.

ENGINEERING + ENVIRONMENTAL

Phase 1 Archaeological Investigation

Phase I Archaeological Investigation for the Dom-Mar Transfer & Recycling Center
Town of Wawayanda, Orange County, New York

April 2021

Prepared for:
EnSol, Inc., Niagara Falls, New York

Alfred G. Cammisa, M.A.
with Alexander Padilla, B.A. (CAD)

1053

MANAGEMENT SUMMARY

PR#:
20PR08024

Involved agencies:
Town of Wawayanda

Phase:
Phase IA & IB

Location:
Town of Wawayanda
Orange County

Survey Area:
Length: up to 1120 feet (341 meters) north-south
Width: up to 1300 feet (396 m) east-west
Acres Surveyed: about 18 acres (7h)

USGS:
Middeltown, NY

Survey overview:
ST no. & interval: 297 ST's at 50 ft (15m) intervals

Results:
No prehistoric or historic sites

Structures:
No. Of buildings/structures/cemeteries in project area: 20th century dwelling, store, & barn complex
No. Of buildings/structures/cemeteries adjacent to project area: na
No. Of previously determined NR listed or eligible buildings/structures/cemeteries/districts: none
No. Of identified eligible buildings/structures/cemeteries/districts: none

Authors:
Alfred G. Cammisa, M.A.
Alexander Padilla, B.A. (CAD)

Date of Report:
Report completed April, 2021

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF PHOTOGRAPHS

INTRODUCTION

Between February 18 and April 7, 2021 and TRACKER Archaeology, Inc. conducted a Phase IA documentary study and a Phase IB field testing for the Dom-Mar Transfer & Recycling Center, Town of Wawayanda, Orange County, New York.

The purpose of the Phase IA documentary study was to determine the prehistoric and historic potential of the project area for the recovery of archaeological remains. This was implemented by a review of the original and current environmental data, archaeological site files, other archival literature, maps, and documents.

The prehistoric and historic site file search was conducted utilizing the CRIS resources of the New York State Historic Preservation Office in Waterford, New York. Various historic and/or archaeological web sites may have been visited to review any pertinent site information.

The purpose of the Phase IB survey was to recover physical evidence for the presence or absence of archaeological sites on the property. This was accomplished through subsurface testing and ground surface reconnaissance.

These investigations have been conducted in accordance with the standards set forth by the New York Archaeological Council and the New York State Historic Preservation Office.

The project area is located at 1138 Dolsontown Road between McVeigh Road and Caskey Lane. It is bound by Dolsontown Road to the north, a stream to the east, and other properties on the other sides.

The investigation was completed by TRACKER-Archaeology, Inc. of Monroe, New York. Historic & prehistoric research by P.I., Alfred G. Cammisa, M.A. Field work was conducted by Alfred G. Cammisa, crew chief, Alfred T. Cammisa and field technicians Erin Murphy, B.A. and Alec Denniger, B.A. Report preparation was by Alfred G. Cammisa with Alexander Padilla, B.A. (CAD).

The work was performed for EnSol, Inc., Niagara Falls,, New York.

ENVIRONMENT

Geology

The study area is located in the southeast portion of New York State in the center part of Orange County. This region of New York lies within the Ridge and Valley Physiographic Province. This province, also known as the Newer Appalachians, extends from Lake Champlain to Alabama. It passes as a narrow lowland belt between the New England Uplands (Taconic Mountains and Hudson Highlands) to the east and the Appalachian Plateau (Catskill and Shawangunk Mountains) and Adirondack Mountains to the west. The characteristic topography is a succession of parallel valleys and ridges trending roughly in a northeasterly direction. This is a region of sedimentary rocks which were easily eroded and subjected to folding or bedding of the rock layers (Schuberth 1968: cover map, 16-18; Isachsen et al 2000: 4, 53-54; New York-New Jersey Trail Conference 1998: cover map).

Soils and Topography

Soils on the project area consist of:

Name	Soil Horizon Depth in(cm)	Color	Texture Inclusion	Slope %	Drainage	Landform
Hoosic	O=3-0 (8-0) A=0-4(-10) B=4-14(-36)	Roots, leaves 10YR4/3 7.5YR5/6	GrSaLo	3-8	well	glacial lake deposits
Mardin	Ap=0-8(-20) B=8-15(-38)	10YR4/2 10YR5/6	GrSiLo	3-8	well	glacial lake deposits
Riverhead	Ap 0-7in (0-18cm) B 7-11 (-28)	10YR3/2 10YR5/4	SiLo	0-3	Poor	glacial lake deposits
Wayland	Ap=0-9(-22) B=9-17(-43)	10YR3/2 10YR5/2	GrLo	3-8	well	glacial till

(Olsson 1981: Map 48 pgs., 34, 37-38, 49, 768, 95, 99).

KEY:

Shade: Lt=Light, Dk=Dark, V=Very
Color: Br=Brown, Blk=Black, Gry=Gray, Gbr=Gray Brown, StBr=Strong Brown, Rbr=Red Brown, Ybr= Yellow Brown
Soils: Si=Silt, Lo=Loam, Sa=Sand, Cl=Clay
Other: Sh=shale, M=Mottle, Gr=Gravelly, Cb=cobbles, /=or

The elevation on the project area is approximately 450 to 460 feet above mean sea level.

Hydrology
The project area is adjacent to a tributary of Monhagen Brook. The Monhagan drains into the Wallkill River. The Wallkill drains north into the Hudson River.

Vegetation
The predominant forest community in this area was probably the Oak Hickory Forest. This forest is a nut producing forest with acorns and hickory nuts usually an obvious part of the leaf litter on the forest floor. The Oak Hickory Forest intermingles with virtually all other forest types. The northern extension of this forest community was also originally called the Oak-Chestnut forest, before the historic Chestnut blight (Kricher 1988:38, 57-60).

At the time of the Phase IB survey, the property consisted of an open grass field with a 20th century store, dwelling, and barn complex.

PREHISTORIC POTENTIAL

A prehistoric site file search was conducted at the New York State Historic Preservation Office. The search included a 1 mile radius around the study area. The following sites were recorded:

NYSM Sites	NYSHPO Sites	Distance from APE ft(m)	Site Description
6169		Within project area	Cemetery: no info.
	7119.000083	565(172)	Simon:Late Archaic/Early Woodland point, bifaces, cores, flakes, scraper
	7119.000017	2363(720)	Unknown
	7119.000021	1203(366)	Unknown
	7119.000016	2562(781)	Unknown
	7119.000008	3333(1016)	Unknown
	7119.000205	2946(898)	4 lithic scatters, 1 with Late Archaic Brewerton Eared
	7119.000206	4574(1394)	Isolated find: Brewerton Eared
	7119.000186	3367(1026)	Late Archaic.2 Lamoka point, 2 biface, 2 utilized flakes, 1 retouched flake, 1 core, 107 flakes, shatter 2 FCRs
	7119.000187	3541(1079)	Lake Archaic with 1 Lamoka point, 1 Normanskill point, 2 utilized flakes, 32 flakes, 3 shatter 1 FCR
	7119.000018	4656(1389)	Cemetery expansion
	7119.000015	2285(6966)	Unknown

-The project area is adjacent to a tributary of Monhagen Brook.

-The study parcel consists of level to moderately sloped, well drained terrain with some poorly drained soils also.

-Numerous prehistoric sites are in the vicinity.

In our opinion, the study area has a higher than average potential for the recovery of prehistoric sites on the well drained terrain. The type of site encountered could be from either Woodland or Archaic Periods and likely encountered in the A or upper B soil horizons.

HISTORIC POTENTIAL

Seventeenth Century

At the time of European contact and settlement, the study area was probably occupied by the Waoranecks who lived between Stony Point and Danns Kammer (near Newburgh Bay). Their western boundary was unknown. These peoples were likely a sub-branch and/or clan related to the large Munsee (Minsi) tribe belonging to the Delawarean linguistic family. The term "Minsi" (or "Munsee") means people of the stony country" or abbreviated as "mountaineers" (Ruttenber 1992A:35, 44-45, 49-50, 93; Ruttenber 1992B:221; Becker 1993:16-22; Hearne Brothers nd:wall map; Weslager 1991:45; Synder 1969:2).

Population estimates for the Munsee are 600 to 800 individuals. The Munsee are described by Becker (1993:18) as possibly horticultural. Hull (1996:10) mentions that they were hunters, gatherers, and horticulturalists. They fished in the fast running waters of the Wawayanda and Pochuck creeks.

An Indian trail known as the Wawayanda Trail started at the tribal meeting grounds at Danns Kammer, then passed through Washingtonville, Warwick and Vernon villages, and eventually on to Philadelphia. This road, or the close approximation, is currently known as Kings Highway (Hull 1996:127; Figure 5).

Eighteenth Century

New York State Military Museum mentions Fort Gardner as being constructed in 1756 in Gardnerville by Captain Richard Gardner of the Frontier Guard. The fort had a 100 foot square palisade and contained multiple dwellings (www.dmna.state.ny.us.forts).

The 1779 Sauthier map shows the study property just west of the Wallkill River on lands possibly within or near the Minisink Angle (Figure 3).

Early business in town included farming, potash, and milling (Ruttenber 1881:676-684).

Nineteenth Century

The 1840 Burr map shows the study property possibly near Route 17A. Land here appears to have been on land in the Minisink Angle or belonging to Ten Eyck or L. Clowes (Figure 4).

In 1849 the Town of Wawayanda was formed when it separated from the Town of Minisink. The population in 1850 in Wawayanda was 2,069 inhabitants (Stickney 1903:454).

The 1850 Sydney map depicts a structures nearby or adjacent to the project area belonging to G. Hulse. The Dolsen family has many structures in the surrounding vicinity. A sawmill is nearby (Figure 5).

The 1859 map of Orange County depicts no structures on or adjacent to the project area(Figure 6).

By 1860 the town's population *decreased* by 163 people (Stickney 1903:454).

The 1875 Beers atlas a stream on the project area. There is a milk station either on, adjacent, or close to the property which may be owned by Caskey on his 160 acre farm (Figure 7).

Twentieth Century

The 1908 U.S.G.S. shows no structures on or adjacent to the project area (Figure 8).

An historic site file search was conducted at the New York State Historic Preservation Office. The search included a 1 mile radius around the study area. The following sites were recorded:

-No reported historic sites.

Assessing the known environmental and historic data, we can summarize the following points:

-The project area is adjacent to a tributary of Monhagen Brook.

-The study parcel consists of level to moderately sloped, well drained terrain with some poorly drained soils also.

-An historic map documented structure (MDS) was noted on or adjacent to the project area in 1950 as was the Caskey milk station in 1875.

-No historic sites were recorded in the area.

In our opinion, the study area has a higher than average potential for encountering nineteenth to early twentieth century European-American sites relating to Hulse/Caskey.

FIELD METHODS

Walkover

Exposed ground surfaces were subjected to a close quarters walk-over, when possible, at 3 to 5 meter intervals to observe for artifacts. Covered ground terrain was reconnoitered at about 15 meter intervals, or less, to observe for any above ground features, such as berms, depression, or rock configurations, which could be evidence for a prehistoric or historic site. Photographs were taken of the project area.

Shovel Testing

Shovel tests (ST's) were excavated at about 15 meter intervals across the project area. Each ST measured about 30 to 40 cm. in diameter and was dug into the underlying subsoil (B horizon) 10 to 20 cm. when possible. All soils were screened through 1/4 inch wire mesh and observed for artifacts. Shovel tests were flagged in the field. All ST's were mapped on the project area map at this time.

Soil stratigraphy was recorded according to texture and color. Soil color was matched against the Munsell color chart for soils. Notes were transcribed in a notebook and on pre-printed field forms.

FIELD RESULTS

Field testing of the project area included the excavation of 297 shovel tests (ST's) across the project area. No prehistoric artifacts were encountered. No historic artifacts or features were encountered. The soils were impacted to some small degree likely by construction of the overhead utility line.

Stratigraphy

Stratigraphy across the project area was generally:

-O horizon - 1 to 5 cm. thick of root mat, leaf litter, and humus.

-A horizon - 20 to 31 cm. thick of 10YR4/3 brown or 10YR4/4 dark yellow brown gravelly loam or 10YR4/2 dark grey brown gravely loam in the wetter areas.

-B horizon - about 10. dug into where possible of 10YR5/4, yellow brown gravelly loam.

CONCLUSIONS AND RECOMMENDATIONS

Based on distance to prehistoric sites in the vicinity, well drained soils, level terrain, and distance to a water sources, the property was seen as having an above average potential for encountering prehistoric native American sites.

Based upon similar soils, terrain, and water sources as well as proximity to historic MDS's and/or historic sites, Indian foot trails, or roads, the property was assessed as having a higher than average potential for historic sites.

During the course of the field testing, 297 ST's were excavated. No prehistoric or historic artifacts or features were encountered. No further archaeological work is recommended.

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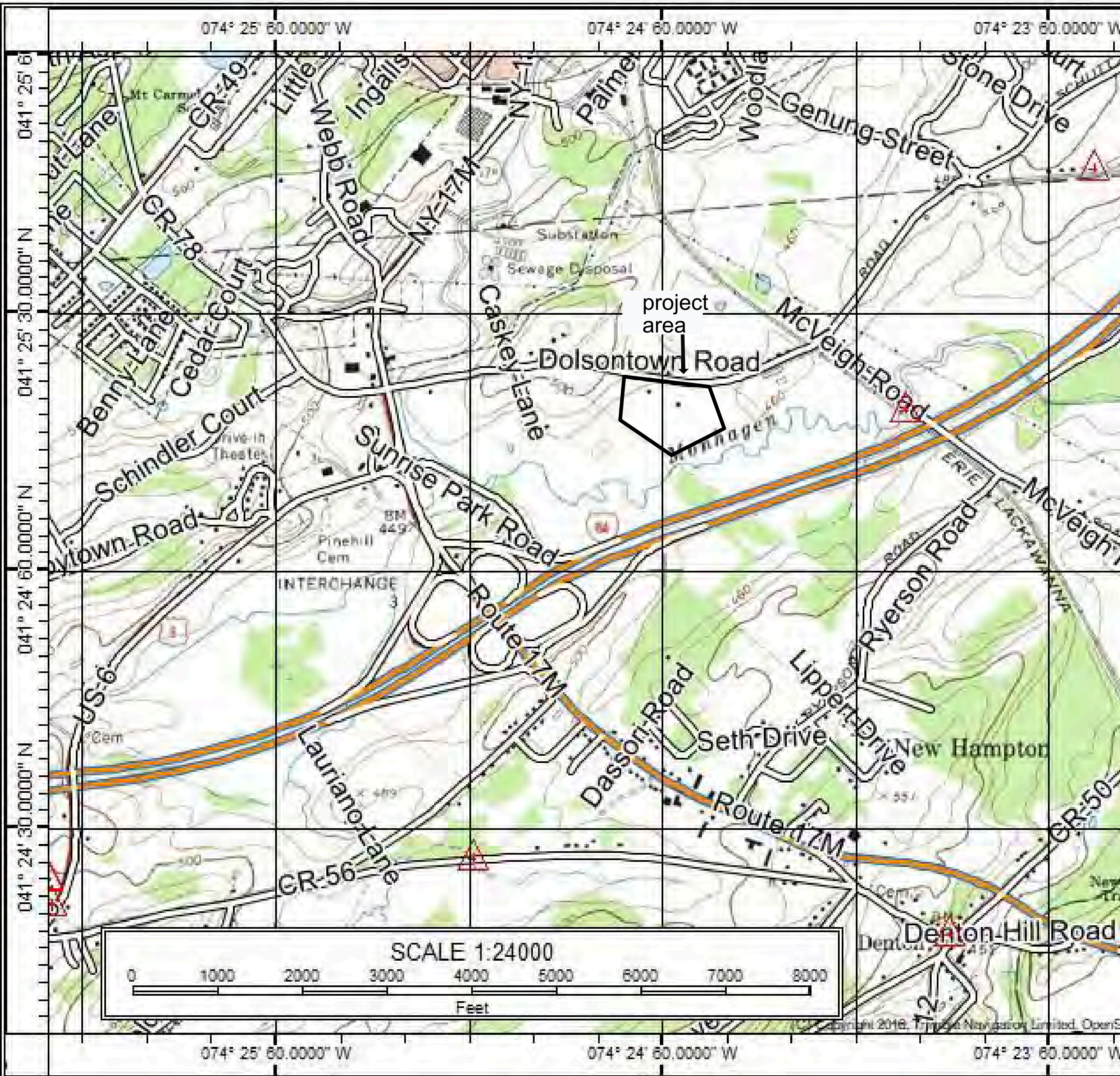
APPENDIX 1

Figure 1

Middletown, NY USGS



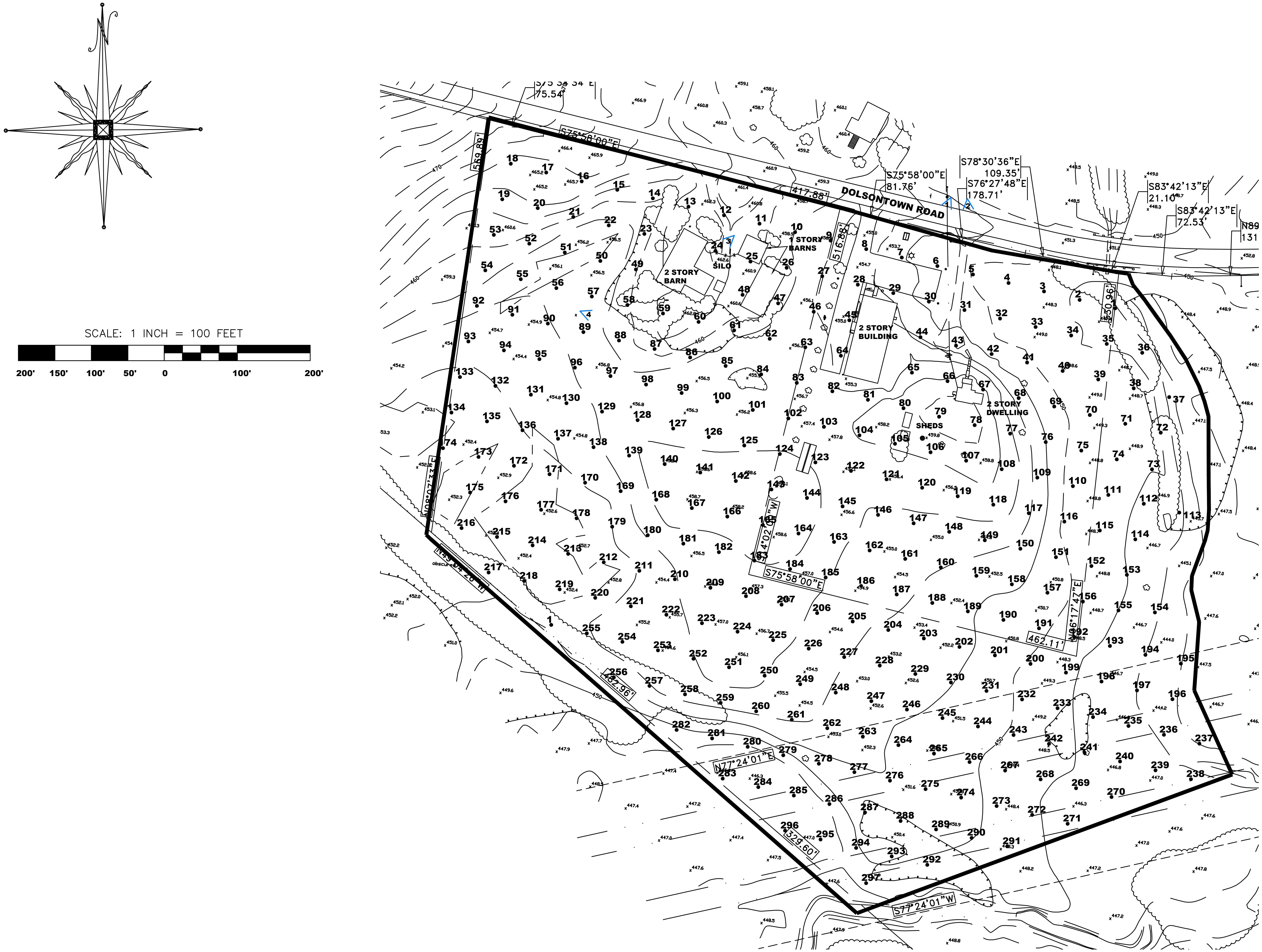


FIGURE 2: LOCATION OF SHOVEL TESTS

- PHOTO ANGLE
- NEGATIVE SHOVEL TEST
- POSITIVE SHOVEL TEST w/ARTIFACTS
- PROJECT BOUNDARY(A.P.E.)

PROJECT NAME: DOM MAR

Figure 3
1779 Sauthier map

Figure 4

1840 Burr map

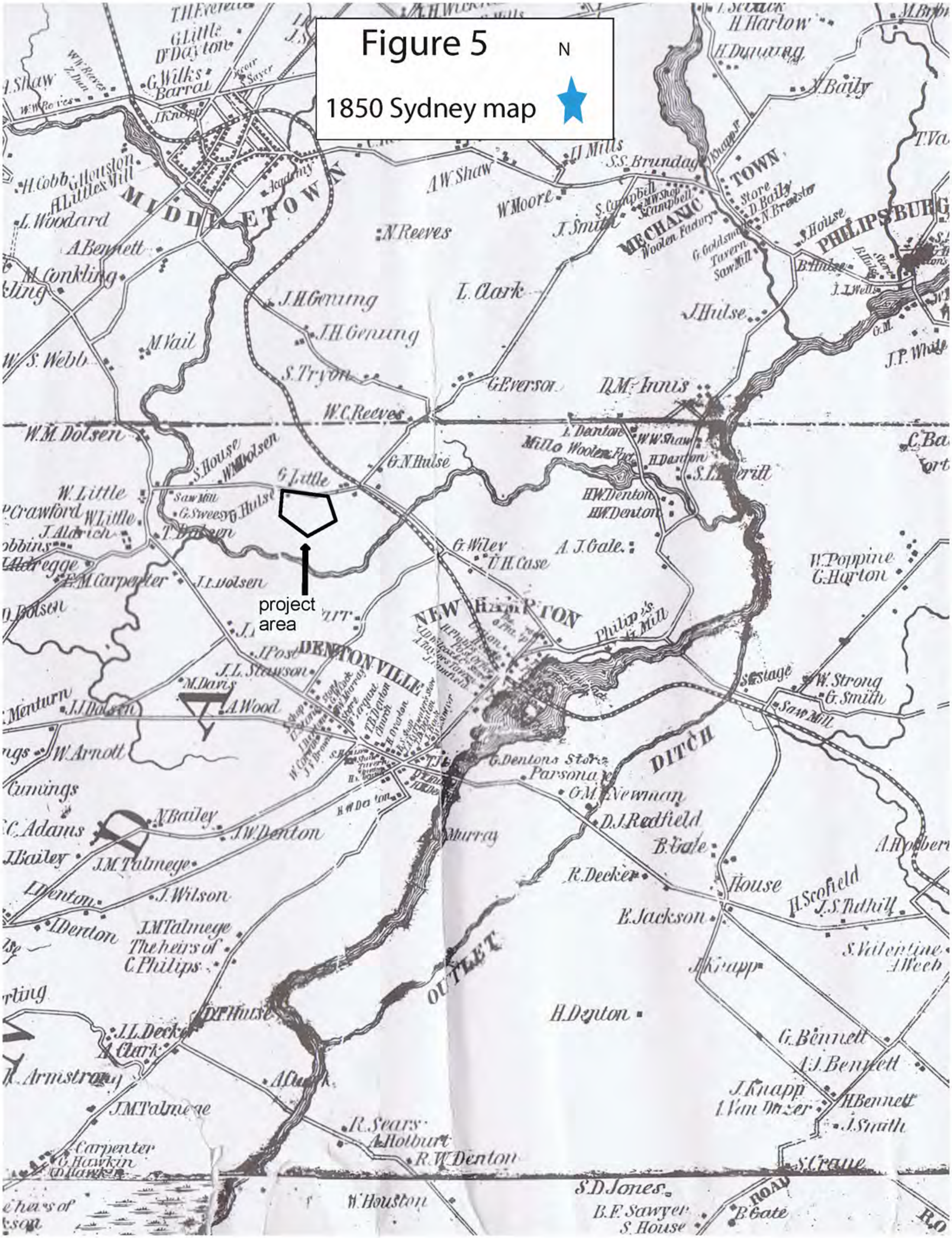
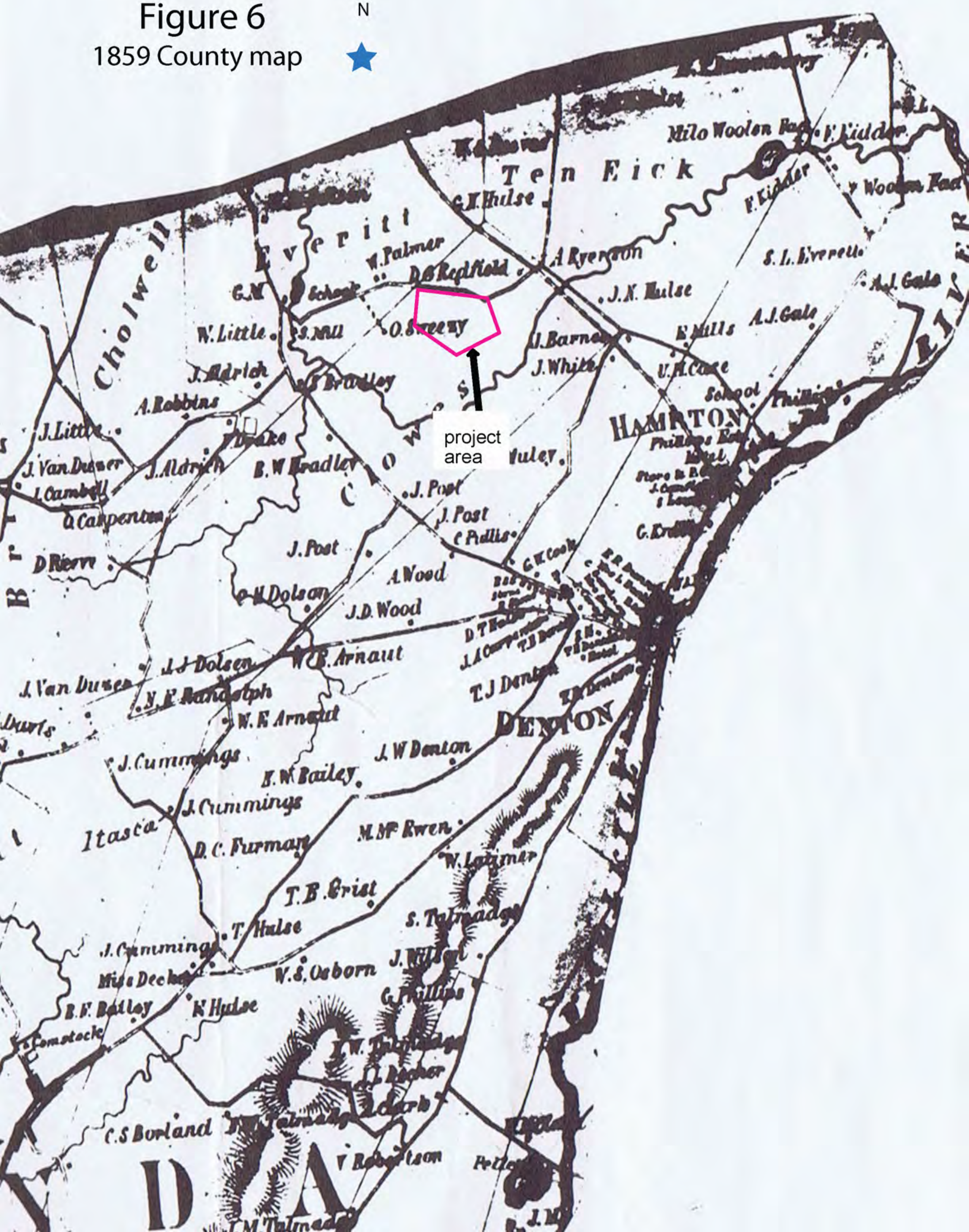


Figure 5

1850 Sydney map

Figure 6

1859 County map



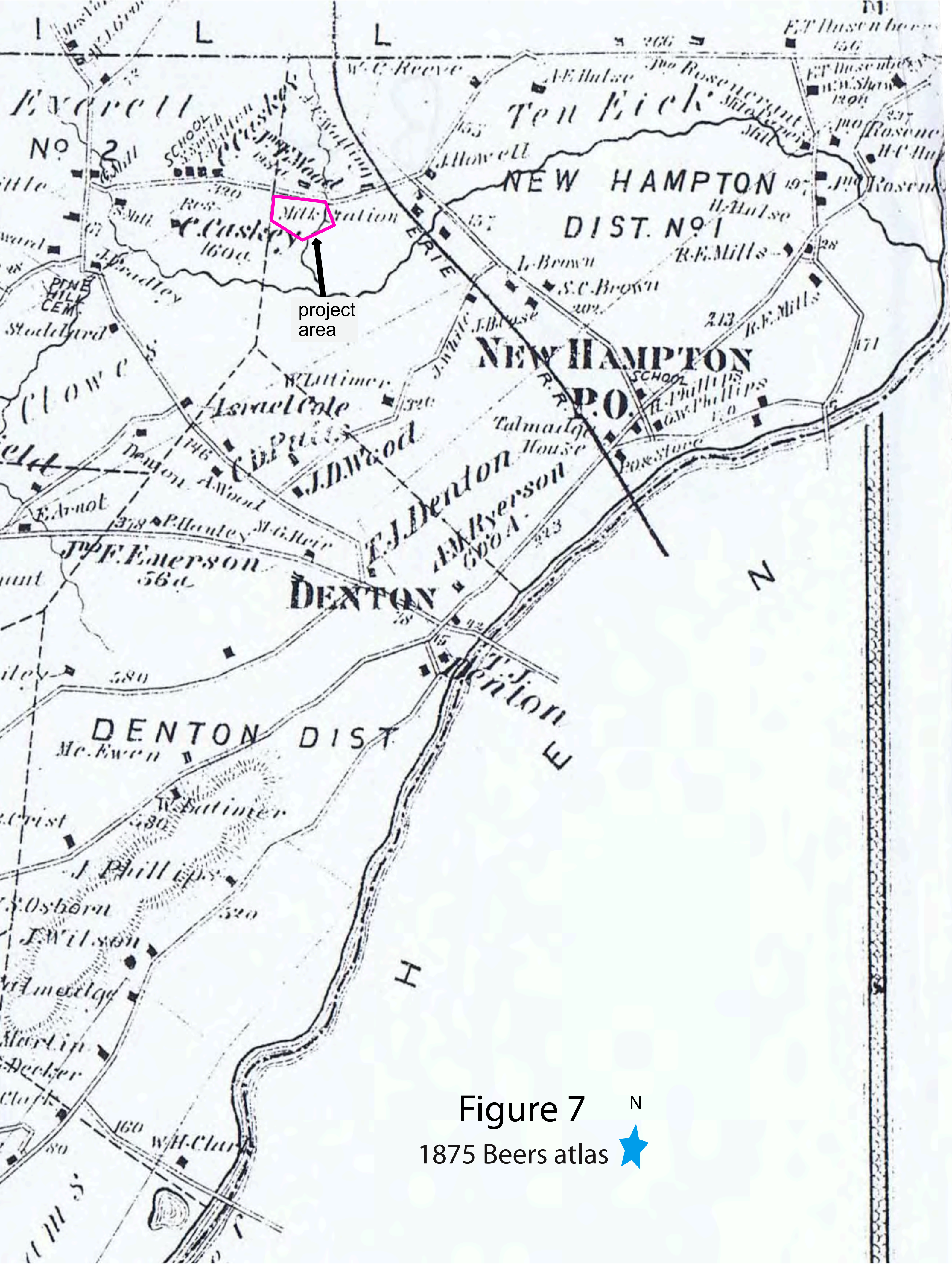


Figure 7
1875 Beers atlas

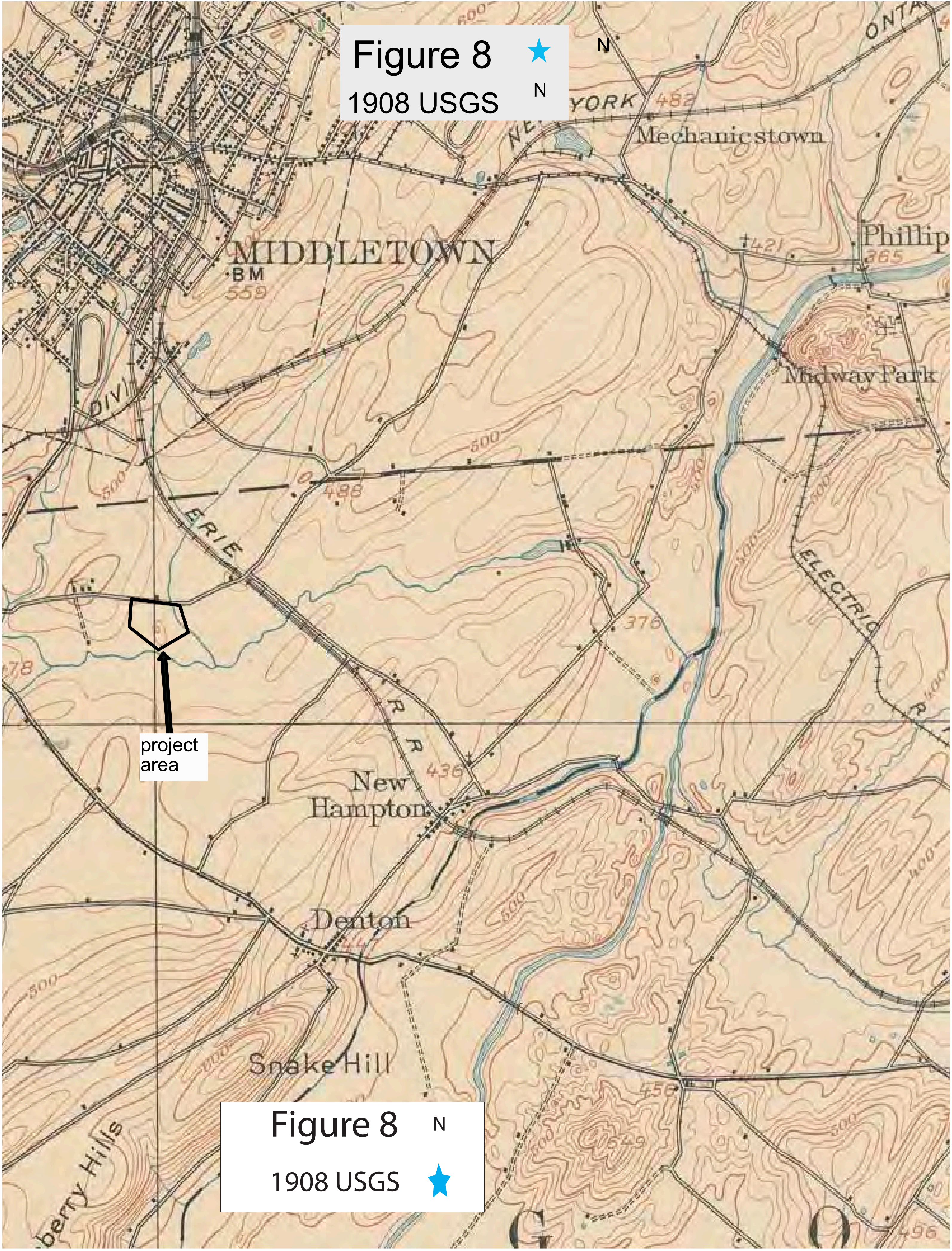


Figure 8 N
1908 USGS

Figure 8 N
1908 USGS

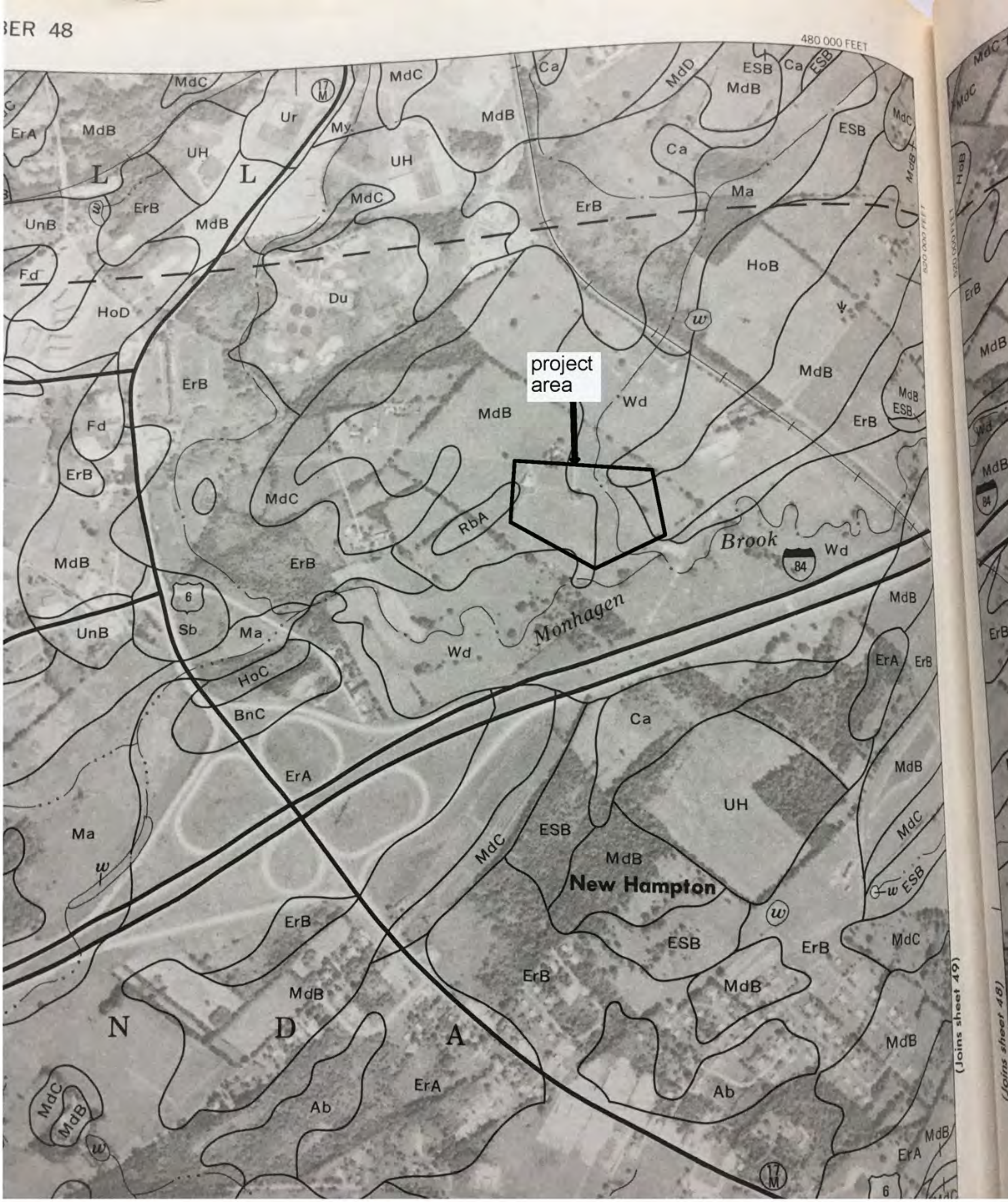


Figure 9 N

County Soil Survey

Photo 1
Looking SW from road

Photo 2
Looking SE from road

Photo 3
Barn complex

Photo 4
Looking east from near barn

APPENDIX 2

Shovel Tests

STP	LV	DEPTH(CM)	TEXTURE	COLOR	HOR	COMMENT
1	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo mottled	10YR4/3-5/6	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
2	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
3	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
4	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
5	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
6	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	27-39	GrLo	10YR5/4	B	NCM
7	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
8	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
9	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-36	GrLo	10YR5/4	B	NCM
10	1	gravel driveway				
11	1	gravel				
12	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo mottled	10YR4/3-5/4	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
13	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM

14	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
15	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
16	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
17	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-33	GrLo	10YR4/3	A	NCM
	3	33-43	GrLo	10YR5/4	B	NCM
18	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
19	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
20	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
21	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
22	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-28	GrLo wet	10YR4/3	A	NCM
	3	28-40	GrLo wet	10YR5/4	B	NCM
23	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
24	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-28	GrLo wet mottled	10YR4/3	A	NCM
	3	28-40	GrLo wet	10YR5/4	B	NCM
25	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo mud	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
26	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-35	SaGr	10YR4/3	A	NCM

27	1	gravel				
28	1	gravel				
29	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
30	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
31	1	pavement				
32	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-28	GrLo	10YR4/3	A	plastic toy tool
	3	28-38	GrLo	10YR5/4	B	NCM
33	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-27	VSiLo	10YR3/2	A	NCM
	3	27-38	GrLo	10YR5/4	B	NCM
34	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-27	GrLo	10YR4/3	A	NCM
	3	27-38	GrLo	10YR5/4	B	NCM
35	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/4	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
36	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/4	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
37	1	water				
38	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-28	GrLo wet	10YR4/2	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
39	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	plastic
	3	26-37	GrLo	10YR5/4	B	NCM
40	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
41	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM

42	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
43	1	gravel				
44	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
45	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
46	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
47	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
48	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/2	A	NCM
	3	26-35	GrLo	10YR5/4	B	NCM
49	1	0-1	rootmat,leaves,humus		A/O	NCM
	2	1-10	GrLo	10YR4/3	A	NCM
	3	10-27	GrLo	10YR5/4	B	NCM
50	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
51	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
52	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	26-37	GrLo	10YR5/4	B	NCM
53	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-24	GrLo	10YR4/3	A	NCM
	3	24-root				
54	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
55	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM

56	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/4	A	NCM
	3	26-36	GrLo		10YR54/4	B	NCM
57	1	wetlands (flagging) standing water					
58	1	0-53	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/4	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
59	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-27	GrLo	wet	10YR3/2	A	NCM
	3	26-37	GrLo	wet	10YR5/4	B	NCM
60	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-27	GrLo		10YR4/3	A	NCM
	3	27-38	GrLo		10YR5/4	B	NCM
61	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-27	GrLo		10YR4/3	A	wg
	3	27-37	GrLo		10YR5/4	B	NCM
62	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-27	GrLo		10YR4/3	A	NCM
	3	27-40	GrLo		10YR5/4	B	NCM
63	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
64	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-22	GrLo		10YR4/3	A	NCM
	3	22-35	GrLo		10YR5/4	B	NCM
65	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
66	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
67	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/3	A	NCM
	3	26-40	GrLo		10YR5/4	B	NCM
68	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo		10YR4/3	A	NCM
	3	26-root					
69	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-38	GrLo		10YR5/4	B	NCM

70	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
71	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	brick frag
	3	28-38	GrLo	10YR5/4	B	NCM
72	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	brick frag
	3	28-40	GrLo	10YR5/4	B	NCM
73	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-29	GrLo	10YR4/3	A	brick frag
	3	29-39	GrLo	10YR5/4	B	NCM
74	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/4	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
75	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/4	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
76	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/4	A	NCM
	3	25-36	GrLo	10YR5/4	B	NCM
77	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-35	GrLo	10YR5/4	B	NCM
78	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-26	GrLo	10YR4/4	Ap	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
79	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
80	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
81	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
82	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM

83	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
84	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
85	1	0-2	rootmat,leaves,humus			A/O	NCM
	2	2-30	GrLo		10YR4/3	A	NCM
	3	30-40	GrLo		10YR5/4	B	NCM
86	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
87	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
88	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
89	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-28	GrLo		10YR4/3	A	NCM
	3	28-40	GrLo		10YR5/4	B	NCM
90	1	0-2	rootmat,leaves,humus			A/O	NCM
	2	2-27	GrLo		10YR4/3	A	NCM
	3	27-37	GrLo		10YR5/4	B	NCM
91	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
92	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	wet	10YR4/3	A	NCM
	3	25-35	GrLo	wet	10YR5/4	B	NCM
93	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	wet	10YR4/3	A	NCM
	3	25-35	GrLo	wet	10YR5/4	B	NCM
94	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	wet	10YR4/3	A	NCM
	3	25-35	GrLo	wet	10YR5/4	B	NCM
95	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-27	GrLo		10YR4/3	A	NCM
	3	27-37	GrLo		10YR5/4	B	NCM

96	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
97	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
98	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
99	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
100	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
101	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	27-40	GrLo	10YR5/4	B	NCM
102	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-40	GrLo	10YR5/4	B	NCM
103	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
104	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-41	GrLo	10YR5/4	B	NCM
105	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
106	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	NCM
	3	27-37	GrLo	10YR5/4	B	NCM
107	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	wg
	3	23-33	GrLo	10YR5/4	B	NCM
108	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-27	GrLo	10YR4/3	A	coal
	3	27-37	GrLo	10YR5/4	B	NCM

109	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-30	GrLo	10YR4/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
110	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
111	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
112	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
113	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
114	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
115	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
116	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-24	GrLo	10YR4/3	A	NCM
	3	24-35	GrLo	10YR5/4	B	NCM
117	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
118	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
119	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
120	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-20,rock	GrLo	10YR4/3	A	NCM
121	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
122	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM

123	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-26,rock	GrLo	10YR5/4	B	NCM
124	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
125	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
126	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
127	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
128	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
129	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
130	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-26	GrLo	10YR4/3	A	clay pot
	3	26-36	GrLo	10YR5/4	B	NCM
131	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
132	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-24	GrLo	10YR4/3	A	NCM
	3	24-36	GrLo	10YR5/4	B	NCM
133	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-28	GrLo wet	10YR3/2	A	NCM
	3	28-38	GrLo wet	10YR5/4	B	NCM
134	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-21	GrLo	10YR4/3	A	NCM
	3	21-35	GrLo	10YR5/4	B	NCM
135	1	0-4	rootmat,leaves,humus		A/O	NCM
	3	4-26	GrLo	10YR5/4	B	NCM

136	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-30	GrLo	10YR5/4	B	NCM
137	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-30	GrLo	10YR5/4	B	NCM
138	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-30	GrLo	10YR5/4	B	NCM
139	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-22	GrLo	10YR4/3	A	NCM
	3	22-32	GrLo	10YR5/4	B	NCM
140	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-30	GrLo	10YR5/4	B	NCM
141	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-22	GrLo	10YR4/3	A	NCM
	3	22-32	GrLo	10YR5/4	B	NCM
142	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-30	GrLo	10YR5/4	B	NCM
143	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
144	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
145	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
146	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
147	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-20	GrLo	10YR4/3	A	NCM
	3	20-rocks				
148	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM

149	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
150	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
151	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
152	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
153	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
154	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-28	SiLo	10YR3/2	A	NCM
	3	28-38	SiLo	10YR5/4	B	NCM
155	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
156	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-40	GrLo	10YR5/4	B	NCM
157	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
158	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
159	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
160	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
161	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM

162	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
163	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
164	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
165	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
166	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
167	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
168	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
169	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
170	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
171	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/4	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
172	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-30	GrLo	10YR3/3	A	NCM
	3	30-40	GrLo	10YR5/4	B	NCM
173	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM
174	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-25	GrLo	10YR4/3	A	NCM
	3	25-37	GrLo	10YR5/4	B	NCM

175	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM

Note: wetland flagged

176	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM
177	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM
178	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM
179	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM
180	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-30	GrLo	wet	mottled	10YR3/2-5/4	A	NCM
181	1	0-5	rootmat,leaves,humus				A/O	NCM
	2	5-26	GrLo			10YR4/3	A	NCM
	3	26-37	GrLo			10YR5/4	B	NCM
182	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-26	GrLo			10YR4/3	A	NCM
	3	26-36	GrLo			10YR5/4	B	NCM
183	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-26	GrLo			10YR4/3	A	NCM
	3	26-37	GrLo			10YR5/4	B	NCM
184	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-25	GrLo			10YR4/3	A	NCM
	3	25-36	GrLo			10YR5/4	B	NCM
185	1	0-5	rootmat,leaves,humus				A/O	NCM
	2	5-24	GrLo			10YR4/3	A	NCM
	3	24-35	GrLo			10YR5/4	B	NCM
186	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-22	GrLo			10YR4/4	Ap	NCM
	3	22-35	GrLo			10YR5/4	B	NCM
187	1	0-3	rootmat,leaves,humus				A/O	NCM
	3	3-27	GrLo			10YR5/4	B	NCM
188	1	0-3	rootmat,leaves,humus				A/O	NCM
	2	3-26	GrLo			10YR4/3	A	NCM
	3	26-36	GrLo			10YR5/4	B	NCM
189	1	0-5	rootmat,leaves,humus				A/O	NCM
	2	5-28	GrLo			10YR4/3	A	NCM
	3	28-38	GrLo			10YR5/4	B	NCM

190	1	0-5	rootmat,leaves,humus			A/O	NCM
	2	5-22	GrLo		10YR4/3	A	NCM
	3	22-32	GrLo		10YR5/4	B	NCM
191	1	0-5	rootmat,leaves,humus			A/O	NCM
	2	5-23	GrLo		10YR4/3	A	NCM
	3	23-33	GrLo		10YR5/4	B	NCM
192	1	0-2	rootmat,leaves,humus			A/O	NCM
	2	2-26	GrLo		10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
193	1	0-2	rootmat,leaves,humus			A/O	NCM
	2	2-26	GrLo		10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
194	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-27	GrLo		10YR4/3	A	NCM
	3	27-37	GrLo		10YR5/4	B	NCM
195	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-23	GrLo		10YR4/3	A	NCM
	3	23-33	GrLo		10YR5/4	B	NCM
196	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
197	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
198	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
199	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
200	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
201	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
202	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM

203	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
204	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
205	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
206	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
207	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-26	GrLo	densely packed	10YR4/3	A	NCM
	3	26-36	GrLo		10YR5/4	B	NCM
208	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-20	GrLo		10YR4/2	A	NCM
	3	20-30	GrLo		10YR5/4	B	NCM
209	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-20	GrLo	mottled wet	10YR4/2-5/4	A	NCM
	3	20-30	GrLo		10YR5/4	B	NCM
210	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-23	GrLo		10YR4/3	A	NCM
	3	23-33	GrLo		10YR5/4	B	NCM
211	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-20	GrLo		10YR4/3	A	NCM
	3	20-30	GrLo		10YR5/4	B	NCM
212	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-22	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
213	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-22	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
214	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-22	GrLo		10YR4/2	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
215	standing water						
216	standing water						
217	standing water						

218	standing water					
219	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-12	GrLo	10YR4/3	A	NCM
	3	12-23	GrLo	10YR5/4	B	NCM
221	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-35	GrLo	10YR5/4	B	NCM
222	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-35	GrLo	10YR5/4	B	NCM
223	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-40	GrLo	10YR4/3	A?	NCM
224	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
225	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-20	GrLo	10YR4/3	A	NCM
	3	20-35	GrLo	10YR5/4	B	NCM
226	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
227	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
228	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-28	GrLo	10YR4/3	A	NCM
	3	28-30,root	GrLo	10YR5/4	B	NCM
229	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
230	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
231	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
232	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM

233	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
234	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
235	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
236	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
237	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
238	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
239	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
240	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-28	GrLo	10YR4/3	A	NCM
	3	28-38	GrLo	10YR5/4	B	NCM
241	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-22	GrLo	10YR4/4	A	NCM
	3	22-32	GrLo	10YR5/4	B	NCM
242	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/4	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
243	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
244	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR54/4	B	NCM
245	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM

246	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
247	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
248	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
249	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-25	GrLo	10YR4/4	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
250	1	0-2	rootmat,leaves,humus		A/O	NCM
	2	2-23	GrLo	10YR4/4	A	NCM
	3	23-gravel				
251	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
252	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
253	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
254	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
255	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
256	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
257	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-24	GrLo	10YR4/3	A	NCM
	3	24-34	GrLo	10YR5/4	B	NCM
258	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM

259	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-24	GrLo		10YR4/3	A	NCM
	3	24-34	GrLo		10YR5/4	B	NCM
260	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	very gravelly	10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
261	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	v gravelly	10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
262	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo	v gravelly	10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
263	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
264	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
265	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
266	1	0-6	rootmat,leaves,humus			A/O	NCM
	2	6-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
267	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-37	GrLo		10YR5/4	B	NCM
268	1	0-4	rootmat,leaves,humus			A/O	NCM
	2	4-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
269	1	0-5	rootmat,leaves,humus			A/O	NCM
	2	5-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
270	1	0-3	rootmat,leaves,humus			A/O	NCM
	2	3-24	GrLo	wet	10YR4/2	A	NCM
	3	24-38	GrLo	wet	10YR5/4	B	NCM
271	1	0-1	rootmat,leaves,humus			A/O	NCM
	2	1-25	GrLo		10YR4/3	A	NCM
	3	25-35	GrLo		10YR5/4	B	NCM
272	1	gravel					

273	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
274	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
275	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
276	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
277	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
278	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-25	GrLo	10YR4/3	A	NCM
	3	25-35	GrLo	10YR5/4	B	NCM
279	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
280	1	0-5	rootmat,leaves,humus		A/O	NCM
	2	5-26	Sa	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
281	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-26	SaLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
282	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
283	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
284	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
285	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM

286	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
287	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
288	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-23	GrLo	10YR4/3	A	NCM
	3	23-37	GrLo	10YR5/4	B	NCM
289	1	0-6	rootmat,leaves,humus		A/O	NCM
	2	6-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
290	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
291	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
292	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
293	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
294	1	0-3	rootmat,leaves,humus		A/O	NCM
	2	3-23	GrLo	10YR4/3	A	NCM
	3	23-33	GrLo	10YR5/4	B	NCM
295	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
296	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM
297	1	0-4	rootmat,leaves,humus		A/O	NCM
	2	4-26	GrLo	10YR4/3	A	NCM
	3	26-36	GrLo	10YR5/4	B	NCM

Attachment 5

EnSol, Inc.

ENGINEERING + ENVIRONMENTAL

NYS SHPO Response Letter

June 15, 2021

David Lenox
Project Manager
EnSol, Inc.
661 Main Street
Niagara Falls, NY 14301

Re: USACE
Dom-Mar Transfer and Recycling Facility: New Construction
1128 Dolsontown Rd, Middletown, NY 10940
20PR08024

Dear David Lenox:

Thank you for requesting the comments of the New York State Historic Preservation Office (SHPO). We have reviewed the submitted materials in accordance with Section 106 of the National Historic Preservation Act of 1966. These comments are those of the SHPO and relate only to Historic/Cultural resources.

SHPO has reviewed *Phase I Archaeological Investigation for the Dom-Mar Transfer & Recycling Center Town of Wawayanda, Orange County, New York* (Tracker Archaeology, April 2021). The investigation found no evidence of archaeological sites within the project's Area of Potential Effects (APE). However, as noted in the report, a New York State Museum-recorded archaeological site, NYSM 6169, is mapped within the project area. The site is described as "Cemetery." No other information is available. The mapped location must be considered approximate and, based on a review of historic USGS topographic maps, there may have been significant landscape modification in the recorded site's vicinity. Therefore, based on these factors, we recommend that the project will not adversely affect historic or archaeological properties listed or eligible for listing on the National Register of Historic Places conditioned on a commitment by the applicant to implement our Human Remains Discovery Protocol (attached) should any evidence of human remains or possible burial goods be encountered during construction.

If you have any questions, please don't hesitate to contact me.

Sincerely,

Philip A. Perazio, Historic Preservation Program Analyst - Archaeology Unit
Phone: 518-268-2175
e-mail: philip.perazio@parks.ny.gov via e-mail only

Attachment

cc: Ryan Elliott, EnSol; Brian Orzel, USACE; Charles Vandrei and David Witt, DEC

State Historic Preservation Office/
New York State Office of Parks, Recreation and Historic Preservation
Human Remains Discovery Protocol
(January 2021)

If human remains are encountered during construction or archaeological investigations, the New York State Historic Preservation Office (SHPO) recommends that the following protocol is implemented.

- Human remains shall be treated with dignity and respect. Should human remains or suspected human remains be encountered, work in the general area of the discovery shall stop immediately and the location shall be secured and protected from damage and disturbance.

- If skeletal remains are identified and the archaeologist is not able to conclusively determine if they are human, the remains and any associated materials shall be left in place. A qualified forensic anthropologist, bioarchaeologist or physical anthropologist shall assess the remains in situ to help determine if they are human.

- If the remains are determined to be human, law enforcement, the SHPO, the appropriate Indian Nations, and the involved state and federal agencies shall be notified immediately. If law enforcement determines that the burial site is not a criminal matter, no skeletal remains or associated materials shall be removed until appropriate consultation takes place.

- If human remains are determined to be Native American, they shall be left in place and protected from further disturbance until a plan for their avoidance or removal is developed. Please note that avoidance is the preferred option of the SHPO and the Indian Nations. The involved agency shall consult SHPO and the appropriate Indian Nations to develop a plan of action. Photographs of Native American human remains and associated materials should not be taken without consulting with the involved Indian Nations.

- If human remains are determined to be non-Native American, the remains shall be left in place and protected from further disturbance until a plan for their avoidance or removal is developed. Please note that avoidance is the preferred option of the SHPO. The involved agency shall consult SHPO and other appropriate parties to develop a plan of action.

- The SHPO recommends that burial information is not released to the public to protect burial sites from possible looting.

Attachment 6

EnSol, Inc.

ENGINEERING + ENVIRONMENTAL

Noise Evaluation

Noise Evaluation: Town Noise Criteria
Proposed Dom-Mar Transfer and Recycling Facility
Town of Wawayanda, Orange County, NY

INTRODUCTION

DOM KAM LLC of Middletown, NY (DOM KAM) is the applicant for a combined development located at 1128 Dolsontown Road in Wawayanda, NY (Facility). The Facility will consist of a transfer station/recycling facility on the western portion of the development and a fleet maintenance facility on the eastern portion of the development. This Noise Evaluation has been prepared to summarize detailed modeling of the combined total projected noise to be produced by the Facility in comparison with the Town regulations which are discussed in greater detail in the section below. This evaluation has been completed via sound modeling using standard modeling techniques in general accordance with International Organization for Standardization standard ISO 9613-2 (Attenuation of Sound During Propagation Outdoors).

A depiction of the proposed facility is included as Attachment 1. It should be noted that this evaluation considers only operations of the proposed Facility, not construction of the Facility. The proposed operating hours of the Facility are 4am-7pm (Monday-Friday) and 5am-4pm (Saturday).

REGULATORY REQUIREMENTS – TOWN OF WAWAYANDA

Noise associated with the operation of the Facility will be governed by the Town's zoning code. Paragraph D of Code Chapter 195-23 (General Commercial and Industrial Standards) states that *"Noise shall not exceed an intensity of 65 decibels as measured 100 feet from the boundaries of the lot where such use is situated"*.

NOISE TERMINOLOGY

Sound results from traveling compression waves that move through the atmosphere. Sound from a single source can be schematically or graphically represented in the same manner as when an object is dropped into a still water body. The waves ripple outward and radiate away from the source or center in straight lines, decreasing in intensity as they travel outward. As sound waves pass through a point in the atmosphere, the waves result in an alternate compression and expansion of the air. Human perception of sound results from vibrations induced within the ear by these pressure waves.

The perceived loudness of a sound is directly proportional to the magnitude of the pressure fluctuations within a given sound wave. The larger the amplitude of the pressure fluctuation, the louder the sound is perceived by the human receptor. Sound pressure is measured in a unit called a Pascal (a measure of force per unit area of the air pressure wave). The human ear is sensitive to a very large range of sound pressures, from 0.00002 Pascals to 200 Pascals. In order to make the numbers more manageable, a logarithmic sound pressure scale known as the decibel scale is used. Each increase of 10 decibels (dB) is equivalent to 3.2 times greater sound pressure. Each increase of 20 decibels is equivalent to a ten-fold increase in sound pressure. The range of audible sound pressure levels that can be heard by the human ear is from 0 dB to over 130 dB, which is the threshold of painful noise. The maximum achievable sound level is about 194 dB.

In contrast, the pitch of a sound is related to the frequency of the sound wave (the number of waves that pass any point in one second); high frequencies are associated with a high pitch and low frequencies are associated with a low pitch. In actuality, sound heard in everyday life generally consists of a range of frequencies and the perceived pitch reflects those frequencies that dominate in amplitude. The characterization of noise or sound therefore considers both its loudness, and frequency (pitch).

For analysis of environmental noise the A-weighted decibel scale, or dB(A) scale, is generally used. This scale weighs different frequencies in a complex sound in proportion to the human ear's sensitivity and assigns one dB(A) value to the sound. The dB(A) scale provides a good measure of human perception of a sound's loudness, provides a good assessment of speech interference, and defines community disturbance conditions. This means the dB(A) scale is appropriate for measuring the impact of a new sound source on the existing audio environment. In addition to its recognition by the NYSDEC, the widely-gained acceptance and use of noise A-weighting is substantiated by the fact that the US EPA, Federal Aviation Administration (FAA), Department of Defense (DOD), and American Conference of Governmental Industrial Hygienists (ACGIH) have all adopted this measurement standard.

SITE LOCATION AND SURROUNDING AREA

The Facility is situated in a mixed residential/commercial environment, and surrounding property uses are depicted on Figure 1 and are also summarized as follows:

- North: Dolsontown Road then Residential and undeveloped commercial lots
- East: Commercial (tire & vehicle sales / self-storage)
- South: Interstate 84
- West: Undeveloped commercial lot

Topography of the Facility and surrounding area generally slopes in a southerly direction toward Monhagen Brook, which is located approximately 600 feet south of the Facility.

PRIMARY RECEPTORS

To demonstrate compliance with Town regulatory guidance summarized above, noise impacts were calculated at several places located 100 feet from the subject property line (receiver numbers 1-6 in the model results discussed below).

FACILITY NOISE MODELING

A detailed model was developed to predict noise levels generated by operations at the Facility. All sound modeling was completed using the SoundPlan Essential software provided by Navcon Engineering Network. Assumptions regarding traffic and equipment operating on the site were developed based on projected Facility operations.

Noise generated at the Facility will generally fall into two categories: vehicular traffic and operations of site-related equipment as described below.

<u>Modeling Scenario</u>

As described further below, the modeled day and night scenarios considered the potential maximum equipment and traffic noise scenarios for conservative modeling purposes. It should also be noted that the primary noise sources at the Facility will be either on-site traffic (trucks and automobiles) or the operation of heavy equipment (only on the Phase 1/transfer station portion of the Facility) which is associated with material unloading, handling, and consolidation/loading to outbound tractor-trailers Details of the separate heavy equipment and traffic modeling scenarios are described further below.

Model Inputs – Traffic

Noise resulting from predicted site vehicular traffic was modeled within the SoundPlan Essential software in accordance with the United States Department of Transportation Federal Highway Administration Traffic Noise Model TNM 3.0. There will be three distinct traffic patterns on the combined development as follows:

- The western pattern which will be combined automobile traffic for Facility employees as well as customers using the residential drop off area.
- The central pattern which will be combined medium and heavy truck traffic for inbound and outbound materials as well as on-site traffic between the building and recyclables storage area
- The eastern pattern which will be combined automobile and medium truck traffic for employees and operations of the maintenance garage

For the purpose of conservative modeling, the combined estimated peak-hour traffic volumes were used for all traffic types in both the night (4am-7am) and day (7am-7pm) scenarios. A detailed breakdown of those peak-hour volumes is presented below as Table 1. Modeling also assumed a maximum on-site vehicular traffic speed of 35 km/h for all vehicle types.

Table 1
Summary of Modeled On-Site Peak Hour Traffic Volumes

Traffic Pattern	Vehicle Type	Night Volume (4am-7am)	Day Volume (7am-7pm)
Western	Automobiles (employees/users)	10	22
Central	Medium Trucks (inbound)	5	12
	Heavy Trucks (outbound)	3	10*
Eastern	Automobiles (employees)	10	12
	Medium Trucks (service)	14	7

(*) includes combination of 6 trucks/hr for outbound loads and 4 trucks/hr for onsite transfers to recyclables storage area

Model Inputs – Industry

The transfer station is designed so that initial material deliveries are brought into the building via four large overhead doors located on the south side of the building (facing away from Dolsontown Road and the residential receptor across the road). Outbound tractor-trailers will be loaded within the building and then exit the building through two large overhead doors on the north side of the building once loaded. To minimize noise emanating out of the front of the building, the outbound doors will only be opened to allow outbound vehicles to exit and will remain closed at all other times. This model assumes operation of the heavy equipment at locations just outside the south/inbound doors as a conservative scenario representing operation of the machinery just at the door openings while opened. It should be noted that the Facility design also includes periodic operations of a baler within the OCC portion of the building. The baler is not incorporated into this model as it will be operated within the building with the doors closed and also will not be operated simultaneously with the excavator and loader as further discussed below.

Noise resulting from industrial sources (Facility equipment and machinery) was modeled in accordance with International Organization for Standardization standard ISO 9613-2 (Attenuation of Sound During Propagation Outdoors) (Attachment 2). Modeled industrial noise sources include the simultaneous operation of two pieces of equipment outdoors (one excavator and one front-end loader).

Noise generated from the excavator and front-end loader, at a distance of 50 feet from the noise source, was assumed at levels of 85dB(A) and 80dB(A) respectively. These assumed values are based on Table 9.1 (Default Noise Emission Reference Levels and Usage Factors) of the Construction Noise Handbook published by the Federal Highway Administration which is included as Attachment 3.

The multiple sources are calculated within the model in consideration of the Additive Effects of Multiple Sound Sources theory which states that the total sound pressure created by multiple sound sources does not create a mathematical additive effect. For instance, two proximal noise sources that are 70dB(A) each do not have a combined noise level of 140dB(A). In this case the combined noise level is 73dB(A).

Model Inputs – Buildings

The SoundPlan modeling software considers the entire three-dimensional environment of the modeled area, rather than completing just simple two-dimensional distance attenuation calculations. One of the four buildings currently existing on the property will remain in addition to the proposed Facility building as depicted in Attachment 1. All site buildings that will be present at the completion of the development were included in the model as well as the residential building located across Dolsontown Road. Buildings meet the definition of a screening barrier as discussed in section 7.4 of ISO 9613-2 and, to account for their anticipated effect on sound propagation, were incorporated into the model at assumed heights of six meters (existing residence and site building to remain) and twelve meters (proposed Facility building).

Model Inputs – Topography

As an additional consideration of the three-dimensional environment of the modeled area, SoundPlan uses ground elevation data published by Google Earth® as the base of the model, and all resulting model calculations consider the topography of the model area.

Model Attenuation Calculations – Distance Attenuation

The primary attenuation calculation is sound level reduction over distance. As defined in DEP-00-1, sound pressure levels (SPL) change in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6dB reduction in the sound.

Model Attenuation Calculations – Landscape Buffer Zones

Existing heavily-vegetated areas consisting mainly of mature trees are present to the south and west of the proposed Facility. These buffer zones were incorporated in the model to include predictions of additional sound attenuation associated with vegetative buffer zones. All vegetative buffer zones were modeled at an assumed height of ten meters (mature trees). This model only includes vegetated areas that are currently present. The final site design includes planting of additional vegetative buffer areas which were not considered by the model and, once grown to mature height, will provide for additional attenuation.

Model Attenuation Calculations – Atmospheric Absorption

Additional noise attenuation via atmospheric absorption is also considered in the model in general accordance with section 7.2 of ISO 9613. The primary variables that affect atmospheric absorption are temperature, humidity, and pressure. As defined in Part 360.19(j)(5), noise assessments are allowed to utilize average annual conditions when calculating atmospheric absorption. This model was prepared based upon atmospheric conditions of a temperature of 48 degrees (F), humidity of 75%, and air pressure of 1,013mbar.

Model Attenuation Calculations – Ground Effect

The final attenuation effect included in the model calculation is the ground effect as defined in section 7.3 of ISO 9613. In summary, the ground effect applies additional attenuation of noise over soft (non-reflective) ground surfaces. The ground effect factor ranges from 0 (hard surfaces) to 1 (soft surfaces). A ground effect of 0 assumes complete reflectivity of the surface and therefore no additional ground effect attenuation would be applied to any ground surface defined with an effect factor of 0. For purposes of this model, the entire combined development footprint was assigned a ground effect factor of 0 and remaining undeveloped/vegetated areas within the model area were assigned a ground effect factor of 1.

Conservative Modeling Scenario

Using the inputs described above, "worst-case" operation scenarios were analyzed in this modeling effort consisting of the following variables:

- *Maximum potential on-site traffic loads.* The actual average traffic loads during typical Facility day and night operations are lower; however, the maximum potential day and night hourly loads were used for modeling.
- *Simultaneous operation of equipment.* The model assumes simultaneous, and continuous, operation of the two pieces of equipment described above (one excavator and one front-end loader). Simultaneous and continuous operation of both pieces of equipment is a condition that will rarely occur during actual Facility operations as the equipment will more typically be operated individually and on an intermittent basis.
- *Outdoor operation of equipment.* As described above, this model considers the operation of the equipment at outdoor locations adjacent to the inbound doors. During actual operations this equipment will more typically be operated within the building (with the outbound doors closed and the inbound doors open). In effect, the placement of these noise sources at these outdoor locations in the model over-estimates a "worst case" scenario of the equipment operating right at the inbound door openings.
- *Ground Effects.* As discussed above, a ground effect of 0 (hard surfaces) was applied to the entire development area. The development footprint contains multiple interior landscaped areas (soft surfaces). However the model considers the entire footprint as a hard surface for both conservative purposes and model simplicity.
- *Additional Vegetative Screening.* As indicated in Attachment 1, the final facility design may also include additional plantings along the western and northern facility boundaries. The primary purpose of these plantings will be for visual screening but, as they mature, they will also act as additional vegetative attenuation areas. However, for conservative modeling purposes, these areas were not included in this modeling effort.

Model Results

Using all modeling inputs and attenuation factors described above, the model was run and the final results are presented on Figures 2, 3, and 4 (attached). All model results are presented as 1-hour Leq values representing the scenarios defined above. Figure 2 displays the final predicted noise levels (from Facility operations only) at each of the receptor locations. And Figures 3 and 4 respectively display color-coded heat maps of the predicted noise levels during proposed day and night Facility operations.

As indicated on Figure 2, the predicted noise levels at the Town receptor receivers (locations 100' from the property line) range from 44.3 to 64.2 dB(A). These values are also summarized in Table 2 below.

Table 2
Summary of Model Results – Town Receivers

#	100-foot Offset Receiver Location	Town Regulatory Limit	Day (7am-7pm) Receiver Result dB(A)	Night (4am-7am) Receiver Result dB(A)
1	West	65	63.7	63.7
2	Southwest	65	64.2	64.1
3	South	65	60.7	60.7
4	Northwest 1	65	46.9	44.3
5	Northwest 2	65	46.7	44.5
6	Northeast	65	50.8	48.2

Note that the model displays only noise generated by the previously-described inputs and does not factor in additional background/ambient noise that is generated by business operations, local road, and highway traffic within the study area.

CONCLUSIONS

Based upon the modeling effort, predicted noise levels at all Town property line offset receivers are lower than the Town standard of 65dB(A). Also, as noted above, the model scenario considers "worst case"/maximum operating conditions for conservative modeling purposes. The actual average noise output of the Facility is anticipated to be less than what is represented by this modeling scenario.

Figures
Figure 1 – Adjacent Properties
Figure 2 – Point Receiver Results
Figure 3 – Noise Map – Day
Figure 4 – Noise Map – Night

Attachments
Attachment 1 – Proposed Facility Site Plan
Attachment 2 – International Standard ISO 9613-2: Attenuation of Sound During Propagation Outdoors
Attachment 3 – FHWA Construction Noise Handbook, Chapter 9

Figures

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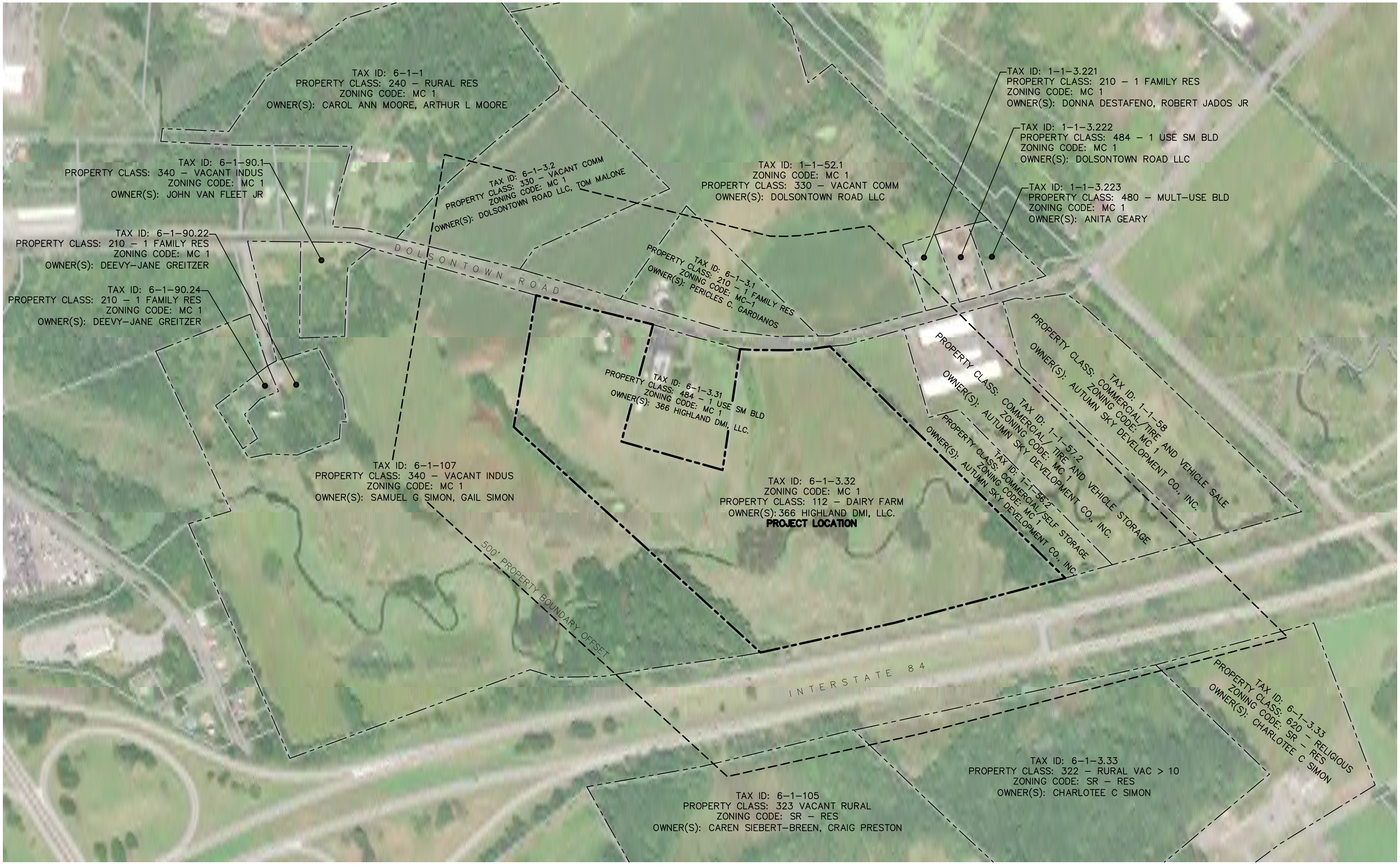
professional engineering – business consulting



NOTES:

1. BASE MAP OBTAINED FROM THE ORANGE COUNTY GIS PARCEL VIEWER, ACCESSED ON 12/4/2020

N

SCALE: 300' 0' 300' 600'

ADJACENT PROPERTIES

DOM-MAR TRANSFER AND RECYCLING FACILITY

DOMKAM, LLC.

TOWN OF WAWAYANDA, STATE OF NEW YORK

EnSol, Inc.
Environmental Solutions

661 MAIN STREET
NIAGARA FALLS, NY 14301
PHONE (716) 285-3920
FAX (716) 285-3928

FIGURE 1

DECEMBER 2020 | PN: 20-0062

Figure 2
Point Reciever Results
Dom-Mar Transfer & Recycling Facility
Noise Evaluation

Red line = 65dB during the Day
two pieces of equipment running
and full traffic load (29 trucks & 34 cars/hr)

Green line = 65dB during the Night
two pieces of equipment running
and full traffic load (22 trucks & 22 cars/hr)

Recievers 1-7 at a distance of 100'
from property line for Town evaluation

Predicted noise levels (dB(A)) at
Reciver locations:
Data box left cell = day results (7am-7pm)
Data box right cell = night results (4am-7am)

Ground atttenuation of entire
proposed development (blue line)
set at 0.0 (hard surface) for conservative
modeling purposes

Vegetative attenuation areas set at default height
of 10 meters

Modeled Atmospheric Conditions:
Temperature = 48 F
Humidity = 75%
Air Pressure = 1,013 mbar

Noise modeling completed with SoundPlan
Essential ver. 5.1 modeling software

Signs and symbols

- Property Line
- Ground effects
- Volume attenuation areas
- Receiver
- Traffic Noise Emission Line
- Point source (site equipment)
- Limit line Day: 65 dB(A)
- Limit line Night: 65 dB(A)

0 50 100 200 300 400 feet

N

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Figure 3
Noise Map - Day
Dom-Mar Transfer & Recycling Facility
Noise Evaluation

Day Time Operating Assumptions

1) Day operation hours:
   7am - 7pm (M-F)
   7am - 4pm (Sat)
2) Equipment
   One Excavator @ 85dB (at 50')*
   One Loader @ 80dB (at 50')*
   * - per FHWA Table 9.1
3) Simultaneous operation of both pieces of equipment is a conservative modeling scenario as typical operations will likely include operation of one piece of equipment.
4) Maximum anticipated hourly traffic volume of:
   PHASE 1 CARS (western traffic pattern)
   22 cars (employee, visitor, & res.drop off)
   PHASE 1 TRUCKS (central traffic pattern)
   12 medium trucks (inbound materials) and
   10 heavy trucks (6 outbound & 4 yard tractor)
   PHASE 2 COMBINED (eastern traffic pattern)
   7 medium trucks (maintenance)
   12 cars (employees & visitors)

Signs and symbols

- Property Line
- Ground effects
- Volume attenuation areas
- Traffic Noise Emission Line
- Point source (site equipment)

Levels in dB(A)

- < 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- 85 - 90
- >= 90

0 50 100 200 300 400 feet

N

Figure 4
Noise Map - Night
Dom-Mar Transfer & Recycling Facility Noise Evaluation

Night Time Operating Assumptions

1) Night operation hours:
   4am - 7am (M-F)
   5am - 7am (Sat)
2) Equipment
   One Excavator @ 85dB (at 50')*
   One Loader @ 80dB (at 50')*
   * - per FHWA Table 9.1
3) Simultaneous operation of both pieces of equipment is a conservative modeling scenario as typical operations will likely include operation of one piece of equipment.
4) Maximum anticipated hourly traffic volume of:
   PHASE 1 CARS (western traffic pattern)
   10 cars (employee, visitor, & res.drop off)
   PHASE 1 TRUCKS (central traffic pattern)
   5 medium trucks (inbound materials) and
   3 heavy trucks (outbound materials)
   PHASE 2 COMBINED (eastern traffic pattern)
   14 medium trucks (maintenance)
   10 cars (employees & visitors)

Signs and symbols

- Property Line
- Ground effects
- Volume attenuation areas
- Traffic Noise Emission Line
- Point source (site equipment)

Levels in dB(A)

Levels in dB(A)
< 40
40 - 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
85 - 90
>= 90

0 50 100 200 300 400 feet

N

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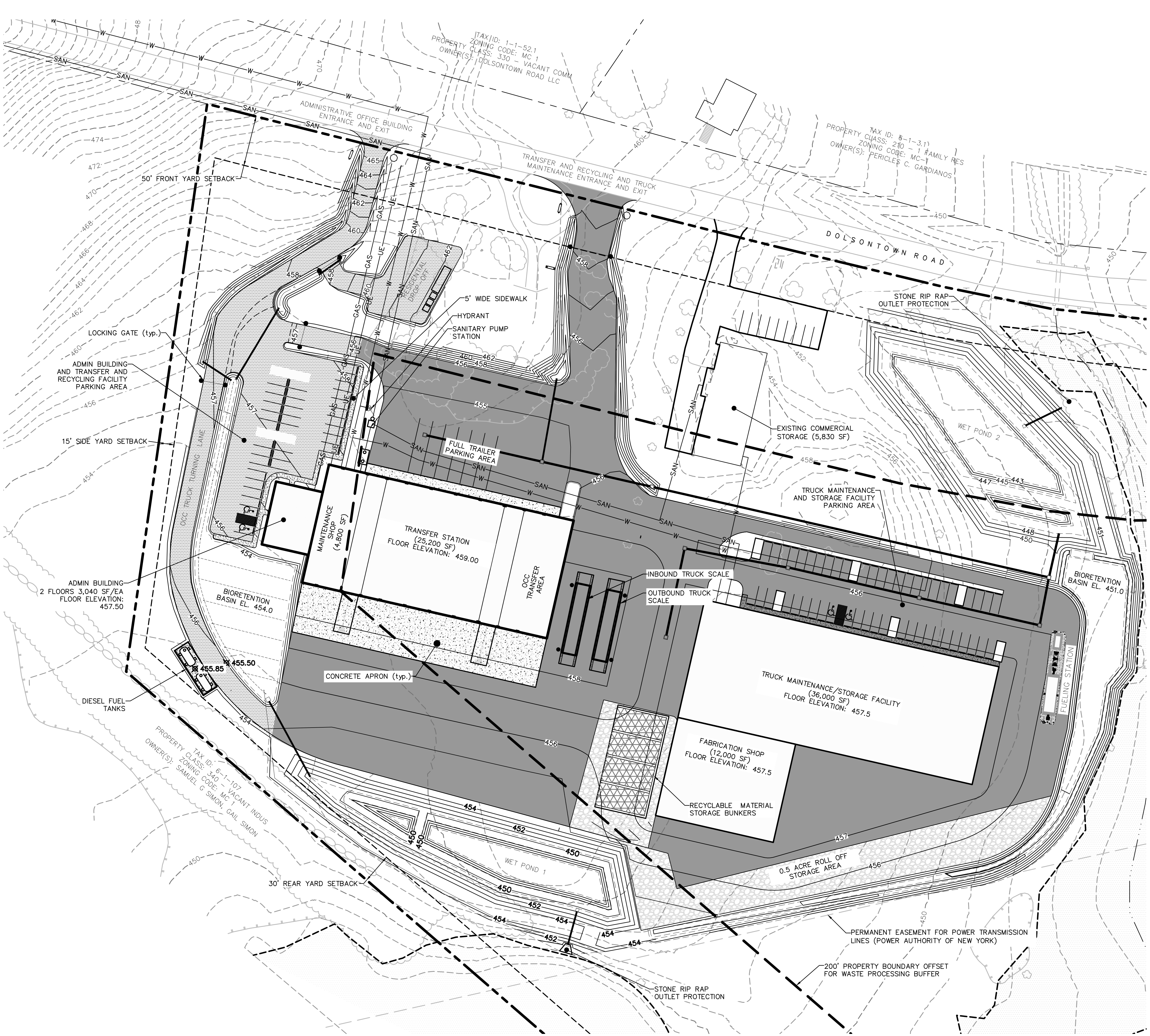
Attachment 1

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

Proposed Facility Site Plan



LEGEND:

450	EXISTING GROUND MAJOR CONTOUR
	EXISTING GROUND MINOR CONTOUR
450	PROPOSED GRADING MAJOR CONTOUR
448	PROPOSED GRADING MINOR CONTOUR
	PROPERTY BOUNDARY
	PROPERTY BOUNDARY SETBACK
	EXISTING BUILDING
	APPARENT JURISDICTIONAL FEDERAL WETLAND
	OUTDOOR SIGNAGE
	STANDARD DUTY PAVEMENT
	HEAVY DUTY PAVEMENT
	CONCRETE
	GRAVEL
SAN	SANITARY FORCEMAIN
W W	WATER LINE
UE UE	UNDERGROUND ELECTRIC
GAS GAS	NATURAL GAS LINE
> > >	PROPOSED SWALE
	PROPOSED STORM SEWER
	PROPOSED CATCH BASIN

NOTES:

1. EXISTING PROPERTY LINE, BUILDINGS AND TOPOGRAPHY FROM A SURVEY PREPARED FOR MIKE MARANGI, DATED NOVEMBER 16, 2020, BY LANC & TULLY ENGINEERING AND SURVEYING, P.C.
2. ELEVATIONS BASED ON NAVD88 DATUM, HORIZONTAL DATUM IS NEW YORK STATE PLANE EAST.
3. THE EXISTING COMMERCIAL STORAGE BUILDING SHALL BE CONNECTED TO THE EXTENDED 12-INCH WATER MAIN INSIDE THE NORTH ROW OF DOLSONTOWN ROAD.
4. WETLAND BOUNDARY AND APPARENT JURISDICTION FROM DOLSONTOWN ROAD WETLAND DELINEATION REPORT PREPARED BY ENSOL, INC. DATED DECEMBER 2020. WETLAND BOUNDARY SURVEY LOCATIONS ARE FROM THE SURVEY PREPARED FOR MIKE MARANGI, DATED NOVEMBER 16, 2020, BY LANC & TULLY ENGINEERING AND SURVEYING, P.C.
5. EACH RESIDENTIAL, INDUSTRIAL, COMMERCIAL SUBDIVISION OR SITE PLANS SHALL CONTRIBUTE RECREATIONAL FEES CALCULATED ON THE BASIS OF GROSS FLOOR AREA FOR ALL NEW CONSTRUCTION.
6. THE TRANSFER AND RECYCLING FACILITY IS PROPOSED TO OPERATE FROM 4:00AM TO 7:00PM MONDAY THROUGH FRIDAY, AND FROM 5:00AM TO 4:00PM ON SATURDAY. THE PROPOSED OPERATION HOURS REQUIRE A WAIVER FROM THE TOWN BOARD FROM SECTION 152-17D.(7) OF THE TOWN CODE.

NO.	REVISION	BY	DATE
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EnSol
661 Main St.
Niagara Falls, NY 14301
716.285.3920

DAVID A. LENOX, P.E.
NYSPE LICENSE NO. 093384

CLIENT: DOM KAM LLC

SITE: DOM-MAR TRANSFER AND RECYCLING FACILITY
TOWN OF WAWAYANDA
COUNTY OF ORANGE
STATE OF NEW YORK

PROJECT: SITE PLAN AND SPECIAL USE PERMIT APPLICATION

TITLE: CONCEPTUAL FULL BUILD SITE PLAN

ISSUE: REVIEW

DES:	DRN:	CHK:
DL	SJD	DL

PROJECT NO: 029-A0001
DATE: APRIL 2021

GRAPHIC SCALE: 0' 50' 100'

FILE: Sheet 4 - Conceptual Full Build Site Plan.dwg

REV NO: 0
SHEET NO: 4

Attachment 2

EnSol, Inc. *Environmental Solutions*

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International Standard ISO 9613-2: Attenuation of Sound During Propagation Outdoors

INTERNATIONAL STANDARD

ISO 9613-2

First edition
1996-12-15

Acoustics — Attenuation of sound during propagation outdoors —

Part 2:
General method of calculation

Acoustique — Atténuation du son lors de sa propagation à l'air libre —

Partie 2: Méthode générale de calcul

Reference number
ISO 9613-2:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9613-2 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

ISO 9613 consists of the following parts, under the general title *Acoustics — Attenuation of sound during propagation outdoors:*

— *Part 1: Calculation of the absorption of sound by the atmosphere*

— *Part 2: General method of calculation*

Part 1 is a detailed treatment restricted to the attenuation by atmospheric absorption processes. Part 2 is a more approximate and empirical treatment of a wider subject — the attenuation by all physical mechanisms.

Annexes A and B of this part of ISO 9613 are for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

The ISO 1996 series of standards specifies methods for the description of noise outdoors in community environments. Other standards, on the other hand, specify methods for determining the sound power levels emitted by various noise sources, such as machinery and specified equipment (ISO 3740 series), or industrial plants (ISO 8297). This part of ISO 9613 is intended to bridge the gap between these two types of standard, to enable noise levels in the community to be predicted from sources of known sound emission. The method described in this part of ISO 9613 is general in the sense that it may be applied to a wide variety of noise sources, and covers most of the major mechanisms of attenuation. There are, however, constraints on its use, which arise principally from the description of environmental noise in the ISO 1996 series of standards.

Acoustics — Attenuation of sound during propagation outdoors —

Part 2:
General method of calculation

1 Scope

This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favourable to propagation from sources of known sound emission.

These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night. Inversion conditions over water surfaces are not covered and may result in higher sound pressure levels than predicted from this part of ISO 9613.

The method also predicts a long-term average A-weighted sound pressure level as specified in ISO 1996-1 and ISO 1996-2. The long-term average A-weighted sound pressure level encompasses levels for a wide variety of meteorological conditions.

The method specified in this part of ISO 9613 consists specifically of octave-band algorithms (with nominal midband frequencies from 63 Hz to 8 kHz) for calculating the attenuation of sound which originates from a point sound source, or an assembly of point sources. The source (or sources) may be moving or stationary. Specific terms are provided in the algorithms for the following physical effects:

— geometrical divergence;

— atmospheric absorption;

— ground effect;

— reflection from surfaces;

— screening by obstacles.

Additional information concerning propagation through housing, foliage and industrial sites is given in annex A.

This method is applicable in practice to a great variety of noise sources and environments. It is applicable, directly or indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground-based noise sources. It does not apply to sound from aircraft in flight, or to blast waves from mining, military or similar operations.

To apply the method of this part of ISO 9613, several parameters need to be known with respect to the geometry of the source and of the environment, the ground surface characteristics, and the source strength in terms of octave-band sound power levels for directions relevant to the propagation.

NOTE 1 If only A-weighted sound power levels of the sources are known, the attenuation terms for 500 Hz may be used to estimate the resulting attenuation.

The accuracy of the method and the limitations to its use in practice are described in clause 9.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9613. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9613 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1996-1:1982, *Acoustics — Description and measurement of environmental noise — Part 1: Basic quantities and procedures.*

ISO 1996-2:1987, *Acoustics — Description and measurement of environmental noise — Part 2: Acquisition of data pertinent to land use.*

ISO 1996-3:1987, *Acoustics — Description and measurement of environmental noise — Part 3: Application to noise limits.*

ISO 9613-1:1993, *Acoustics — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere.*

IEC 651:1979, *Sound level meters,* and Amendment 1:1993.

3 Definitions

For the purposes of this part of ISO 9613, the definitions given in ISO 1996-1 and the following definitions apply. (See table 1 for symbols and units.)

3.1 equivalent continuous A-weighted sound pressure level, L_{AT}: Sound pressure level, in decibels, defined by equation (1):

$$L_{AT} = 10 \lg \left\{ \left[(1/T) \int_0^T p_A^2(t)\, dt \right] \Big/ p_0^2 \right\} \text{ dB} \qquad \dots (1)$$

where

$p_A(t)$ is the instantaneous A-weighted sound pressure, in pascals;

p_0 is the reference sound pressure (= 20×10^{-6} Pa);

T is a specified time interval, in seconds.

The A-frequency weighting is that specified for sound level meters in IEC 651.

NOTE 2 The time interval T should be long enough to average the effects of varying meteorological parameters. Two different situations are considered in this part of ISO 9613, namely short-term downwind and long-term overall averages.

Table 1 — Symbols and units

Symbol	Definition	Unit
A	octave-band attenuation	dB
C_{met}	meteorological correction	dB
d	distance from point source to receiver (see figure 3)	m
d_p	distance from point source to receiver projected onto the ground plane (see figure 1)	m
$d_{s,o}$	distance between source and point of reflection on the reflecting obstacle (see figure 8)	m
$d_{o,r}$	distance between point of reflection on the reflecting obstacle and receiver (see figure 8)	m
d_{ss}	distance from source to (first) diffraction edge (see figures 6 and 7)	m
d_{sr}	distance from (second) diffraction edge to receiver (see figures 6 and 7)	m
D_I	directivity index of the point sound source	—
D_z	screening attenuation	—
e	distance between the first and second diffraction edge (see figure 7)	m
G	ground factor	—
h	mean height of source and receiver	m
h_s	height of point source above ground (see figure 1)	m
h_r	height of receiver above ground (see figure 1)	m
h_m	mean height of the propagation path above the ground (see figure 3)	m
H_{max}	largest dimension of the sources	m
l_{min}	minimum dimension (length or height) of the reflecting plane (see figure 8)	m
L	sound pressure level	dB
α	atmospheric attenuation coefficient	dB/km
β	angle of incidence	rad
ρ	sound reflection coefficient	—

3.2 equivalent continuous downwind octave-band sound pressure level, L_{fT}(DW): Sound pressure level, in decibels, defined by equation (2):

$$L_{fT}(\mathrm{DW}) = 10\lg\left\{\left[(1/T)\int_0^T p_f^2(t)\,\mathrm{d}t\right]\Big/p_0^2\right\} \quad \mathrm{dB} \qquad \ldots (2)$$

where $p_f(t)$ is the instantaneous octave-band sound pressure downwind, in pascals, and the subscript f represents a nominal midband frequency of an octave-band filter.

NOTE 3 The electrical characteristics of the octave-band filters should comply at least with the class 2 requirements of IEC 1260.

3.3 insertion loss (of a barrier)**:** Difference, in decibels, between the sound pressure levels at a receiver in a specified position under two conditions:

a) with the barrier removed, and

b) with the barrier present (inserted),

and no other significant changes that affect the propagation of sound.

4 Source description

The equations to be used are for the attenuation of sound from point sources. Extended noise sources, therefore, such as road and rail traffic or an industrial site (which may include several installations or plants, together with traffic moving on the site) shall be represented by a set of sections (cells), each having a certain sound power and directivity. Attenuation calculated for sound from a representative point within a section is used to represent the attenuation of sound from the entire section. A line source may be divided into line sections, an area source into area sections, each represented by a point source at its centre.

However, a group of point sources may be described by an equivalent point sound source situated in the middle of the group, in particular if

a) the sources have approximately the same strength and height above the local ground plane,

b) the same propagation conditions exist from the sources to the point of reception, and

c) the distance d from the single equivalent point source to the receiver exceeds twice the largest dimension H_{max} of the sources ($d > 2H_{max}$).

If the distance d is smaller ($d \leqslant 2H_{max}$), or if the propagation conditions for the component point sources are different (e.g. due to screening), the total sound source shall be divided into its component point sources.

NOTE 4 In addition to the real sources described above, image sources will be introduced to describe the reflection of sound from walls and ceilings (but not by the ground), as described in 7.5.

5 Meteorological conditions

Downwind propagation conditions for the method specified in this part of ISO 9613 are as specified in 5.4.3.3 of ISO 1996-2:1987, namely

— wind direction within an angle of ± 45° of the direction connecting the centre of the dominant sound source and the centre of the specified receiver region, with the wind blowing from source to receiver, and

— wind speed between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground.

The equations for calculating the average downwind sound pressure level L_{AT}(DW) in this part of ISO 9613, including the equations for attenuation given in clause 7, are the average for meteorological conditions within these limits. The term average here means the average over a short time interval, as defined in 3.1.

These equations also hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights.

6 Basic equations

The equivalent continuous downwind octave-band sound pressure level at a receiver location, L_{fT}(DW), shall be calculated for each point source, and its image sources, and for the eight octave bands with nominal midband frequencies from 63 Hz to 8 kHz, from equation (3):

$$L_{fT}(\mathrm{DW}) = L_W + D_c - A \qquad \ldots (3)$$

where

L_W is the octave-band sound power level, in decibels, produced by the point sound source relative to a reference sound power of one picowatt (1 pW);

D_c is the directivity correction, in decibels, that describes the extent by which the equivalent continuous sound pressure level from the point sound source deviates in a specified direction from the level of an omnidirectional point sound source producing sound power level L_W; D_c equals the directivity index D_I of the point sound source plus an index D_Ω that accounts for sound propagation into solid angles less than 4π steradians; for an omnidirectional point sound source radiating into free space, $D_c = 0$ dB;

A is the octave-band attenuation, in decibels, that occurs during propagation from the point sound source to the receiver.

NOTES

5 The letter symbol A (in italic type) signifies attenuation in this part of ISO 9613 except in subscripts, where it designates the A-frequency weighting (in roman type).

6 Sound power levels in equation (3) may be determined from measurements, for example as described in the ISO 3740 series (for machinery) or in ISO 8297 (for industrial plants).

The attenuation term A in equation (3) is given by equation (4):

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc} \quad \ldots (4)$$

where

A_{div} is the attenuation due to geometrical divergence (see 7.1);

A_{atm} is the attenuation due to atmospheric absorption (see 7.2);

A_{gr} is the attenuation due to the ground effect (see 7.3);

A_{bar} is the attenuation due to a barrier (see 7.4);

A_{misc} is the attenuation due to miscellaneous other effects (see annex A).

General methods for calculating the first four terms in equation (4) are specified in this part of ISO 9613. Information on three contributions to the last term, A_{misc} (the attenuation due to propagation through foliage, industrial sites and areas of houses), is given in annex A.

The equivalent continuous A-weighted downwind sound pressure level shall be obtained by summing the contributing time-mean-square sound pressures calculated according to equations (3) and (4) for each point sound source, for each of their image sources, and for each octave band, as specified by equation (5):

$$L_{AT}(\mathrm{DW}) = 10 \lg \left\{ \sum_{i=1}^{n} \left[\sum_{j=1}^{8} 10^{0,1\left[L_{fT}(ij) + A_f(j)\right]} \right] \right\} \text{ dB} \quad \ldots (5)$$

where

n is the number of contributions i (sources and paths);

j is an index indicating the eight standard octave-band midband frequencies from 63 Hz to 8 kHz;

A_f denotes the standard A-weighting (see IEC 651).

The long-term average A-weighted sound pressure level L_{AT}(LT) shall be calculated according to

$$L_{AT}(\mathrm{LT}) = L_{AT}(\mathrm{DW}) - C_{met} \quad \ldots (6)$$

where C_{met} is the meteorological correction described in clause 8.

The calculation and significance of the various terms in equations (1) to (6) are explained in the following clauses. For a more detailed treatment of the attenuation terms, see the literature references given in annex B.

7 Calculation of the attenuation terms

7.1 Geometrical divergence (A_{div})

The geometrical divergence accounts for spherical spreading in the free field from a point sound source, making the attenuation, in decibels, equal to

$$A_{div} = \left[20 \lg(d/d_0) + 11\right] \text{ dB} \quad \ldots (7)$$

where

d is the distance from the source to receiver, in metres;

d_0 is the reference distance (= 1 m).

NOTE 7 The constant in equation (7) relates the sound power level to the sound pressure level at a reference distance d_0 which is 1 m from an omnidirectional point sound source.

7.2 Atmospheric absorption (A_{atm})

The attenuation due to atmospheric absorption A_{atm}, in decibels, during propagation through a distance d, in metres, is given by equation (8):

$$A_{atm} = \alpha d/1\,000 \qquad \dots (8)$$

where α is the atmospheric attenuation coefficient, in decibels per kilometre, for each octave band at the midband frequency (see table 2).

For values of α at atmospheric conditions not covered in table 2, see ISO 9613-1.

NOTES

8 The atmospheric attenuation coefficient depends strongly on the frequency of the sound, the ambient temperature and relative humidity of the air, but only weakly on the ambient pressure.

9 For calculation of environmental noise levels, the atmospheric attenuation coefficient should be based on average values determined by the range of ambient weather which is relevant to the locality.

7.3 Ground effect (A_{gr})

7.3.1 General method of calculation

Ground attenuation, A_{gr}, is mainly the result of sound reflected by the ground surface interfering with the sound propagating directly from source to receiver. The downward-curving propagation path (downwind) ensures that this attenuation is determined primarily by the ground surfaces near the source and near the receiver. This method of calculating the ground effect is applicable only to ground which is approximately flat, either horizontally or with a constant slope. Three distinct regions for ground attenuation are specified (see figure 1):

a) the source region, stretching over a distance from the source towards the receiver of $30h_s$, with a maximum distance of d_p (h_s is the source height, and d_p the distance from source to receiver, as projected on the ground plane);

b) the receiver region, stretching over a distance from the receiver back towards the source of $30h_r$, with a maximum distance of d_p (h_r is the receiver height);

c) a middle region, stretching over the distance between the source and receiver regions. If $d_p < (30h_s + 30h_r)$, the source and receiver regions will overlap, and there is no middle region.

According to this scheme, the ground attenuation does not increase with the size of the middle region, but is mostly dependent on the properties of source and receiver regions.

The acoustical properties of each ground region are taken into account through a ground factor G. Three categories of reflecting surface are specified as follows.

Table 2 — Atmospheric attenuation coefficient α for octave bands of noise

Temperature	Relative humidity	Atmospheric attenuation coefficient α, dB/km							
		Nominal midband frequency, Hz							
°C	%	63	125	250	500	1 000	2 000	4 000	8 000
10	70	0,1	0,4	1,0	1,9	3,7	9,7	32,8	117
20	70	0,1	0,3	1,1	2,8	5,0	9,0	22,9	76,6
30	70	0,1	0,3	1,0	3,1	7,4	12,7	23,1	59,3
15	20	0,3	0,6	1,2	2,7	8,2	28,2	88,8	202
15	50	0,1	0,5	1,2	2,2	4,2	10,8	36,2	129
15	80	0,1	0,3	1,1	2,4	4,1	8,3	23,7	82,8

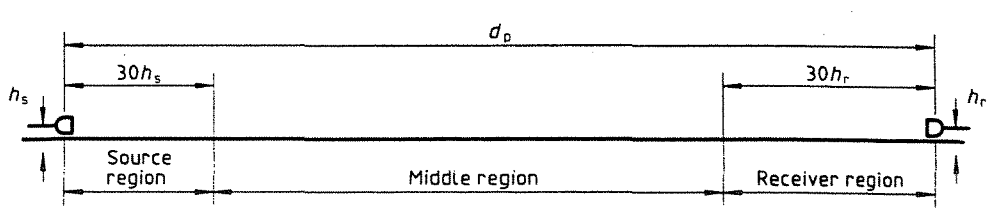


Figure 1 — Three distinct regions for determination of ground attenuation

a) **Hard ground,** which includes paving, water, ice, concrete and all other ground surfaces having a low porosity. Tamped ground, for example, as often occurs around industrial sites, can be considered hard. For hard ground $G = 0$.

NOTE 10 It should be recalled that inversion conditions over water are not covered by this part of ISO 9613.

b) **Porous ground,** which includes ground covered by grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation, such as farming land. For porous ground $G = 1$.

c) **Mixed ground:** if the surface consists of both hard and porous ground, then G takes on values ranging from 0 to 1, the value being the fraction of the region that is porous.

To calculate the ground attenuation for a specific octave band, first calculate the component attenuations A_s for the source region specified by the ground factor G_s (for that region), A_r for the receiver region specified by the ground factor G_r, and A_m for the middle region specified by the ground factor G_m, using the expressions in table 3. (Alternatively, the functions a', b', c' and d' in table 3 may be obtained directly from the curves in figure 2.) The total ground attenuation for that octave band shall be obtained from equation (9):

$$A_{gr} = A_s + A_r + A_m \qquad \ldots (9)$$

NOTE 11 In regions with buildings, the influence of the ground on sound propagation may be changed (see A.3).

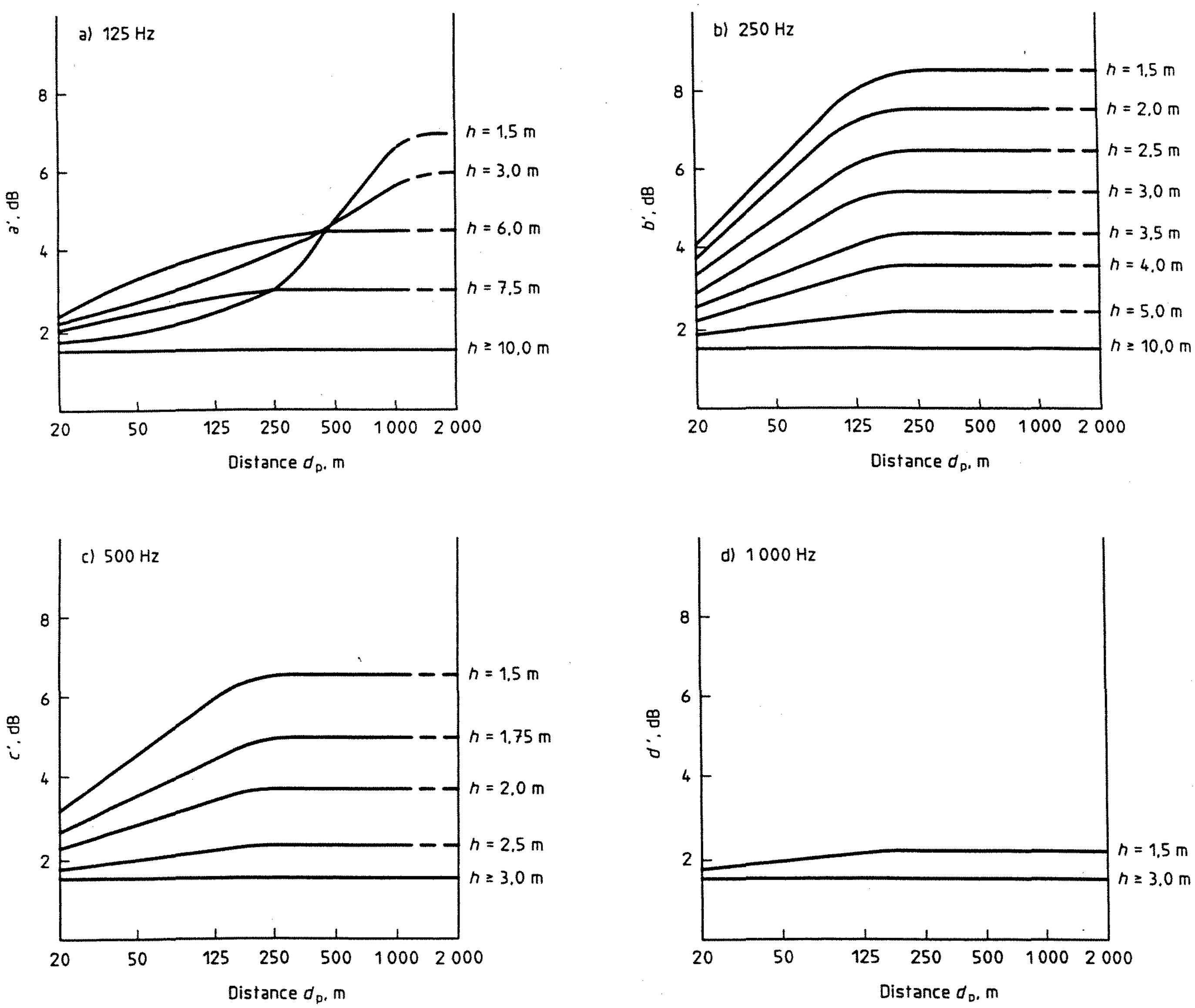


Figure 2 — Functions a', b', c' and d' representing the influence of the source-to-receiver distance d_p and the source or receiver height h, respectively, on the ground attenuation A (computed from equations in table 3)

Table 3 — Expressions to be used for calculating ground attenuation contributions A_s, A_r and A_m in octave bands

Nominal midband frequency Hz	A_s or A_r 1) dB	A_m dB
63	$-1{,}5$	$-3q$ 2)
125	$-1{,}5 + G \times a'(h)$	$-3q(1 - G_m)$
250	$-1{,}5 + G \times b'(h)$	
500	$-1{,}5 + G \times c'(h)$	
1 000	$-1{,}5 + G \times d(h)$	
2 000	$-1{,}5(1 - G)$	
4 000	$-1{,}5(1 - G)$	
8 000	$-1{,}5(1 - G)$	

NOTES

$$a'(h) = 1{,}5 + 3{,}0 \times e^{-0{,}12(h-5)^2}\left(1 - e^{-d_p/50}\right) + 5{,}7 \times e^{-0{,}09h^2}\left(1 - e^{-2{,}8 \times 10^{-6} \times d_p^2}\right)$$

$$b'(h) = 1{,}5 + 8{,}6 \times e^{-0{,}09h^2}\left(1 - e^{-d_p/50}\right)$$

$$c'(h) = 1{,}5 + 14{,}0 \times e^{-0{,}46h^2}\left(1 - e^{-d_p/50}\right)$$

$$d'(h) = 1{,}5 + 5{,}0 \times e^{-0{,}9h^2}\left(1 - e^{-d_p/50}\right)$$

1) For calculating A_s, take $G = G_s$ and $h = h_s$. For calculating A_r, take $G = G_r$ and $h = h_r$. See 7.3.1 for values of G for various ground surfaces.

2) $q = 0$ when $d_p \leqslant 30(h_s + h_r)$

$$q = 1 - \frac{30(h_s + h_r)}{d_p} \quad \text{when } d_p > 30(h_s + h_r)$$

where d_p is the source-to-receiver distance, in metres, projected onto the ground planes.

7.3.2 Alternative method of calculation for A-weighted sound pressure levels

Under the following specific conditions

- only the A-weighted sound pressure level at the receiver position is of interest,
- the sound propagation occurs over porous ground or mixed ground most of which is porous (see 7.3.1),
- the sound is not a pure tone,

and for ground surfaces of any shape, the ground attenuation may be calculated from equation (10):

$$A_{gr} = 4{,}8 - (2h_m/d)\left[17 + (300/d)\right] \geqslant 0 \text{ dB} \quad \ldots (10)$$

where

h_m is the mean height of the propagation path above the ground, in metres;

d is the distance from the source to receiver, in metres.

The mean height h_m may be evaluated by the method shown in figure 3. Negative values for A_{gr} from equation (10) shall be replaced by zeros.

NOTE 12 For short distances d, equation (10) predicts no attenuation and equation (9) may be more accurate.

When the ground attenuation is calculated using equation (10), the directivity correction D_c in equation (3) shall include a term D_Ω, in decibels, to account for the apparent increase in sound power level of the source due to reflections from the ground near the source.

$$D_\Omega = 10 \lg \left\{1 + \left[d_p^2 + (h_s - h_r)^2\right] \Big/ \left[d_p^2 + (h_s + h_r)^2\right]\right\} \text{ dB} \quad \ldots (11)$$

where

h_s is the height of the source above the ground, in metres;

h_r is the height of the receiver above the ground, in metres;

d_p is the source-to-receiver distance projected onto the ground plane, in metres.

7.4 Screening (A_{bar})

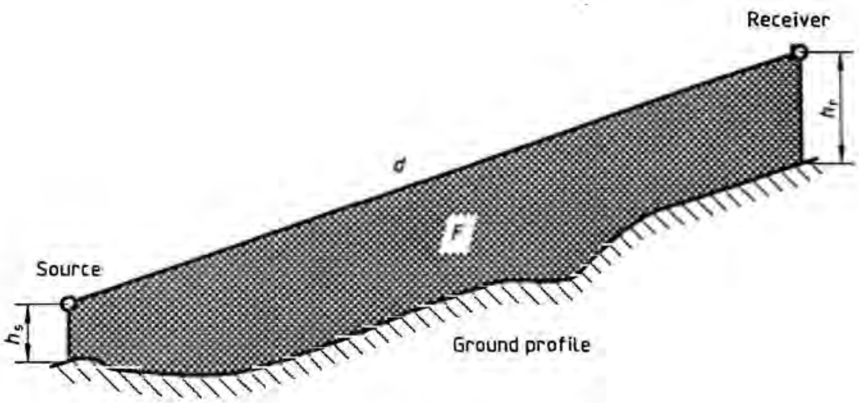
An object shall be taken into account as a screening obstacle (often called a barrier) if it meets the following requirements:

— the surface density is at least 10 kg/m^2;

— the object has a closed surface without large cracks or gaps (consequently process installations in chemical plants, for example, are ignored);

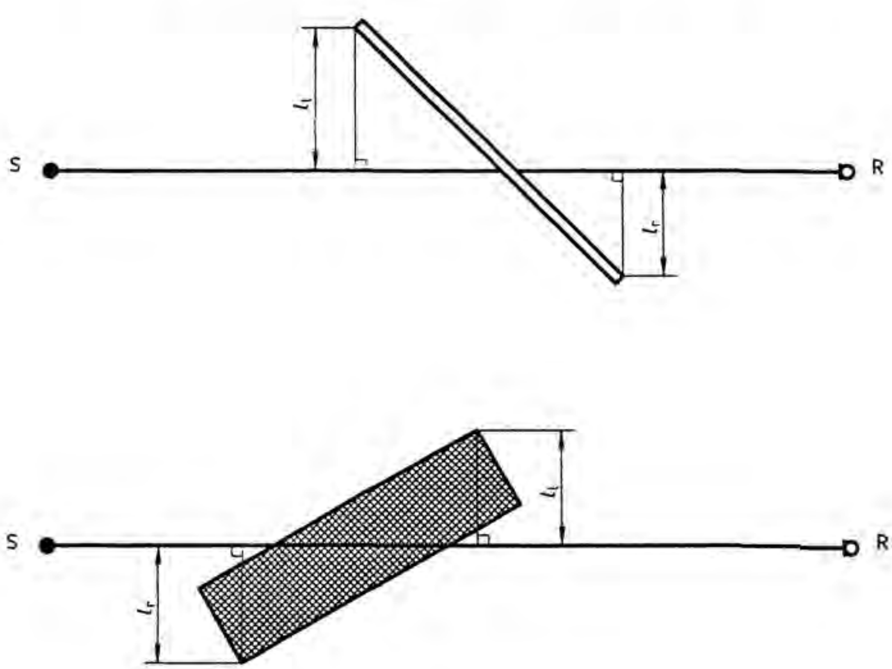
— the horizontal dimension of the object normal to the source-receiver line is larger than the acoustic wavelength λ at the nominal midband frequency for the octave band of interest; in other words $l_l + l_r > \lambda$ (see figure 4).

Each object that fulfils these requirements shall be represented by a barrier with vertical edges. The top edge of the barrier is a straight line that may be sloping.



$h_m = F/d$, where F is the area

Figure 3 — Method for evaluating the mean height h_m



NOTE — An object is only considered to be a screening obstacle when its horizontal dimension perpendicular to the source-receiver line SR is larger than the wavelength: $(l_l + l_r) > \lambda$

Figure 4 — Plan view of two obstacles between the source (S) and the receiver (R)

For the purposes of this part of ISO 9613, the attenuation by a barrier, A_{bar}, shall be given by the insertion loss. Diffraction over the top edge and around a vertical edge of a barrier may both be important. (See figure 5.) For downwind sound propagation, the effect of diffraction (in decibels) over the top edge shall be calculated by

$$A_{bar} = D_z - A_{gr} > 0 \qquad \ldots (12)$$

and for diffraction around a vertical edge by

$$A_{bar} = D_z > 0 \qquad \ldots (13)$$

where

D_z is the barrier attenuation for each octave band [see equation (14)];

A_{gr} is the ground attenuation **in the absence of the barrier** (i.e. with the screening obstacle removed) (see 7.3).

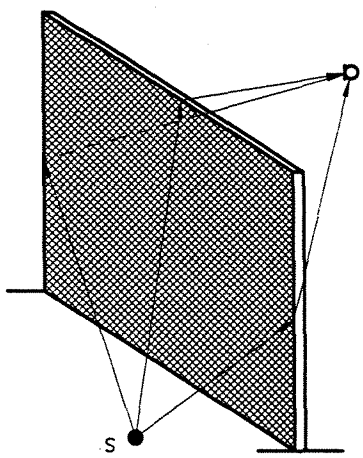


Figure 5 — Different sound propagation paths at a barrier

NOTES

13 When A_{bar} as defined by equation (12) is substituted in equation (4) to find the total attenuation A, the two A_{gr} terms in equation (4) will cancel. The barrier attenuation D_z in equation (12) then includes the effect of the ground in the presence of the barrier.

14 For large distances and high barriers, the insertion loss calculated by equation (12) is not sufficiently confirmed by measurements.

15 In calculation of the insertion loss for multisource industrial plants by high buildings (more than 10 m above the ground), and also for high-noise sources within the plant, equation (13) should be used in both cases for determining the long-term average sound pressure level [using equation (6)].

16 For sound from a depressed highway, there may be attenuation in addition to that indicated by equation (12) along a ground surface outside the depression, due to that ground surface.

To calculate the barrier attenuation D_z, assume that only one significant sound-propagation path exists from the sound source to the receiver. If this assumption is not valid, separate calculations are required for other propagation paths (as illustrated in figure 5) and the contributions from the various paths to the squared sound pressure at the receiver are summed.

The barrier attenuation D_z, in decibels, shall be calculated for this path by equation (14):

$$D_z = 10 \lg \left[3 + (C_2/\lambda) C_3 z K_{met}\right] \text{ dB} \qquad \ldots (14)$$

where

C_2 is equal to 20, and includes the effect of ground reflections; if in special cases ground reflections are taken into account separately by image sources, $C_2 = 40$;

C_3 is equal to 1 for single diffraction (see figure 6);

$$C_3 = \left[1 + (5\lambda/e)^2\right] \Big/ \left[(1/3) + (5\lambda/e)^2\right] \qquad \ldots (15)$$

for double diffraction (see figure 7);

λ is the wavelength of sound at the nominal midband frequency of the octave band, in metres;

z is the difference between the pathlengths of diffracted and direct sound, as calculated by equations (16) and (17), in metres;

K_{met} is the correction factor for meteorological effects, given by equation (18);

e is the distance between the two diffraction edges in the case of double diffraction (see figure 7).

For single diffraction, as shown in figure 6, the pathlength difference z shall be calculated by means of equation (16):

$$z = \left[(d_{ss} + d_{sr})^2 + a^2\right]^{1/2} - d \qquad \ldots (16)$$

where

d_{ss} is the distance from the source to the (first) diffraction edge, in metres;

d_{sr} is the distance from the (second) diffraction edge to the receiver, in metres;

a is the component distance parallel to the barrier edge between source and receiver, in metres.

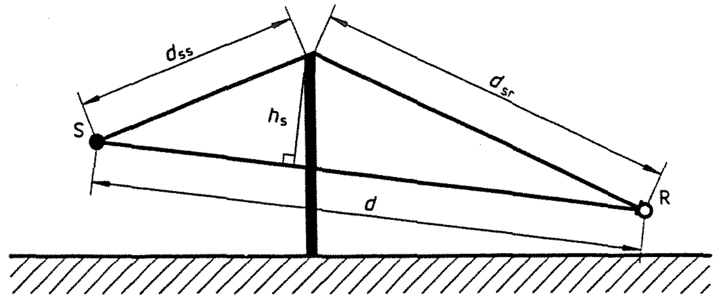


Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

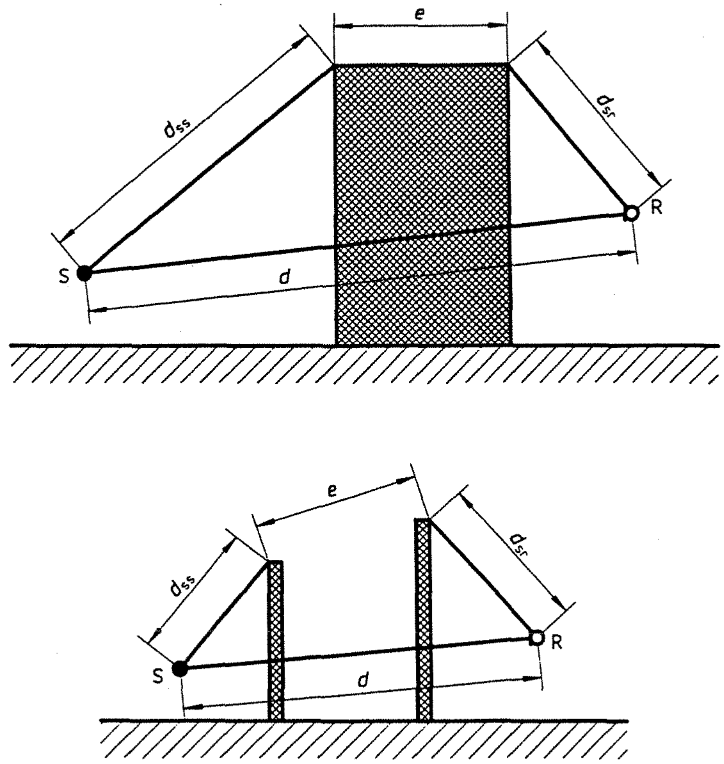


Figure 7 — Geometrical quantities for determining the pathlength difference for double diffraction

If the line of sight between the source S and receiver R passes above the top edge of the barrier, z is given a negative sign.

For double diffraction, as shown in figure 7, the pathlength difference z shall be calculated by

$$z = \left[\left(d_{ss} + d_{sr} + e \right)^2 + a^2 \right]^{1/2} - d \qquad \dots (17)$$

The correction factor K_{met} for meteorological conditions in equation (14) shall be calculated using equation (18):

$$K_{met} = \exp\left[-(1/2000)\sqrt{d_{ss} d_{sr} d/(2z)} \right] \quad \text{for } z > 0 \qquad \dots (18)$$

$$K_{met} = 1 \quad \text{for } z \leqslant 0$$

For lateral diffraction around obstacles, it shall be assumed that $K_{met} = 1$ (see figure 5).

NOTES

17 For source-to-receiver distances less than 100 m, the calculation using equation (14) shows that K_{met} may be assumed equal to 1, to an accuracy of 1 dB.

18 Equation (15) provides a continuous transition from the case of single diffraction ($e = 0$) where $C_3 = 1$, to that of a well-separated double diffraction ($e \gg \lambda$) where $C_3 = 3$.

19 A barrier may be less effective than calculated by equations (12) to (18) as a result of reflections from other acoustically hard surfaces near the sound path from the source to the receiver or by multiple reflections between an acoustically hard barrier and the source.

The barrier attenuation D_z, in any octave band, should not be taken to be greater than 20 dB in the case of single diffraction (i.e. thin barriers) and 25 dB in the case of double diffraction (i.e. thick barriers).

The barrier attenuation for two barriers is calculated using equation (14) for double diffraction, as indicated in the lower part of figure 7. The barrier attenuation for more than two barriers may also be calculated approximately using equation (14), by choosing the two most effective barriers, neglecting the effects of the others.

7.5 Reflections

Reflections are considered here in terms of image sources. These reflections are from outdoor ceilings and more or less vertical surfaces, such as the façades of buildings, which can increase the sound pressure levels at the receiver. The effect of reflections from the ground are not included because they enter into the calculation of A_{gr}.

The reflections from an obstacle shall be calculated for all octave bands for which all the following requirements are met:

— a specular reflection can be constructed, as shown in figure 8;

— the magnitude of the sound reflection coefficient for the surface of the obstacle is greater than 0,2;

— the surface is large enough for the nominal midband wavelength λ (in metres) for the octave band under consideration to obey the relationship

$$1/\lambda > \left[2/(l_{min}\cos\beta)^2\right]\left[d_{s,o}d_{o,r}/(d_{s,o}+d_{o,r})\right] \quad \ldots (19)$$

where

λ is the wavelength of sound (in metres) at the nominal midband frequency f (in hertz) of the octave band $\left(\lambda = \dfrac{340\ \text{m/s}}{f}\right)$;

$d_{s,o}$ is the distance between the source and the point of reflection on the obstacle;

$d_{o,r}$ is the distance between the point of reflection on the obstacle and the receiver;

β is the angle of incidence, in radians (see figure 8);

l_{min} is the minimum dimension (length or height) of the reflecting surface (see figure 8).

If any of these conditions is not met for a given octave band, then reflections shall be neglected.

The real source and source image are handled separately. The sound power level of the source image $L_{W,im}$ shall be calculated from

$$L_{W,im} = L_W + 10\lg(\rho)\,\text{dB} + D_{Ir} \quad \ldots (20)$$

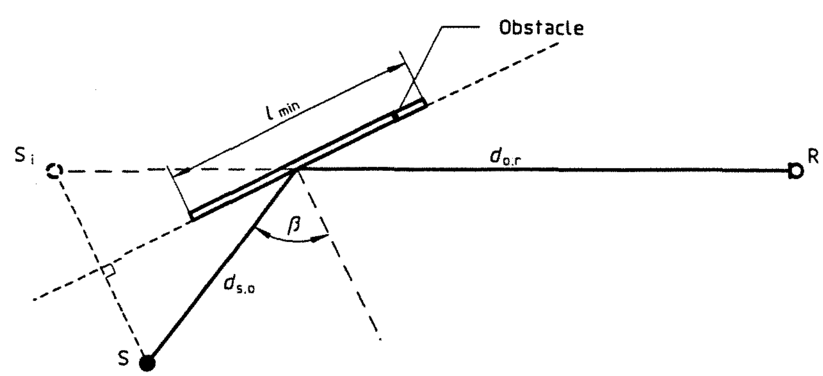
where

ρ is the sound reflection coefficient at angle β on the surface of the obstacle ($\geqslant 0{,}2$) (see figure 8);

D_{Ir} is the directivity index of the source in the direction of the receiver image.

If specific data for the sound reflection coefficient are not available, the value may be estimated using table 4.

For the sound source image, the attenuation terms of equation (4), as well as ρ and D_{Ir} in equation (20), shall be determined according to the propagation path of the reflected sound.



NOTE — A path $d_{s,o} + d_{o,r}$ connecting the source S and receiver R by reflection from the obstacle exists in which β, the angle of incidence, is equal to the angle of reflection. The reflected sound appears to come from the source image S_i.

Figure 8 — Specular reflection from an obstacle

Table 4 — Estimates of the sound reflection coefficient ρ

Object	ρ
Flat hard walls	1
Walls of building with windows and small additions or bay	0,8
Factory walls with 50 % of the surface consisting of openings, installations or pipes	0,4
Cylinders with hard surfaces (tanks, silos)	$\frac{D \sin(\phi/2)}{2d_{sc}}$ *) where D is the diameter of the cylinder; d_{sc} is the distance from the source to the centre C of the cylinder; ϕ is the supplement of the angle between lines SC and CR.
Open installations (pipes, towers, etc.)	0
*) This expression applies only if the distance d_{sc} from the source S to cylinder C is much smaller than the distance d_{cr} from the cylinder to receiver; see figure 9.	

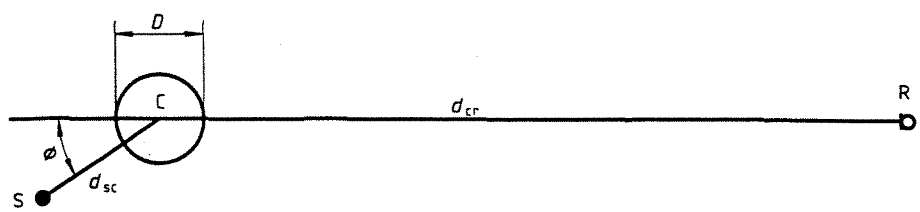


Figure 9 — Estimation of sound reflection coefficient for a cylinder

8 Meteorological correction (C_{met})

Use of equation (3) leads directly to an equivalent continuous A-weighted sound pressure level L_{AT} at the receiver for meteorological conditions which are favourable for propagation from the sound source to that receiver, as described in clause 5. This may be the appropriate condition for meeting a specific community noise limit, i.e. a level which is seldom exceeded (see ISO 1996-3). Often, however, a long-term average A-weighted sound pressure level L_{AT}(LT) is required, where the time interval T is several months or a year. Such a period will normally include a variety of meteorological conditions, both favourable and unfavourable to propagation. A value for L_{AT}(LT) may be obtained in this situation from that calculated for L_{AT}(DW) via equation (3), by using the meteorological correction C_{met} in equation (6).

A value (in decibels) for C_{met} in equation (6) may be calculated using equations (21) and (22) for the case of a point sound source with an output which is effectively constant with time:

$$C_{met} = 0 \qquad \text{... (21)}$$

if $d_p \leqslant 10(h_s + h_r)$

$$C_{met} = C_0 \left[1 - 10(h_s + h_r)/d_p\right] \qquad \text{... (22)}$$

if $d_p > 10(h_s + h_r)$

where

h_s is the source height, in metres;

h_r is the receiver height, in metres;

d_p is the distance between the source and receiver projected to the horizontal ground plane, in metres;

C_0 is a factor, in decibels, which depends on local meteorological statistics for wind speed and direction, and temperature gradients.

The effects of meteorological conditions on sound propagation are small for short distances d_p, and for longer distances at greater source and receiver heights. Equations (21) and (22) account approxi-

Values in metres

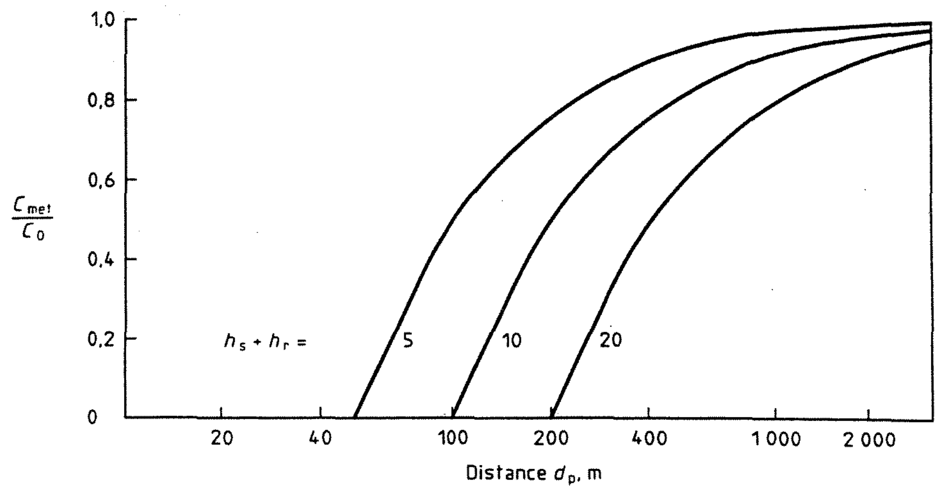


Figure 10 — Meteorological correction C_{met}

NOTES

20 A value for C_0 in equations (21) and (22) may be estimated from an elementary analysis of the local meteorological statistics. For example, if the meteorological conditions favourable to propagation described in clause 5 are found to occur for 50 % of the time period of interest, and the attenuation during the other 50 % is higher by 10 dB or more, then the sound energy which arrives for meteorological conditions unfavourable to propagation may be neglected, and C_0 will be approximately + 3 dB.

21 The meteorological conditions for evaluating C_0 may be established by the local authorities.

22 Experience indicates that values of C_0 in practice are limited to the range from zero to approximately + 5 dB, and values in excess of 2 dB are exceptional. Thus only very elementary statistics of the local meteorology are needed for a ± 1 dB accuracy in C_0.

For a source that is composed of several component point sources, h_s in equations (21) and (22) represents the predominant source height, and d_p the distance from the centre of that source to the receiver.

9 Accuracy and limitations of the method

The attenuation of sound propagating outdoors between a fixed source and receiver fluctuates due to variations in the meteorological conditions along the propagation path. Restricting attention to moderate downwind conditions of propagation, as specified in clause 5, limits the effect of variable meteorological conditions on attenuation to reasonable values.

There is information to support the method of calculation given in clauses 4 to 8 (see annex B) for broad-band noise sources. The agreement between calculated and measured values of the average A-weighted sound pressure level for downwind propagation, L_{AT}(DW), supports the estimated accuracy of calculation shown in table 5. These estimates of accuracy are restricted to the range of conditions specified for the validity of the equations in clauses 3 to 8 and are independent of uncertainties in sound power determination.

NOTE 24 The estimates of accuracy in table 5 are for downwind conditions averaged over independent situations (as specified in clause 5). They should not necessarily be expected to agree with the variation in measurements made at a given site on a given day. The latter can be expected to be considerably larger than the values in table 5.

The estimated errors in calculating the average downwind octave-band sound pressure levels, as well as pure-tone sound pressure levels, under the same conditions, may be somewhat larger than the estimated errors given for A-weighted sound pressure levels of broad-band sources in table 5.

In table 5, an estimate of accuracy is not provided in this part of ISO 9613 for distances d greater than the 1 000 m upper limit.

Throughout this part of ISO 9613 the meteorological conditions under consideration are limited to only two cases:

a) moderate downwind conditions of propagation, or their equivalent, as defined in clause 5;

b) a variety of meteorological conditions as they exist over months or years.

The use of equations (1) to (5) and (7) to (20) (and therefore also table 5) is limited to case a): meteorological conditions only. Case b) is relevant only to the use of equations (6), (21) and (22). There are also a substantial number of limitations (non-meteorological) in the use of individual equations. Equation (9) is, for example, limited to approximately flat terrain. These specific limitations are described in the text accompanying the relevant equation.

Table 5 — Estimated accuracy for broadband noise of L_{AT}(DW) calculated using equations (1) to (10)

Height, h *)	**Distance, d *)**	
	$0 < d < 100$ m	100 m $< d < 1\,000$ m
$0 < h < 5$ m	± 3 dB	± 3 dB
5 m $< h < 30$ m	± 1 dB	± 3 dB

*) h is the mean height of the source and receiver.
d is the distance between the source and receiver.

NOTE — These estimates have been made from situations where there are no effects due to reflection or attenuation due to screening.

Annex A
(informative)

Additional types of attenuation (A_{misc})

The term A_{misc} in equation (4) covers contributions to the attenuation from miscellaneous effects not accessible by the general methods of calculating the attenuation specified in clause 7. These contributions include

— A_{fol}, the attenuation of sound during propagation through foliage,

— A_{site}, the attenuation during propagation through an industrial site, and

— A_{hous}, the attenuation during propagation through a built-up region of houses,

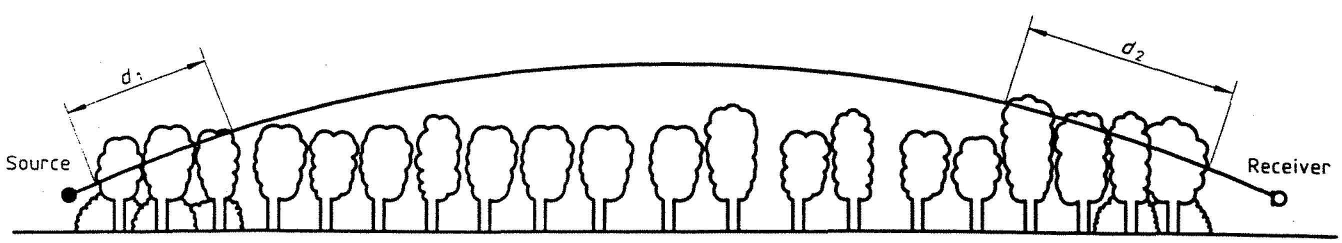
which are all considered in this annex.

For calculating these additional contributions to the attenuation, the curved downwind propagation path may be approximated by an arc of a circle of radius 5 km, as shown in figure A.1.

A.1 Foliage (A_{fol})

The foliage of trees and shrubs provides a small amount of attenuation, but only if it is sufficiently dense to completely block the view along the propagation path, i.e. when it is impossible to see a short distance through the foliage. The attenuation may be by vegetation close to the source, or close to the receiver, or by both situations, as illustrated in figure A.1. Alternatively, the path for the distances d_1 and d_2 may be taken as falling along lines at propagation angles of 15° to the ground.

The first line in table A.1 gives the attenuation to be expected from dense foliage if the total path length through the foliage is between 10 m and 20 m, and the second line if it is between 20 m and 200 m. For path lengths greater than 200 m through dense foliage, the attenuation for 200 m should be used.



NOTE — $d_f = d_1 + d_2$

For calculating d_1 and d_2, the curved path radius may be assumed to be 5 km.

Figure A.1 — Attenuation due to propagation through foliage increases linearly with propagation distance d_f through the foliage

Table A.1 — Attenuation of an octave band of noise due to propagation a distance d_f through dense foliage

Propagation distance d_f m	**Nominal midband frequency** Hz							
	63	125	250	500	1 000	2 000	4 000	8 000
	Attenuation, dB:							
$10 \leqslant d_f \leqslant 20$	0	0	1	1	1	1	2	3
	Attenuation, dB/m:							
$20 \leqslant d_f \leqslant 200$	0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,12

A.2 Industrial sites (A_{site})

At industrial sites, an attenuation can occur due to scattering from installations (and other objects), which may be described as A_{site}, unless accounted for under A_{bar}, or the sound source radiation specification. The term installations includes miscellaneous pipes, valves, boxes, structural elements, etc.

As the value of A_{site} depends strongly on the type of site, it is recommended that it is determined by measurements. However, for an estimate of this attenuation, the values in table A.2 may be used. The attenuation increases linearly with the length of the curved path d_s through the installations (see figure A.2), with a maximum of 10 dB.

A.3 Housing (A_{hous})

A.3.1 When either the source or receiver, or both are situated in a built-up region of houses, an attenuation will occur due to screening by the houses. However, this effect may largely be compensated by propagation between houses and by reflections from other houses in the vicinity. This combined effect of screening and reflections that constitutes A_{hous} can be calculated for a specific situation, at least in principle, by applying the procedures for both A_{bar} and reflections described in 7.4 and 7.5. Because the value of A_{hous} is very situation-dependent, such a calculation may be justified in practice. A more useful alternative, particularly for the case of multiple reflections where the accuracy of calculation suffers, may be to measure the effect, either in the field or by modelling.

A.3.2 An approximate value for the A-weighted attenuation A_{hous}, which should not exceed 10 dB, may also be estimated as follows. There are two separate contributions

$$A_{hous} = A_{hous,1} + A_{hous,2} \qquad \text{... (A.1)}$$

A.3.3 An average value for $A_{hous,1}$ (in decibels) may be calculated using the equation

$$A_{hous,1} = 0{,}1 B d_b \quad \text{dB} \qquad \text{... (A.2)}$$

where

- B is the density of the buildings along that path, given by the total plan area of the houses divided by the total ground area (including that covered by the houses);
- d_b is the length of the sound path, in metres, through the built-up region of houses, determined by a procedure analogous to that shown in figure A.1.

The path length d_b may include a portion d_1 near the source and a portion d_2 near the receiver, as indicated in figure A.1.

The value of A_{hous} shall be set equal to zero in the case of a small source with a direct, unobstructed line of sight to the receiver down a corridor gap between housing structures.

NOTE 25 The A-weighted sound pressure level at specific individual positions in a region of houses may differ by up to 10 dB from the average value predicted using equations (A.1) and (A.2).

Table A.2 — Attenuation coefficient of an octave band of noise during propagation through installations at industrial plants

Nominal midband frequency, Hz	63	125	250	500	1 000	2 000	4 000	8 000
A_{site}, dB/m	0	0,015	0,025	0,025	0,02	0,02	0,015	0,015

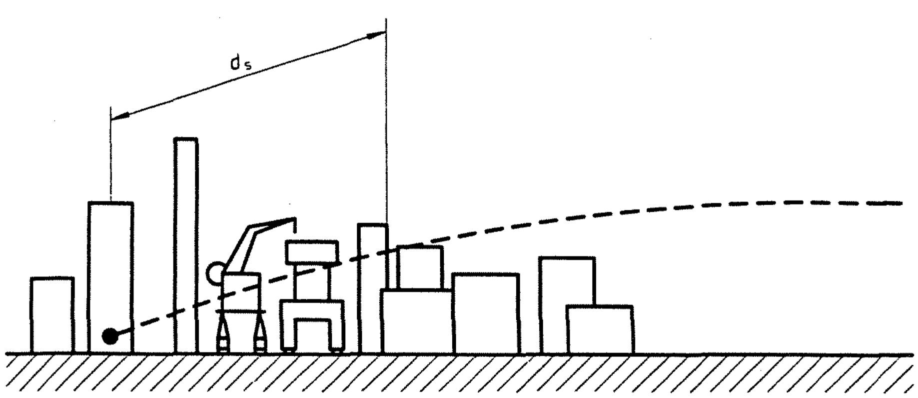


Figure A.2 — The attenuation A_{site} increases linearly with the propagation distance d_s through the installations at industrial plants

A.3.4 If there are well-defined rows of buildings near a road, a railway, or a similar corridor, an additional term $A_{hous,2}$ may be included (provided this term is less than the insertion loss of a barrier at the same position with the mean height of the buildings):

$$A_{hous,2} = -10 \lg[1 - (p/100)] \text{ dB} \qquad \text{. . . (A.3)}$$

where p (the percentage of the length of the façades relative to the total length of the road or railway in the vicinity) is $\leqslant$ 90 %.

A.3.5 In a built-up region of houses, the value of $A_{hous,1}$ [as calculated by equation (A.2)] interacts as follows with the value for A_{gr}, the attenuation due to the ground [as calculated by equation (9) or equation (10)].

Let $A_{gr,b}$ be the ground attenuation in the built-up region, and $A_{gr,0}$ be the ground attenuation if the houses were removed [i.e. as calculated by equation (9) or equation (10)]. For propagation through the built-up region in general, $A_{gr,b}$ is assumed to be zero in equation (4). If, however, the value of $A_{gr,0}$ is greater than that of A_{hous}, then the influence of A_{hous} is ignored and only the value of $A_{gr,0}$ is included in equation (4).

The interaction above is essentially to allow for a range of housing density B. For low-density housing, the value of A_{gr} is dominant, while for high-density housing A_{hous} dominates.

Annex B
(informative)

Bibliography

[1] ISO 266:—[1)], *Acoustics — Preferred frequencies.*

[2] ISO 2204:1979, *Acoustics — Guide to International Standards on the measurement of airborne acoustical noise and evaluation of its effect on human beings.*

[3] ISO 3740:1980, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards and for the preparation of noise test codes.*

[4] ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane.*

[5] ISO 8297:1994, *Acoustics — Determination of sound power levels of multisource industrial plants for the evaluation of sound-pressure levels in the environment — Engineering method.*

[6] IEC 804:1985, *Integrating averaging sound level meters,* and Amendment 1:1989 and Amendment 2:1993.

[7] IEC 1260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters.*

[8] ANSI S1.26:1978, *Method for the calculation of the absorption of sound by the atmosphere.* (American national standard)

[9] BRACKENHOFF H.E.A. et al. *Guidelines for the measurement and prediction of environmental noise from industry.* Interdepartmental Commission on Health, Report HR-IL-13-01, Delft, April 1981. (In Dutch)

[10] KRAGH J. et al. *Environmental Noise from Industrial Plants: General Prediction Method.* Danish Acoustical Institute Report No. 32, Lyngby, 1982. (In English)

[11] VDI 2714:1988, *Guidelines: Sound propagation outdoors.* Verein Deutscher Ingenieure. (In German)

[12] VDI 2720-1:1996, *Guidelines: Outdoor noise control by means of screening.* Verein Deutscher Ingenieure. (In German)

[13] Engineering Equipment Material Users Association, *Publication 140,* London, 1985.

1) To be published. (Revision of ISO 266:1975)

ICS 17.140.01

Descriptors: acoustics, noise (sound), airborne sound, wave propagation, attenuation, rules of calculation.

Price based on 18 pages

Attachment 3

EnSol, Inc. *Environmental Solutions*

professional engineering – business consulting

FHWA Construction Noise Handbook, Chapter 9

Construction Noise Handbook

9.0 Construction Equipment Noise Levels and Ranges

9.1 Equipment Type Inventory and Related Emission Levels

Noise levels generated by individual pieces of construction equipment and specific construction operations form the basis for the prediction of construction-related noise levels. A variety of information exists related to sound emissions related to such equipment and operations. This data transcends the period beginning in the 1970s thru 2006. This information exists for both stationary and mobile sources and for steady, intermittent, and impulse type generators of noise.

9.1.1 Stationary Equipment

Stationary equipment consists of equipment that generates noise from one general area and includes items such as pumps, generators, compressors, etc. These types of equipment operate at a constant noise level under normal operation and are classified as non-impact equipment. Other types of stationary equipment such as pile drivers, jackhammers, pavement breakers, blasting operations, etc., produce variable and sporadic noise levels and often produce impact-type noises. Impact equipment is equipment that generates impulsive noise, where impulsive noise is defined as noise of short duration (generally less than one second), high intensity, abrupt onset, rapid decay, and often rapidly changing spectral composition. For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time.

9.1.2 Mobile Equipment

Mobile equipment such as dozers, scrapers, graders, etc., may operate in a cyclic fashion in which a period of full power is followed by a period of reduced power. Other equipment such as compressors, although generally considered to be stationary when operating, can be readily relocated to another location for the next operation.

9.2 Sources of Information

Construction-related equipment and operation noise level data may be provided by numerous sources, including suppliers, manufacturers, agencies, organizations, etc. Some information is included in this document, and many web-based links are given for equipment manufacturers.

9.3 Specifics of Construction Equipment and Operation Noise Inventories

Details included in each specific inventory of construction equipment and operation noise emission levels are often variable in terms of how data is represented. Some inventories include ranges of noise levels while others present single numbers for each equipment type. Others provide levels for specific models of each type of construction equipment. Often, different noise descriptors are used, such as L_{Aeq}, L_{max}, L_{10}, sound power level, etc. As such, the array of data does not readily lend itself to being combined into a single table or easily compared. As such, this Handbook attempts to summarize a variety of such inventories and provide links to each, thereby providing the reader with a variety of sources from which to choose the appropriate levels for use in his or her respective analysis.

9.4 Summaries of Referenced Inventories

Included below are examples of several inventories of construction-related noise emission values. These and additional inventories are included on the companion CD-ROM.

9.4.1 RCNM Inventory

Equipment and operation noise levels in this inventory are expressed in terms of L_{max} noise levels and are accompanied by a usage factor value. They have been recently updated and are based on extensive measurements taken in conjunction with the Central Artery/Tunnel (CA/T) Project. Table 9.1 summarizes the equipment noise emissions database used by the CA/T Project. While these values represent the "default" values for use in the RCNM, user-defined equipment and corresponding noise levels can be added.

Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors.

Equipment Description	Impact Device?	Acoustical Usage Factor (%)	Spec. 721.560 L_{max} @ 50 feet (dBA, slow)	Actual Measured L_{max} @ 50 feet (dBA, slow) (Samples Averaged)	Number of Actual Data Samples (Count)
All Other Equipment > 5	No	50	85	N/A	0

HP					
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	N/A	0
Blasting	Yes	N/A	94	N/A	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	N/A	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS Signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	N/A	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydraulic Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	N/A	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarifier	No	20	85	90	2

Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/Chipping Gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (single nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Sheers (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	N/A	0
Tractor	No	40	84	N/A	0
Vacuum Excavator (Vac-Truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

For each generic type of equipment listed in Table 9.1, the following information is provided:

- an indication as to whether or not the equipment is an impact device;
- the acoustical usage factor to assume for modeling purposes;
- the specification "Spec" limit for each piece of equipment expressed as an L_{max} level in dBA "slow" at a reference distance of 50 foot from the loudest side of the equipment;
- the measured "Actual" emission level at 50 feet for each piece of equipment based on hundreds of emission measurements performed on CA/T work sites; and
- the number of samples that were averaged together to compute the "Actual" emission level.

A comparison of the "Spec" emission limits against the "Actual" emission levels reveals that the Spec limits were set, in general, to realistically obtainable noise levels based on the equipment used by contractors on the CA/T Project. When measured in the field, some equipment such as pile drivers, sand blasting, demolition shears, and pumps tended to exceed their applicable emission limit. As such, these noisy devices needed to have some form of noise mitigation in place in order to comply with the Spec emission limits. Other equipment, such as clamshell shovels, concrete mixer trucks, truck-mounted drill rigs, man-lifts, chipping guns, ventilation fans, pavers, dump trucks, and flatbed trucks, easily complied. Therefore, the Spec emission limits for these devices could have been reduced somewhat further. It is recommended that the user review the RCNM User's Guide contained in Appendix A for detailed guidance regarding application of values contained in Table 9.1.

9.4.2 FHWA Special Report Inventories

Appendix A of the 1977 Handbook provides tables of construction equipment noise levels and ranges. The majority of the data were provided by the American Road Builders Association. These data were taken during a 1973 survey in which member contractors were asked to secure readings of noise exposure to operators of various types of equipment. Additionally, the contractors were asked to take readings at 50 feet from the machinery. These 50-foot peak readings are provided in Tables 9.2 through 9.8. Though the data were produced under varying conditions and degrees of expertise, the values are relatively consistent.

Table 9.2 Construction Equipment Noise Levels Based on Limited Data Samples - Cranes.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Northwestern	80D	77	Within 15m 1958 mod
Northwestern	8	84	Within 15m 1940 mod
Northwestern	6	72	Within 15m 1965 mod
American	7260	82	Within 15m 1967 mod
American	599	76	Within 15m 1969 mod
American	5299	70	Within 15m 1972 mod
American	4210	82	Within 15m 1968 mod
Buck Eye	45C	79	Within 15m 1972 mod
Buck Eye	308	74	Within 15m 1968 mod
Buck Eye	30B	73	Within 15m 1965 mod
Buck Eye	30B	70	Within 15m 1959 mod
Link Belt	LS98	76	Within 15m 1956 mod
Manitowoc	4000	94	Within 15m 1956 mod
Grove	RF59	82	Within 15m 1973 mod
Koehr	605	76	Within 15m 1967 mod
Koehr	435	86	Within 15m 1969 mod
Koehr	405	84	Within 15m 1969 mod

Table 9.3 Construction Equipment Noise Levels Based on Limited Data Samples - Backhoes.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Link Belt	4000	92	Within 15m 1971 mod
John Deere	609A	85	Within 15m 1971 mod
Case	680C	74	Within 15m 1973 mod
Drott	40 yr.	82	Within 15m 1971 mod
Koehr	1066	81 & 84	Within 15m 2 tested

Table 9.4 Construction Equipment Noise Levels Based on Limited Data Samples - Front Loaders.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Caterpillar	980	84	Within 15m 1972 mod
Caterpillar	977K	79	Within 15m 1969 mod
Caterpillar	977	87	Within 15m 1971 mod
Caterpillar	977	94	Within 15m 1967 mod
Caterpillar	966C	84	Within 15m 1973 mod
Caterpillar	966C	85	Within 15m 1972 mod
Caterpillar	966	81	Within 15m 1972 mod
Caterpillar	966	77	Within 15m 1972 mod
Caterpillar	966	85	Within 15m 1966 mod

Caterpillar	955L	90	Within 15m ;1973 mod
Caterpillar	955K	79	Within 15m 1969 mod
Caterpillar	955H	94	Within 15m 1963 mod
Caterpillar	950	78 & 80	Within 15m 1972 mod
Caterpillar	950	75	Within 15m 1968 mod
Caterpillar	950	88	Within 15m 1967 mod
Caterpillar	950	86	Within 15m 1965 mod
Caterpillar	944A	80	Within 15m 1965 mod
Caterpillar	850	82	Within 15m 1968 mod
Michigan	75B	90	Within 15m 1969 mod
Michigan	475A	96	Within 15m 1967 mod
Michigan	275	85	Within 15m 1971 mod
Michigan	125	87	Within 15m 1967 mod
Hough	65	82	Within 15m 1971 mod
Hough	60	91	Within 15m 1961 mod
Hough	400B	94	Within 15m 1961 mod
Hough	H90	86	Within 15m 1961 mod
Trojan	3000	85	Within 15m 1956 mod
Trojan	RT	82	Within 15m 1965 mod
Payloader	H50	85	Within 15m 1963 mod

Table 9.5 Construction Equipment Noise Levels Based on Limited Data Samples - Dozers.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Caterpillar	D5	83	Within 15m 1967 mod
Caterpillar	D6	85	Within 15m 1967 mod
Caterpillar	D6	86	Within 15m 1964 mod
Caterpillar	D6	81	Within 15m 1967 mod
Caterpillar	D6B	83	Within 15m 1967 mod
Caterpillar	D6C	82	Within 15m 1962 mod
Caterpillar	D7	85	Within 15m 1956 mod
Caterpillar	D7	86	Within 15m 1969 mod
Caterpillar	D7	84	Within 15m 1969 mod
Caterpillar	D7	78	Within 15m 1970 mod
Caterpillar	D7	78	Within 15m 1972 mod
Caterpillar	D7E	86	Within 15m 1965 mod
Caterpillar	D7E	78	Within 15m 1970 mod
Caterpillar	D7E	84	Within 15m 1973 mod
Caterpillar	D7F	80	Within 15m 1972 mod
Caterpillar	D8	92	Within 15m 1954 mod
Caterpillar	D8	95	Within 15m 1968 mod
Caterpillar	D8	86	Within 15m 1972 mod
Caterpillar	D8H	88	Within 15m 1966 mod
Caterpillar	D8H	82	Within 15m 1972 mod
Caterpillar	D9	85	Within 15m 1972 mod

Caterpillar	D9	94	Within 15m 1972 mod
Caterpillar	D9	90	Within 15m 1963 mod
Caterpillar	D9	87	Within 15m 1965 mod
Caterpillar	D9	90	Within 15m 1965 mod
Caterpillar	D9	88	Within 15m 1968 mod
Caterpillar	D9	92	Within 15m 1972 mod
Caterpillar	D9G	85	Within 15m 1965 mod
Allis Chambers	HD41	93	Within 15m 1970 mod
International	TD15	79	Within 15m 1970 mod
International	TD20	87	Within 15m 1970 mod
International	TD25	90	Within 15m 1972 mod
International	TD8	83	Within 15m 1970 mod
Case	1150	82	Within 15m 1972 mod
John Deer	350B	77	Within 15m 1971 mod
John Deer	450B	65	Within 15m 1972 mod
Terex	8230	70	Within 15m 1972 mod
Terex	8240	93	Within 15m 1969 mod
Michigan	280	85	Within 15m 1961 mod
Michigan	280	90	Within 15m 1962 mod
Caterpillar	824	90	Within 15m 1968 mod

Table 9.6 Construction Equipment Noise Levels Based on Limited Data Samples - Graders.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Caterpillar	16	91	Within 15m 1969 mod
Caterpillar	16	86	Within 15m 1968 mod
Caterpillar	140	83	Within 15m 1970 mod
Caterpillar	14E	84	Within 15m 1972 mod
Caterpillar	14E	85	Within 15m 1971 mod
Caterpillar	14C	85	Within 15m 1971 mod
Caterpillar	14B	84	Within 15m 1967 mod
Caterpillar	12F	82	Within 15m 1961-72 mod
Caterpillar	12F	72-92	Within 15m 1961-72 mod
Caterpillar	12E	81.3	Within 15m 1959-67 mod
Caterpillar	12E	80-83	Within 15m 1959-67 mod
Caterpillar	12	84.7	Within 15m 1960-67 mod
Caterpillar	12	82-88	Within 15m 1960-67 mod
Gallon	T500	84	Within 15m 1964 mod
Allis Chambers		87	Within 15m 1964 mod

Table 9.7 Construction Equipment Noise Levels Based on Limited Data Samples - Scrapers.

Manufacturer	Type or Model	Peak Noise Level (dBA)	Remarks
Caterpillar	660	92	Within 15m
Caterpillar	641B	85	Within 15m 1972 mod
Caterpillar	641B	86	Within 15m 1972 mod

Caterpillar	641	80 & 84	Within 15m 1972 mod
Caterpillar	641	83 & 89	Within 15m 1965 mod
Caterpillar	637	87	Within 15m 1971 mod
Caterpillar	633	87	Within 15m 1972 mod
Caterpillar	631C	89	Within 15m 1973 mod
Caterpillar	631C	83	Within 15m 1972 mod
Caterpillar	631B	94	Within 15m 1969 mod
Caterpillar	631B	84-87	Within 15m 1968 mod
Caterpillar		85 avg.	Within 15m 1968 mod
Caterpillar	621	90	Within 15m 1970 mod
Caterpillar	621	86	Within 15m 1967 mod
Caterpillar	613	76	Within 15m 1972 mod
Terex	TS24	87	Within 15m 1972 mod
Terex	TS24	84-91	
Terex	TS24	82	Within 15m 1971 mod
Terex	TS24	81-83	Within 15m 1971 mod
Terex	TS24	94	Within 15m 1966 mod
Terex	TS24	92-98	Within 15m 1966 mod
Terex	TS24	94.7	Within 15m 1963 mod
Terex	TS24	94-95	Within 15m 1963 mod
Terex	TS14	82	Within 15m 1969 mod
Terex	S35E	84	Within 15m 1971 mod

Table 9.8 Noise Levels of Standard Compressors.

Manufacturer	Model	Silenced or Standard	Type Eng.	Type Comp.	Test Avg. Cond. (cfm.psi)	Avg. Cond. Noise Lev. (cfm.psi) (dBA) at 7m*
Atlas	ST-48	Standard	Diesel	Reciprocal	160,100	83.6
Atlas	ST-95	Standard	Diesel	Reciprocal	330,105	80.2
Atlas	VSS-170Dd	Silenced	Diesel	Reciprocal	170,850	70.2
Atlas	VT-85M	Standard	Gas	Reciprocal	85,100	81.4
Atlas	VS-85Dd	Silenced	Gas	Reciprocal	85,100	75.5
Atlas	VSS-125Dd	Silenced	Diesel	Reciprocal	125,100	70.1
Atlas	STS-35Dd	Silenced	Diesel	Reciprocal	125,100	73.5
Atlas	VSS-170Dd	Silenced	Diesel	Reciprocal	170,100	
Gardner-Denver	SPWDA/2	Silenced	Diesel	Rotary-Screw	1200,000	73.3
Gardner-Denver	SPQDA/2	Silenced	Diesel	Rotary-Screw	750,000	78.2
Gardner-Denver	SPHGC	Silenced	Gas	Rotary-Screw	185,000	77.1
Ingersoll-Rand	DXL 1200	Standard	Diesel	Rotary-Screw	1200,125	92.6
Ingersoll-Rand	DXL 1200 (doors open)	Standard	Diesel	Rotary-Screw	1200,125	
Ingersoll-Rand	DXL 900S	Silenced	Diesel	Rotary-Screw	900,125	76.0
Ingersoll-Rand	DXL 900S	Silenced	Diesel	Rotary-	900,125	75.1

				Screw		
Ingersoll-Rand	DXLCU1050	Standard	Diesel	Rotary-Screw	1050,125	90.2
Ingersoll-Rand	DXL 900S	Silenced	Diesel	Rotary-Screw	900,125	75.3
Ingersoll-Rand	DXL 900S	Silenced	Diesel	Rotary-Screw	900,125	75.0
Ingersoll-Rand	DXL 900	Standard	Diesel	Rotary-Screw	900,125	89.9
Ingersoll-Rand	DXL 750	Standard	Diesel	Rotary-Screw	750,125	87.7
Jaeger	A	Standard	Gas	Rotary-Screw	175,100	88.2
Jaeger	A(doors open)	Standard	Gas	Rotary-Screw	175,100	
Jaeger	E	Standard	Gas	Vane	85,100	81.5
Jaeger	E(doors open)	Standard	Gas	Vane	85,100	
Worthington	60 G/2Qt	Silenced	Gas	Vane	160,100	74.2
Worthington	750-QTEX	Silenced	Diesel	Rotary-Screw	750,100	74.7

*Data taken from EPA Report - EPA 550/9-76-004.

9.4.3 FTA Noise and Vibration Assessment Procedure

Chapter 12 of the FTA Transit Noise and Vibration Guidance Handbook discusses construction noise evaluation methodology and contains the noise emission levels for construction equipment displayed in Table 9.9.

Table 9.9 FTA Construction Equipment Noise Emission Levels.

Equipment	Typical Noise Level (dBA) 50 ft from Source*
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane Derrick	88
Crane Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile Driver (Impact)	101
Pile Driver (Sonic)	96
Pneumatic Tool	85

Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

*Table based on EPA Report, measured data from railroad construction equipment taken during Northeast Corridor improvement project and other measured data.

9.5 Links to Equipment Manufacturers

Table 9.10 contains web-based links to manufacturers of construction equipment. While few of these links contain noise-related data associated with the equipment, they provide descriptions and/or specifications related to the equipment, as well as sources for possibly obtaining additional information related to the equipment. Information in this table is by no means all-inclusive and does not represent any type of endorsement of the manufacturers, suppliers, or equipment. Users are hereby advised that the referenced websites may have certain restrictions, copyrights, etc., associated with any use of data contained therein.

Table 9.10 Equipment Manufacturers and Websites.

Equipment	**Manufacturer**	**Website Address**
Arrow Boards		
	North Star	http://northstar-traffic.com/index.cfm?SC=14&PT=1
	Trafcom	http://www.trafcon.com
	Allmand	http://www.allmand.com/MB%20AB%20page.htm
Articulated Trucks		
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=196
	Hitachi	http://www.hitachi-c-m.com/global/products/articulate/index.html
	Terex	http://www.terex.com/main.php
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Volvo	http://www.volvo.com/constructionequipment/na/en-us/products/articulatedhaulers/
Asphalt Saws		
	Allied	http://www.alliedcp.com/products/rotocut.asp
Augers - See Drills / Augers		
Backhoes - See Loaders/Backhoes		
Boring Equipment - See Pile Drivers/Boring Equipment		
Compaction Equipment		
	Allied	http://www.alliedcp.com/products/compactor.asp
Compressors		
	Sullair	http://www.sullair.com/corp/details/0,10294,CLI1_DIV61_ETI5714,00.html
	Compair	http://www.compair.com/Products/Portable_Compressors.aspx
Concrete and Asphalt Batch/Mixing Plants and Equipment		

	Con-E-Co	http://www.con-e-co.com/products.cfm
	Terex	http://www.terex.com/main.php
	Gunter & Zimmerman	http://www.guntert.com/concrete_mobilebatching.asp
	Rex Con	http://www.rexcon.com
Concrete Breakers/ Hydraulic Hammers/Hydraulic Breakers		
	Drillman	http://www.drillmanindia.com/concrete-breaker.html
	Hydro Khan	http:/www.sangi.co.kr/english/e_product1_2.php
	Stanley	http://www.stanley-hydraulic-tools.com/Hand%20Held/NoAmbreakers.htm
	Lynx	http://www.stanley-hydraulic-tools.com/Lynx/breakers.htm
Concrete Chain Saws		
	Lynx	http://www.stanley-hydraulic-tools.com/Lynx/concrete-saws.htm
Concrete Core Drilling Machines		
	Multiquip	http://www.multiquip.com/multiquip/318_ENU_HTML.htm
Concrete Cutters		
	Vermeer	http://www.vermeermfg.com/vcom/TrenchingEquipment/Line.jsp?PrdlnID=3618
Concrete/Material Pumps		
	Multiquip	http://www.multiquip.com/multiquip/309_ENU_HTML.htm
	Reed	http://www.reedpumps.com/
Concrete Mixer Trucks		
	Oshkosh	http://www.oshkoshtruck.com/concrete/products~overview~home.cfm
	London	http://www.lmi.ca/mixers.cfm
	Terex/Advance	http://www.advancemixer.com
Concrete Saws		
	Multiquip	http://www.multiquip.com/multiquip/315_ENU_HTML.htm
	Diamond Core Cut	http://www.diamondproducts.com/dp_home.htm
Concrete Screeds		
	Multiquip	http://www.multiquip.com/multiquip/317_ENU_HTML.htm
Concrete Vibrators		
	Multiquip	http://www.multiquip.com/multiquip/313_ENU_HTML.htm
	Sullair	http://www.sullair.com/corp/details/0,10294,CLI1_DIV61_ETI5722,00.html
Cranes		
	Malcolm Drilling	www.malcolmdrilling.com
	Link-Belt	http://www.linkbelt.com/lit/products/frameproducthome.htm
	Casagrande	http://www.casagrandegroup.com
	Liebherr	http://www.liebherr.com/em/en/35381.asp
	Terex	http://www.terex.com/main.php
Crawler Tractors - See Dozers/Crawler Tractors		
Crushing and Screening Equipment		
	Cedarapids	http://www.cedarapids.com/crushscr.htm
	Hitachi	http://www.hitachi-c-m.com/
	Komatsu	http://www.komatsu.com/ce/products/mobile_crushers.html
	Terex	http://www.terex.com/main.php
Crushers/Pulverizers		
	Hydro Khan	http://www.sangi.co.kr/english/e_product3.php

Cutoff Saws		
	Multiquip	http://www.multiquip.com/multiquip/309_ENU_HTML.htm
	Lynx	http://www.stanley-hydraulic-tools.com/Lynx/cutoff%20saw.htm
Dozers/CrawlerTractors		
	John Deere	http://www.deere.com/en_US/cfd/construction/deere_const/crawlers/deere_dozer_selection.html
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=2
	Komatsu	http://www.komatsu.com/ce/products/crawler_dozers.html
Dewatering Pumps		
	Multiquip	http://www.multiquip.com/multiquip/371_ENU_HTML.htm
Drills / Augers		
	Malcolm Drilling	www.malcolmdrilling.com
	Casagrande	www.casagrandegroup.com
	Soilmec	http://www.soilmec.com/_vti_g1_techno.aspx?rpstry=4_
	Terex	http://www.terex.com/main.php
Excavators		
	Hitachi	http://www.hitachi-c-m.com/global/products/excavator/index.html
	Caterpiller	http://www.cat.com/cda/layout?m=37840&x=7
	Volvo	http://www.volvo.com/constructionequipment/na/en-us/products/compactexcavators/
		http://www.volvo.com/constructionequipment/na/en-us/products/wheeledexcavators/
		http://www.volvo.com/constructionequipment/na/en-us/products/crawlerexcavators/
	John Deere	http://www.deere.com/en_US/cfd/construction/deere_const/excavators/deere_excavator_selection.html
	Liebherr	http://www.liebherr.com/em/en/18891.asp
	Soilmec	http://www.soilmec.com/_vti_g1_t02.aspx?rpstry=29_
	Gehl	http://www.gehl.com
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=216
	Komatsu	http://www.komatsu.com/ce/products/crawler_excavators.html
		http://www.komatsu.com/ce/products/wheel_excavators.html
	Terex	http://www.terex.com/main.php
	Link-Belt	http://www.lbxco.com/lx_series.asp
	Gradall	http://www.gradall.com/
	Badger Daylighting	http://www.badgerinc.com/
Fork Lifts - See Lifts / Variable Reach Fork Lifts/ Material Handlers		
Generators		
	Terex	http://www.terex.com/main.php
	Multiquip	http://www.multiquip.com/multiquip/212_ENU_HTML.htm
	Sullair	http://www.sullair.com/corp/details/0,10294,CLI1_DIV61_ETI5714,00.html
	Baldor	http://www.baldor.com/products/generators/ts.asp
Graders		
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=190
	Volvo	http://www.volvo.com/constructionequipment/na/en-us/products/MotorGraders/
	Komatsu	http://www.komatsu.com/ce/products/motor_graders.html
	Terex	http://www.terex.com/main.php

Hand Compaction Equipment		
	Terex	http://www.terex.com/main.php
	Multiquip	http://www.multiquip.com/multiquip/56_ENU_HTML.htm
Hydraulic Hammers/Hydraulic Breakers - See Concrete Breakers/ Hydraulic Hammers/Hydraulic Breakers		
Jackhammers - See Rock Drilling Equipment/Jackhammers		
Lifts / Variable Reach Fork Lifts/ Material Handlers		
	Genie Lift	www.genielift.com
	Sky Track	www.kirby-smith.com/
	Ingersol-Rand	www.ingersollrand.com
	Terex	http://www.terex.com/main.php
	Roadtec	http://www.roadtec.com/www/docs/102/mtv-material-transfer-vehicle/
Light Towers		
	Baldor	http://www.baldor.com/products/generators/mlt.asp
	Multiquip	http://www.multiquip.com/multiquip/293_ENU_HTML.htm
	Allmand	http://www.allmand.com/Night%20Lite%20Pro%20page.htm
Loaders/Backhoes		
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=54
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Volvo	http://www.volvo.com/constructionequipment/na/en-us/products/backhoeloaders/
	John Deere	http://www.deere.com/en_US/cfd/construction/deere_const/backhoes/deere_backhoe_selection.html
	Komatsu	http://www.komatsu.com/ce/products/backhoe_loaders.html
Material Handlers - See Lifts / Variable Reach Fork Lifts/ Material Handlers		
Milling Machines		
	Wirtgen	http://www.wirtgenamerica.com/en-us/
Mining Trucks - See Rigid Dump Trucks/Mining Trucks		
Pans - See Scrapers/Pans		
Pavers/Paving Equipment		
	Caterpillar/ Barber Greene	http://www.cat.com/cda/layout?m=37840&x=7
	Rosco	http://www.leeboy.com/rosco/
	Bomag	http://www.bomag.com/americas/index.aspx?&Lang=478
	Gehl	http://www.gehl.com/const/prodpg_ap.html
	Leeboy	http://www.leeboy.com/leeboy/
	Terex	http://www.terex.com/main.php
	Ingersoll-Rand	http://www.road-development.irco.com/Default.aspx?MenuItemID=12
	Vogele	http://www.vogeleamerica.com/noflash.html
	GOMACO	http://www.gomaco.com/index.html
	Roadtec	http://www.roadtec.com
Pile Drivers/Boring Equipment		
	Soilmec	http://www.soilmec.com/_vti_g1_t09.aspx?rpstry=29_
	Leffer	http://www.leffer.com/hme.html
	Bauer	http://www.bauer.de/en/maschinenbau/produkte/drehbohrgeraete/bg_reihe/usbg15h.htm
Pipelayers/Trenchers		

	Liebherr	http://www.liebherr.com/em/en/18908.asp
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=28&archived=1
	Vermeer	http://www.vermeermfg.com/vcom/TrenchingEquipment/trenching-equipment.htm
	Ditchwitch	http://www.ditchwitch.com/dwcom/Product/ProductView/115
	Eagle	http://www.guntert.com/trenchers_home.asp
Profilers - See Roadway Planers/Profilers		
Rammers		
	Multiquip	http://www.multiquip.com/multiquip/56_ENU_HTML.htm
Rebar Benders/Cutters		
	Multiquip	http://www.multiquip.com/multiquip/1316_ENU_HTML.htm
Recyclers - See Stabilizers/Recyclers		
Rigid Dump Trucks/Mining Trucks		
	Hitachi	http://www.hitachi-c-m.com/global/products/rigid/index.html
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Liebherr	http://www.liebherr.com/em/en/18898.asp
	Komatsu	http://www.komatsu.com/ce/products/dump_trucks.html
	Terex	http://www.terex.com/main.php
Roadway Planers/Profilers		
	Terex	http://www.terex.com/main.php
	Roadtec	http://www.roadtec.com/products/cold_planers/default.htm
Rock Drilling Equipment/Jackhammers		
	Drillman	http://www.drillmanindia.com/rock-drilling-machine.html
	Whaker	http://www.wackergroup.com/webapp/wcs/stores/servlet/
	Sullair	http://www.sullair.com/corp/details/0,10294,CLI1_DIV61_ETI5721,00.html
	Allied	http://www.alliedcp.com/products/hammers.asp
Rollers - See Tampers/Rollers		
Scrapers/Pans		
	Terex	http://www.terex.com/main.php
Screening Equipment - See Crushing and Screening Equipment		
Slabbuster		
	Allied	http://www.alliedcp.com/products/slabbuster.asp
Slip Form Pavers		
	Huron	http://www.huronmanufacturing.com/
	Guntert & Zimmerman	http://www.guntert.com/concreteSlipformPavers.asp
Stabilizers/Recyclers		
	Bomag	http://www.bomag.com/americas/index.aspx?&Lang=478
	Komatsu	http://www.komatsu.com/ce/products/mobile_crushers.html
	Terex	http://www.terex.com/main.php
	Wirtgen	http://www.wirtgenamerica.com/en-us/
	Roadtec	http://www.roadtec.com
Sweepers		
	Elgin	http://www.elginsweeper.com
	Johnston	http://www.johnstonsweepers.com/

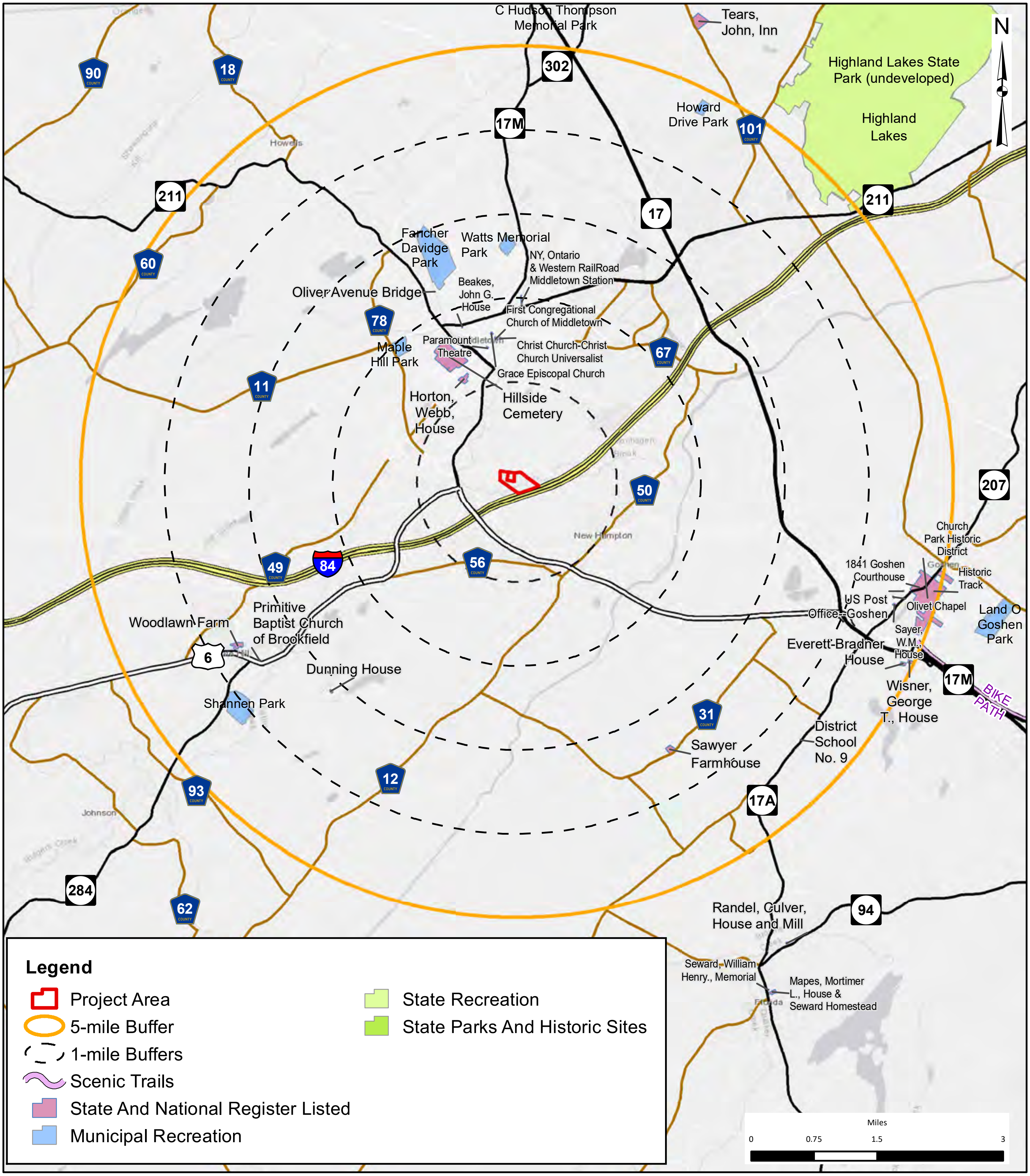
Tampers/ Rollers		
	Bomag	http://www.bomag.com/americas/index.aspx?&Lang=478
	Komatsu	http://www.komatsu.com/ce/products/vibratory_rollers.html
	Whaker	http://www.wackergroup.com/webapp/wcs/stores/servlet/
	Lynx	http://www.stanley-hydraulic-tools.com/Lynx/tamper.htm
	Multiquip	http://www.multiquip.com/multiquip/181_ENU_HTML.htm
	Ingersoll-Rand	http://www.road-development.irco.com/Default.aspx?MenuItemID=15
Trenchers - See Pipelayers/Trenchers		
Trucks - See Articulated Trucks, Concrete Mixer Trucks, Rigid Dump Trucks/Mining Trucks		
Vacuum Units		
	Advanced Recycling Systems	www.arsrecycling.com/
	Vacmasters	http://www.vacmasters.com/airsystm.htm
	Vector	http://www.vector-vacuums.com/
Variable Message Signs		
	Allmand	http://www.allmand.com/MB%20only%20page.htm
	North Star	http://northstar-traffic.com/index.cfm?SC=13&PT=1
	Trafcom	http://www.trafcon.com
	Daktronics	http://www.daktronics.com/vms_prod/dak_vms_products.cfm
Vibratory Rammers		
	Whaker	http://www.wackergroup.com/webapp/wcs/stores/servlet/
Welders/Welding Equipment		
	Airgas	www.airgas.com
	Multiquip	http://www.multiquip.com/multiquip/408_ENU_HTML.htm
	Miller	http://www.millerwelds.com/products/
	Lincoln	http://www.mylincolnelectric.com/Catalog/equipmentseries.asp?browse=101|400|
Wheel Loaders		
	Hitachi	http://www.hitachi-c-m.com/global/products/loader/index.html
	Case	http://www.casece.com/products/products.asp?RL=NAE&id=30
	Caterpillar	http://www.cat.com/cda/layout?m=37840&x=7
	Volvo	http://www.volvo.com/constructionequipment/na/en-us/products/wheelloaders/
	Terex	http://www.terex.com/main.php
	Komatsu	http://www.komatsu.com/ce/products/wheel_loaders.html
	TCM	http://www.tcmglobal.net/products/main02.html

Attachment 7

EnSol, Inc.

ENGINEERING + ENVIRONMENTAL

Publicly Accessible Federal, State, or Local Scenic or Aesthetic Resources within 5 Miles



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Dutchess County Office:
21 Fox Street, Poughkeepsie, NY 12601
Phone: (845) 454-3980

Capital District Office:
547 River Street, Troy, NY 12180
Phone: (518) 273-0055

North Country Office:
20 Elm Street, Glens Falls, NY 12801
Phone: (518) 812-0513

Marangi Solid Waste Handling Facility

Publicly Accessible Federal, State, or Local Scenic or Aesthetic Resources within 5 Miles

Town of Wawayanda - Orange County, NY

Drawn:	JC
Date:	01/22/2021
Scale:	1 in = 1.6 miles
Project:	32034.00
Figure:	8