AGRICULTURAL DEVELOPMENT BOARD

MERCER COUNTY AGRICULTURAL DEVELOPMENT BOARD

POLICY ESTABLISHING A PROCESS AND GUIDELINES FOR DETERMINING SITE SPECIFIC AGRICULTURAL MANAGEMENT PRACTICES

I. PURPOSE

To provide a process for the Mercer County Agriculture Development Board (CADB) to follow for the development and determination of Site Specific Agricultural Management Practices ("Site Specific AMPs").

II. REASON FOR NEED

Under the Right to Farm Act, a commercial farm can receive significant protection from nuisance lawsuits and overly restrictive local regulations, provided the farm is operated responsibly and in compliance with agricultural management practices (AMPs) that have been adopted by the State Agriculture Development Committee (SADC) or with generally accepted agricultural management practices. Should a farm conduct activities that are not addressed by an established AMP, the County Agriculture Development Board (CADB) would determine whether the activities comply with generally accepted operations or practices. This determination may be made after a complaint is filed, following Mercer County Agricultural Development Board's Right to Farm Hearings – Conflict Resolution Policy.

Preemptive of complaints, commercial farms may voluntarily request that the CADB determine whether their activities constitute generally accepted operations or practices. **This is known as requesting a Site Specific AMP determination.** A commercial farm's operation or practices will be entitled to protection under Right to Farm if the CADB determines that the farm's practices, as detailed in the Site Specific AMP determination, constitute generally accepted agricultural management practices.

III. AUTHORITY

Site Specific AMPs are available to owners and operators of commercial farms pursuant to N.J.S.A. 4:1C-1 et seq. and N.J.A.C. 2:76-2.3. Pursuant to N.J.A.C. 2:76-2.3, CADBs are charged with the determinations of Site Specific AMPs. The State Agriculture Development Committee recommends that CADBs encourage commercial farm operators to request Site Specific AMPs.

IV. REFERENCES

1. The Right to Farm Program Guidebook: www.nj.gov/agriculture/sadc/documents/rtfprogram/resources/guidebook.pdf
2. Right to Farm Factsheet (SADC): https://www.nj.gov/agriculture/sadc/documents/publications/njrighttofarmact.pdf
3. Right to Farm – What It Is and How It Works (Rutgers): https://njaes.rutgers.edu/fs1253/
4. Right to Farm Process Flowchart: https://www.nj.gov/agriculture/sadc/documents/rtfprogram/resources/rtfprocessflowchart.pdf

V. POLICY

The Board adopts the following policy with respect to requests for Site Specific AMPs.

1. **REQUEST FOR A SITE SPECIFIC AMP DETERMINATION; NOTIFICATION**
The farm operator or owner (herein referred to as Applicant) shall initiate the Site Specific AMP process by requesting same in writing to the CADB using the forms annexed hereto as Exhibit A. Pursuant to N.J.A.C. 2:76-2.3(c), upon receipt of a Site Specific AMP request, the CADB must advise the SADC and the municipality in which the commercial farm is located of same, in writing, within ten (10) days.

2. **ELIGIBILITY FOR RIGHT TO FARM**
To be eligible for the protections of the Right to Farm Act, a farm must qualify as a commercial farm. A commercial farm may comprise multiple parcels, whether contiguous or non-contiguous, provided they are operated together as a single enterprise. This is the farm's "farm management unit." To qualify as commercial, the farm must meet **one of** the following standards:
   - An operation larger than five acres must annually engage in agricultural or horticultural production worth at least $2,500 and be eligible (not necessarily enrolled) for differential property taxation under Farmland Assessment.
   - An operation smaller than five acres must have an annual production of at least $50,000 and the farm must satisfy eligibility requirements for Farmland Assessment, other than the farm-size requirement.
   - A beekeeping operation that produces apiary-related products or provides crop pollination services worth at least $10,000 annually.

   Farmland Assessment eligibility is governed by NJSA 54:4-23.1 et seq.

   If the farm satisfies one of the above standards as a commercial farm, to qualify for Right to Farm it must furthermore meet the following conditions:
   - The farm must be located in a zone that, of as of December 31, 1997 or thereafter, has agriculture as a permitted use under the municipal zoning ordinance and is consistent with the municipal master plan, OR the commercial farm has been in operation as of July 2, 1998 (the effective date of the 1998 amendments to the Right to Farm Act).
   - The commercial farm operation (practices, activities, or structures) must:
     - Conform to generally-accepted agricultural management practices
     - Comply with relevant state and federal statutes and rules.
     - Not pose a direct threat to public health and safety.

   Documents that may be helpful in establishing the farm as a commercial venture are: IRS 1040 Schedule F, lease agreement(s), crop registration with the local Farm Service Agency (FSA) office, Certificate(s) of Incorporation and partnership agreement(s).

3. **SUBMISSION REQUIREMENTS FOR SITE SPECIFIC AMP REQUEST**
The Applicant shall submit to the CADB a written certification in the form annexed hereto as Exhibit A. This includes the following forms and their required attachments:
   - Part 1 – Commercial Farm Determination and Right to Farm Eligibility Questionnaire
   - Part 2 – Commercial Farm Certification Form
   - Part 3 – Agricultural Management Practices Questionnaire

4. **ELIGIBLE ACTIVITIES**
Only those agricultural activities expressly protected in the Right to Farm Act (N.J.S.A. 4:1C-9) or as adopted by the SADC pursuant to the Administrative Procedure Act are appropriate to address in a Site Specific AMP determination. They include:
   - Producing

- Produce agricultural or horticultural crops, trees, forest products, livestock, poultry, and other products
- Replenish soil nutrients and improve soil tilth
- Control pests, predators, and diseases of plants and animals
- Clear woodlands using open burning and other techniques, install and maintain vegetative and terrain alterations and other physical facilities for water and soil conservation and surface water control in wetland areas
- Conduct on-site disposal of organic agricultural wastes

o Processing
- Process and package the agricultural output of the commercial farm

o Marketing
- Provide for the operation of a farm market, including the construction of building and parking areas in conformance with municipal standards
- Conduct agriculture-related educational and farm-based recreational activities provided that the activities are related to marketing the agricultural or horticultural output of the commercial farm

o Other
- Engage in solar, wind, and biomass energy generation, in compliance with adopted rules and conditions
- Other activities as adopted by the SADC pursuant to the Administrative Procedure Act.

5. INELIGIBLE ACTIVITIES

The following activities are examples of those that are not provided protection under the Right to Farm Act:

- o Agricultural-related services, such as landscape installation.
- o Processing commodities produced off the farm management unit unless recommended by the SADC pursuant to an adopted agricultural management practice.

6. CONSULTATION WITH PROFESSIONALS

Pursuant to *N.J.A.C.* 2:76-2.3(d), the CADB may consult with other agricultural agencies, organizations, and persons. Among the agencies most often contacted are:

- o The New Jersey Department of Agriculture
- o The SADC
- o The New Jersey Agricultural Experiment Station, including appropriate county agents
- o Other CADBs
- o The State Soil Conservation Committee and the local Soil Conservation Districts
- o The United States Department of Agriculture, or any other Federal governmental agency
- o Other states' Department of Agriculture, land grant institutes, or Agricultural Experiment Stations

7. SITE VISIT

One or more CADB members or staff should inspect the farm operation in the presence of the Applicant to confirm commercial farm eligibility and/or to verify that the operation or practice is included in one or more of the permitted activities noted as "Eligible Activities". The CADB reserves the right to conduct multiple site visits, if necessary. If CADB members conduct the inspection they shall ensure that it is less than a quorum. When possible, this inspection should include the County Extension Agent and a representative from CADB staff. While on the farm, the Applicant should discuss any future plans, which should be considered as part of the Site Specific AMP determination. A written report of the site visit, supplemented with photographs, may be generated and retained in the applicant's file along with the commercial farm certification.

The findings of any site visit should be presented to the CADB at the next regularly scheduled public meeting so that the CADB can make an informed decision regarding not only the eligibility of the farm operation for Site Specific AMP determination, but also whether the AMP is a generally accepted practice. The CADB shall not be under any time constraints when considering a Site Specific AMP request and shall fully analyze all available information and question appropriate individuals.

8. ELIGIBILITY DETERMINATION

At a regularly-scheduled meeting, the CADB will review whether the farm operation is commercial and eligible for Right to Farm (Part 1 and 2 of Exhibit A). If the CADB determines that the farm operation is not a commercial farm, the CADB shall pass a detailed resolution dismissing the request and shall forward the resolution to the Applicant, the SADC, the municipality, and any others which the CADB deems appropriate within 30 days of passage.

If the CADB determines that the farm operation is a commercial farm, then the matter shall proceed to a SSAMP Hearing as noted below. This determination that the farm operation is a commercial farm may be included in a resolution that is passed after the Site Specific AMP Hearing, combining the Site Specific AMP determination and eligibility determination in one resolution, or the CADB may elect to pass a separate resolution at the time the commercial farm determination is made.

9. SITE SPECIFIC AMP HEARING

If the CADB determines the farm is eligible for Right to Farm and Part Three of the application is deemed to be complete, a Site Specific AMP public hearing shall be held by the CADB and must comply with the following procedures:

NOTICE PROCEDURE

- The Applicant must give written notice of its Site Specific AMP request and the hearing via certified mail with return receipt requested, and/or personal service to:
  1. Clerk and Land Use Board Secretary of the municipality(ies) in which the farm is located. If located within 200 feet of an adjoining municipality, notice to the Clerk and Land Use Board Secretary of that municipality
  2. Owners of all real property (on the current tax map) within 200 feet in all directions of the property where the farm is located. Applicant is responsible to obtain this list from the local municipality
  3. SADC
  4. County Planning Board if the farm is on a county road
  5. Commission of the NJ DOT if the farm is on a state highway
  6. The public by publication in the official newspaper of the municipality and if no such newspaper, then in a newspaper of general circulation in the municipality.
- This written notice shall state the following:
  1. Date, time, and place of hearing
  2. The Site Specific AMPs that will be considered
  3. The farm street address, block, and lot
  4. The location and time at which documents supporting the request will be available at the office of the CADB
  5. Advise that the CADB will accept public comments at and/or prior to the hearing.
- This written notice shall be served at least 10 days in advance of the hearing and proof of service of the notice, along with the certified list of property owners, must be provided to the CADB.
- The hearing may not be held until satisfactory proof of notice has been provided to the CADB in advance of the hearing.

HEARING PROCEDURE

The hearing shall be held in accordance with the same procedures as a Right to Farm hearing described in N.J.A.C 2:76-2.8, with a stenographer or sound recording device.

The Applicant shall prepare a presentation regarding their practices and be prepared to answer questions from the CADB. The CADB must provide the applicant an opportunity to respond to any written public comments that were received prior to the meeting.

The CADB has no authority to determine compliance with State laws, rules and regulations delegated to municipalities or counties for administration and enforcement (including stormwater management and construction code requirements) unless the Municipal ordinance or County resolution exceeds State regulatory standards.

At the end of the hearing, the CADB will discuss whether a Site Specific AMP determination should be approved or denied. If approved, the CADB should discuss what stipulations or conditions may be included. If denied, the CADB should discuss the reasons for denial. The Resolution for the Site Specific AMP determination (approval or denial) will be drafted by staff after the hearing and presented to the CADB at the next regularly scheduled meeting.

10. FORMAT OF THE SITE SPECIFIC AMP

The determination of the Site Specific AMP shall take place after the CADB is satisfied that it has sufficient information. At the discretion of the CADB, this determination may be made simultaneously with the Site Specific AMP Hearing, or at the following regularly scheduled CADB meeting, or via email approval of the Board following the SSAMP Hearing.

The CADB shall pass a detailed resolution granting (with or without conditions) or denying the request, with findings of fact, and conclusions of law (including commercial farm eligibility). If the resolution approves the request, the CADB may pose guidelines within which the activity is to conform in order to be approved. The resolution should reference the farm by name and clearly state the activity in question.

11. FOLLOW-UP (POST-DETERMINATION)

Upon the CADB's written determination on the Site Specific AMP request, it shall forward the determination to the Applicant, the SADC, and any other person or agency deemed appropriate by the CADB within thirty (30) days.

12. APPEALS OF A SITE SPECIFIC AMP

Pursuant to *N.J.A.C.* 2:76-2.3(f), any person aggrieved by any decision of a CADB regarding a Site Specific AMP may appeal the CADB's decision to the SADC within forty-five (45) days of receipt of the board's final determination.

Adopted:	Effective:	Revision #:	Last Revised:
03-04-24	03-05-24		

EXHIBIT A
FORM OF REQUEST FOR COMMERICAL FARM DETERMINATION, RIGHT TO FARM ELIGIBLITY, AND SITE SPECIFIC AMP

MERCER COUNTY AGRICULTURE DEVELOPMENT BOARD
Request for Site Specific Agricultural Management Practice (AMP) Determination
Part 1 – Commercial Farm Determination and Right to Farm Eligibility Questionnaire

Date: 04/10/2024

Applicant: Bellemont Farm, LLC

Farm Operator (if not applicant):

Landowner (if not applicant):

Name of Farm: Bellemont Farm

Farm Address: 22 Valley Road, Lambertville, NJ
Block 57, Lot 4, Hopewell Township

Applicant Mailing Address: c/o 71 South Orange Ave., #396
South Orange, NJ 07079

Applicant Phone Number(s): 917-868-7755

Applicant Email: contact@bellemontfarmnj.com

1. Identification of Farm Management Unit and Current Agriculture Practices *(Use additional sheet if necessary)*:

Municipality	Block	Lot	Acres	Product/Operation	Year Product or Operation Began
Hopewell Township	57	4	33	1.8 acres vegetable farming	2021
Hopewell Township	57	3	55	Woodlands Management	2021
Hopewell Township	56	3	22	Woodlands Management	2021
	Total Acreage		110		

2. Describe details regarding the farm operation and current agricultural that are not captured in the table above (labor, total output, etc). *(Use additional sheets if necessary).*

See attached document on current farm operations and proposed on-farm brewery

3. Does the farm management unit receive farmland assessment taxation treatment? YES ☑ NO ☐
If yes, please attach a copy of the most recent filed farmland assessment form(s).

4. If you responded NO to #3, are you eligible? YES ☐ NO ☐ N/A ☑
If YES, please explain why the farm is not receiving farmland assessment:

_____

_____

5. Please identify which of the standards below describes your farm. *(If none are applicable, your farm does not qualify as a commercial farm and is therefore ineligible for Right to Farm protections or a Site Specific AMP hearing):*

☑ I certify that Bellemont Farm, LLC *(Insert name of commercial farm)* is five acres or more, produces agricultural and/or horticultural products worth $2,500 or more annually, and is eligible for differential property taxation pursuant to the Farmland Assessment Act of 1964. **If the land is farmland assessed, I have attached a copy of the filed farmland assessment form(s). If the land is not farmland assessed, I have attached a copy of the tax map representing the farm acreage.**

☐ I certify that _____ *(Insert name of commercial farm)* is less than five acres, produces agricultural/horticultural products worth $50,000 or more annually and otherwise satisfies the eligibility criteria for differential property taxation pursuant to the Farmland Assessment Act of 1964. **I have attached a copy of the tax map representing the farm acreage.**

☐ I certify that _____ *(Insert name of commercial farm)* is a beekeeping operation that produces honey or other agricultural or horticultural apiary-related products, or provides crop pollination services, worth $10,000 or more annually.

6. Total agricultural production gross income for most recent tax year: Tax Year 2023 = $ 15,321
(You may wish to provide or be asked to provide data for additional years)

7. If you operate a farm market, what percentage of annual gross sales are generated from items produced on your farm management unit? 100 % Farmstand, not a building

8. If you operate a farm market, what percentage of the sales area is devoted to the sale of agricultural output of the farm? 100 %

9. To enable us to evaluate consistency with the municipal zoning ordinance, please list the zone or zones in which the farm management unit is located and whether those zones permit agriculture:

Municipality	Block	Lot	Municipal Zone	Zone Permits Agriculture (Y/N)
Hopewell Township	57	3/4	MRC	Y
Hopewell Township	56	4	MRC	Y

10. If you are only seeking Commercial Farm certification at this time and not a Site Specific SAMP determination, please explain why:

Seeking both. Would like on-farm brewery approved, conditioned on engineered site plan.

Please return this Request with the following documents (*check as attached*):

☒	Most recently filed FA-1 farmland assessment form(s), if applicable.
☒	Tax map
☒	Site map showing location(s) of all agricultural production activities as well as ancillary and nonagricultural activities (You may use an aerial map, tax map, or existing survey as a base). Included in attached Plan
☒	Proof of agricultural production income in the form of sales receipts, an IRS Schedule F, or similar documentation. Provide income totals for each year of receipts submitted.
☒	Proof that the farm is located in an area in which, as of December 31, 1997 or thereafter, agriculture has been permitted under the municipal zoning ordinance and is consistent with the municipal master plan OR proof that the farm was in operation as of July 2, 1998.
☒	Commercial Farm Certification Form (see pages 10-11) completed and signed

Michael Ehrenreich

Applicant Signature/Title

04/12/24

Date

MERCER COUNTY AGRICULTURE DEVELOPMENT BOARD
Request for Site Specific Agricultural Management Practice (AMP) Determination
Part 2 – Commercial Farm Certification Form

CERTIFICATION OF Michael Ehrenreich
(NAME OF COMMERCIAL FARM OWNER/OPERATOR)

Bellemont Farm, LLC
(NAME OF COMMERCIAL FARM)

22 Valley Road, Lambertville, NJ (Hopewell Township)
(ADDRESS OF COMMERCIAL FARM)

I, Michael Ehrenreich, hereby certify the following:

1. I am (one of) the owner(s)/operator(s) of Bellemont Farm, LLC.
(NAME OF COMMERCIAL FARM)

2. The nature of my operation and agricultural activities are correctly listed on the attached Commercial Farm Determination Questionnaire and/or Agricultural Management Practice Questionnaire.

3. I certify that Bellemont Farm, LLC is five acres or more,
(NAME OF COMMERCIAL FARM)
produces agricultural and/or horticultural products worth $2,500 or more annually, and is eligible for differential property taxation pursuant to the Farmland Assessment Act of 1964. A list of agricultural/horticultural commodities produced on the commercial farm is attached. If land is farmland assessed, a copy of the filed farmland assessment form(s) is (are) attached. If land is not farmland assessed, a copy of the tax map representing the farm acreage is attached.

OR

I certify that _____ is less than five acres, produces
(NAME OF COMMERCIAL FARM)
agricultural and/or horticultural products worth $50,000 or more annually (or $10,000 of apiary-related products) and otherwise satisfies eligibility criteria for differential property taxation pursuant to the Farmland Assessment Act of 1964. A list of agricultural/horticultural commodities produced on the commercial farm is attached. A copy of the tax map representing the farm acreage is attached. I have attached proof of my agricultural production income.

OR

I certify that _____ is a beekeeping operation that produces
(NAME OF COMMERCIAL FARM)
honey or other agricultural or horticultural apiary-related products, or provides crop pollination services, worth $10,000 or more annually.

4. I have attached proof that the farm:

   a) is located in an area in which, as of December 31, 1997 or thereafter, agriculture has been a permitted use under the municipal zoning ordinance and is consistent with the municipal master plan,

   OR

   b) was in operation as of July 2, 1998.

5. To the best of my knowledge and belief, my agricultural operation is in compliance with all relevant federal and New Jersey statutes, rules and regulations.

6. I understand that as per Right to Farm regulations, written notice of the hearing on this request shall be given by the commercial farm, at its sole expense, via certified mail, return receipt requested, and/or by personal service, to: 1) the clerk and land use board secretary of the municipality in which the commercial farm is located; including any adjoining municipalities if located within 200': 2) the owners of all real property within 200 feet in all directions of the property; 3) the SADC; 4) the county planning board if the commercial farm is located on property adjacent to a county road or county-owned property; 5) the Commissioner of the New Jersey Department of Transportation, if the commercial farm is located on a State highway; and 6) the public, by publication in the official newspaper of the municipality, if there is one, or in a newspaper of general circulation in the municipality. I understand that I must provide proof of compliance with the above notice requirements to the Mercer CADB in advance of the hearing.

7. I understand that within 30 days of the Mercer CADB's issuance of its written determination, it will forward the relevant resolution(s) to the commercial farm owner and the commercial farm operator if applicable; the aggrieved person if the matter involves a complaint pursuant to N.J.S.A. 4:1C-10.1 and N.J.A.C. 2:76-2.7; the municipality(ies) in which the commercial farm is located; the State Agriculture Development Committee (SADC) and any other individuals or organizations deemed appropriate by the Mercer CADB.

8. I understand that any person aggrieved by any decision of the Mercer CADB regarding a commercial farm determination or determination of a Site Specific Agricultural Management Practice, including myself, may appeal the decision to the SADC in accordance with the provisions of the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules, N.J.A.C. 1:1, within 45 days from receipt of the board's final determination.

   1. The decision of the SADC shall be considered a final administrative agency decision.
   2. If the Mercer CADB's decision is not appealed within 45 days, the Mercer CADB's decision is binding.

9. I understand that the Mercer CADB may require that I submit additional information and I agree to provide such information. I also understand and agree that my failure to provide requested information to the Mercer CADB may result in the denial of commercial farm eligibility and/or the SSAMP request.

Dated: 04/12/24 Michael Kronreich

(Signature of Requestor)

MERCER COUNTY AGRICULTURE DEVELOPMENT BOARD
Request for Site Specific Agricultural Management Practice (AMP) Determination
Part 3 – Agricultural Management Practices Questionnaire

1. Describe in detail the specific activity or activities you want the Mercer County Agriculture Development Board (Mercer CADB) to consider for development of a Site Specific AMP.

See attached written plan for a proposed craft brewery

2. Describe any activities that take place on the farm management unit that are ancillary to the agricultural production activities or nonagricultural in nature (examples include horse boarding, storage of lawn maintenance equipment, etc.)

None

Please attach a site map that details the location of the agricultural production activities described above and the other activities that take place on site.

3. Are you seeking relief from any municipal ordinances? YES ☐ NO ☑
   If yes, please explain:

If the proposed on-farm brewery is approved by the CADB then Hopewell Township will accept is as an agricultural use. See attached memo from the Hopewell Township planner.

4. Are any of the activities on the farm being disputed by neighboring property owners, the municipality, or any other party? YES ☐ NO ☑
   If yes, please provide further details:

5. Has the matter been heard in court? YES ☐ NO ☑
   If yes, please provide further details about the proceedings including dates, outcomes, etc.

6. Is there another reason that you are seeking a Site Specific AMP Determination from the Mercer CADB?

7. Does the farm have a conservation plan prepared by the USDA-Natural Resources Conservation Service (NRCS)? YES ☑ NO ☐ Covering 1.8 acres of vegetable farming

8. If you responded NO to #7, have you initiated efforts to obtain a farm conservation plan?
YES ☐ NO ☐ N/A ☐

9. Are you working with any other government agencies regarding the current or proposed activities on your farm (such as the NJ Department of Environmental Protection, NJ Department of Transportation, NJ Department of Agriculture, or Mercer County Division of Engineering)? YES ☐ NO ☑
If yes, please explain:

Please return this request with the following documents not already covered in Part 1 *(check as attached)*:

☒	Site map that details the location of the agricultural production activities described above and the other activities that take place on site
☐	Site plans related to proposed new structures or disturbance (if relevant)
☐	Any approvals and permits received from the local municipality and state
☒	USDA-NRCS Conservation Plan (if one exists)
☐	Animal waste management plan (if relevant)
☒	Forest Management Plan (if relevant)

Michael Ehrenreich
Applicant Signature

04/12/24
Date

EXHIBIT B

PROCESS AND PROCEDURES TO BE FOLLOWED FOR SITE SPECIFIC AMP MATTERS

SITE SPECIFIC AMP PROCESS

Applicant Submits Exhibit A Application

Notice by County to the SADC and municipality within ten (10) days

Site Visit (optional by staff/board, to verify Commercial Farm status)

Regular CADB Meeting - Determination of Commercial Farm Status and Right to Farm Eligibility

Site Visit (to verify Agriculture Management Practices)

Public Hearing (requires notice, may be held during a regularly scheduled CADB meeting)

Regular CADB Meeting (or sooner) - Resolution of Hearing Findings

SITE SPECIFIC AMP PROCEDURE

1. Application: Farm owner sends a request to CADB for Site Specific AMP determination by submitting Exhibit A.

2. Notice: Within 10 days of receipt, CADB sends advisory notice to SADC and clerk of municipality of the nature of the application

3. Site Visit: Staff may inspect the farm to confirm the information submitted with Exhibit A regarding Commercial Farm status. If board members conduct the inspection, they shall ensure that it is less than a quorum.

4. Determination of Commercial Farm Eligibility/Permitted Activities: The CADB, at one or more regularly scheduled meeting(s), determines commercial farm eligibility and if the farm is eligible for Right to Farm. Site visit results should be presented at this meeting.

    - If the CADB determines that the farm is **NOT** a commercial farm, the CADB shall pass a detailed resolution at the following regularly scheduled meeting, dismissing the request with an explanation as to why. Within 30 days, the resolution must be sent to Applicant, the SADC, the municipality, and any others which the CADB deems appropriate.

    - If the CADB determines that the farm **IS** a commercial farm and eligible for Right to Farm protections, the CADB will determine whether the application provided in Exhibit A is complete and sufficient for a Public Hearing. Approval of commercial farm eligibility may be addressed in the Resolution following the Site Specific AMP public hearing.

5. Site Visit: One or more board members or staff may inspect the farm to confirm the information submitted with Exhibit A and assess the Agriculture Management Practices. If board members conduct the inspection they shall ensure that it is less than a quorum. This inspection is highly recommended by the SADC in its Site Specific AMP policy and the SADC recommends that the team includes the County Extension Agent and a representative from CADB staff. The site visit results should be presented at the next CADB meeting.

6. Public Hearing. The CADB shall hold a public hearing that complies with the regulations listed under #9 of this policy: Site Specific AMP Hearing. At the conclusion of the public hearing and following deliberations by the CADB, the CADB will provide staff with instructions for drafting a Resolution that provides a determination on the Site Specific AMP request. These instructions may include reasons for denial or conditions stipulated for approval.

7. Resolution of Approval or Denial. At the following regularly scheduled meeting, the CADB shall pass a detailed resolution granting (with or without conditions) or denying the request. This may be passed earlier, if feasible.

Bellemont Farm, LLC
c/o 71 South Orange Ave., #396
South Orange, NJ 07079

April 12, 2024

To Whom It May Concern:

In June 2023, Bellemont Farm, LLC requested a zoning determination from Hopewell Township as to whether an on-farm brewery (Exhibit 9) would be permitted under the Township's zoning and Right to Farm ordinances. The Township's planner authored a memo (Exhibit 8) indicating that this decision was beyond the Zoning Board's jurisdiction. For this reason, we are making this application to the MCADB.

Please note that the term "farm brewery" as used in our application to Hopewell Township and in the Township's planner's memo was used to indicate an on-farm brewery. This application preceded recent legislation (Bill S4265/A5912) that codified a classification of a "Farm Brewery". We are requesting an SSAMP for a "Craft Brewery", as a Farm Brewery allows for only off-premises consumption and does not meet our needs.

Please find the following documents included as attachments to this email:

Application 041224
Includes:
-Commercial Farm Determination and Right to Farm Eligibility Questionnaire
-Commercial Farm Certification Form
-Agricultural Management Practices Questionnaire

Exhibit 1 – FA1

Exhibit 2 – Tax Map

Exhibit 3 – Bellemont Brewery Plan, including Site Map

Exhibit 4a – Notes on Proof of Agricultural Production Income

Exhibit 4b – 2023 Profit & Loss Statement

Exhibit 4c(i) – Beiler check for timber harvest

Exhibit 4c(ii) – Beiler contract for timber harvest

Exhibit 4d – Stripe Credit Card Payments For BellemontFarmNJ 2024 YTD

Exhibit 5 – Excerpt from Hopewell Township code. Agriculture permitted use in MRC.

Exhibit 6a – USDA NRCS Conservation Plan

Exhibit 6b – USDA NRCS Conservation Plan, Soil Health Management Plan

Exhibit 7a – Forest Management Plan

Exhibit 7b – Forest Management Plan Map

Exhibit 8 – Hopewell Township Planner Memo

Exhibit 9 – Kyle + McManus Planner Memo for Bellemont Farm

Thank you for your assistance with this matter.

Sincerely,

Michael Ehrenreich

Michael Ehrenreich

APPLICATION FOR FARMLAND ASSESSMENT

N.J.S.A. 54:4-23.1 et seq.; N.J.A.C. 18:15-1.1 et seq. **SEE INSTRUCTIONS**

FILE ANNUALLY BY AUGUST 1 OF THE PRE-TAX YEAR

COUNTY Mercer MUNICIPALITY Hopewell Twp TAX YEAR 2024

Check if ALL farmland assessed acres are woodlands under a: *(DO NOT CHECK IF MIX USE)*
☒ **Woodland Management Plan**
☐ **NJ Forest Stewardship Plan** ***(Effective 2019)***

SECTION 1 – IDENTIFICATION INFORMATION (Please print or type all information)

(1) Owner's Name BELLEMONT FARM LLC

(2) Mailing Address 71 S ORANGE AVE STE 396
SOUTH ORANGE NJ 07079

(3) Telephone 917-868-7755

(4) Email Address me@somalaser.com

(5) Land Location VALLEY RD

(6) Block(s), Lot(s), Qual. No. 56-3-Q0132
~~57-3-Q0132~~

(7) The land is [☒] farmed solely by owner
[☐] rented to farmer
[☐] farmed by owner and tenant

(8) Is farm deed restricted to agriculture?
Yes ☐ No ☒ # of Acres

(9) Farm operator(s) other than owner:
(a1) Name

(b1) Address

(c1) Telephone ( )

(a2) Name

(b2) Address

(c2) Telephone

HOPEWELL TOWNSHIP
TAX ASSESSOR
RECEIVED
JUL 18 2023

Total Farmland Acreage ~~25.98~~ 110.34 ~~113.98~~

SECTION 2 – BREAKDOWN OF LAND USE CLASSES (All entries and totals must be accurate)

Insert the current year's acreage in the appropriate land use class. Indicate acres to the nearest 100th– DO NOT USE DIMENSIONS

REFER TO DEFINITIONS OF LAND USE CLASSES UNDER *INSTRUCTIONS*

ACTIVELY DEVOTED LAND	Acreage	LAND NOT ACTIVELY DEVOTED	Acreage
(1) Cropland harvested	(1)	(9) Land under and land used in connection with farmhouse.	(9)
(2) Cropland pastured *(Don't include acreage in #6)*	(2)	(10) All other land not devoted to agricultural / horticultural use	(10)
(3) Permanent pasture	(3) 33.00	(11) Total NOT devoted to agricultural or horticultural use (Sum of lines 9 & 10)	(11)
(4) Non-appurtenant woodland (See instructions before making entry)	(4) 77.34	(12)TOTAL ACREAGE OF ALL LAND (Sum of lines 8 & 11)	(12) 110.34
(5) Appurtenant woodland or wetland (See instructions before making entry)	(5)	*If fewer than five acres are located in this municipality, list the municipality, block(s) & lot(s) of contiguous acreage	
(6) Acres used for: *(don't include pastured acres)* (a) boarding (b) rehabilitating (c) training	(6) Total a, b & c	(13) Is there a claim for land under: • Seasonal farm markets? Yes ☐ No ☒ • Seasonal agricultural labor housing? Yes ☐ No ☒	
(7) Acres used for renewable energy	(7)	(14) Is there a claim for land under: • solar ☐ wind ☐ biomass ☐	
(8) Total ACRES to Agricultural OR Horticultural use (Sum of lines 1 to 7)	(8) 110.34		

This form is prescribed by the Director, Division of Taxation, as required by law, and may not be altered without the approval of the Director.
Form: FA-1 Rev: Mar. 2018

SECTION 3 – CURRENT YEAR FARMING ACTIVITY– *Indicate acres to nearest 10th. Include Double Cropping. For example, two plantings on 50 acres should be reported as 100 acres.*

INSERT CURRENT YEAR HARVESTED OR TO BE HARVESTED ACRES FOR LAND ONLY IN SECTION 2

A. FIELD CROPS (Harvested Acres)	Acres
Irrigated Acres (80)	
Barley (grain) (11)	
Corn for grain (12)	
Corn for silage (13)	
Hay(alfalfa) (15)	
Hay (other excluding salt hay) (16)	
Oats (grain) (17)	
Rye (grain) (18)	
Sorghum (19)	
Soybeans (20)	
Wheat (21)	
Cover Crops Planted: (specify)	
Other Field Crops: (specify)	

B. FRUIT CROPS (Bearing Acres)	Acres
Irrigated Acres (81)	
Apples (22)	
Blueberries (23)	
Cranberries (24)	
Grapes (25)	
Nectarines (86)	
Peaches (26)	
Strawberries (27)	
Other fruit crops: (specify)	
Non-bearing fruit: (specify)	

C. ORNAMENTAL CROPS	Acres
Irrigated Acres (82)	
Bedding plants (28)	
Flowers (cut) (29)	
Trees & shrubs (nursery) (30)	
Sod (cultivated) (31)	
Christmas trees (32)	
Other: (specify)	

D. LIVESTOCK	Avg. # of Livestock
All beef cattle (33)	
Dairy (34)	
Dairy (young) (35)	
Horses & ponies (36)	
Sheep (37)	
Swine (38)	
Bees (Hives) (39)	
Ducks (40)	
Fur animals (41)	
Goats (42)	
Chickens (meat) (43)	
Chickens (layers) (44)	
Turkeys (45)	
Other: (specify)	

E. VEGETABLE CROPS (Harvested Acres)	Acres
Irrigated Acres (83)	
Asparagus (46)	
Beans, lima (47)	
Beans, snap (48)	
Cabbage (49)	
Carrots (50)	
Corn, sweet (51)	
Cucumbers (52)	
Eggplant (53)	
Lettuce (54)	
Onions (55)	
Peas (56)	
Peppers (bell) (57)	
Potatoes (white) (58)	
Potatoes (sweet) (59)	
Pumpkins (60)	
Spinach (61)	
Squash (62)	
Tomatoes (63)	
Melons (64)	
Mixed & other vegetable (65)	
Other: (specify):	

F. AQUACULTURE	Acres
Fresh water, food fish or plants for harvest or sale (66)	
Other: (specify)	

G. ANNUAL HARVEST OF WOODLAND PRODUCTS	Cords, Board Feet etc.
Fuelwood (cords) (67)	5 cords
Pulpwood (cords) (68)	
Timber (Bd. Ft.) (69)	
Other. (specify)	

H. LAND IN FEDERAL GOVERNMENT PROGRAM

Name of Program _____

Program Number _____

Acres in Program (70) _____

I. RENEWABLE ENERGY	Acres
Solar (71)	
Wind (72)	
Biomass (73)	

J. NJ FOREST STEWARDSHIP	Acres
Forested Woodland/Wetland (74)	

SECTION 4 – SIGNATURE & VERIFICATION OF OWNER(S)

The undersigned declares that this form, including any accompanying schedules and statements, has been examined by him (her) and to the best of his (her) knowledge and belief is true and correct. Filing of this form is also a representation that the land will continue to be devoted to an agricultural or horticultural use during the year for which farmland assessment is requested. Under N.J.S.A. 54:4-23.14(b), this certification shall be considered as if made under oath and is subject to the same penalties as provided by law for perjury. In addition, for a gross and intentional misrepresentation on this form, the landowner shall be subject to a civil penalty of up to $5,000.

Signature of Individual Owner or Co-owner — Date: 6/24/23 — OR — Signature of Corporate Officer — Date — Corporate Name

RESERVED FOR OFFICIAL USE

This application is: (√) APPROVED ( ) DISAPPROVED

NOV 0 1 2023 — Date

ASSESSOR

FILE THIS FA-1 APPLICATION IN DUPLICATE AND ONE SUPPLEMENTAL FA-1 GROSS SALES FORM WITH YOUR ASSESSOR. TAXPAYER SHOULD RETAIN COPIES FOR OWN RECORDS. (IF ENTRY MADE IN SECTION 2, LINE 4, FILE A COPY OF FA-1, AWD-1 FORM, AND AN ACTIVITY MAP WITH THE NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION.)

SUPPLEMENTAL FARMLAND ASSESSMENT GROSS SALES FORM

N.J.S.A. 54:4-23.1 ; N.J.A.C. 18:15-1.1 et seq.

FILE ANNUALLY BY AUGUST 1 OF THE PRE-TAX YEAR

If the application includes a Form WD-1, check one: Woodland Management Plan ☒

NJ Forest Stewardship Plan (Effective 2019) ☐

SECTION I: IDENTIFICATION

COUNTY: Mercer

MUNICIPALITY: Hopewell Twp.

OWNER'S NAME: Bellement Farm LLC, C/O Ehrenreich

TAX YEAR: 2024

PROPERTY LOCATION: Valley Road

BLOCK(s), LOT(s): Block: 57, Lots 3.04, Lot: 56, Lot 3

TELEPHONE: 917-868-7755

EMAIL: me@somalaser.com

SECTION II: GROSS SALES

Field Crops	Acres	Ornamental Crops	Acres	Aquaculture	Acres
Vegetables	all map for area				

Fruit Crops	Acres	Livestock	Acres	Woodland Products	Acres
				Firewood	all map for area

Vegetable Crops	Acres	Equine	Acres	Conservation Program	Acres

Imputed Grazing Value Acres _____

Income Acres
77.34
Non-Income Acres
+ 33.00
Total Acres Under Farmland
= 110.34
FINAL INCOME
Total income received and anticipated for the current year. Must be sufficient to meet the minimum gross sales criteria, if applicable, to show active devotion to agriculture/horticultural use.
$ 1,628.16

combined firewood & vegetables

SECTION III: SIGNATURE AND VERIFICATION OF OWNER(S)

The undersigned declares that this form, including any accompanying schedules and statements, has been examined by him (her) and to the best of his (her) knowledge and belief is true and correct. Filing of this form is also a representation that the land will continue to be devoted to an agricultural or horticultural use during the year for which farmland assessment is requested. Under N.J.S.A. 54:4-23.14(b), this certification shall be considered as if made under oath and is subject to the same penalties as provided by law for perjury. In addition, for a gross and intentional misrepresentation on this form, the landowner shall be subject to a civil penalty of up to $5,000.

Signature of Individual Owner or Co-Owner/Corporate Officer

6/26/23
Date

Title of Corporate Officer

Corporate Name

THIS MUST BE FILED WITH THE FARMLAND ASSESSMENT APPLICATION (FA-1) AND, WHERE APPLICABLE, WOODLAND DATA FORM (WD-1) AND ACTIVITY MAP

TAX ASSESSOR
RECEIVED
JUL 18 2023

Reserved For Office Use

This Application is: Approved ☐ Disapproved ☐

Date: _____

Assessor: _____

GENERAL INSTRUCTIONS

APPLICATION: Only one Supplemental Farmland Assessment Gross Sales Form, FA-1 G.S., should be filed annually with the municipal assessor on or before August 1 of the year immediately preceding the tax year for which "farmland assessment" is requested. **You are reporting the current year's gross sales for qualification in the next tax year. Late or incomplete applications will be denied.** At the assessor's request, applicants must provide proofs of eligibility as to ownership, land area, agricultural or horticultural activity and gross sales. Lands in Farmland Preservation Programs must still meet the criteria and filing prerequisites of the Farmland Assessment Act to receive preferential reduced assessment.

Filing Extension-Assessors may grant an extension of time for filing an FA-1 application and FA-1 Gross Sales form, but no later than September 1 of the year immediately preceding the tax year for which "farmland assessment" is requested, if the assessor is satisfied that failure to file by August 1 was due to (1) the owner's illness and a physician's certificate stating that the owner was physically incapacitated and unable to file by August 1 and the FA-1 & FA-1 G.S. forms are filed with the assessor ; or(2) the death of the owner or the owner's immediate family member and a certified copy of the death certificate and the FA -1 & FA-1 G.S. forms are filed with the assessor by the owner or by the executor/executrix of the owner's estate. "Immediate family member" means an owner's spouse, child, parent or sibling residing in the same household. (See N.J.S.A. 54:4-23.6d.)

QUALIFICATIONS. *Farmland assessment* means valuation, assessment and taxation under the Farmland Assessment Act. Land may be eligible for *farmland assessment* when:

a. The land has been actively devoted to agricultural or horticultural use for at least 2 successive years immediately preceding the tax year for which "farmland assessment" is requested. (See N.J.S.A. 54:4-23.6.)
b. The land area actively devoted to agricultural or horticultural use is not less than five acres, exclusive of the land upon which the farmhouse is located and such additional land actually used in connection with the farmhouse.
c. Gross sales, fees or payments (See N.J.S.A. 54:4-23.5.)
   1. ***Agricultural/Horticultural (Non Woodland):*** Gross sales, fees or payments average at least $1,000 annually on the first five acres and average at least $5 for each additional acre of actively devoted land plus 50 cents per acre of appurtenant woodland or non-wooded wetlands. Required Income is calculated on the total number of acres under Farmland Assessment on the property, whether income producing or not. (See N.J.S.A. 54:4-23.5.)
   2. ***Woodland Management Plan:*** If the land is approved under a Woodland Management Plan the gross sales, fees, or payment average $500 annually on the first five acres and average at least 50 cents for each additional acre of woodland or non-wooded wetlands.
   3. ***NJ Forest Stewardship Plan:*** Defined under N.J.A.C. 7:3-5, does not have a minimum gross sales requirement to show active devotion, **but** the land must be actively managed in compliance with the approved plan.
d. Application by the owner is filed on or before August 1 of the year immediately preceding the tax year (See N.J.S.A. 54-23.6.)
e. Farmland management units less than 7 acres are required to submit a descriptive narrative of agricultural/horticultural uses, a sketch of their location, and number of acres devoted.

SECTION I: IDENTIFICATION

Owners' Name- List every individual, partnership or corporation having an ownership interest in the land.
Block(s) & Lot(s)- List block(s) and lot(s) comprising a farm of contiguous land from your tax bill; official tax map; or page(s) and line(s) from the current year's tax list.

SECTION II: GROSS SALES

List products produced and the respective acreage under the appropriate headings. The acreages listed for the products in this section should match the values entered in Section 2 of the FA-1 application. If necessary, attach a separate sheet with the break down of additional products produced on the farm and the acreage devoted to those products.

***Equine*:** Includes acres dedicated to the breeding, raising, boarding, training, or rehabilitating of horses and ponies, as well as structures like stables used for the equine activities.

***Imputed Grazing Value Acres*:** Includes acres that are permanent pasture and/or cropland pastured, if the imputed grazing value is being claimed as income for livestock grazing on those acres.

***Livestock*:** Includes permanent pasture and cropland pasture used for grazing livestock if not claiming the imputed grazing value for those acres, as well as land under stables, pens, coops, or other structures used to house livestock.

Woodland Products*:** Includes any tree and forest products produced from woodland under an approved Woodland Management Plan or ***NJ Forest Stewardship Plan if income is generated. Account for all woodland acres subject to a Woodland Management Plan even when only a particular stand within the parcel is being harvested for income that year. This value should equal the number of acres entered on Line 4 of Section 2 of the FA-1 application.

Total Non-Income Acres*:** Includes lands under streams or ponds when those bodies of water are not being used for aquaculture production, irrigation ditches, land under solar panels or other renewable energy generation systems, appurtenant woodlands, non-wooded wetlands, and permanent pasture and cropland pastured when used as a break or buffer but not when being grazed by livestock or under a federal soil conservation program. It should also include land under farm buildings, such as sheds, barns, silos, etc., which are used for the storage of farm equipment and harvested products as well as woodlands managed under a ***NJ Forest Stewardship Plan from which no tree or forest products are being harvested for income that year.

***Total Acres Under Farmland Assessment*:** Is the total acreage devoted to agricultural or horticultural use (income producing plus (non-income-producing) acres on the property and should correspond to the value on Line (8) in Section 2 of the FA-1 Application.

***Final Income*:** Is the income produced by the property's actively devoted acres, including income attributable to agricultural/horticultural products produced thereon, payments received under Federal soil conservation programs, fees received for breeding, raising or grazing livestock, income imputed to grazing land as determined by the State Farmland Evaluation Committee, and fees received for boarding, rehabilitating or training livestock where the land under the boarding, rehabilitating or training facilities is within the same property as land otherwise qualified for Farmland Assessment. Rents paid to owners by tenant farmers **do not** constitute gross sales. Generated energy from any source is **not** an agricultural or horticultural product and any power or heat sold from biomass, solar, or wind energy generation is **not** income for valuation, assessment and taxation of land pursuant to the "Farmland Assessment Act of 1964."

SECTION III: SIGNATURE AND VERIFICATION OF OWNER(S)

For non-corporate multiple ownership, one owner is presumed to have authority to sign on behalf of the other co-owners. For a corporate owner or co-owners, the full name of the corporation and the signature and title of the corporate officer authorized to sign the application in its behalf must be provided.

OWNERSHIP–Must be single ownership: i.e., a unified title meaning common ownership by one distinct legal entity of one or more contiguous parcels together.

HOPEWELL TOWNSHIP MERCER COUNTY

SUPPLEMENTAL LAND USE FORM

BLOCK 56
LOT 3
QUALIFIER Q0132

Land is farmed by owner Bellemont Farm LLC, c/o Michael Ehrenreich

Land is rented to _____ Address _____

Acreage Use	SOIL CLASS	NUMBER OF ACRES	For Assessor Use Only X	FARMLAND VALUE	TOTAL VALUE
CROPLAND HARVESTED	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
CROPLAND PASTURED	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
PERMANENT PASTURE	A		X		
	B		X		
	C	3.00	X		
	D		X		
	E		X		
NON-APPURTENANT WOODLAND	A		X		
	B		X		
	C	22.98	X		
	D		X		
	E		X		
APPURTENANT WOODLAND	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
WETLANDS			X		
Total acreage In Farmland		25.98		Total Value	

Crop. Harvested	Acres
Corn	
Hay	
Oats	
Wheat	
TOTAL ACRES	

Permanent Pasture/Acreage Used for Graz.	No. Of Acres

Government Program	No. Of Acres
Specify the Crop & Contract No.	

LAND NOT IN AGRICULTURAL USE

HOME SITE	–
Other non-farm use land	–
TOTAL (non-farm use)	–
ENTIRE FARM ACREAGE	25.98

FOR OFFICE USE ONLY

Income Should Be _____

Income Submitted _____

Plot Plan Received - Yes ___ No ___

TAX ASSESSOR

JUL 18 2023

RECEIVED

SIGNED Michael Ehrenreich

DATED 6/27/23

HOPEWELL TOWNSHIP

MERCER COUNTY

SUPPLEMENTAL LAND USE FORM

BLOCK 57
LOT 3
QUALIFIER Q0132

Land is farmed by owner Bellemont Farm LLC, c/o Michael Ehrenreich

Land is rented to _____ Address _____

Acreage Use	SOIL CLASS	NUMBER OF ACRES	For Assessor Use Only X	FARMLAND VALUE	TOTALVALUE
CROPLAND HARVESTED	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
CROPLAND PASTURED	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
PERMANENT PASTURE	A		X		
	B		X		
	C	30.00	X		
	D		X		
	E		X		
NON-APPURTENANT WOODLAND	A		X		
	B		X		
	C	54.36	X		
	D		X		
	E		X		
APPURTENANT WOODLAND	A		X		
	B		X		
	C		X		
	D		X		
	E		X		
WETLANDS			X		
Total acreage In Farmland		84.36	Total Value		

Crop. Harvested	Acres
Corn	
Hay	
Oats	
Wheat	
TOTAL ACRES	

Permanent Pasture/Acreage Used for Graz.	No. Of Acres

Government Program	No. Of Acres
Specify the Crop & Contract No.	

LAND NOT IN AGRICULTURAL USE

HOME SITE	-
Other non-farm use land	-
TOTAL (non-farm use)	-
ENTIRE FARM ACREAGE	84.36

FOR OFFICE USE ONLY

Income Should Be _____

Income Submitted _____

Plot Plan Received - Yes _____ No ___

HOPEWELL TOWNSHIP TAX ASSESSOR RECEIVED JUL 18 2023

SIGNED Michael Ehrenreich

DATED 6/21/23

WOODLAND DATA FORM

Forestry Number: B-2268
(If unknown, DEP will assign)

For Use With Woodland Management and/or NJ Forest Stewardship
Submit With Application for Farmland Assessment
(See filing information)
Type or Print *(File in each municipality where woodland is situated)*

COUNTY Mercer MUNICIPALITY Hopewell Township TAX YEAR 2024

Block(s) and Lot(s) Block: 57, Lots: 3 & 4, Block: 56, Lot 3

SECTION I: IDENTIFICATION INFORMATION *if changed since prior WD-1, please check:* ☐

Owner Name: Bellemont Farm LLC, C/O Ehrenreich Mailing Address: 71 South Orange Ave., Suite 396
South Orange, NJ 07079

Phone: 917-868-7755

Email: me@somalaser.com

Amount of Woodland Acres in Plan: 77.34 acres

Location of Property: *(Nearest Road, etc.)*
Intersection River Road & Valley Road

If portions of the property's woodland are in more than one municipality, name the other municipalities: N/A

SECTION II: PLAN INFORMATION

Type of Plan: ☒ Woodland Management Plan (WMP) ☐ NJ Forest Stewardship Plan (FSP) ***Effective beginning Tax Year 2019***

Plan Period: Start Date 10/25/21 End Date 10/25/31

Status of Plan: ☐ New plan ☐ Revisions to an existing plan Date of Change: _____
☒ Plan previously filed remains valid and continues to be followed

SECTION III: FOREST MANAGEMENT PRACTICE

- *Describe all practices completed or to be completed during the current tax year (January through December).*
- *Submit a scaled activity map with this form showing the location(s) on the property of the activities.*

Practice/Activity	Type *(see back for filling information)*	Extent *(in Acres/ft.)*	*(if applicable)* Product *(in cords/board ft./etc.)*	Income *($ of gross sales, received or to be received)*	Expenses
Forest Stand Improvement (FSI)	Thinning - sanitation Hardwood	see map for work areas	Firewood 5-6 cords		
Harvest					
Reforestation					
Weed/Brush Control					
Insect/Disease Control					
Site Preparation					
Prescribed Burning (RxB)					
Invasive Species Control					
Wildlife Habitat Improvement					
Forestry Infrastructure					
Other					

Were any practices funded in whole or in part through a soil conservation program administered by a federal agency? ☐ Yes ☒ No Amount $ _____

SECTION IV: CERTIFICATION STATEMENTS *(Owner and Forester must sign)*

I certify that the woodland is actively devoted to agricultural use, that the above reported activities and practices reported are those specified for the pre-tax year in the filed plan and are being carried out in compliance with the plan, and that the information provided on this form is true and correct. For woodland management plans, I additionally certify that the income reported on the form as received or anticipated to be received from the sale of forest products is valid and true and that, if any activities and practices reported on the form have not been completed at the time of form submission, they will be completed within the pre-tax year.

Signature (Owner or Co-owner) _____ Date 6/27/23

OR

Signature (Corporate Officer) _____ Corporate Name _____ Date _____

I certify that the woodland is actively devoted to agricultural use, that the above reported activities and practices reported are those specified for the pre-tax year in the filed plan and are being carried out in compliance with the plan, and that the information provided on this form is true and correct.

Approved Forester's Name (print) George Boesze Signature _____ Date 7/4/23

Approved Foresters most recent on-site inspection date 2/5/23

File this form and your Farmland Assessment Application with the Local Tax Assessor. Also file this form, Activity Map, and FA-1 Form with the New Jersey Forest Service Regional Office that serves your county.

(See addresses for New Jersey Forest Service offices in the filing information)

HOPEWELL
TAX ASSESSOR

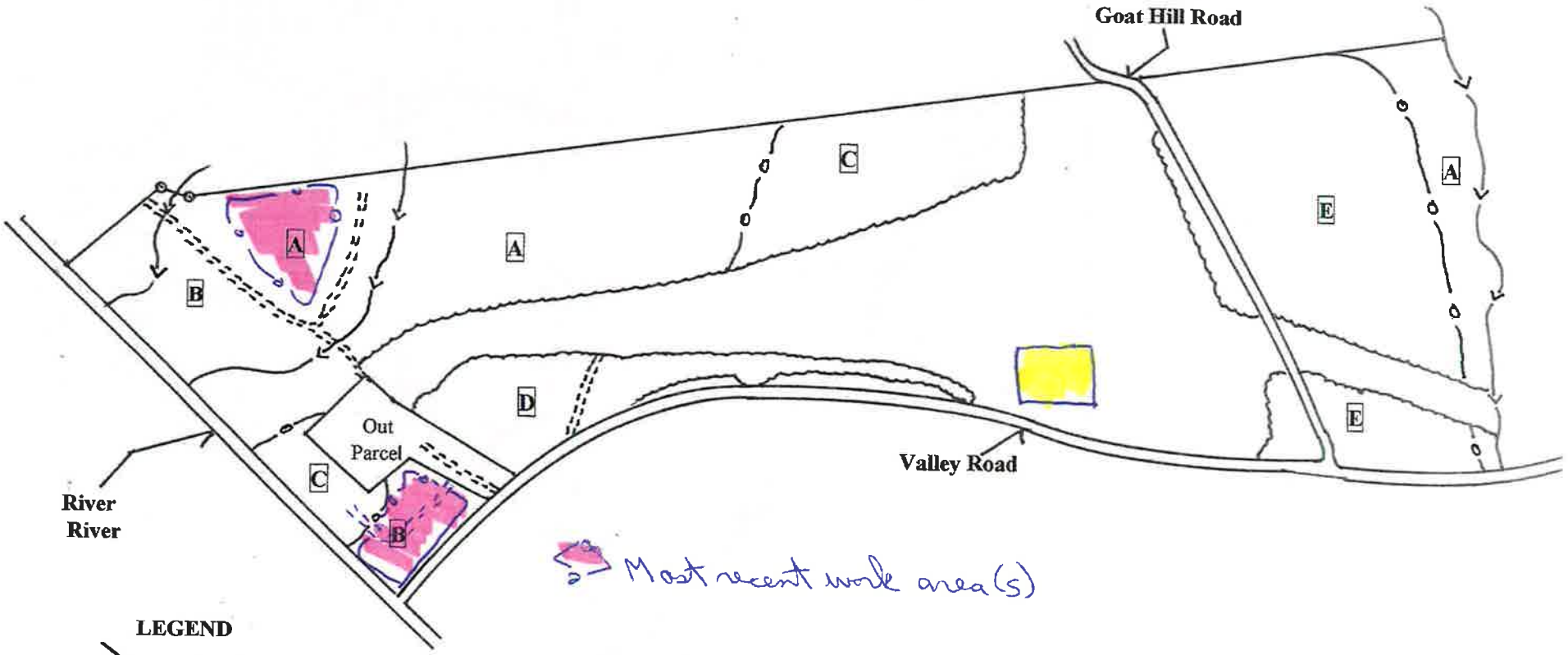
RECEIVED
JUL 18 2023

FOREST STAND MAP

Property of:
Bellemont Farm LLC (Ehrenreich)
Valley Road
Hopewell Township, Mercer County
Block: 57 Lots: 3 and 4, Block: 56 Lot: 3

Activity Map
2022-2023
For Tax Year 2024

Prepared by:
George J. Boesze, Consulting Forester
October, 2021
Total: 110+- acres, Woodland: 77+- acres
Forestry Number:



Most recent work area(s)

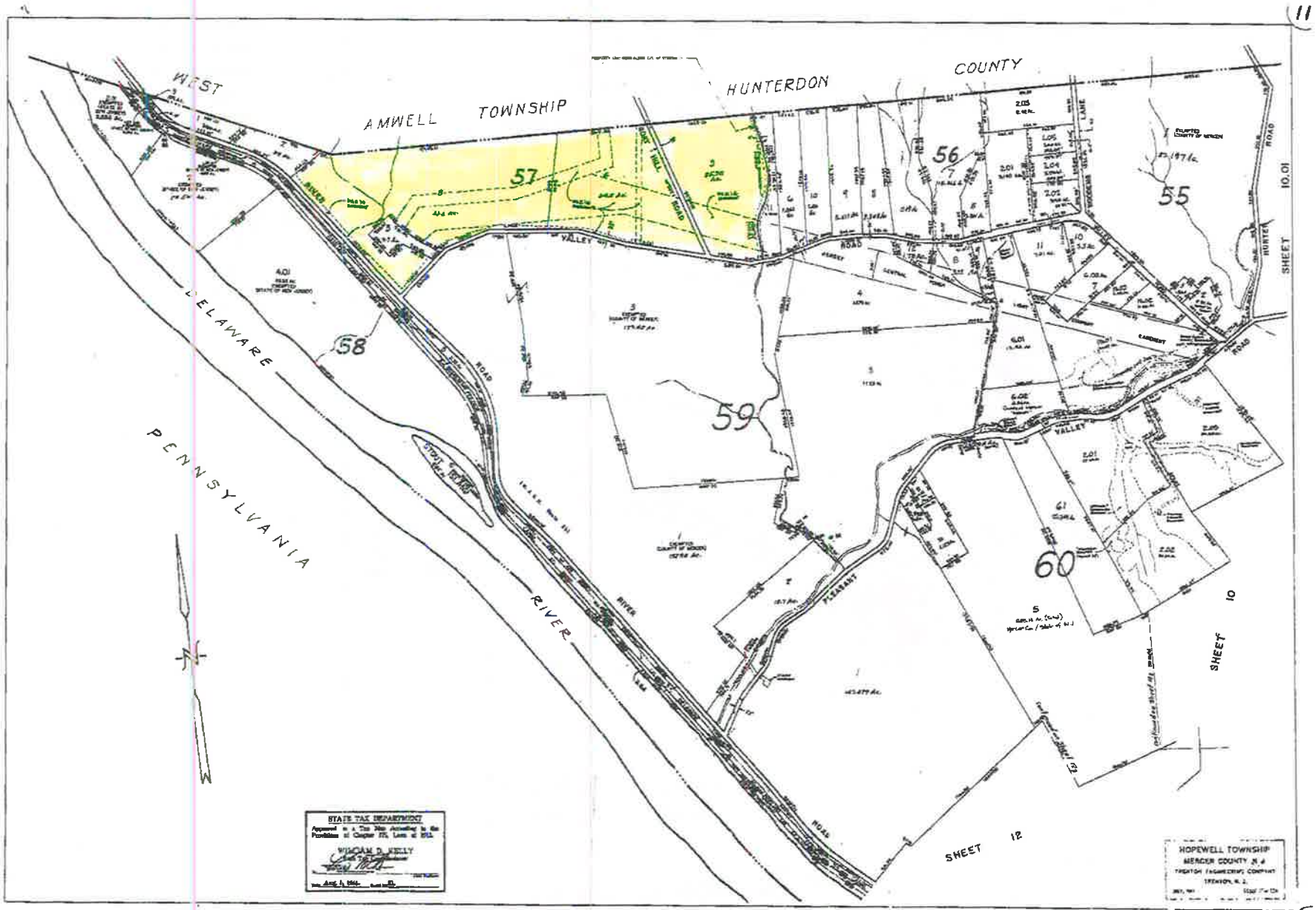
access road creation and maintenance

Approximate area of vegetable farming

LEGEND
... Property corner
... Forest access road
... Edge of woods
... Stream or creek
A ... Forest Stand
... Stand Delineation Line

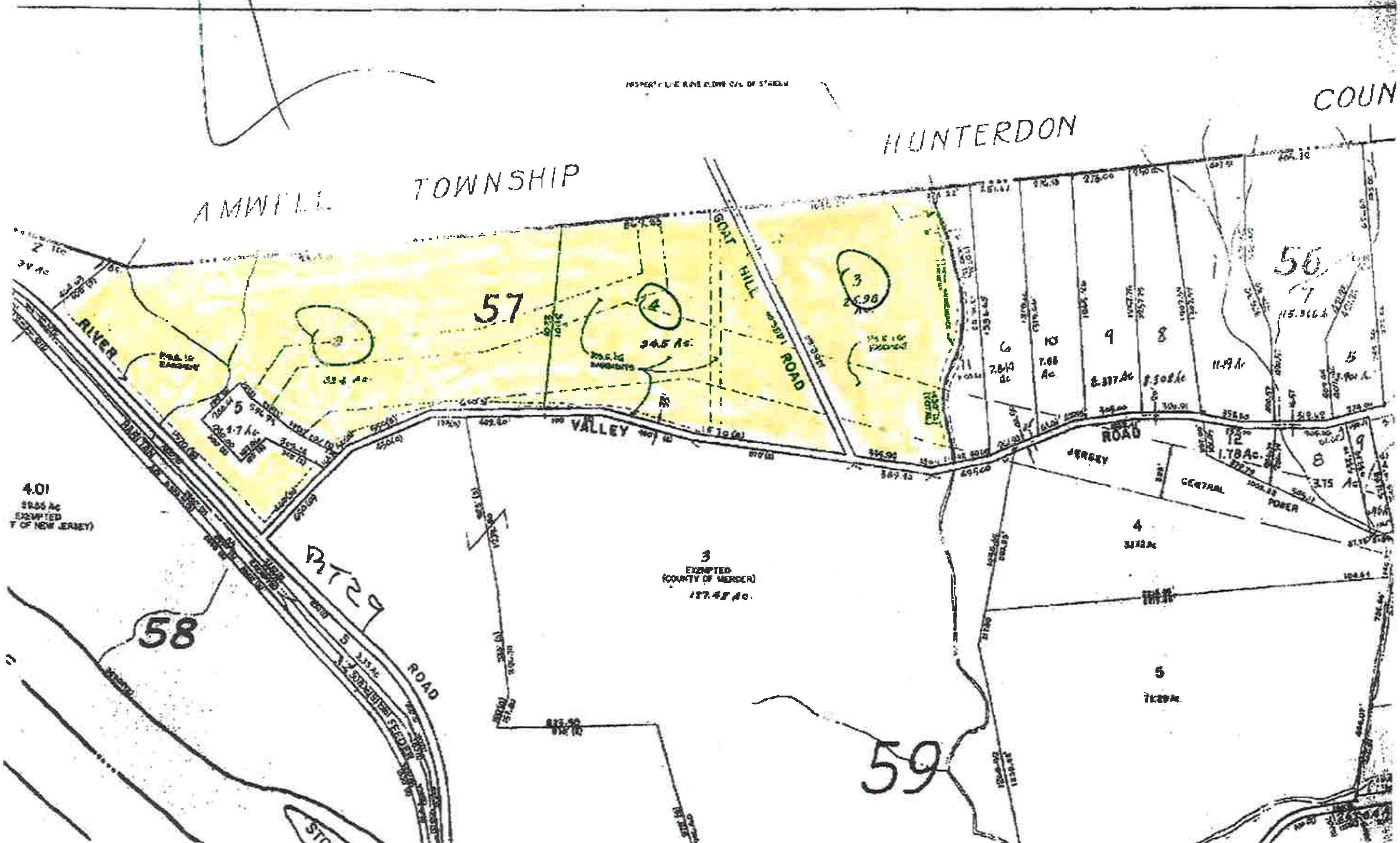
N

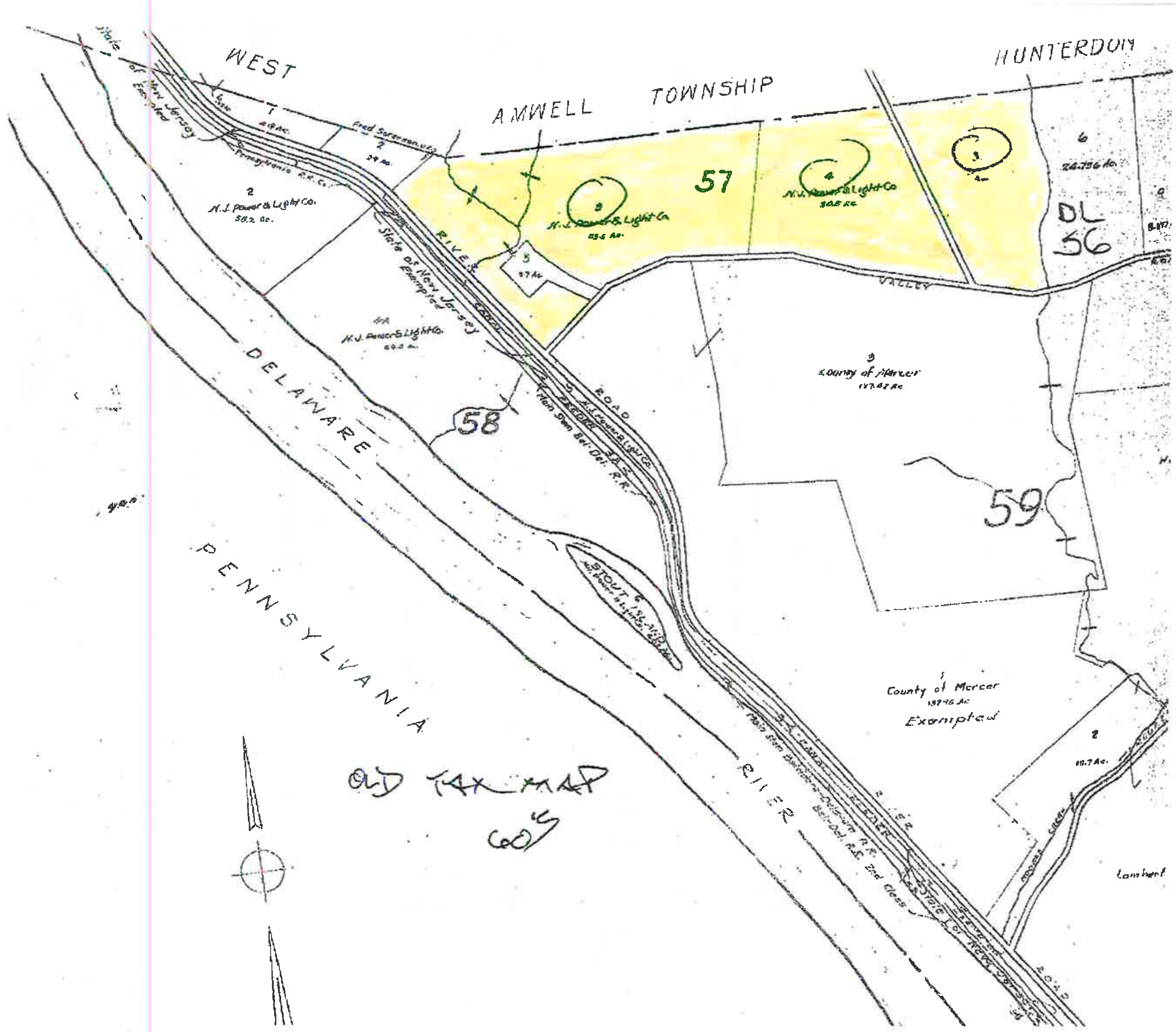
SCALE
1": 480'


WEST AMWELL TOWNSHIP
HUNTERDON COUNTY
DELAWARE RIVER
PENNSYLVANIA
57
58
59
60
56
55
SHEET 10.01
SHEET 10
SHEET 12
HOPEWELL TOWNSHIP
MERCER COUNTY, N. J.
STATE TAX DEPARTMENT
WILLIAM D. KELLY

HOPEWELL TAX MAP

Pg 11




WEST AMWELL TOWNSHIP
HUNTERDON
57
58
59
DL 56
N.J. Power & Light Co.
County of Mercer
County of Mercer Exempted
State of New Jersey Exempted
DELAWARE
PENNSYLVANIA
RIVER
ROAD
VALLEY
Fred Sorenson
Pennsylvania R.R. Co.
Lambert
OLD TAX MAP
60'S

Bellemont Brewery

at

Bellemont Farm

Introduction

In 2021, Bellemont Farm, LLC acquired 110 acres in Hopewell Township (Mercer County) from Genon, a utility company. The property consists of a mix of woodlands and open spaces and is crisscrossed by several utility easements. The property had been owned by the utility company for several decades, but prior to that it was actively farmed, as evidenced by prior surveys and historic aerial photos (Figure 2 and Figure 3). In fact, the property had been farmed for centuries, and is the site of the historic Upper Bellemont Farm.

At the time of purchase the entire property was in a severe state of neglect (Figure 1), as the utility company had taken no interest in the property other than maintaining its powerline easements. The property was overgrown with invasive species, including widespread Russian Olive. After purchase, we set about the process of beginning to restore the property to agriculture.

Figure 1 - 2020 aerial view – **Red outline is three parcels that comprise Bellemont Farm**

Figure 2 - 2002 aerial view

Figure 3 - 1930s aerial view

Since that time, at substantial cost, we have made the following improvements to the property:

- Cleared approximately 5 acres fronting Valley Road for agricultural purposes and property access.
- Installed a well
- Installed electric

- Fenced 1.8 acres
- Cleared approximately 1 acre for a future farmhouse.

Along with the above improvements, we took the following steps to begin restoring the property.

- Established a woodlands management plan
- Conducted a timber harvest
- Cleared access trails in the woodlands.
- Planted vegetable and floral crops on 1.8 acres, including tomatoes, peppers, pumpkins, green beans, squashes, eggplant, carrots, turnips, radishes, flowers, sage, rosemary.
- Dried sage and packaged into Bellemont Farm sage tea.
- Sold produce at our on-site farmstand and through an affiliated retail store (Big Bear Gear, Lambertville, NJ).
- Received an NRCS grant to restore damaged woodlands and completed the contract.
- Received an NRCS grant to create a Soil Health Management plan (which was completed by our consultant.)
- Applied for an EQIP grant for a high tunnel.
- Applied for a DEP grant to restore 4 acres of dead ash.
- Qualified for farmland assessment with Hopewell Township.

Figure 4 - Bellemont Farm farmstand 2023

Figure 5 - Bellemont Farm farmstand 2023

Figure 6 - Sage grown on farm and drying in hoop house

Figure 7 - Sage grown on farm, dried, and processed into sage bundles and sage tea.

Figure 8 - Farmstand Fall 2022

Figure 9 - Farmstand 2023

Figure 10 – A happy customer on farm Summer 2023

Bellemont Brewery

We were inspired when visiting the Readington Brewery and Hop farm to establish a similar facility at Bellemont Farm. We believe this would be an excellent use of the land, enabling us to incorporate our own agricultural produce into our beer and allowing us to farm in a profitable and sustainable fashion. We believe that our location near to the tourist destinations of Lambertville, NJ and New Hope, PA puts us in a unique position to develop agritourism at our farm, including the brewery.

Our plan is to incorporate our own hops and barley into the product, as well as other minor ingredients, such as herbs, and to source additional hops and barley locally as needed to the extent possible. Furthermore, we intend to send our barley to local processors for malting when possible. In the future, we may set up our own malting capacity.

Summary Agricultural Plan

It will take some time and effort to restore the land to agricultural production. This will be done simultaneously with the engineering, design and construction work for the brewery facility. The agricultural and brewery area will be situated on 32 acres west of Goat Hill Road (Block 57, Lot 4), with additional crop production area on a portion of the 26 acre parcel (Block 56, Lot 3) east of Goat Hill Road (Figure 11). Some additional acreage can be added in the future on Block 57, Lot 3. When fully realized, we can have up to 25 acres of grain production, two acres of hops production and two acres of vegetable and herb production.

Figure 11 - Bellemont Farm agricultural plan

Hops Farm

We plan to establish approximately two acres of hops in Area D on the farm. The specific varieties are still to be determined.

Year 1

- Nematode assay
- Eliminate perennial weeds and brush
    - Clear all woody vegetation
    - Brush hog
    - Chisel plow, followed by disking and harrowing
    - Plant biofumigant crop (e.g. rapeseed)

Year 2

- Install trellis system (~100 poles per acre)
- Plant dormant rhizomes in the Spring
- Install drip irrigation
- Fertilize
- Harvest first crop

Year 3 and beyond

- Ongoing weed management
- Ongoing pest management
- Ongoing fertilizing
- Soil testing, leaf petiole testing, and nutritional enhancements as needed

Based on a two acre hop farm, we expect to be able to produce enough hops for 2,600 barrels of beer, contributing 50+% of the hops. Additional hops varieties will be purchased for flavor and variation. Additional acres of hops can be put into cultivation if production needs exceed 2,600 barrels or if we produce varieties with a higher hopping rate. Any excess hops will be sold to other brewers.

HOPS Analysis		
Dried Hops Yield per acre	**1,300**	**lbs**
# of acres	**2**	
Total Hops Yield	**2,600**	**lbs**
Purchased Hops	**2,600**	**lbs**
Total Hops	**5,200**	**lbs**
Hopping Rate	**2**	**lb/barrel**
Total Barrels Beer Input	**2,600**	

Figure 12 - Hops Analysis

Barley Plan

We plan to establish barley production initially in Area B (approximately 6 acres), followed by Area F (approximately 4 acres), and finally followed by Area G (up to 15 acres).

Year 1

- Eliminate perennial weeds and brush
    - Clear all woody vegetation from Area B
    - Brush hog
    - Establish cover crop (e.g. clover)
    - Lime if needed (to soil pH 6.5 to 7.0)

Year 2

- Establish second well
- Establish irrigation
- Soil testing
- P, K, N as needed
- Establish malt barley in Area B (experiment with Spring and Winter barleys)
    - Spring barley
    - Winter barley
- Cover crop (e.g soy beans)
- Weed control
- Insect control

Year 3 and beyond

- Add area F and Area G as needed for production

Based on eventually having 25 acres of barley, we expect that this will support our production needs for up to 1,643 barrels (50,935 gallons) of beer, with our barley contributing 51% of the grain bill. Additional barley would be purchased from local sources or additional land obtained for additional cultivation and added to our Farm Management Unit to increase our capacity.

Barley Analysis		
Barley yield per acre	**75**	**bushels**
Lbs Barley/Acre	**3,600**	**lbs**
Lbs Barley Per Barrel	**97.5**	**Lbs**
# of acres	**25**	
Total Barley Yield	**90,000**	**Lbs**
Purchased Barley	**88,200**	**Lbs**
Total Barley	**178,200**	**Lbs**
Yield loss	**20%**	
Barrels Beer Input	**1,643**	

Figure 13 - Barley Analysis

We intend to grow and harvest barley from the farm and transport it to a malthouse for processing and then return the malted barley back to the brewery for processing.

Other Grains

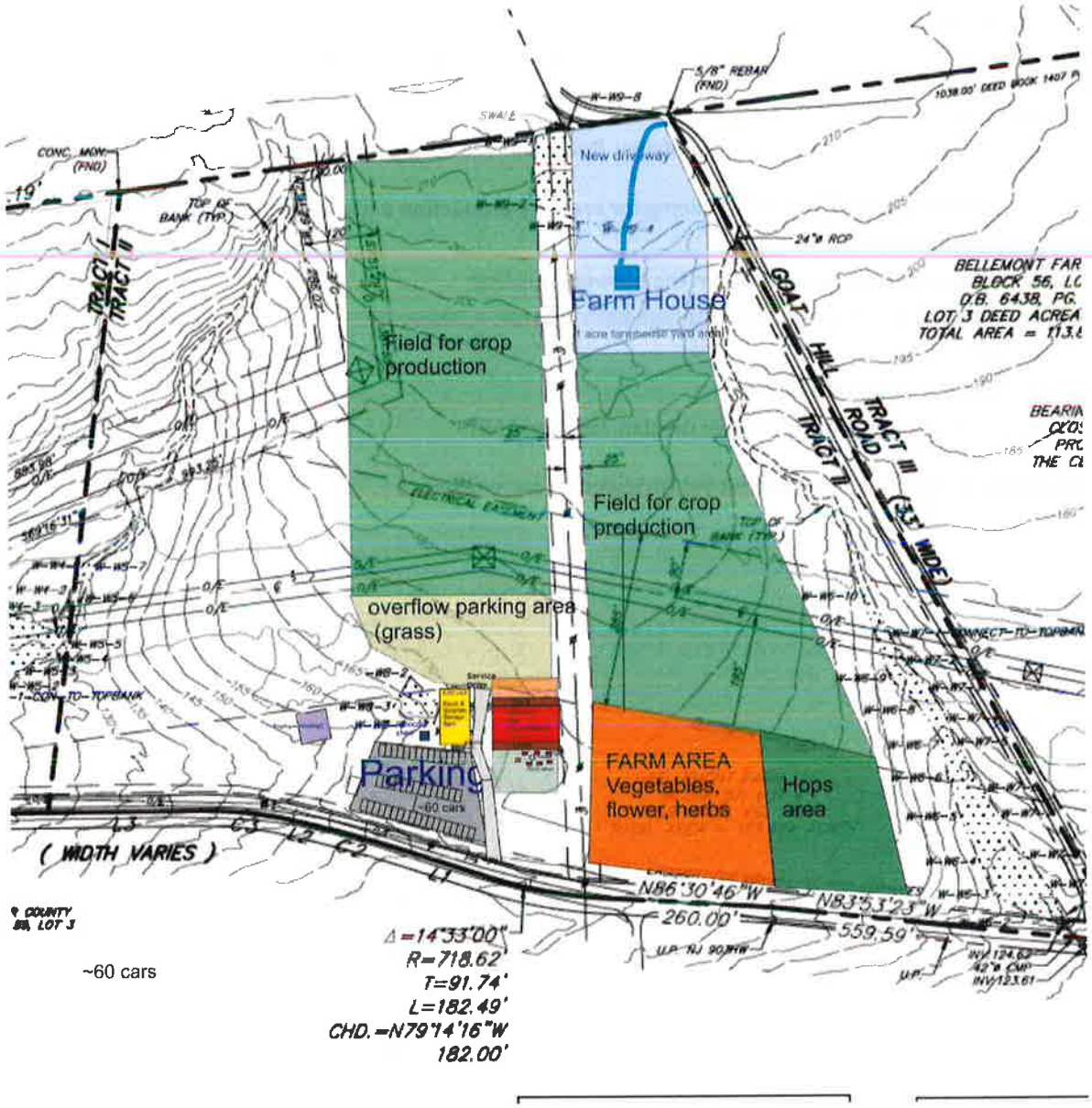
It is possible that we will also grow some wheat and rye for use in our brewing, in rotation with barley.

Brewery Area

The brewery area will be located off of Valley Road, and will consist of:

- Approximately 5,700 sq ft building for brewery production and a tap room with customer seating areas.
- A farm store contained within the brewery building
- An equipment and supplies storage barn (approx. 4,000 sq ft)
- Paved parking
- Possibly employee housing
- Grain storage bin (not shown on plan, location TBD)

A concept plan is shown below (not yet reviewed by our engineer.)



~60 cars

Figure 14 - Brewery Area

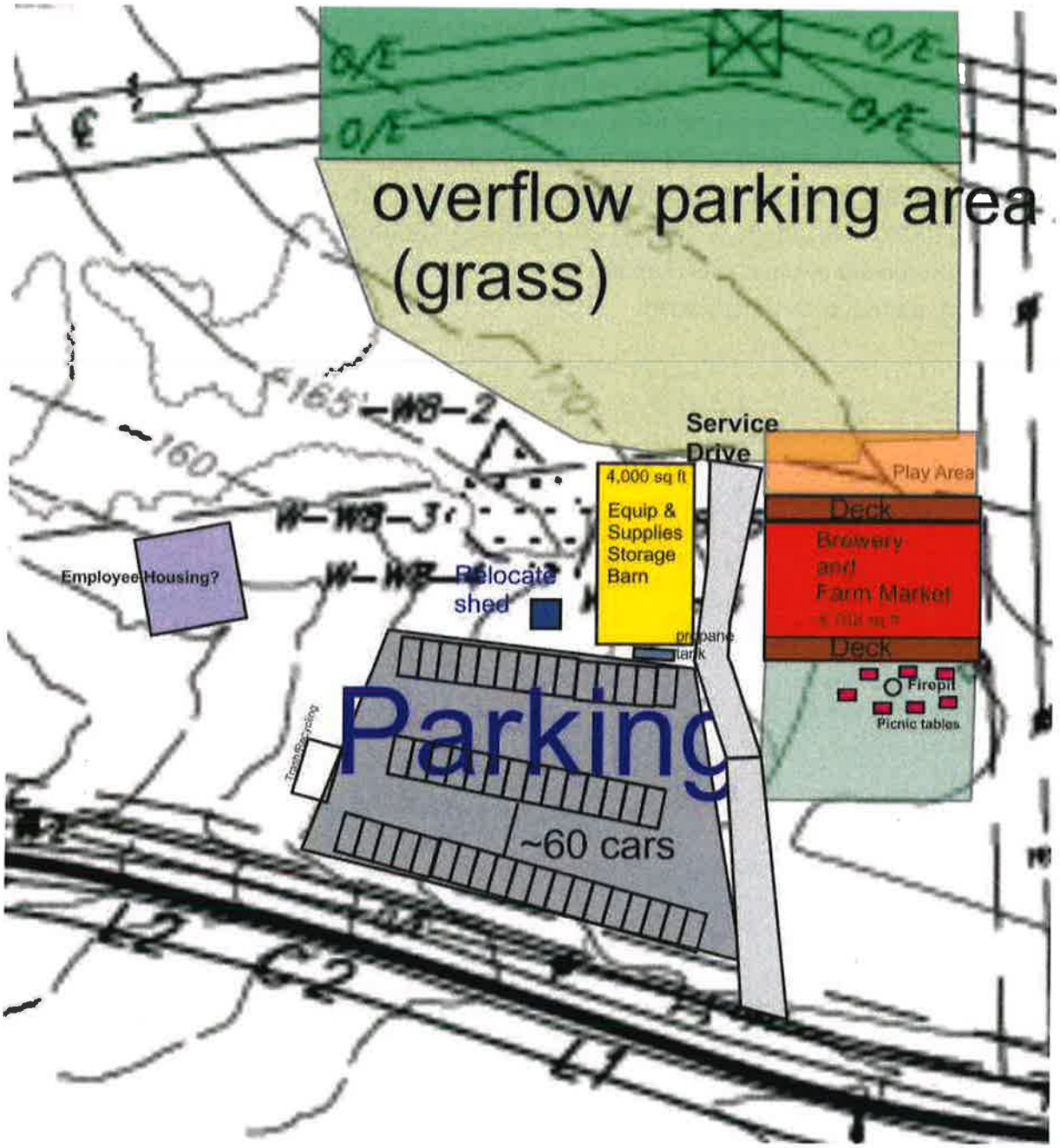


Figure 15 - Brewery Area Detail

Bellemont Farm - Notes on Commercial Farm Designation

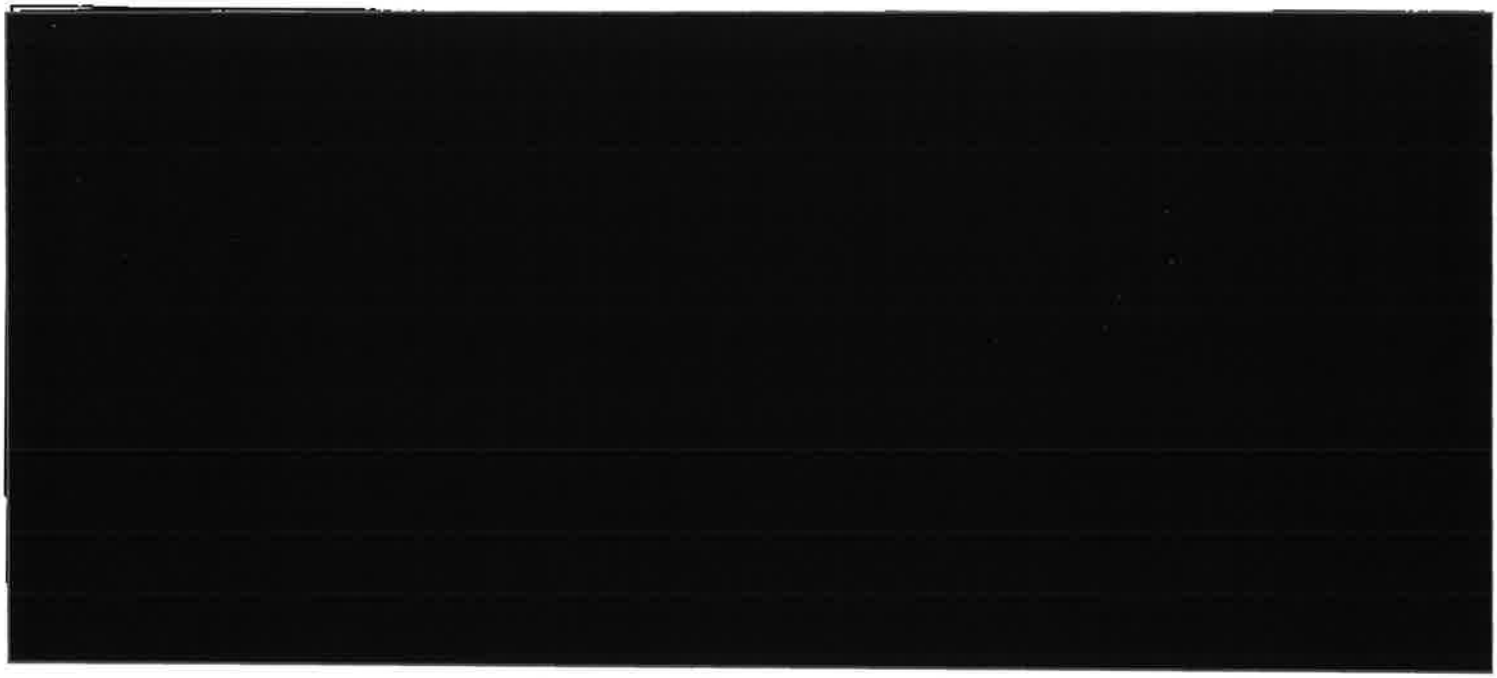
- 2023 tax returns are not yet available. A P&L from our accounting system is provided. Income is a combination of farmstand sales, firewood sales, and timber harvest. Farmstand and firewood sales are primarily cash payments at our "honor box" and is not evidenced by receipts or bank deposits.
- For 2024 we introduced a CSA, with revenues to-date of nearly $7,000. This is evidenced by payments through our website using our credit card processor, Stripe. A printout of this is provided.

Bellemont Farm LLC
Income Statement
For the Twelve Months Ending December 31, 2023

	Current Month	Year to Date
Revenues		
Firewood Sales	$	[redacted]
Land LIcense Fees		
Farm Product Sales		
Timber Sales		
CSA Revenue		
Appraisal Fees		
Referral Fees		
Brokers' Escrow Fees		
Mortgage Interest Earned		
Property Management Fees		
Mortgage Principal Received		
Condo Income		
Notary Public Income		
Interest Income		
Other Income		
USDA Payments		
Finance Charge Income		
Shipping Charges Reimbursed		
Fee Refunds		
Fee Discounts		
Total Revenues		
Cost of Sales		
Cost of Sales		
Cost of Sales-Salaries and Wag		
Total Cost of Sales		
Gross Profit		
Expenses		
Default Purchase Expense		
Advertising Expense		
Amortization Expense		
Auto Expenses		
Bad Debt Expense		
Bank Charges		
Cash Over and Short		
Charitable Contributions Exp		
Commissions and Fees Exp		
Depreciation Expense		
Dues and Subscriptions Exp		
Employee Benefit Programs Exp		
Equipment Rental		
Farm Management Fees - BBG		
Farm Work - Other		
Forestry Services		
Logging/Woodlands Services		
Freight Expense		
Gifts Expense		
Income Tax Expense		
Insurance Expense		
Hopewell Township - Fees		
Interest Expense		
Land Clearing Expense		
Laundry and Cleaning Exp		
Legal and Professional Expense		
Licenses Expense		

Bellemont Farm LLC
Income Statement
For the Twelve Months Ending December 31, 2023

	Current Month	Year to Date
Loss on NSF Checks		
Maintenance Expense		
Meals and Entertainment Exp		
Milling Services		
Mortage Fee (Second)		
Office Expense		
Closing Costs Farm Credit East		
Payroll Tax Expense		
Payroll Service Expense		
Penalties and Fines Exp		
Planning Expense		
Other Taxes		
Hopewell Twshp Real Estate Tax		
Postage Expense		
Professional Development		
Rent or Lease Expense		
Repairs Expense		
Seed and planting Expense		
Soil Testing		
Supplies Expense		
Telephone Expense		
Utilities - Electric		
Salaries Expense		
Wages Expense		
Travel Expense		
Utilities Expense		
Other Expense		
Purchase Disc-Expense Items		
Gain/Loss on Sale of Assets		
Total Expenses		
Net Income		



Timber Harvest Report Sheet

Date of Report: 12/5/2023

Harvest Crew: AB Logging

Landowner Name: Bellemont Farm LLC

Landowner #: 973-763-7546

Site Address: 22 Valley Rd.
Lambertville, NJ 08530

Report of Current Conditions

1. Felling Damage: A
2. Skidding Damage: A
3. Skid Trail Condition: A
4. Haul Road/ Access Point Conditions A
5. Boundary Lines: A
6. Residual Tree Damage: A
7. Lodged/Uprooted/Broken/Cull Trees (All to be felled): A
8. Lopping of Tops (+/- 6'): A
9. Condition of Landing: A
10. Condition of Waterways: A
11. Stump Heights: A
12. Trash & Debris A
13. Condition of Structures and Improvements: N/A
14. Field Conditions: N/A

A = Acceptable/Normal U = Unacceptable C = Caution N/A = Not Applicable

Comments/Work to be Done: 78 Sawtimber trees removed from Stand A, approximately 31,000 board feet. Single tree selection. Remaining stand is well-stocked with mature, dominant white, black and red oak.

Report Created by Beiler's Sawmill – Contact Us Anytime for Any Reason at 610-858-9100

Payments

Create payment

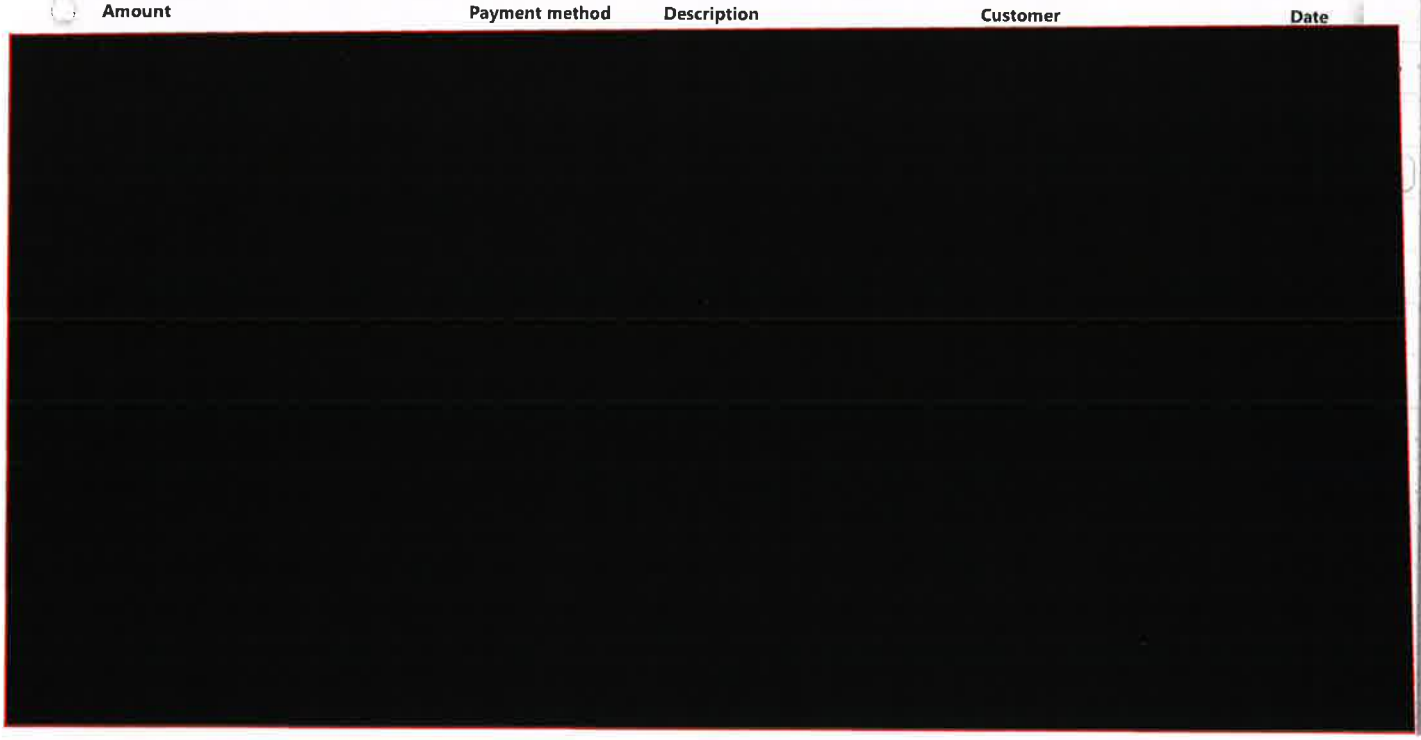
All payments Disputes All transactions

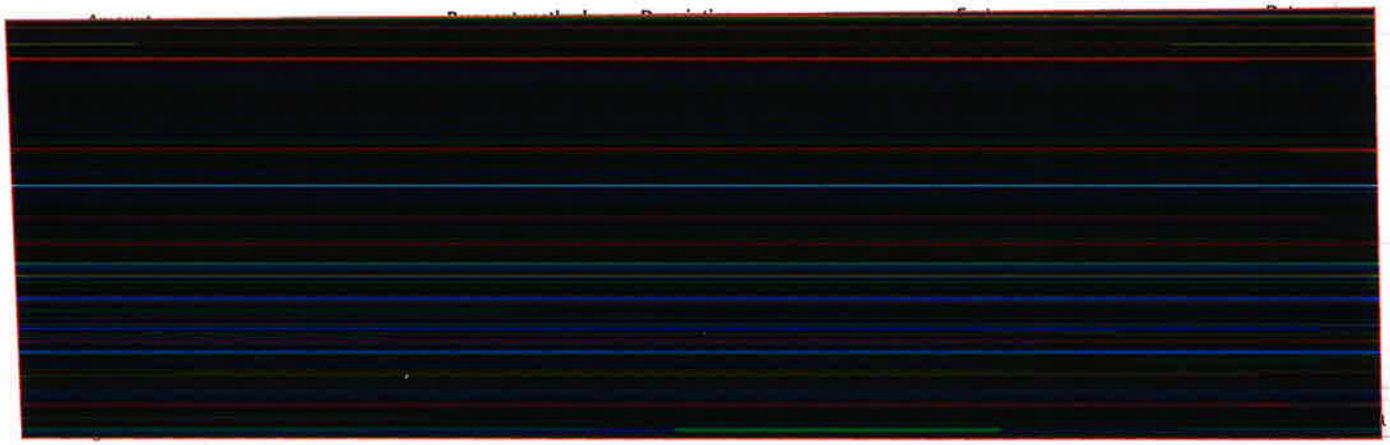
All	Succeeded	Refunded	Uncaptured	Failed
28	25	0	0	3

⊕ Date & Time ⊕ Amount ⊕ Currency ⊕ Status ⊕ Payment method ⊕ More filters

Export Edit columns

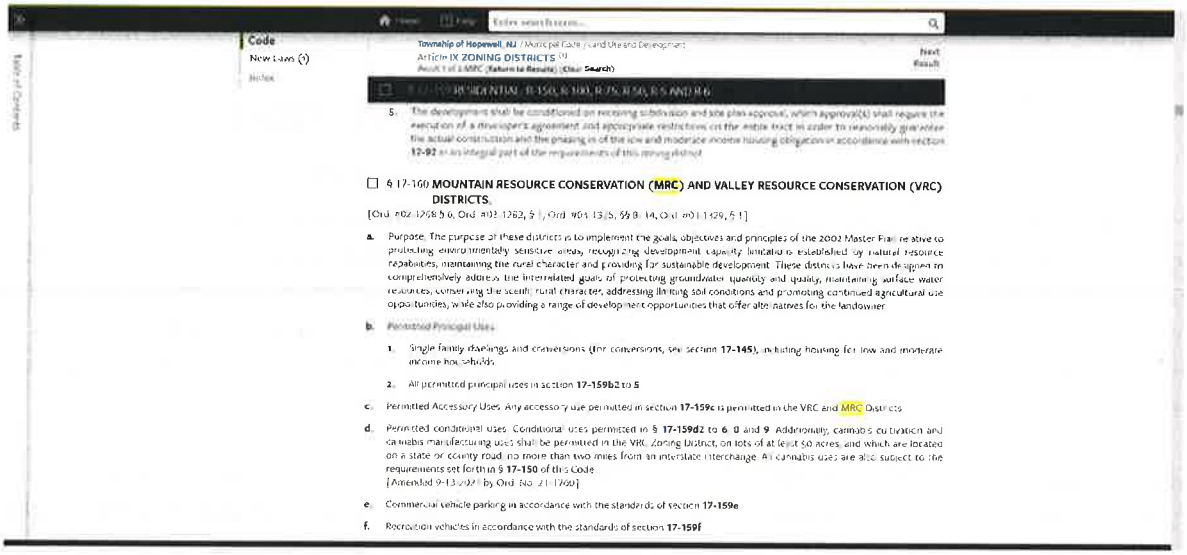
Amount	Payment method	Description	Customer	Date





Agriculture is a permitted use in the Moutain Resource Conservation (MRC) district

Per the Hopewll Township municipal code, agriculture is a permitted use in the MRC.



Code

New Laws (1)

Township of Hopewell, NJ / Municipal Code / Land Use and Development

Article IX ZONING DISTRICTS [1]

Result 1 of 1 MRC (Return to Results) (Clear Search)

Next Result

RESIDENTIAL, R-150, R-100, R-75, R-50, R-5 AND R-6

5. The development shall be conditioned on receiving subdivision and site plan approval, which approval(s) shall require the execution of a developer's agreement and appropriate restrictions on the entire tract in order to reasonably guarantee the actual construction and the phasing in of the low and moderate income housing obligation in accordance with section **17-92** as an integral part of the requirements of this zoning district.

☐ § 17-160 **MOUNTAIN RESOURCE CONSERVATION (MRC) AND VALLEY RESOURCE CONSERVATION (VRC) DISTRICTS.**

[Ord. #02-1268 § 6; Ord. #03-1282, § 1; Ord. #04-13 §§ 5, 8; 14; Ord. #04-1429, § 1]

a. Purpose. The purpose of these districts is to implement the goals, objectives and principles of the 2002 Master Plan relative to protecting environmentally sensitive areas, recognizing development capacity limitations established by natural resource capabilities, maintaining the rural character and providing for sustainable development. These districts have been designed to comprehensively address the interrelated goals of protecting groundwater quantity and quality, maintaining surface water resources, conserving the scenic rural character, addressing limiting soil conditions and promoting continued agricultural use opportunities, while also providing a range of development opportunities that offer alternatives for the landowner.

b. Permitted Principal Uses.

1. Single family dwellings and conversions (for conversions, see section **17-145**), including housing for low and moderate income households.

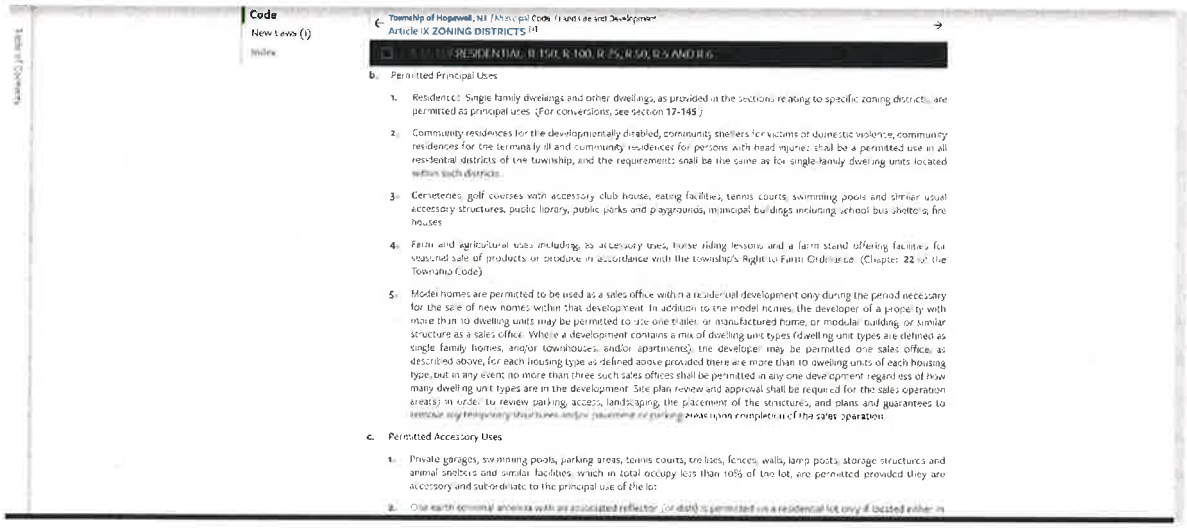
2. All permitted principal uses in section **17-159b2** to **5**.

c. Permitted Accessory Uses. Any accessory use permitted in section **17-159c** is permitted in the VRC and MRC Districts.

d. Permitted conditional uses. Conditional uses permitted in § **17-159d2** to **6**, **8** and **9**. Additionally, cannabis cultivation and cannabis manufacturing uses shall be permitted in the VRC Zoning District, on lots of at least 50 acres, and which are located on a state or county road, no more than two miles from an interstate interchange. All cannabis uses are also subject to the requirements set forth in § **17-150** of this Code.
[Amended 9-13-2021 by Ord. No. 21-1760]

e. Commercial vehicle parking in accordance with the standards of section **17-159e**.

f. Recreation vehicles in accordance with the standards of section **17-159f**.



Code

New Laws (1)

Township of Hopewell, NJ / Municipal Code / Land Use and Development

Article IX ZONING DISTRICTS [1]

RESIDENTIAL, R-150, R-100, R-75, R-50, R-5 AND R-6

b. Permitted Principal Uses

1. Residences. Single family dwellings and other dwellings, as provided in the sections relating to specific zoning districts, are permitted as principal uses. (For conversions, see section **17-145**.)

2. Community residences for the developmentally disabled, community shelters for victims of domestic violence, community residences for the terminally ill and community residences for persons with head injuries shall be a permitted use in all residential districts of the township, and the requirements shall be the same as for single-family dwelling units located within such districts.

3. Cemeteries, golf courses with accessory club house, eating facilities, tennis courts, swimming pools and similar usual accessory structures, public library, public parks and playgrounds, municipal buildings including school bus shelters, fire houses.

4. Farm and agricultural uses including, as accessory uses, horse riding lessons and a farm stand offering facilities for seasonal sale of products or produce in accordance with the township's Right to Farm Ordinance. (Chapter **22** of the Township Code).

5. Model homes are permitted to be used as a sales office within a residential development only during the period necessary for the sale of new homes within that development. In addition to the model homes, the developer of a property with more than 10 dwelling units may be permitted to use one trailer or manufactured home, or modular building or similar structure as a sales office. Where a development contains a mix of dwelling unit types (dwelling unit types are defined as single family homes, and/or townhouses, and/or apartments), the developer may be permitted one sales office, as described above, for each housing type as defined above provided there are more than 10 dwelling units of each housing type, but in any event no more than three such sales offices shall be permitted in any one development regardless of how many dwelling unit types are in the development. Site plan review and approval shall be required for the sales operation area(s) in order to review parking, access, landscaping, the placement of the structures, and plans and guarantees to remove any temporary structures and/or pavement or parking areas upon completion of the sales operation.

c. Permitted Accessory Uses

1. Private garages, swimming pools, parking areas, tennis courts, tree lines, fences, walls, lamp posts, storage structures and animal shelters and similar facilities, which in total occupy less than 10% of the lot, are permitted provided they are accessory and subordinate to the principal use of the lot.

2. One earth communal antenna with an associated reflector (or dish) is permitted on a residential lot only if located either in

USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

Soil Health Management Plan

Conservation Planning Activity 116

The Soil Health Management Plan (SHMP) is used to identify and document soil health resource concerns and develop a transitional cropping management plan to improve overall soil health. The Conservation Planning Activity (CPA) documents the client objectives, assesses benchmark conditions, identifies resource concerns, develops and evaluates alternative actions, and identifies the client's preferred alternative. The plan includes management activities and/or land management practices to address all 4 soil health principles associated with crop and forage production.

Soil Health Management Plan (SHMP) CPA 116 definition: Component of a conservation plan that identifies soil health concerns related to the physical, biological and chemical properties of the soil and identifies conservation practices for use in an adaptive soil health management plan. Soil health is the continued capacity for soil to function as a vital living ecosystem to support plants, animals and humans.

SHMP Purpose and Conditions

A SHMP is used to identify and document soil health resource concerns and develop a traditional cropping management plan to improve overall soil health. The plan includes management activities and/or land management practices to address all four soil health principles associated with crop and forage production. The plan is developed for the following primary purposes:

- Improve soil organic matter levels,
- Reduce compaction,
- Improve soil organism habitat,
- Increase aggregate stability,
- Improve plant productivity and health,
- Reduce sediment transported to surface water,
- Reduce sheet and rill erosion.

SHMP Goals & Objectives

The transitional plan of practices should be developed for at least a 3-year interval that, as much as possible, follows the four principles of soil health:

Minimize soil disturbance:

By reducing tillage, managing irrigation, and controlling traffic to improve soil structure and water infiltration, reduce aggregate breakdown, and protect soil habitat and organic matter.

Maximize soil cover:
Using cover crops and surface residue management to reduce nutrient runoff, buffer soil temperature, reduce evaporation, reduce erosion, reduce aggregate breakdown, protect soil organic matter, and provide habitat for biological organisms.

Maximize biodiversity:
Using diverse crop rotations, multi-species cover crops, and livestock to improve nutrient cycling, break disease cycles, and stimulate below ground activity.

Maximize living roots:
By using cover crops and perennial crops that will provide soil biota a continuous food source.

Table of Contents

SECTION 1: GENERAL INFORMATION

Client Contact Information: *Bellemont Farm, c/o Michael Ehrenreich*
(mailing) 90 Millburn Ave, #206, Millburn, New Jersey 07041
(farm) 22 Vally Road, Lambertville, New Jersey
917-763-7546
me@somalaser.com

Physical Location: *Mercer County, Hopewell Township, Block 57, Lot 4*

Type of Operation: *Bellemont Farm is a farm that offers fresh vegetables, herbs, plants, wood slabs, and pick-your-own pumpkins.*

Total size of Operation: *1.8 ac.*
Acres included in SHMP: *1.8 ac.*

Latitude/Longitude: *Lat. 40.33742* *Long. -74.92147*

Program: **EQIP** **Contract #:** **742B292306D** **County: Mercer**

TSP Certification:
I certify the work completed and delivered for this Conservation Planning Activities (CPA):

- Complies with all applicable Federal, State, Tribal, and local laws and regulations.
- Meets the General and Technical Requirements for this CPA.
- The planned practices are based on NRCS Conservation Practice Standards (CPSs) in the state Field Office Technical Guide where the practices are to be implemented.
- Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.
- Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and participant's objective(s).

Name: John Kluthe TSP#: TSP-18-22247 TSP Expiration Date: 04/04/26
Mailing Address: 64 Norma Road, Hampton, NJ 08827
Phone Number: 908-297-2461 E-Mail: JohnKluthe@KlutheEnvironmental.com

Signature: Date:

Participant Acceptance:
I accept the completed CPA deliverables as thorough and satisfying my objectives.

Participant Signature _____ Date _____

Reviewer Certification:
NRCS administrative review completion by:

Signature _____ Title _____ Date _____

SECTION 2: CONSERVATION ASSISTANCE NOTES & CORRESPONDENCE

aaa 2.a Client Objectives and Operation Description:

Operation Description:

Bellemont Farm is a sustainable, family-owned agricultural enterprise. The farm specializes in the cultivation of fresh vegetables, herbs, various plants, and offers a pick-your-own pumpkin experience for families during the autumn season. The farm's mission is to provide the local community with healthy, high-quality, and sustainably grown produce while fostering a deep connection to nature and the farming experience.

Bellemont Farm is committed to transitioning from conventional farming practices to a regenerative and soil health-focused approach. After meeting their production goals, their primary objective is to enhance soil health, improve overall sustainability, and produce high-quality, nutrient-dense crops while maintaining an authentic connection with the natural ecology of the soil and the farming experience.

Community Supported Agriculture (CSA):

- Establish and maintain a CSA program to provide local residents with regular access to the farm's fresh produce.
- Foster a direct connection between the farm and the community by offering CSA members a share of the seasonal harvest.
- Encourage sustainable and locally sourced food consumption by making CSA memberships an affordable and convenient option for their customers.
- Provide CSA members with exclusive benefits, such as early access to certain crops, educational resources, and farm events, to enhance their farm experience and knowledge.
- Strive to expand the CSA program to serve a growing number of households within the local area, promoting a stronger bond between the farm and its community.

Soil Regeneration and Health:

- Transition from conventional farming practices to regenerative agriculture by implementing techniques such as cover cropping, minimal tillage, and compost application.
- Monitor soil health through regular soil testing to assess improvements in organic matter, microbial diversity, and nutrient content.

Crop Diversity and Resilience:

- Expand crop diversity to include cover crops, legumes, and diverse plant species to improve soil structure and reduce the risk of pests and diseases.
- Utilize companion planting and crop rotation strategies to enhance crop resilience and reduce the need for synthetic pesticides.

Nutrient Cycling and Reduced Chemical Inputs:

- Implement nutrient cycling practices to minimize reliance on synthetic fertilizers and reduce the environmental impact of chemical inputs.
- Encourage the use of organic and natural amendments to enrich the soil and promote healthier plant growth.

Education and Outreach:

- Offer workshops, seminars, and educational resources to the local community, sharing knowledge about soil health, regenerative agriculture, and the importance of sustainable farming practices.
- Engage with local schools, gardening clubs, and organizations to raise awareness about the benefits of soil health-focused farming.

Pick-Your-Own Pumpkin Experience:

- Continue to offer a memorable and family-friendly autumn experience with a well-maintained pumpkin patch.
- Educate visitors about the principles of regenerative agriculture and the positive impact it has on the quality of the pumpkins they pick.

Financial Viability and Efficiency:

- Develop innovative and efficient farming practices to maintain profitability while reducing costs associated with conventional farming inputs.
- Seek funding opportunities and grants to support the transition to regenerative agriculture and soil health improvement.

Local Food Access and Distribution:

- Collaborate with local markets, restaurants, and cooperatives to ensure the availability of our nutrient-dense, sustainably grown produce to the wider community.
- Aim to establish a farm-to-table model that prioritizes local food access and minimizes food miles.

Bellemont Farm is dedicated to the transitioning from conventional agriculture to regenerative and soil health-focused practices. Their commitment to soil health, sustainability, and environmental stewardship will help ensure a healthier planet, nourishing food for our community, and a strong connection between our farm and the land they steward.

2.b Documented Interactions:

7/1/2023

Michael Ehrenreich, the farm employee, and John Kluthe met on-site to discuss prioritizing soil health for the property. Michael wants to invest in soil health for long-term benefits, including increased resilience to climate changes and reduced erosion. Michael's focus was on sustainability and ensuring the land's long-term viability and fertility.

2.c Documented Site Visits:

11/22/2023

Soil samples were taken.

2.d Other Documented Correspondence:

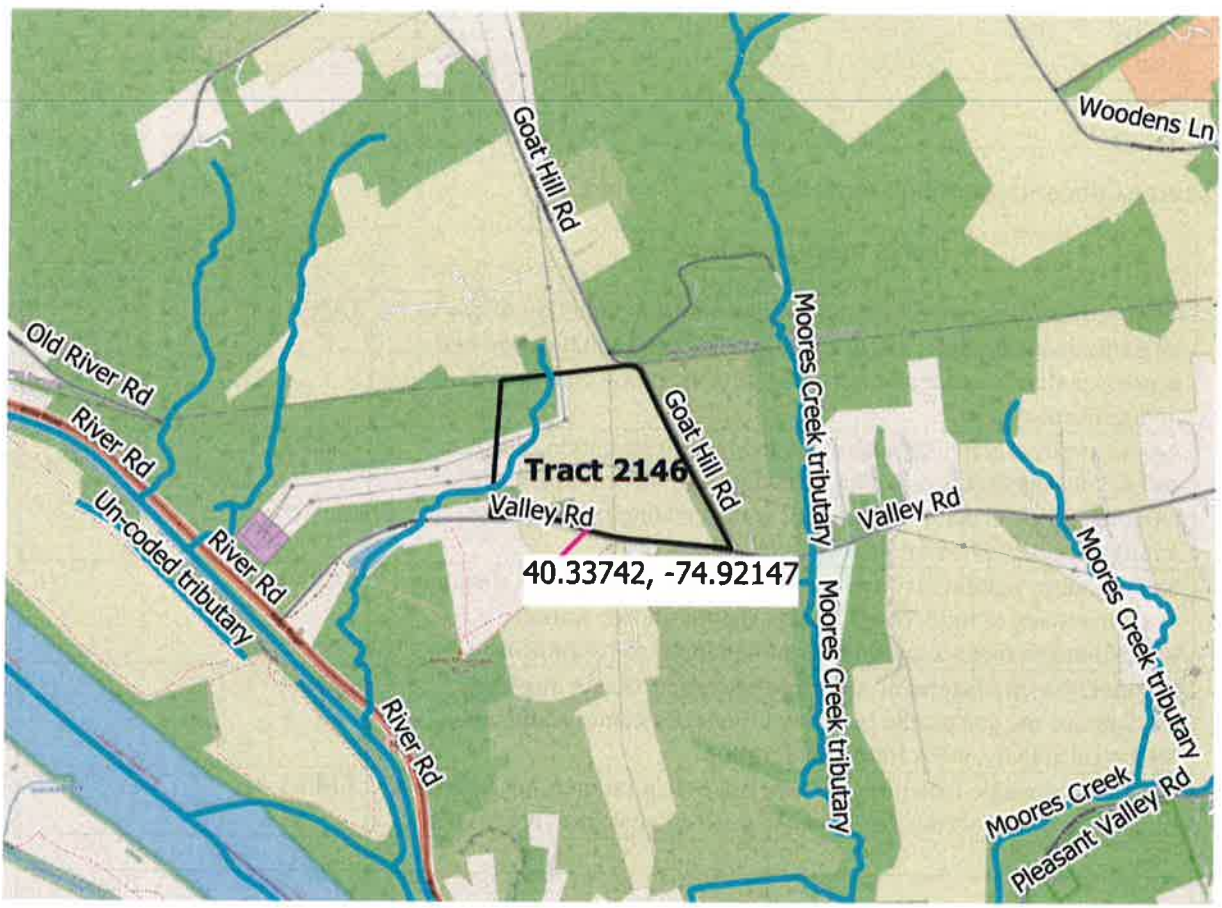
n/a

SECTION 3: MAPS

3.a Location Map for Operation:

Location Map
2023 Soil Health Management Plan
NRCS Code 116/162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District



Legend
- Bellemont Farm
- New_Jersey_Road_Centerlines
- nhdstreams2002

OpenStreetMap

0 0.1 0.2 mi

3.a.i Conservation Plan Map SHMU

Grouping of Farms/Tracts/Fields included in the SHMP: A SHMU can be 1 or more Planning Land Units (PLU) with similar soil type, land use, and management. A SHMU is typically less than 20 acres but may be larger depending on soil type, topography and cropping system.

Land Use Designation	Modifier	Farm(s)	Tract(s)	USDA Field No.	Operator Assigned Field No.	Acres	Planned Land Unit	SHMU Number
Select from dropdown	Select from dropdown	Enter values	Enter values	Enter values		Enter values		Select from dropdown
Crop	----	2316	2146	5	n/a	1.5	PLU 1	CMU 1
Choose an item.	----							

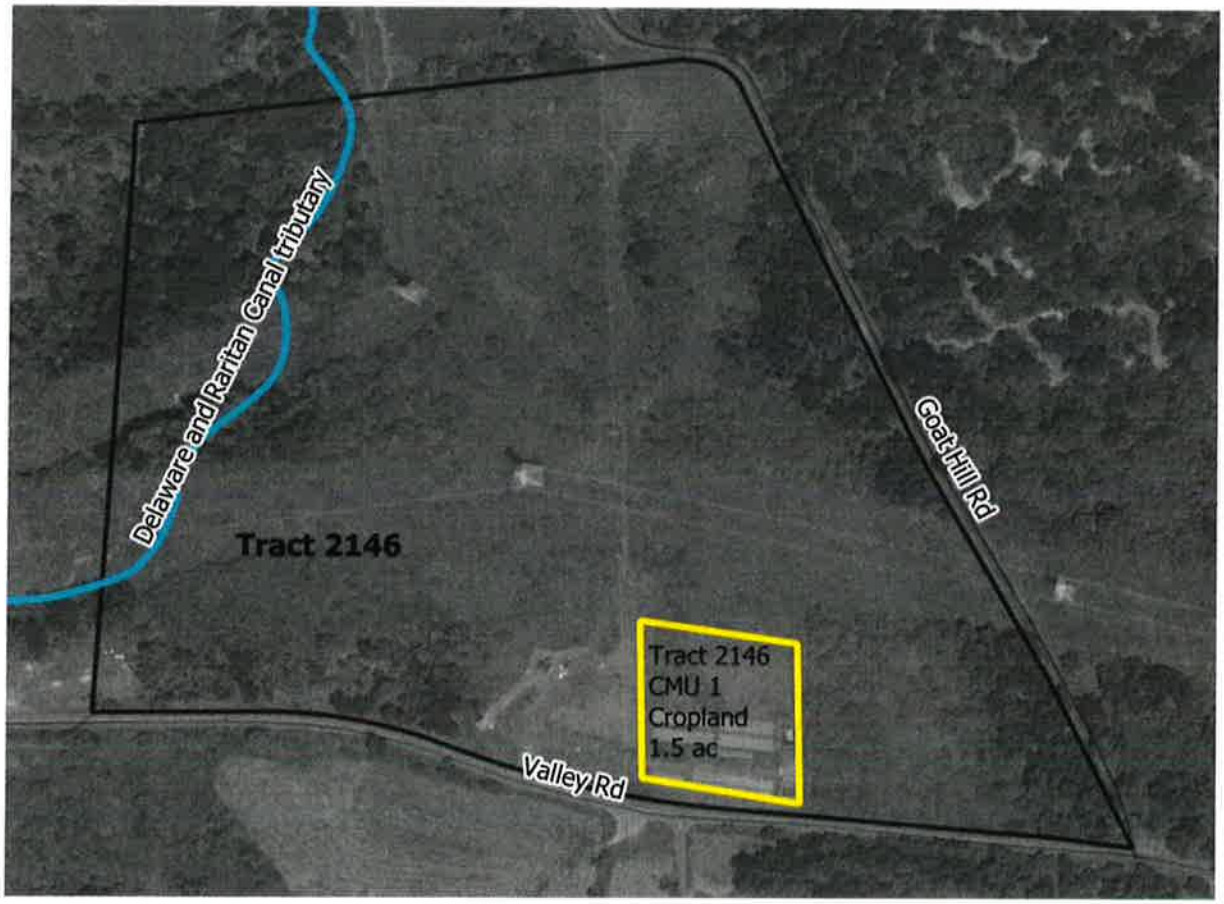
Resource Concerns identified for SHMU

NRCS Resource Concerns	SHMU's Affected
Select from dropdown	Enter all affected CMU's from above
Organic matter depletion- Management-induced depletion of any or all pools of soil organic matter resulting in limited soil function and processes that support plant productivity, biological activity and water and nutrient cycling.	CMU 1
Aggregate instability- Management-induced degradation of water stable soil aggregates resulting in destabilized soil carbon; surface crusting; reduced water infiltration, water holding capacity, and aeration-reduced habitat and soil biological activity.	CMU 1
Soil organism habitat loss or degradation- Quantity, quality, diversity or connectivity of food, cover, space, shelter and/or water is inadequate to meet requirements of beneficial soil organisms.	CMU 1
Compaction- Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, infiltration and aeration.	CMU 1
Naturally available moisture use- Natural precipitation is not optimally managed to support desired land use goals or ecological processes.	CMU 1

3.b. Conservation Plan Map

Conservation Plan Map
2023 Soil Health Management Plan
NRCS Code 116/162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District



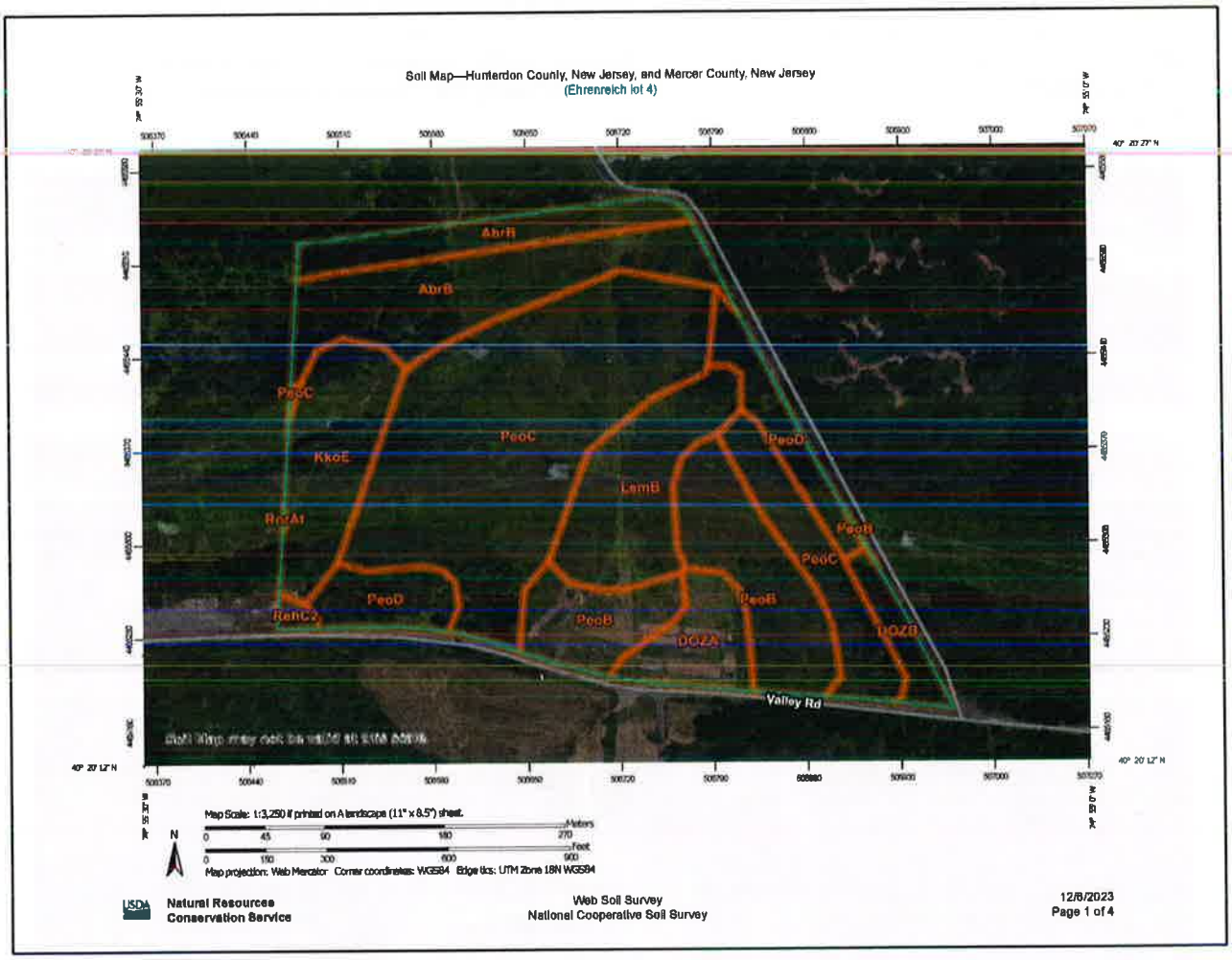
Legend
- Bellemont Farm
- New_Jersey_Road_Centerlines
- nhdstreams2002

Bing

* Land management conservation practices are not currently being implemented.

0 200 400 ft

3.c Soil Maps and Reports



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hunterdon County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

MAP LEGEND

MAP INFORMATION

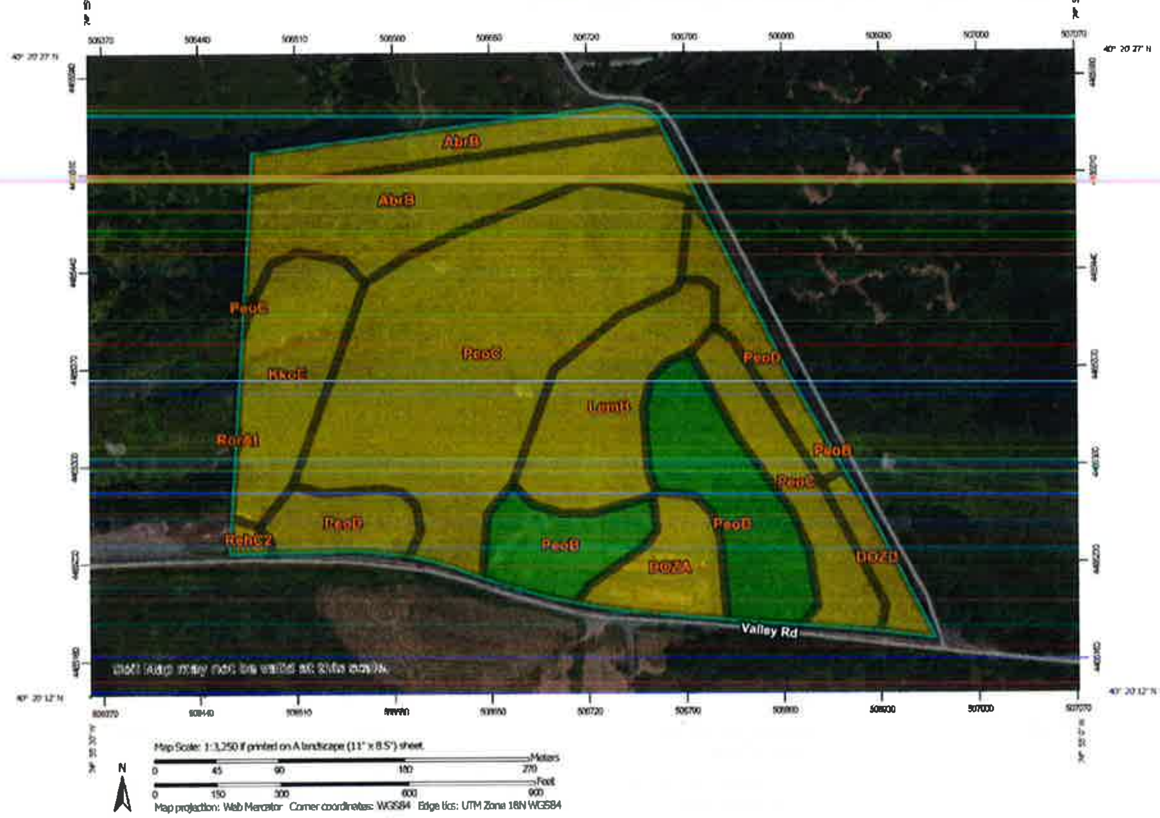
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	1.7	5.2%
Subtotals for Soil Survey Area		**1.7**	**5.2%**
Totals for Area of Interest		**32.6**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	4.0	12.2%
DOZA	Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	1.4	4.4%
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	0.7	2.2%
KkoE	Klinesville channery loam, 18 to 35 percent slopes	2.8	8.5%
LemB	Lehigh silt loam, 2 to 6 percent slopes	3.1	9.4%
PeoB	Penn channery silt loam, 2 to 6 percent slopes	4.5	13.9%
PeoC	Penn channery silt loam, 6 to 12 percent slopes	11.9	36.4%
PeoD	Penn channery silt loam, 12 to 18 percent slopes	2.4	7.3%
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.1	0.4%
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.0	0.0%
Subtotals for Soil Survey Area		**30.9**	**94.8%**
Totals for Area of Interest		**32.6**	**100.0%**

Soil Health Assessment (NJ)—Hunterdon County, New Jersey, and Mercer County, New Jersey
(Ehrenreich lot 4)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Lines
- Poor
- Fair
- Good
- Not rated or not available

Soil Rating Points
- Poor
- Fair
- Good
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hunterdon County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Soil Health Assessment (NJ)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	Fair	Abbottstown (85%)	Available water capacity (0.00)	1.7	5.2%
				Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Restrictive feature (0.00)		
				Soil reaction (0.58)		
			Klinesville (4%)	Soil fertility (0.00)		
				Drainage class (0.00)		
				Restrictive feature (0.00)		
				Available water capacity (0.00)		
				Soil reaction (0.81)		
			Readington (4%)	Available water capacity (0.00)		
				Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.33)		
				Soil reaction (0.40)		
Subtotals for Soil Survey Area					**1.7**	**5.2%**
Totals for Area of Interest					**32.6**	**100.0%**

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	Fair	Abbottstown (85%)	Available water capacity (0.00)	4.0	12.2%
				Soil fertility (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Soil erodibility (0.00)		
				Restrictive feature (0.00)		
				Soil reaction (0.66)		
			Klinesville (4%)	Soil fertility (0.00)		
				Drainage class (0.00)		
				Restrictive feature (0.00)		
				Available water capacity (0.00)		
				Soil reaction (0.81)		
			Readington (4%)	Available water capacity (0.00)		
				Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.33)		
				Soil reaction (0.40)		
DOZA	Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	Fair	Doylestown (80%)	Soil fertility (0.00)	1.4	4.4%
				Drainage class (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.00)		
				Soil reaction (0.58)		
			Reaville, very wet (20%)	Soil fertility (0.00)		
				Drainage class (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.15)		
				Available water capacity (0.99)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	Fair	Doylestown (80%)	Soil fertility (0.00)	0.7	2.2%
				Drainage class (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.00)		
				Soil reaction (0.58)		
			Reaville, very wet (20%)	Soil fertility (0.00)		
				Drainage class (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.15)		
				Available water capacity (0.99)		
KkoE	Klinesville channery loam, 18 to 35 percent slopes	Fair	Klinesville (85%)	Available water capacity (0.00)	2.8	8.5%
				Drainage class (0.00)		
				Slope (0.00)		
				Restrictive feature (0.00)		
				Soil reaction (0.81)		
			Abbottstown (4%)	Available water capacity (0.00)		
				Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Slope (0.00)		
				Restrictive feature (0.00)		
			Readington (4%)	Available water capacity (0.00)		
				Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Slope (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Clay content (0.33)		
			Penn (3%)	Slope (0.00)		
				Soil fertility (0.47)		
				Soil reaction (0.58)		
				Available water capacity (0.69)		
				Clay content (0.76)		
LemB	Lehigh silt loam, 2 to 6 percent slopes	Fair	Lehigh (85%)	Soil fertility (0.00)	3.1	9.4%
				Soil erodibility (0.00)		
				Available water capacity (0.02)		
				Clay content (0.78)		
			Chalfont (4%)	Available water capacity (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.27)		
				Soil fertility (0.47)		
				Soil reaction (0.58)		
			Reaville, very wet (3%)	Drainage class (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.00)		
				Restrictive feature (0.00)		
				Soil fertility (0.42)		
PenB	Penn channery silt loam, 2 to 6 percent slopes	Good	Penn (85%)	Soil fertility (0.47)	4.5	13.9%
				Soil reaction (0.58)		
				Available water capacity (0.69)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Clay content (0.76)		
PeoC	Penn channery silt loam, 6 to 12 percent slopes	Fair	Penn (85%)	Slope (0.00)	11.9	36.4%
				Soil reaction (0.20)		
				Clay content (0.46)		
				Soil fertility (0.46)		
				Available water capacity (0.69)		
			Reaville (5%)	Soil erodibility (0.00)		
				Slope (0.00)		
				Available water capacity (0.00)		
				Restrictive feature (0.00)		
				Soil fertility (0.05)		
			Readington (5%)	Soil fertility (0.00)		
				Soil erodibility (0.00)		
				Clay content (0.06)		
				Soil reaction (0.66)		
				Available water capacity (0.93)		
			Klinesville (5%)	Drainage class (0.00)		
				Slope (0.00)		
				Restrictive feature (0.00)		
				Available water capacity (0.00)		
				Soil reaction (0.81)		
PeoD	Penn channery silt loam, 12 to 18 percent slopes	Fair	Penn (85%)	Slope (0.00)	2.4	7.3%
				Soil fertility (0.47)		
				Soil reaction (0.58)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Available water capacity (0.69)		
				Clay content (0.76)		
			Bucks (5%)	Available water capacity (0.00)		
				Soil erodibility (0.00)		
				Slope (0.00)		
				Soil reaction (0.40)		
				Soil fertility (0.50)		
			Reaville (5%)	Soil erodibility (0.00)		
				Slope (0.00)		
				Available water capacity (0.00)		
				Restrictive feature (0.00)		
				Soil fertility (0.05)		
			Klinesville (5%)	Drainage class (0.00)		
				Slope (0.00)		
				Restrictive feature (0.00)		
				Available water capacity (0.43)		
				Soil reaction (0.58)		
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	Fair	Reaville, eroded (85%)	Soil erodibility (0.00)	0.1	0.4%
				Available water capacity (0.00)		
				Slope (0.00)		
				Restrictive feature (0.00)		
				Soil fertility (0.05)		
			Bucks, eroded (5%)	Available water capacity (0.00)		
				Soil erodibility (0.00)		
				Slope (0.00)		

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
				Soil reaction (0.40)		
				Soil fertility (0.50)		
			Penn (5%)	Slope (0.00)		
				Soil fertility (0.47)		
				Soil reaction (0.58)		
				Available water capacity (0.69)		
				Clay content (0.76)		
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	Good	Rowland, frequently flooded (85%)	Soil erodibility (0.00)	0.0	0.0%
				Soil fertility (0.56)		
				Available water capacity (0.69)		
				Clay content (0.71)		
				Soil reaction (0.81)		
Subtotals for Soil Survey Area					**30.9**	**94.8%**
Totals for Area of Interest					**32.6**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Fair	28.1	86.1%
Good	4.5	13.9%
Totals for Area of Interest	**32.6**	**100.0%**

Description

The State of New Jersey consists of approximately 4.7 million acres. Only 15 percent of this acreage is under farm operation, with an average farm size of 79 acres (USDA-NASS, 2016). The State has a diverse population of approximately 8.9 million people. The number of people increases the pressure on and intensity of farm production. Plant diversity is reduced in order to supply the demand for fresh produce. As a result, the soils quality and natural productivity may be reduced, making the addition of chemicals necessary. It is possible to measure changes in soil condition if an initial assessment is developed prior to the implementation of mechanisms to improve the soil. The changes can be measured by creating a soil condition level or index using soil properties (Sojka and Upchurch, 1999). In creating a soil index, it is importance to select soil properties that provide information on how the soil functions (Karlen et al., 2003). The purpose of this interpretation is to develop a soil health assessment that utilizes dynamic and inherent soil properties to evaluate the relative productive capacity of a soil and that can be used during the process of introducing a comprehensive conservation plan.

Interpretation summary:

The soil survey interpretation for soil health assessment is made to provide guidance to users on a soils condition for potential crop production. The soil health assessment measures the soils potential to sustain crop production without becoming degraded. The use of a rating guide can provide the user with a means to select potential sites for further field evaluation. Final site evaluation and selection require an onsite inspection to determine the suitability and quality of the soil materials for the intended purpose. Implementation of these interpretations helps to minimize the need for excessive random exploratory investigation by pinpointing potential sites.

A soil can be a non-member, partial member, or complete member of the set of soils that contain a combination of inherent soil properties appropriate for good soil health. If a soil property within 46 cm of the soil surface has a membership index greater than zero, then that property contributes to the soil's index. The soil property contributing the least is identified as the soil feature making this soil less than desirable.

Soils are placed into suitability rating classes according to their rating assessment. Soils in the "good" class (rating assessment greater than 0.8) have dynamic and inherent properties that are suitable for microbial activity, water holding, and nutrient availability to plants. Soils in the "fair" class (rating assessment greater than 0.4 and less than or equal to 0.8) require some management to improve their dynamic properties and overall soil health. Soils in the "poor' class (rating assessment less than or equal to 0.4) are depleted of nutrients, have minimal biological activity, and require management to improve their dynamic properties.

Description:

Generally, the upper part of the soil, which is richest in organic matter, is most desirable for physical, chemical, and biological activity. In this assessment, the upper 46 cm of soil material is evaluated as the root zone for use as topsoil.

Scope: Statewide

Criteria used:

1. Available water capacity: A low or high soil capacity to deliver water to plants limits vegetative growth of some plant species. Soil feature considered is the available water capacity between depths of 0 and 46 cm (0 and 18 inches) or above the first restrictive layer.

2. Electrical conductivity: High salinity in soil affects the soil-water balance, which in turn restricts plant growth and re-establishment of vegetation. Soil feature considered is the salinity (electrical conductivity) between depths of 0 and 46 cm (0 and 18 inches) or above the first restrictive layer.

3. Clay content: A low or high clay content in the soil affects the availability of nutrients and water to plants and the soils microbial community.

4. Soil reaction: A low or high soil pH negatively affects nutrient availability and microbial activity, which in turn restrict plant growth and re-establishment of vegetation. Soil feature considered is the pH between depths of 0 and 20 cm (0 and 8 inches) or above the first restrictive layer.

5. Cation-exchange capacity: Low CEC in the soil limits the soils potential for sequestering heavy metals and other potential pollutants; however, high CEC in the soil has the potential to negatively impact pH and the nutrient-buffering capacity.

6. Drainage class: A low or high seasonal water table in the soil limits vegetative growth of some plant species. Soil feature considered is the drainage class.

7. Soil erodibility factor: Soils with a high erodibility factor have long-term soil loss from sheet and rill erosion, which restricts plant growth and re-establishment of vegetation. Soil feature considered is the soil erodibility factor for the whole soil (Kw) between depths of 0 and 46 cm (0 and 18 inches) or above the first restrictive layer.

8. Soil slope: Steep slopes may increase soil erosion, reduce water infiltration, and increase transport of fine particles and nutrients. Soil feature considered is the component slope.

9. Soil surface texture: Soil texture influences drainage class, water-holding capacity, organic matter content, cation-exchange capacity, soil reaction, and gas exchange.

10. Restrictive feature: Depth to first restrictive feature affects the volume of material suitable for plant growth. Soil feature considered is the depth to the top of the first restrictive layer between depths of 0 and 61 cm (0 and 24 inches).

References:

Karlen, D.L., C.A. Ditzler, and S.S. Andrews. 2003. Soil quality: Why and how? Geoderma 114:145-156.

Soika, R.E., and D.R. Upchurch. 1999. Reservation regarding the soil quality concept. Soil Science Society of America Journal 63:1039-1054.

U.S. Department of Agriculture, National Agricultural Statistics Service. 2016. State agriculture overview. Available at: https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=NEW JERSEY.

Rating Options

Aggregation Method: Dominant Condition

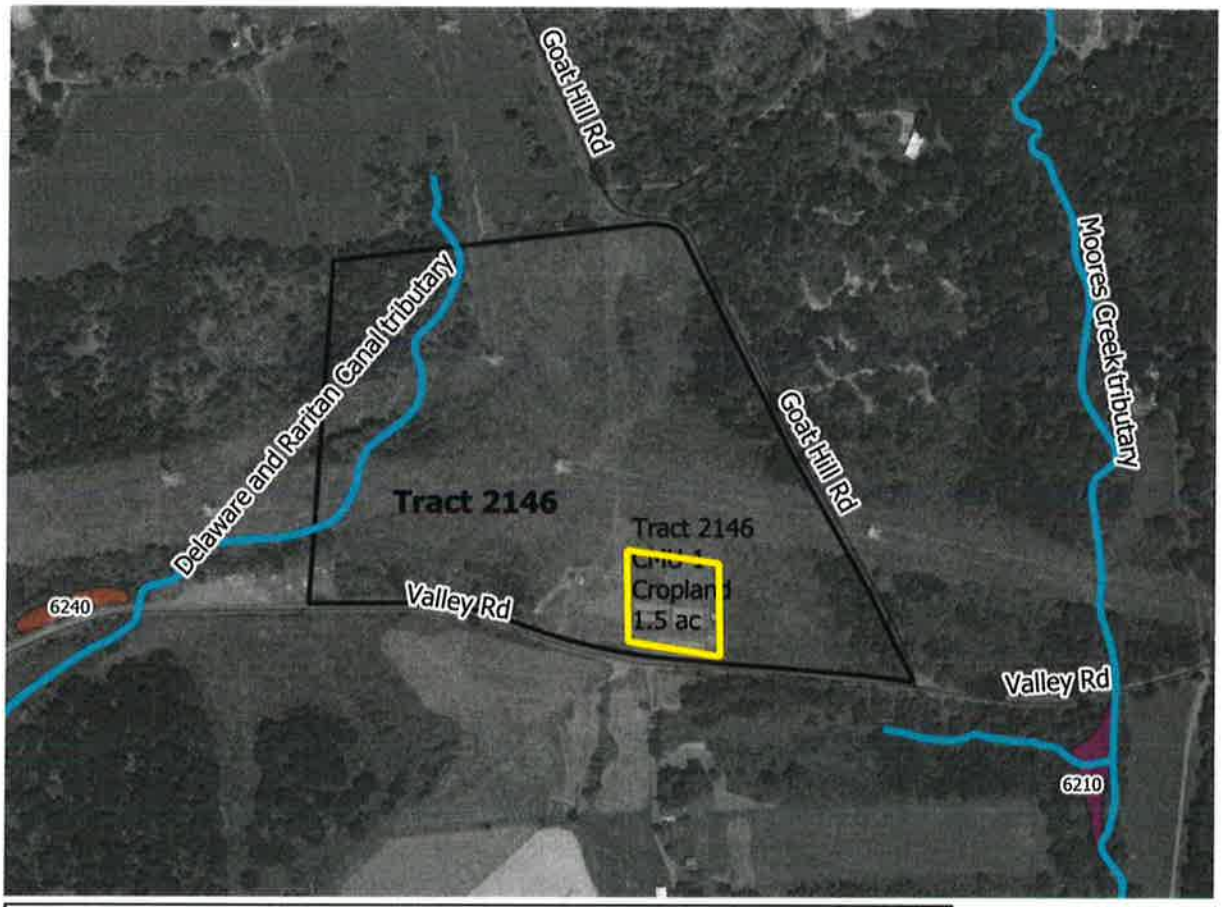
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

3.d Other Supporting Maps

Wetland and Water Resources Map
2023 Soil Health Management Plan
NRCS Code 116/162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District



Legend

- Bellemont Farm
- New_Jersey_Road_Centerlines
- nhdstreams2002
- Category_One_(C1)_Waters_of_NJ
- 2012 LandUse LandCover Wetlands
- DECIDUOUS WOODED WETLANDS
- HERBACEOUS WETLANDS
- Bing

0 200 400 ft

SECTION 4: CONSERVATION PLAN

Currently, land management conservation practices are not implemented on this farm. Practices like Crop Rotation (328), Cover Crop (340), and Contour Farming (330) are anticipated.

This operation currently implements a crop rotation based on vegetables the should or should not follow one another. The crop rotation is not based on soil conservation or soil health principles. The conservation practice, Crop Rotation (328), is anticipated to be a goal of this plan. But instead of specific crops, Crop Rotation (328) will be planned for vegetable crop seasonality; and it will support Cover Crop (340).

Cover crops will also be planned to lengthen the amount of time that living roots are in the soil. Cover Crop (340) will also be based on the vegetable crop seasonality.

It would be ideal if this plan is also able to implement Residue and Tillage Management Reduced Tillage (345) as the practice significantly contributes to enhancing soil health.

The current cropping system does little to intentionally minimize soil disturbance or maximize soil cover or living roots. Biodiversity is achieved by the wide variety of vegetable crops that are produced. By also implementing the conservation practices described above, the farm will benefit soil health by minimizing soil disturbance, maximizing soil cover, biodiversity, and living roots.

- Minimize soil disturbance:
    - Soil disturbance is above the STIR threshold of 20; 70.6.
    - Supports soil aggregate development
        - * this is the primary improvement that your soil structure needs for improved soil quality.
    - Protects soil habitat
    - Protects soil organic matter
- Maximizes soil cover
    - This goal is achieved by increasing the months of the year that the soil is covered with either living plants or non-living mulch/residue.
        - Under the current management (2023 and prior), the field is covered by residue or crops for four months of the year; July through October.
        - This category can be extended by implementing cover crops. Ensure they are planted early in the fall to achieve maximum growth prior to slower growing conditions of winter.
    - Nutrient runoff will be reduced (slight benefit over current system)
    - Buffer soil temperature
    - Reduce evaporation
    - Reduce erosion
    - Reduce aggregate breakdown
    - Protect soil organic matter
    - Provide habitat for biological organisms during much more of the calendar year.
- Maximize biodiversity
    - On an annual basis there is very little biodiversity in this system; corn 2x and soybeans.
        - Implementing a diverse mix of cover crops into the rotation can increase the biodiversity of the field. To achieve maximized biodiversity, cover crops can be grown

during the summer season within the crop rotation, which provides a healthy break from the standard corn/soybean rotation.
    - Use diverse crop rotations and multi-species cover crops to improve nutrient cycling, break disease cycles, and stimulate below ground activity.
- Maximize living roots
    - Living roots are currently present (2023 and prior) only during the summer cropping season.
        - Living roots can be maximized in the soil profile by implementing a cover crop in the fall/winter/spring seasons or by including a winter crop, such as wheat.
    - By using cover crops and perennial crops that will provide soil biota a continuous food source.

Implementing conservation practices like Conservation Crop Rotation (328), Residue and Tillage Management Reduced Tillage (345), and Cover Crop (340) work in conjunction with one another to keep soil erosion at a minimum and increase organic matter in the soil profile. These actions will reduce soil compaction and increase aggregate stability over time.

4.a PLU and/or SHMU label:

In a vegetable production system that incorporates plastic mulch, the following components and practices are commonly used:

1. Site Preparation: Clearing debris, tilling the soil, and addressing weed issues are the first steps in preparing the field for planting.

2. Plastic Mulch Installation: The farm often lay plastic mulch sheets, especially for summer crops, made of polyethylene, over the prepared soil surface. These sheets aid in weed control.

3. Drip Irrigation System: A drip irrigation system is often installed beneath or on top of the plastic mulch to deliver water efficiently to plant roots, conserving water and minimizing weed growth. Irrigation is a future goal for this farm; for now, watering is conducted by hand.

4. Planting Holes: The farmer creates planting holes or slits in the plastic mulch, facilitating the insertion of seedlings or sowing seeds at precise intervals for uniform spacing.

5. Raised Beds: Plastic mulch commonly covers raised beds, providing an elevated planting area. Raised beds enhance drainage, warm the soil, and create an optimal environment for root development.

6. Weed Suppression: Plastic mulch serves a primary purpose in weed suppression by blocking sunlight, reducing competition for nutrients and water.

7. Temperature Regulation: Plastic mulch absorbs and retains solar heat, creating a warmer microclimate around the plants. This benefits heat-loving crops and extends the growing season.

8. Soil Moisture Conservation: The mulch minimizes evaporation, ensuring consistent soil moisture and an adequate water supply for the crops.

9. Nutrient Management: In irrigated systems, fertilizers can be precisely applied through the drip irrigation system, allowing growers to control nutrient delivery to the plant roots.

10. Crop Rotation: The farm often practices crop rotation alongside plastic mulch to minimize disease and pest pressure; a production practice in this case.

11. Plastic Mulch Removal: At the end of the growing season, the grow removes and disposes of the plastic mulch.

4.b Existing Conservation Practices:

n/a

4.c Operation Equipment Inventory:

Rototiller:

The farm employs a rototiller as a key tool in its cultivation practices. The rototiller serves as a versatile implement for soil preparation, effectively breaking up and aerating the soil to create a conducive environment for planting. This mechanized tillage method helps in incorporating organic matter, loosening compacted soil, and facilitating the mixing of nutrients, promoting overall soil health. The use of a rototiller enhances seedbed preparation, contributing to optimal conditions for seed germination and subsequent crop growth. Additionally, the rototiller aids in weed control by disrupting weed growth and reducing competition for nutrients. Its versatility and efficiency make it an essential component in the farm's equipment arsenal, supporting sustainable and productive agricultural practices.

However, it's important to note that while the rototiller plays a significant role in soil preparation, its repeated use can have adverse effects on soil health. The constant disruption caused by tilling may lead to the breakdown of soil structure and the depletion of organic matter. Over time, this can result in increased soil erosion, reduced water retention capacity, and heightened vulnerability to nutrient loss. Excessive tilling may disturb beneficial soil organisms and disrupt the natural microbial balance essential for soil fertility. As the farm seeks to balance the benefits of the rototiller with sustainable soil management practices, careful consideration is given to minimizing its usage and exploring alternative methods that promote long-term soil health and resilience.

4.d Existing Nutrient Strategies:

The farm employs a customized nutrient management approach that prioritizes the individual needs of each plant. Without relying on calculated nutrient requirements, the strategy involves the application of Fertell 3-4-3, fish plant food 5-1-1, and granular organic super lawn 3-2-3 directly at the roots of every plant. In addition to these targeted nutrient sources, lime is strategically introduced at each plant site to promote optimal soil pH. This hands-on method ensures that each crop receives a tailored nutrient mix that has resulted in robust growth and vitality without strictly adhering to pre-determined nutrient calculations. The farm's commitment to this personalized nutrient management approach aims to maximize plant health and productivity while maintaining a focus on sustainability.

Epsom salt is also used on the farm. Scientifically known as magnesium sulfate, it serves as a beneficial fertilizer due to its content of magnesium and sulfur. When applied to soil, Epsom salt provides essential nutrients that contribute to plant health and development. Magnesium is a crucial component in chlorophyll, aiding in photosynthesis and overall plant energy production, while sulfur plays a vital role in enzyme formation and nutrient uptake. As a fertilizer, Epsom salt helps address magnesium and sulfur deficiencies in plants, promoting robust growth, improved nutrient absorption, and overall enhanced plant vitality.

4.e Existing Pest Management Strategies:

Pesticides Typically Utilized:
Dr. Bonner's peppermint – pure-castile liquid soap (diluted)

Active Ingredient	Product Trade Name	EPA Registration #	Rate	Method of Application aerial or ground (Incorporated, foliage, capsule)	Link to Label
BORAX	Borax - 20 Mule Team	n/a	unknown	foliar	Product Information Safety Data Sheet
Acetic acid 30%	Vinegar 30%	n/a	Unknown	foliar	Safety Data Sheet 1 Safety Data Sheet 2
Neem oil	Neem oil	09377100001	Standard	foliar	Safety Data Sheet
None	Dr. Bronner's All-One Castile Peppermint Soap	n/a	Standard	Foliar	Safety Data Sheet

4.f Soil Amendments Used in the Operation:

Lime is applied at the site of plant roots at variable rates.

4.g Livestock Management Details:

Livestock is not part of this operation.

4.h Conservation Practices and activities for applied and planned practices, with estimated amount planned or applied, and a brief description of the planned conservation practice narratives. See Conservation Practice Tables below for examples of common primary and supporting practices.

Tract Number	PLU (Field) # and/or SHMU label	Practice Code	Practice Name	Planned Amt	Practice Units	Planned Date
2146	CMU 1	340	Cover Crop	1.5	Ac	Oct 1-30, 2024
Description: Plant multi-species grasses, legumes, and forbs for seasonal vegetative cover to improve soil aggregate stability, increase soil biotic activity during winter months, and reduce compaction.						
2146	CMU 1	328	Conservation Crop Rotation	1.5	Ac	May 1-30, 2024
Description: A planned sequence of crops grown on the same ground over a period of time (i.e. the rotation cycle). To meet minimum soil health criteria, a positive SCI must be achieved.						
2146	CMU 1	345	Residue and Tillage Management, Reduced-till	1.5	Ac	May 1-30, 2024
Description: Manage the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round while limiting soil-disturbing activities to meet or exceed a positive SCI rating and a STIR value below 80.						

Code	Primary Practice Name
216	Soil Testing
327	Conservation Cover
328	Conservation Crop Rotation
329	Residue and Tillage Management, No-Till
334	Controlled Traffic Farming
340	Cover Crop
345	Residue and Tillage Management, Reduced-Till
484	Mulching
449	Irrigation Water Management
512	Forage and Biomass Planting
528	Prescribed Grazing
550	Range Planting
590	Nutrient Management
595	Pest Management Conservation System
610	Salinity & Sodic Soil Management
808	Soil Carbon Amendment

Code	Supporting Practice name
314	Brush Management
315	Herbaceous Weed Treatment
324	Deep Tillage*
330	Contour Farming
333	Amending Soil Properties with Gypsum Products
338	Prescribed Burning
342	Critical Area Planting
382	Fence
394	Firebreak
516	Pipeline
548	Grazing Land Mechanical Treatment
561	Heavy Use Area Protection
574	Spring Development
575	Animal Trails and Walkways
580	Streambank and Shoreline Protection
614	Watering Facility
642	Water Well

4.i. Conservation Practice Overview:

Conservation Crop Rotation (328)

Source: NJ NRCS Conservation Practice Standard, Conservation Crop Rotation, August 2015

Conservation Crop Rotation (328) is a planned sequence of crops grown on the same ground over a period of time (the rotation cycle). This practice is applied to CMU 1 to support the following purposes: maintain or increase soil health and organic matter content. This practice goes beyond the agronomic reasons to use a crop rotation: i.e., help with the management of diseases, weeds and insect pests; benefits to plant nutrition; and support of healthy soil principals.

Criteria to Maintain or Increase Soil Health and Organic Matter Content

Grow crops that will produce a positive trend in the Organic Matter (OM) subfactor value over the life of the rotation, as determined by the Soil Conditioning Index. Make appropriate adjustments for additions to or subtractions from biomass.

Operation And Maintenance

Maintain the existing conservation crop rotation by following this Operation and Maintenance plan:
Rotations shall provide for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons. Acceptable substitutes are crops having similar properties that will accomplish the purpose of the original crop.
Evaluate the rotation and the crop sequence to determine if the planned system is meeting the planned purpose.

Residue and Tillage Management, Reduced Tillage (345)

Source: NJ NRCS Conservation Practice Standard, Residue and Tillage Management, Reduced Tillage, October 2017

Residue and Tillage Management, Reduced Tillage (345) is managing the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting. This practice is used to reduce sheet, rill, and wind erosion and excessive sediment in surface waters and to improve soil health and maintain or increase organic matter content. Additional benefits include reduction of tillage-induced particulate emissions and reduced energy use.

In order to meet the NRCS conservation planning criteria for the practices the soil condition index (SCI) must be positive, and the Soil Tillage Intensity Rating (STIR) value must be below 80. These ratings can be accomplished by continuing to implement Conservation Crop Rotation (328) and Residue and Tillage Management (345) and by beginning to implement Cover Crop (340). Current calculations predict that the soil loss will be 1.9 T/ac, the SCI will be 0.61, and the STIR will be 11.8. See the enclosed RUSLE2 reports for specific information.

Carbon loss is directly related to the volume of soil disturbed, intensity of the disturbance and soil moisture content, and soil temperature at the time the disturbance occurs. The following guidelines can make this practice more effective:

- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical slot created by these implements is closed at the surface.
- Planting with a single disk opener no-till drill will release less CO2 and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50° F will oxidize less organic matter and release less CO2 than operations done when the soil is warmer.
- Maximizing year-round coverage of the soil with living vegetation and/or crop residues builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation.
- Use a diverse crop rotation by incorporating multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) into the crop rotation.
- Plant a cover crop after every cash crop in the rotation. Multispecies cover crop mixes provide greater benefits than single-specie cover crops.
- Using undercutting tools rather than burying tools will enhance accumulation of organic material in the surface layer.

Conducting any soil-disturbing field operation when soil moisture is optimal, neither excessive nor too dry, will help maintain soil tilth, and reduce the need for additional tillage in the future.

Operation And Maintenance

Evaluate/measure the crop residue cover and orientation for each crop to ensure the planned amounts and orientation are being achieved. Adjust management as needed to either plan a new residue amount or orientation; or adjust the planting, tillage, or harvesting equipment. If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue prior to planting so it does not interfere with planter operation.

SECTION 5: RESOURCE INVENTORY AND ASSESSMENT DOCUMENTATION

5.a Soil Health Testing Results

Standard NRCS Soil Health Tests

1. Active carbon measured by permanganate oxidation (POXC_mgPERkg)
   - Active Carbon, also known as POXC when measured by permanganate oxidation, is a soil health indicator of available carbon and represents the amount of microbial food available.
2. Soil organic carbon content measured by dry combustion (PercOrgC)
   - Soil Organic Carbon is a soil health indicator for carbon storage and soil organic matter cycling and is analyzed by high-temperature, dry combustion of soil.
3. Wet macro-aggregate stability measured using ARS or NRCS methods or by sprinkle infiltrometer (PercAgg)
   - Wet aggregate stability is a method of testing how well soil aggregates resist breaking apart under water pressure, which indicates the size and amount of water-stable aggregates.
4. Respiration using 1, 2, 3 or 4-day incubation (Resp_mgCO2PERgSoil)
   - Respiration is analyzed as a soil health indicator of microbial activity and measured by the amount of carbon dioxide gas released from a soil sample over a period of 1 to 4 days.
5. Bioavailable nitrogen measured by ACE Protein method (Protein_gPERkgSoil)
   - ACE Protein (Autoclaved Citrate Extractable Protein) is a soil health indicator method that measures the amount of protein-like substances in soil organic materials, which indicates the amount of nitrogen potentially available for plants and microorganisms.

Name	POXC mgPERkg	Score	Perc OrgC	Score	Perc Agg	Score	Resp mgCO2PERgSoil	Score	Protein gPERkgSoil	Score
CMU 1	614.6	H	2.18	L	39.1	M	0.431	L	8.7	H-VH

VL = very low, L = low, M = medium, H = high, VH = very high

Waypoint ANALYTICAL

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SOIL ANALYSIS

Client Information:
Kluthe Environmental Solutions
64 Norma Road
Hampton , NJ 08827

Grower :
Bellemont

Field Id:

Report No: 23-333-0578
Cust No: 15750
Date Printed: 11/30/2023
Page : 1 of 1
Agronomist: BLK
Date Received : 11/29/2023

	Sample Id	Organic Matter %	CEC meq/100g	pH	Buffer pH	P ppm	K ppm	Ca ppm	Mg ppm	S ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Na ppm		Calculated Cation Saturations %K	%Ca	%Mg	%H	%Na
1	CMU1		9.5	6.7	6.41	107	127	1351	195									3.4	71.1	17.1	8.4	
Average :			9.5	6.7	6.41	107	127	1,351	195													

Comments:

Analysis prepared by: Waypoint Analytical Pennsylvania, Inc.

Very Low | Low | Medium | Optimum | Very High

Cropland In-Field Soil Health Assessment Worksheet

Soil Health Resource Concerns
CPT: Compaction
SOM: Soil Organic Matter Depletion
AGG: Aggregate Instability
HAB: Soil Organism Habitat Loss or Degradation
Location 22 Valley Rd. Lambertville NJ
Field/CMU 1
Tract # 2146
Client/Customer Bellemont Farm Michael Ehrenreich
Plan SHMP 2023
Date 11/22/2023
Soil Map Units PeoB, LemB, DozA
Soil Moisture higher than field capacity
Surface Horizon Texture silt loam

Indicator Timing and Use Anytime | After Rain or Irrigation | With Adequate Moisture | Before a Tillage Event Primarily No-Till Systems | Before Growing Season | During Growing Season | Interview	Meets Assessment Criteria (Yes/No)
Soil Cover | **SOM, AGG, HAB** • Surface cover from plants, residue or mulch; cover greater than 75% (estimated)	☐ Y ☒ N
Residue Breakdown | **SOM, HAB** • Natural decomposition of crop residues or organic mulch is as expected with crop and conditions	☐ Y ☒ N
Surface Crusts | **AGG, HAB** • Crusting on no more than 5% (estimated) of the field/CMU	☒ Y ☐ N
Ponding/Infiltration | **CPT, AGG** • No ponding on non-hydric soils within 24 hours following typical rainfall or surface irrigation event; • OR, no infiltration difference between assessment area and fencerow sample in the same soil type; • OR, soil infiltrates 1-inch of water in 30 minutes or less	☒ Y ☐ N
Penetration Resistance | **CPT** • Penetrometer rating <150 psi within top 6-inch depth and <300 psi in the 6 to 18-inch depth; • OR, slight or no resistance with wire flag inserted to 12-inches	☒ Y ☐ N
Water-Stable Aggregates | **CPT, SOM, AGG, HAB** • Strainer: soil structure remains intact with aggregates apparent; • OR, Soil Quality Test Kit (SQTK)/Jornada slake box meets stability class 5 to 6; • OR, Cylinder: At least 80% (estimated) remains intact after 5 minutes with little cloudy water	☐ Y ☒ N
Soil Structure | **CPT, SOM, AGG, HAB** • Granular surface soil structure and no platy or massive structure in top foot of soil	☐ Y ☒ N
Soil Color | **SOM** • No color difference between assessment area and fencerow sample in same soil type; • OR, value is on the darker range using color chart and official series description	☒ Y ☐ N
Plant Roots | **CPT, SOM, AGG, HAB** • Roots covered in a soil film (rhizosheaths) or are part of soil aggregates; • OR, living roots if present are healthy, fully branched, extended and unrestricted	☒ Y ☐ N
Biological Diversity | **SOM, AGG, HAB** • Evidence of more than 3 different types of organisms observed or biological hotspots present	☐ Y ☒ N
Biopores | **SOM, AGG, HAB** • Presence of multiple intact root or earthworm channels that extend vertically through the soil with some connecting to the surface	☒ Y ☐ N

Version 1.3

5.c Pasture Condition Score Sheet

N/A

5.d Soil Erosion Prediction with SCI and STIR

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Bellemont Farm – typical cropping system – "benchmark" scenario - prior to soil health planning.

This scenario uses a "typical" system to demonstrate the likely soil loss on a complex vegetable field. It is intended to demonstrate a reasonable estimate of soil loss. RUSLE2 Strip Builder 010809 was used to generate the calculation.

The scenario considers vegetable beds that have been rototilled then laid with plastic mulch. The scenario also considers that there is a grassed strip between each vegetable bed.

File: profiles\default
Access Group: R2_NRCS_Fld_Office

Inputs:

Location	*Soil*	*Slope length (horiz)*	*Avg. slope steepness, %*
USA\New Jersey\Mercer County	SSURGO\Mercer County, New Jersey\PeoB Penn channery silt loam, 2 to 6 percent slopes\Penn Channery silt loam 85%	150	4.0

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 59\a.Single Year/Single Crop Templates\NEW FORAGES\Central Northeast FPZ\Orchardgrass and clover\Orchardgrass and clover, continuous seasonal grazing	vegetations\New Forages\Central Northeast\Orchardgrass and clover, Central Northeast	lb	10000
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_typical_system	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_typical_system	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_typical_system	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_typical_system	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_typical_system	vegetations\Tomato, fresh mkt staked	cwt	300

Contouring	*Strips/barriers*	*Diversion/terrace, sediment basin*	*Subsurface drainage*	*Adjust res. burial level*	*General yield level*	*Rock cover, %*
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Base yield	0

Outputs:

T value	*Soil loss erod. portion*	*Detachment on slope*	*Soil loss for cons. plan*	*Sediment delivery*	*Net C factor*	*Net K factor*	*Crit. slope length*	*Surf. cover after planting, %*
2.0	6.8	5.5	3.9	1.6				

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
1/1/0	Begin growth	New Forages\Central Northeast\Orchardgrass and clover, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		90
4/10/0	Rototiller, on beds		0.33
4/20/0	Fert applic. surface broadcast		0.29
4/28/0	Plastic mulch applicator 75 percent cover		0.33
4/28/0	Planting, manual	Tomato, fresh mkt staked	0.33
5/20/0	Sprayer, insecticide post emergence		0.23
6/15/0	Sprayer, insecticide post emergence		0.14
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	0.096
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	0.18
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	20
10/1/0	Harvest, hand pick	Tomato, fresh mkt staked	44
10/5/0	Plastic mulch, remove		0.23
10/5/0	Scraper/pan/grader, clearing/cutting		0.23
1/1/0	Begin growth	New Forages\Central Northeast\Orchardgrass and clover, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		90
4/10/0	Rototiller, on beds		0.33
4/20/0	Fert applic. surface broadcast		0.29
4/28/0	Plastic mulch applicator 75 percent cover		0.33
4/28/0	Planting, manual	Tomato, fresh mkt staked	0.33
5/20/0	Sprayer, insecticide post emergence		0.23
6/15/0	Sprayer, insecticide post emergence		0.14
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	0.096
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	0.18
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	20
10/1/0	Harvest, hand pick	Tomato, fresh mkt staked	44
10/5/0	Plastic mulch, remove		0.23
10/5/0	Scraper/pan/grader, clearing/cutting		0.23
1/1/0	Begin growth	New Forages\Central Northeast\Orchardgrass and clover, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		90
4/10/0	Rototiller, on beds		0.33
4/20/0	Fert applic. surface broadcast		0.29

4/28/0	Plastic mulch applicator 75 percent cover		0.33
4/28/0	Planting, manual	Tomato, fresh mkt staked	0.33
5/20/0	Sprayer, insecticide post emergence		0.23
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10/1/0	Harvest, hand pick	Tomato, fresh mkt staked	44
10/5/0	Plastic mulch, remove		0.23
10/5/0	Scraper/pan/grader, clearing/cutting		0.23
1/1/0	Begin growth	New Forages\Central Northeast\Orchardgrass and clover, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		90
4/10/0	Rototiller, on beds		0.33
4/20/0	Fert applic. surface broadcast		0.29
4/28/0	Plastic mulch applicator 75 percent cover		0.33
4/28/0	Planting, manual	Tomato, fresh mkt staked	0.33
5/20/0	Sprayer, insecticide post emergence		0.23
6/15/0	Sprayer, insecticide post emergence		0.14
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	0.096
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	0.18
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	20
10/1/0	Harvest, hand pick	Tomato, fresh mkt staked	44
10/5/0	Plastic mulch, remove		0.23
10/5/0	Scraper/pan/grader, clearing/cutting		0.23

SCI and STIR Output

Soil conditioning index (SCI)	*SCI OM subfactor*	*SCI FO subfactor*	*SCI ER subfactor*	*Avg. annual slope STIR*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*
0.41	0.72	0.88	-1.2	11.7	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

USDA NRCS Natural Resources Conservation Service

RUSLE2 Profile Erosion Calculation Record

Info: Bellemont Farm – typical cropping system – "after conservation planning" scenario for soil health planning.

This scenario uses a "typical" system to demonstrate the likely soil loss on a fairly complex field. It is intended to demonstrate an estimate of soil loss. RUSLE2 Strip Builder 010809 was used to generate the calculation.

The scenario considers vegetable beds that have been rototilled then laid with plastic mulch. The scenario also considers that there is a grassed strip between each vegetable bed. However, it goes a step further to establish a cover crop in the beds for the winter months. Follow Cover Crop (340) in the conservation plan (soil health plan) when implementing the cover crop.

File: profiles\default
Access Group: R2_NRCS_Fld_Office

Inputs:

Location	*Soil*	*Slope length (horiz)*	*Avg. slope steepness, %*
USA\New Jersey\Mercer County	SSURGO\Mercer County, New Jersey\PeoB Penn channery silt loam, 2 to 6 percent slopes\Penn Channery silt loam 85%	150	4.0

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 59\a.Single Year/Single Crop Templates\NEW FORAGES\Central Northeast FPZ\Ryegrass\Ryegrass, Perennial, continuous seasonal grazing	vegetations\New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	lb	8700
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Rye and Hairy vetch, winter cover	lbs	5000

Contouring	*Strips/barriers*	*Diversion/terrace, sediment basin*	*Subsurface drainage*	*Adjust res. burial level*	*General yield level*	*Rock cover, %*
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Base yield	0

Outputs:

T value	*Soil loss erod. portion*	*Detachment on slope*	*Soil loss for cons. plan*	*Sediment delivery*	*Net C factor*	*Net K factor*	*Crit. slope length*	*Surf. cover after planting, %*
2.0	3.7	2.8	1.9	0.39				86

Date	Operation	Vegetation	Surf. res. cov. after op, %
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89
4/10/0	Rototiller, on beds		48
4/20/0	Fert applic. surface broadcast		46
4/28/0	Plastic mulch applicator 75 percent cover		37
4/28/0	Planting, manual	Tomato, fresh mkt staked	37
5/20/0	Sprayer, insecticide post emergence		31
6/15/0	Sprayer, insecticide post emergence		24
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	20
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	17
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	29
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	50
10/1/0	Plastic mulch, remove		54
10/4/0	Scraper/pan/grader, clearing/cutting		0.33
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.30
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89
4/10/0	Rototiller, on beds		48
4/20/0	Fert applic. surface broadcast		46
4/28/0	Plastic mulch applicator 75 percent cover		37
4/28/0	Planting, manual	Tomato, fresh mkt staked	37
5/20/0	Sprayer, insecticide post emergence		31
6/15/0	Sprayer, insecticide post emergence		24
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	20
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	17
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	29
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	50
10/1/0	Plastic mulch, remove		54
10/4/0	Scraper/pan/grader, clearing/cutting		0.33
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.30
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89

4/10/0	Rototiller, on beds		48
4/20/0	Fert applic. surface broadcast		46
4/28/0	Plastic mulch applicator 75 percent cover		37
4/28/0	Planting, manual	Tomato, fresh mkt staked	37
5/20/0	Sprayer, insecticide post emergence		31
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7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	20
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	17
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	29
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	50
10/1/0	Plastic mulch, remove		54
10/4/0	Scraper/pan/grader, clearing/cutting		0.33
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.30
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89

SCI and STIR Output

Soil conditioning index (SCI)	*SCI OM subfactor*	*SCI FO subfactor*	*SCI ER subfactor*	*Avg. annual slope STIR*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*
0.61	0.70	0.88	-0.10	11.8	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

RUSLE2 Profile Erosion Calculation Record

Info: Bellemont Farm – typical cropping system – "after conservation planning" scenario for soil health planning.

This scenario uses a "typical" system to demonstrate the likely soil loss on a fairly complex field. It is intended to demonstrate an estimate of soil loss. RUSLE2 Strip Builder 010809 was used to generate the calculation.

This scenario is similar to the rototiller + cover crop scenario. However, it predicts outcomes from substituting a flail mower instead of a rototiller. Benefits to SCI and STIR will be realized.

File: profiles\default
Access Group: R2_NRCS_Fld_Office

Inputs:

Location	*Soil*	*Slope length (horiz)*	*Avg. slope steepness, %*
USA\New Jersey\Mercer County	SSURGO\Mercer County, New Jersey\PeoB Penn channery silt loam, 2 to 6 percent slopes\Penn Channery silt loam 85%	150	4.0

Management	*Vegetation*	*Yield units*	*# yield units, #/ac*
managements\CMZ 59\a.Single Year/Single Crop Templates\NEW FORAGES\Central Northeast FPZ\Ryegrass\Ryegrass, Perennial, continuous seasonal grazing	vegetations\New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	lb	8700
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Rye and Hairy vetch, winter cover	lbs	5000

Contouring	*Strips/barriers*	*Diversion/terrace, sediment basin*	*Subsurface drainage*	*Adjust res. burial level*	*General yield level*	*Rock cover, %*
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Base yield	0

Outputs:

T value	Soil loss erod. portion	Detachment on slope	Soil loss for cons. plan	Sediment delivery	Net C factor	Net K factor	Crit. slope length	Surf. cover after planting, %
2.0	3.4	2.7	1.9	0.81				

Date	Operation	Vegetation	Surf. res. cov. after op, %
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89
4/10/0	Shredder, flail or rotary		72
4/20/0	Fert applic. surface broadcast		71
4/28/0	Plastic mulch applicator 75 percent cover		59
4/28/0	Planting, manual	Tomato, fresh mkt staked	59
5/20/0	Sprayer, insecticide post emergence		52
6/15/0	Sprayer, insecticide post emergence		44
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	39
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	33
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	39
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	55
10/1/0	Plastic mulch, remove		58
10/4/0	Scraper/pan/grader, clearing/cutting		0.27
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.25
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89
4/10/0	Shredder, flail or rotary		72
4/20/0	Fert applic. surface broadcast		71
4/28/0	Plastic mulch applicator 75 percent cover		59
4/28/0	Planting, manual	Tomato, fresh mkt staked	59
5/20/0	Sprayer, insecticide post emergence		52
6/15/0	Sprayer, insecticide post emergence		44
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	39
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	33
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	39
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	55
10/1/0	Plastic mulch, remove		58
10/4/0	Scraper/pan/grader, clearing/cutting		0.27
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.25
1/1/0	Begin growth	New Forages\Central Northeast\Ryegrass, Perennial, Central Northeast	86
4/1/0	Grazing, continuous, set season, rate		89

4/10/0	Shredder, flail or rotary		72
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8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	39
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	55
10/1/0	Plastic mulch, remove		58
10/4/0	Scraper/pan/grader, clearing/cutting		0.27
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.25

SCI and STIR Output

Soil conditioning index (SCI)	*SCI OM subfactor*	*SCI FO subfactor*	*SCI ER subfactor*	*Avg. annual slope STIR*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*
0.64	0.70	0.92	-0.056	8.01	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

5.e WIN-PST Evaluation

NRCS Natural Resources Conservation Service

Pesticide Active Ingredient Rating Report

Active Ingredient Common Name	pH	Solubility in Water (ppm)	Half Life (days)	KOC (mL/g)	Human Toxicity (ppb)	Fish Toxicity MATC* (ppb)	Fish Toxicity STV (ppb)	SPISP II Pesticde Ratings: Leaching	Runoff: Solution	Runoff: Adsorbed	Exposure Adjusted Toxicity Category: Water: Human	Water: Fish	Sediment: Fish
ACTIVE INGREDIENTS													
100% Acetic acid													
Reg No:													
PC_Code:		1000000	20	10	10,000.00	510.00	5,100.00	L (fp)	L (fp)	L (fp)	V	V	L
Method: Foliar													
Area: Spot													
Rate: Standard													
NEEM OIL													
100% Neem oil, cold pressed													
Reg No: 09377100001													
PC_Code:		52.3	20	500	10,000.00	13,605.00	6,802,500.00	V (fp)	L (fp)	L (fp)	V	V	V
Method: Foliar													
Area: Spot													
Rate: Standard													

LEGEND

X -- eXtra High
H -- High
I -- Intermediate
L -- Low
V -- Very low

Conditions that affect ratings:
(none) -- Broadcast application (default); applied to more than 1/2 the field
b -- Banded application; applied to 1/2 the field or less
p -- Spot application; applied to 1/10 of the field or less

(none) -- Surface applied (default); applied to the soil surface
i -- Soil incorporated; with light tillage or irrigation
f -- Foliar application; directed spray at nearly full crop/weed canopy

(none) -- Standard application rate (default); greater than 1/4 lb/acre
l -- Low rate of application; 1/10 to 1/4 lb/acre
 -- Ultra Low rate of application; 1/10 lb/acre or less

SPISP II P-Ratings:
Leaching -- Pesticide Leaching Potential
Runoff Solution -- Pesticide Solution Runoff Potential
Runoff Adsorbed -- Pesticide Adsorbed Runoff Potential

bbb 5.f Additional Supporting Documentation

Seven farmer-reported reasons for using cover crop include they reduce erosion, increase soil organic matter, increase yields for the following cash crop, control weeds, reduce compaction, and scavenge nitrogen (White & et al, 2017).

It is generally accepted that three to five species from three functional groups is ideal for a winter cover crop. The goal of Cover Crop (340) in this plan is to treat (in order of importance) compaction, aggregate instability, soil organic matter depletion, and soil organism habitat loss/degredation. Therefore species selections from several functional groups is needed.

The planned mixture includes rapeseed (canola), winter wheat, and austrian winter pea (field pea). All three will help with compaction and aggregate stability which are the primary resource conerns. This mixture will also greatly benefit soil organic matter and soil organism habitat.

Typically, beginners to implementing cover crops select species that winter kill to present fewer management concerns prior to spring planting of cash crops (Myers, 2018). Radish and turnip have high ratings for treating compaction in the subsoil layer, which is needed on this operation, however they do not overwinter well. In New Jersey, it is expected that they will winter kill in mid-December. This makes it unlikely to that much subsoil penetration will happen if used as a wintertime cover crop. There are also other cover crops that have better ratings for treating subsoil and surface compaction. That said, few grow as well as rapeseed/canola during the winter months in USDA Zones 6 and 7. Growing cover crops to treat compaction in the summer growing season in place of a cash crop is a nonstarter on this operation at this time. Rapeseed is good at treating compaction of the surface layer and fair with the subsoil layer. Rapeseed offers the wither hardiness and surface/subsoil compaction reduction that is needed on this farm.

Rapeseed:
There are two common species of rapeseed; *Brassica napua* and *Brassica rapa*. Some winter-type cultivars can withstand quite low temperatures (10° F). SARE recommends using *B. Rapa*, the winter-type or biennial rapeseed cultivars because of its tolerance for lower temperatures (SARE, 2012). University of Missouri echoes SARE by saying that "getting a true winter canola" is necessary for winter survival (Myers, 2018).

It is possible for rapeseed to grow three to five feet tall, however five feet is doubtful when terminated early in a cover crop scenario. Dwarf Essex rapeseed is a variety that is marketed as a low-biomass variety where an overabundance of reduce is a concern (Myers, 2018).

Canola could also be considered as a cash crop that provides the benefits of a winter cover crop (Myers, 2018). Plant straight canola in September following the corn harvest. The canola should be ready to harvest the following June. Soybeans should be planted immediately following the canola harvest. The University of Missouri article by Myers 2018 seems to be a good resource to further consider this management strategy.

Precautions (rapeseed):
"Brassica cover crops may be susceptible to carry-over from broadleaf herbicides applied to the previous grain crop (SARE, 2012)." Roundup Ready varieties of canola are available; if these are considered, crop termination needs to be a significant consideration in the decision (Myers, 2018). Another important consideration is that

some varieties of rapeseed/canola are hybrids while others are open-pollinated. The U.S. Canola Association website offers the latest variety trial information.

If not completely killed, rapeseed volunteers can be a problem in the subsequent crop. Always check herbicide rotation restrictions before applying.

Winter Wheat:
Winter wheat was selected as a the cool season grass species. Cereal rye was considered because it is an aggressive plant, similar to rapeseed. It has high ratings for increaseing organic matter, infiltration and soil structure, and reducing topsoil compaction. However, it also creates lasting residue, which is a weakness in this case because the residue can tie up the nitrogen supply if not managed properly. Winter wheat is cold tolerant throughout most of New Jersey, provides rapid growth, common varieties are not as tall as cereal rye and therefore easier to manage, provides cover in the winter and spring that helps control weeds, nutrient recycling, organic matter improvement, and soil tilth improvement (Penn State Extension, 2017). Under similar circumstances, winter wheat is expected to tie up nutrients less than cereal rye when used as a green manure.

Field Pea (e.g. Austrian Winter Pea)
Field pea is a versatile legume that does well when interseeded with cereals and brassicas; it may winter kill so getting a good growth before winter is benefical. Therefore, field peas should be planted earlier in September than the winter wheat or rapeseed in this mix.

Important Factors, This Mix:
The ideal seeding dates of all three species in this mix is slightly different. Field pea and rapeseed should be in the ground by September 15th (Penn State Extension, 2017). Winter wheat, however, can be planted throughout October and still result in a successful stand. It is important to realize that the species doing most of the work on building soil is the rapeseed. Every effort to complete planting by September 15th should be made so that the rapeseed and field pea have the best chance to get well established to help prevent winter kill.

Seeding Depth:
Use a seed drill that has a large and small seed box. The rapeseed should be placed in the small seed box, set to three pounds per acre, and at a depth of ¼" to ¾". The winter wheat and innoculated field pea should be placed in the large seed box. Winter wheat's ideal placement is between ¾" to 2" while field pea does best at 1 ½" to 3"; split the difference and set the large seed placement at 1 ½" to 2". If separating seed into different sizes is impossible, it is acceptable to mix the seed and favor the more shallow seed depths listed. A study in Nebraska cited no significant differences between field pea planted at 1", 2" and 3" depths where field moisture and good seed-to-soil contact were obtained (Stepanović & et. al., 2017).

Termination:
"Determining the optimum maturity stage to terminate cover crops can be challenging because it often involves tradeoffs among the different benefits provided by cover crops (White & et al, 2017)." With the assumption that it is important to incoprerate cover crops into the cropping system currently in place, it is important to take action to manage the cover crops termination at the proper stage of maturity.

Terminating these cover crops using a roller-crimper is encouraged when these covers if they are in flower.

Killing (Rapeseed): Brassica cover crops that do not winterkill can be terminated in spring by spraying with an appropriate herbicide, mowing, and/or incorporating above-ground biomass by tillage before the cover crop has

reached full flower. Rapeseed has proved difficult to kill with glyphosate, requiring a higher-than-normal rate of application—at least 1 quart/acre of glyphosate— and possibly multiple applications (follow the label).

Nutrient Management

Brassicas require adequate nitrogen and sulfur to be available in the soil profile. A ratio of 7:1 (ntrogen to sulfur) is optimum for growing rapeseed (SARE, 2012). Sulfur availability should be monitored however soil tests are an inefficent method of monitoring sulfur (similar to N); leaf tissue tests are much more accurate (Penn State Extension, 2017). Thirty to 50 pounds of nitrogen per acre also benefits winter wheat. It isn't necessarily to add nitrogen following soybeans.

5.g Effects on Other Resource Concerns

Source: National Resource Concern List and Planning Criteria, Natural Resources Conservation Service (October 2022)

Soil Resource Concerns

Sheet and rill erosion: the practices in this plan will further reduce sheet and rill erosion.

Ephemeral Gully Erosion: ephemeral gully erosion is a concern on the planning area. The practices in this plan should reduce ephemeral gully erosion.

Classic Gully Erosion: classic gully erosion is not a concern on the planning area nor is it expected to be when following the practices in this plan.

Compaction: Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, and infiltration and aeration. Compaction is an active resource concern; by following this plan compaction is expected to be reduced. Improvements to compaction may not occur immediately, but over the course of a couple of rotations, compaction should be reduced.

Organic matter depletion: Management-induced depletion of any or all pools of soil organic matter resulting in limited soil function and processes that support plant productivity, biological activity and water and nutrient cycling. The practices in this plan will increase organic matter over time.

Soil organism habitat loss or degradation: Quantity, quality, diversity or connectivity of food, cover, space, shelter and/or water is inadequate to meet requirements of beneficial soil organisms. Practices in this plan will increase and improve soil organism habitat.

Aggregate instability: Management-induced degradation of water stable soil aggregates resulting in destabilized soil carbon; surface crusting; reduced water infiltration, water holding capacity, and aeration; depressed resilience to extreme weather; increased ponding and flooding; increased soil erosion and plant stress; and reduced habitat and soil biological activity. By implementing the practices in this plan, especially Cover Crop (340) using the multi-species cover crop, aggregate instability will be reduced, surface crusting will be reduced, water infiltration will be increased, the soil's water holding capacity will be increased, and resilience to extreme weather conditions will be increased.

Water Resource Concerns

Naturally available moisture use: Natural precipitation is not optimally managed to support desired land use goals or ecological processes. Implementing the practices in this plan, naturally available moisture from precipitation will begin to be improved.

Air Resource Concerns

Emissions of greenhouse gases (GHGs): Emissions of methane, nitrous oxide, and carbon dioxide increase atmospheric concentrations of greenhouse gases. Objective: Emissions of nitrous oxide from nitrogen fertilizer, methane and nitrous oxide from confinement-based animal production, and loss of carbon from soils and biomass do not excessively contribute to increased atmospheric concentrations of greenhouse gases. Carbon stocks: The client is maintaining or increasing carbon stocks in soils and perennial biomass at the PLU.

Plant Resource Concerns

Plant pest pressure: Excessive pest damage to plants including that from undesired plants, diseases, animals, soil borne pathogens, and nematodes. Implementing Cover Crop (340) may influence plant pest pressure either positively or negatively; multi-species cover crops often attract both unwanted insects as well as insects that predate them. Observe not only the unwanted pests but also the activities of the ecosystem that is being generated with the implementation of Cover Crop (340).

Energy Resource Concerns

Energy efficiency of field operations: Mobile on-farm, field operations are using energy inefficiently. This includes use of tractors, trucks or other mobile equipment as well as changes in farming/ranching and forestry practices that reduce energy use such as making fewer trips across the field or implementing practices that result in less energy use. Objective: Improve energy efficiency of farming, ranching, forestry practices and mobile field operations to reduce energy use. Implementing the practices in this plan will increase energy consumption over the benchmark condition. That said, it may still meet the planning criteria because energy use has been effectively minimized to the extent practicable at any given time.

ccc 5.h Considerations to Avoid or Mitigate any Adverse Effects – Highly Erodible Land

The farmer's crop field, CMU 1, has been designated as Highly Erodible Land (HEL), signaling its vulnerability to the erosive forces of nature. This classification is a result of a comprehensive assessment conducted by the federal agency, the Natural Resources Conservation Service (NRCS), which takes into account various factors like slope, soil texture, climate, and land cover. The classification of the field as highly erodible signals that it is predisposed to soil degradation, making it essential for the implementation of targeted conservation measures. With this designation, the farmer becomes subject to specific federal requirements and is encouraged to adopt sustainable land management practices to mitigate erosion and safeguard the long-term productivity of the soil.

Highly Erodible Land (HEL) is a term used in the context of soil and land management to identify areas that are particularly susceptible to erosion. Erosion is the process by which soil is gradually worn away by natural forces such as wind, water, and human activities. HEL designation is crucial for the implementation of conservation measures to protect these vulnerable lands from degradation.

The classification of land as highly erodible is based on specific criteria outlined in the United States, primarily under the provisions of the Food Security Act of 1985. In the U.S., the Natural Resources Conservation Service (NRCS) is responsible for identifying and mapping HEL. The criteria include factors such as slope, soil texture, climate, and land cover, which collectively contribute to the land's susceptibility to erosion.

The key factors considered in determining whether land is highly erodible include:

1. Slope: Steeper slopes are generally more prone to erosion as gravity facilitates the movement of soil particles downhill. Land with significant slopes is more likely to be designated as highly erodible.

2. Soil Texture: Soils with certain textures, such as sandy soils, are more susceptible to erosion than soils with finer textures like clay. The NRCS considers the soil's ability to resist erosion when determining

HEL.

3. Climate: Climate influences erosion rates. Areas with high-intensity rainfall or strong winds are more likely to experience erosion, and land in these regions may be classified as highly erodible.

While land cover is not a determining factor for HEL classification, the type of vegetation or land cover plays a crucial role in erosion control. Natural vegetation helps stabilize soil and reduce erosion. The removal of vegetation, such as through plowing, scraping, and improper land use, increases the risk of erosion.

Once a parcel of land is designated as highly erodible, landowners may be subject to specific conservation requirements and regulations. The primary goal is to encourage the adoption of conservation practices that mitigate soil erosion and improve the overall sustainability of agricultural and other land uses.

Conservation practices may include the implementation of contour farming, cover cropping, terracing, and the establishment of riparian buffers. These measures help reduce the impact of water and wind on the soil, preventing the loss of fertile topsoil and maintaining the long-term productivity of the land. Specific practices will be determined through the conservation planning process.

The HEL classification serves as a call to action, prompting the farmer to engage in practices that balance agricultural productivity with environmental stewardship, ensuring the health and resilience of the land for future generations. Highly Erodible Land designation is a regulatory tool designed to identify and address areas at high risk of soil erosion. It serves as the foundation for the implementation of conservation practices aimed at preserving the health and productivity of vulnerable lands.

Practices identified in the following Soil Health Management Plan, DIA 162, will satisfy some of the conservation requirements associated with the HEL designation; specifically soil loss from sheet and rill erosion. That said, ephemeral gully erosion may still become a concern in which case additional measures must be taken.

5.i Evaluation of the Preferred Alternative's Effects on Other Assets

Client's land use: no change

Capital: slight increase due to additional inputs. The increased capital requirement for additional fertilizer and cover crop seed costs may be offset by increased native soil fertility.

Labor: Increase due to an extra planting/fertilization/termination.

Management: Increase due to the introduction of new cover crop system.

Risk: Increase due to success of cover crop established, growth, and termination.

Profitability: Expected to increase as native soil nutrients are improved.

Public health and safety: no risk.

Appendix A

Producer Interview –

Interview with Operator

Operator: Michael Ehreneich	**Date: 7/1/2023**
Owner: Michael Ehreneich	
Farm No.	
Tract No. 2146	

Overall Farming Operation (total acres, crop rotations, acres of each crop, CRP, livestock, all operators, etc.)

Bellemont Farms headquarters are located at 22 Valley Lane, Lambertville, New Jersey. This plan addresses the crop field that is enclosed by dear fence. Michael's farms relies on a vegetable crop rotation. Cover crops are not part of the rotation at this time.

Bellemont Farms uses a mixed vegetable rotation. Planting beds are established for a variety of summer crops. The farm offers a CSA program to the community.

Landowner &/or Operator Objective

Mr. Ehreneich would like to find an effective method of addressing compaction, reducing erosion, and increasing biodiversity.

There is one conservation management unit (CMU) for this SHMP. CMU 1 is assigned to the soil in the crop/vegetable field. The CMU has similar soil types and landscape position.

CMU 1 is an upland site; there is not a subsurface drainage system in the field.

Tillage/ Cropping System (typical system from harvest to harvest)
Bellemont Farm has been conducting a vegetable rotation on CMU 1 since 2021. The farm is scrapped clean of residue from the crop year in November. In the spring, beds are tilled using a rototiller. Plastic mulch is placed on many of the beds, depending on the crops intended for the bed. Natural grasses occupy the spaces between the beds. Michael is satisfied with this rotation but is also hoping for solutions that effectively address his concerns. Michael estimates that the soil surface of CMU 1 is covered with plants or residue for 6-7 months during the year. The field is not grazed; livestock is not likely to be incorporated into this operation.
Equipment Notes (planter setup (coulters, row cleaners, starter), tillage equipment owned i.e. vertical tillage tool, deep ripper, etc.)
Most of the work done on this farm is conducted by hand. The tillage is conducted with the help of a rototiller. Plastic is laid by hand. Beds are planted by hand. Weeding is completed by hand. All harvests are conducted by hand. And the plastic mulch is pulled up and discarded by hand. A blade (tractor implement) is used to clear the site at the end of the season.
Nutrient Program Yield Goals (P&K program, soil test program, manure used (kind, rate, when, placement acres, etc.), Nitrogen program (principal, w/ pre, starter, side dress, anhydrous bar used), Liming program - how often, do they incorporate
Nutrient management is currently conducted by the farmer who places a cup of lime at the site of each plant. Organic fertilizers such as Fertell 3-4-3, Granular Organic Superlawn 3-2-3, and Fish Plant Food 5-1-1 is applied to each plant at or near out-planting. Other nutrient teas are used to fertilize plants when they are getting started in trays.

Pesticide Program (weed resistant issues, herbicide program, insecticide use, over all week control issues)
For pest management, Michael Ehreneich or his farmer use 30% vinegar, neem oil, and Dr. Bronner's peppermint soap to spot spray to target the problem. An IPM program that includes cost:benefit calculations is not used at this time.
Hay Production (acres, species, how its seeded, nurse crop, following crop, N credits)
n/a
Erosion Issues (sheet, rill, ephemeral, gully)
Visible erosion does occur on and around some of the beds, especially those on the slope.
Cover Crop Experiences (species, rate, how, termination, etc.)
Cover crops are not currently used in the rotation on CMU 1. If cover crops were incorporated into the operation today they would be mechanically terminated with tillage.
Livestock Utilized in the Operation (numbers, system, grazing plan)
n/a
Amendments: Organic: Biochar, compost (aerobic, anerobic, tea, vermi,etc.) humates, fluvics paper waste, human waste, food waste etc. Inorganic: Gypsum, Mineral conditioners (sand or topsoil), synthetic binding agents. Polymers: polysaccharides, polyacrylamides, anionic and cationic polymers,

Type	Rate	Method of application
n/a		

Irrigation			
Type	**Rate**	**Timing**	**Method of management: sensor, checkbook etc.**
n/a			

References

Myers, R. (2018, November). *University of Missouri Extension*. Retrieved from Growing Canola for Oilseed or Cover Crop Use: https://extension.missouri.edu/publications/g4162

Penn State Extension. (2017). The Agronomy Guide. In *Soil Fertility Management* (pp. 19-52). Penn State Extension.

SARE. (2012). *Managing Cover Crops Profitably*. Beltsville, MD: Sustainable Agriculture Research and Education Outreach.

Stepanović, S., & et. al. (2017, March 13). *Institure of Agriculture and Natural Resources Cropwatch*. Retrieved from Field Pea Seeding Rates, Seeding Depth, and Inoculant: https://cropwatch.unl.edu/2017/field-pea-seeding-rates-seeding-depth-and-inoculant

White, C., & et al. (2017, September 19). *Making the Most of Mixtures: Considerations for Winter Cover Crops.* Retrieved from Penn State Extension: https://extension.psu.edu/making-the-most-of-mixtures-considerations-for-winter-cover-crops

USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

Soil Health Management

Design and Implementation Activity 162

The Soil Health Management Design and Implementation Activity (SHMP) is used to design a detailed transitional cropping management system to improve overall soil health. The activity includes design and implementation requirements for all management activities and/or land management practices that address all four soil health principles associated with crop and forage production.

Soil Health Management System Design (DIA 162) definition: Site specific recommendations and designs for soil health related practices that address the four principles of soil health as identified in CPA 116 or a conservation plan.

Table of Contents

SECTION 1: GENERAL INFORMATION

Client Contact Information: *Bellemont Farm, c/o Michael Ehrenreich*
(mailing) 90 Millburn Ave, #206, Millburn, New Jersey 07041
(farm) 22 Vally Road, Lambertville, New Jersey
917-763-7546
me@somalaser.com

Physical Location: *Mercer County, Hopewell Township, Block 57, Lot 4*

Type of Operation: *Bellemont Farm is a farm that offers fresh vegetables, herbs, plants, wood slabs, and pick-your-own pumpkins.*

Total size of Operation: *1.8 ac.*
Acres included in SHMP: *1.8 ac.*

Latitude/Longitude: *Lat. 40.33742* *Long. -74.92147*

Program: **EQIP** **Contract #:** **742B292306D** **County: Mercer**

TSP Certification:
I certify the work completed and delivered for this Design and Implementation Activities (DIA):

- Complies with all applicable Federal, State, Tribal, and local laws and regulations.
- Meets the General and Technical Requirements for this DIA.
- The planned practices are based on NRCS Conservation Practice Standards (CPSs) in the state Field Office Technical Guide where the practices are to be implemented.
- Is consistent with and meets the conservation goals and objectives for which the program contract was entered into by the participant.
- Incorporates alternatives that are both cost effective and appropriate to address the resource issue(s) and participant's objective(s).

Name: John Kluthe TSP#: TSP-18-22247 TSP Expiration Date: 04/04/26
Mailing Address: 64 Norma Road, Hampton, NJ 08827
Phone Number: 908-297-2461 E-Mail: JohnKluthe@KlutheEnvironmental.com

Signature: Date:

Participant Acceptance:
I accept the completed DIA deliverables as thorough and satisfying my objectives.

Participant Signature _____ Date _____

Reviewer Certification:
NRCS administrative review completion by:

Signature _____ Title _____ Date _____

SECTION 2: CONSERVATION ASSISTANCE NOTES AND CORRESPONDENCE

2.a Soil Health Management Plan Strategy and Goals

Mr. Ehrenreich would like to find an effective method of addressing soil organic matter depletion and soil organism habitat loss or degradation.

The goals of this plan are to, as much as possible, find a practice or practices that minimizes soil disturbance, maximizes soil cover, maximizes biodiversity, and maximizes living roots.

2.b Documented Interactions

7/1/2023

Michael Ehrenreich, the farm employee, and John Kluthe met on-site to discuss prioritizing soil health for the property. Michael wants to invest in soil health for long-term benefits, including increased resilience to climate changes and reduced erosion. Michael's focus was on sustainability and ensuring the land's long-term viability and fertility.

2.c Documented Site Visits

11/22/2023

Soil samples were taken.

2.d Documented Correspondence

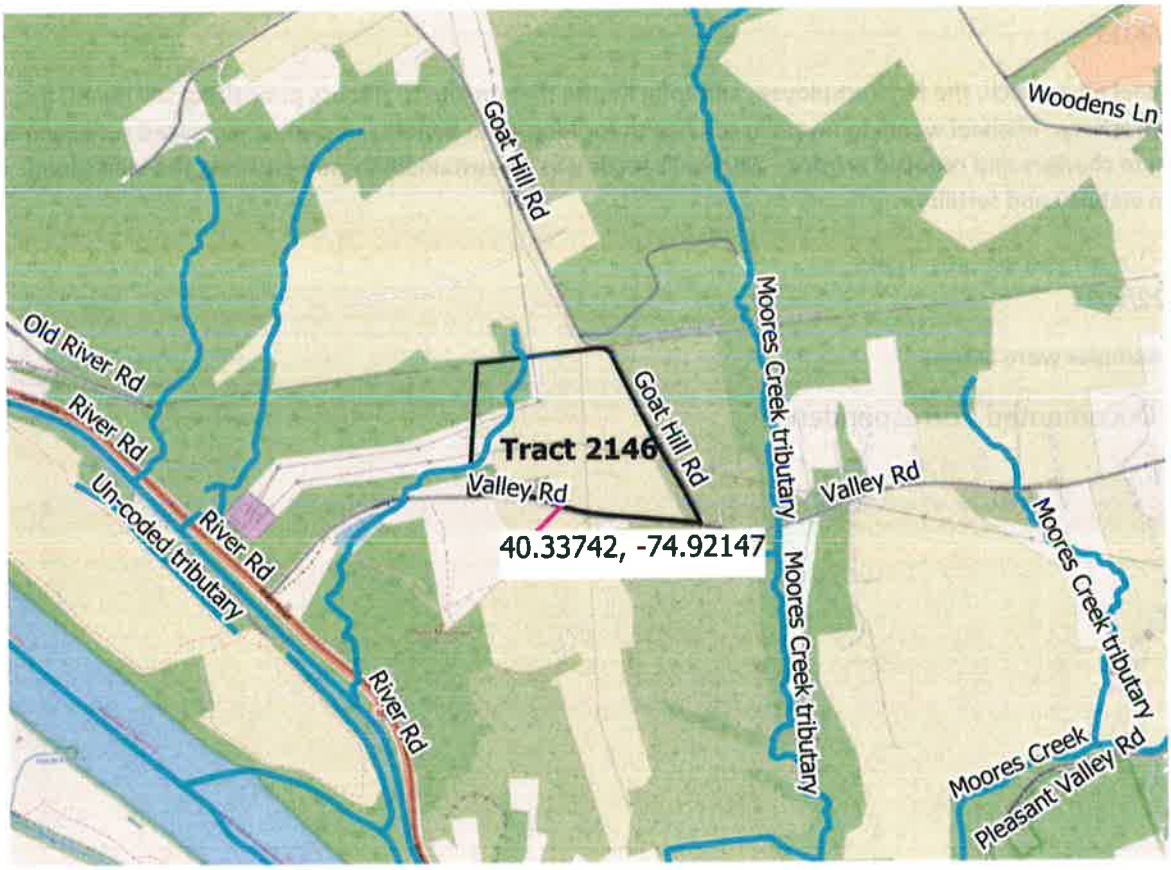
n/a

SECTION 3: MAPS

3.a Location Map of Implementation Areas

Location Map
2023 Soil Health Management Plan
NRCS Code 116/162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District



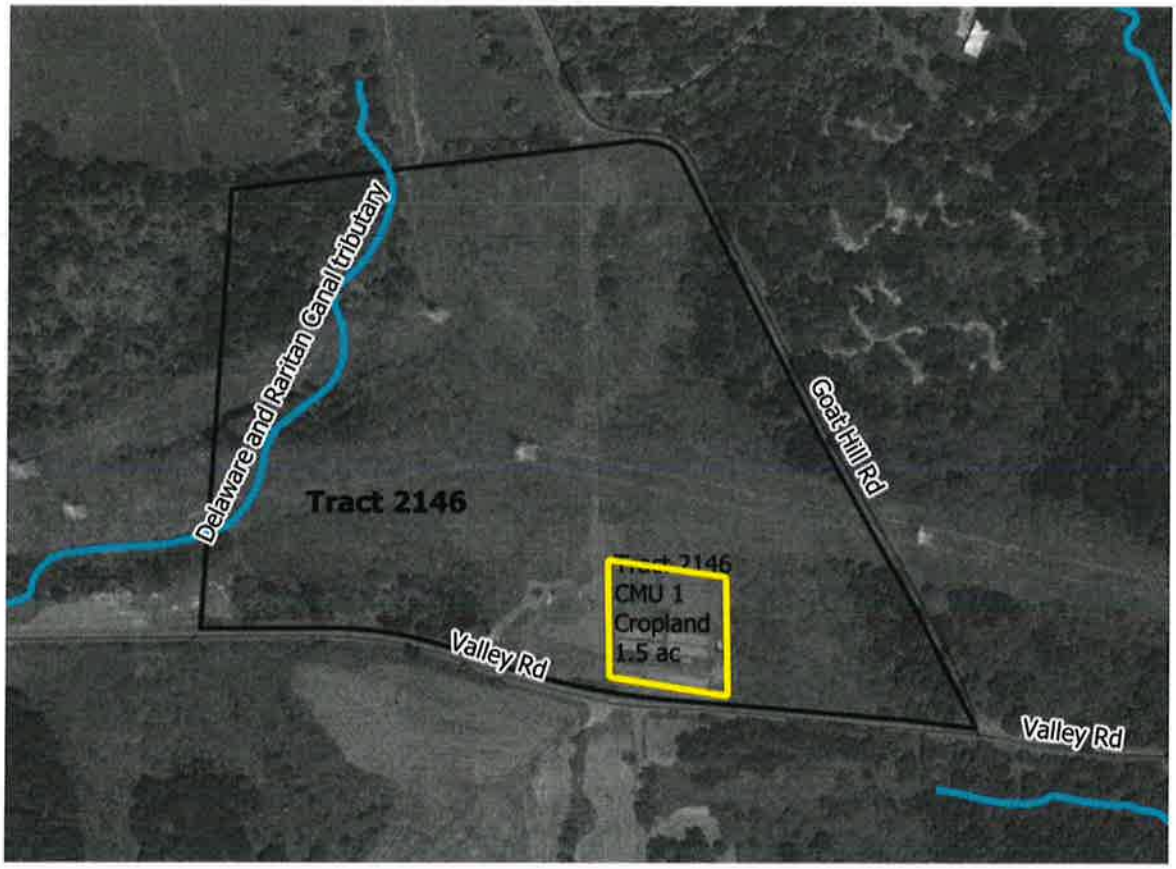
Legend
- Bellemont Farm
- New_Jersey_Road_Centerlines
- nhdstreams2002
- OpenStreetMap

0 0.1 0.2 mi

3.b Conservation Plan Map

Conservation Plan Map
2023 Soil Health Management Plan
NRCS Code CPA116 & DIA162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District



Legend
Bellemont Farm
Bing

Chosen Conservation Practices

Tract Number	PLU	Practice Code	Planned Date
2146	CMU 1	340	Oct 1-31
2146	CMU 1	328	May 1-31
2149	CMU 1	345	May 1-31

0 200 400 ft

3.c Sensitive or Critical Area Narrative and Map

CMU 1 is an upland site. There is a significant buffer between the production field and water and wetland resources.

Wetland and Water Resources Map
2023 Soil Health Management Plan
NRCS Code 116/162
TSP John Kluthe
12/5/2023

Bellemont Farm, c/o Michael Ehrenreich
22 Vally Road, Lambertville, New Jersey
Mercer County, Hopewell Township, Block 57, Lot 4
Mercer County Soil Conservation District

Legend

- Bellemont Farm
- New_Jersey_Road_Centerlines
- nhdstreams2002
- Category_One_(C1)_Waters_of_NJ
- 2012 LandUse LandCover Wetlands
- DECIDUOUS WOODED WETLANDS
- HERBACEOUS WETLANDS
- Bing

0 200 400 ft

3.d Soil Maps


Soil Map—Hunterdon County, New Jersey, and Mercer County, New Jersey
(Ehrenreich lot 4)
AbrB
AbrB
PeoC
KkoE
PeoC
PeoD
LamB
RorA
PeoB
PeoC
PeoD
RehC2
PeoB
PeoB
DOZA
DOZB
Valley Rd
Soil Map may not be valid at this scale.
Map Scale: 1:3,250 if printed on A landscape (11" x 8.5") sheet.
Meters
0
45
90
180
270
Feet
0
150
300
600
900
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84
USDA
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey
12/6/2023
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hunterdon County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Soil Survey Area: Mercer County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	1.7	5.2%
Subtotals for Soil Survey Area		**1.7**	**5.2%**
Totals for Area of Interest		**32.6**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	4.0	12.2%
DOZA	Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	1.4	4.4%
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	0.7	2.2%
KkoE	Klinesville channery loam, 18 to 35 percent slopes	2.8	8.6%
LemB	Lehigh silt loam, 2 to 6 percent slopes	3.1	9.4%
PeoB	Penn channery silt loam, 2 to 6 percent slopes	4.5	13.9%
PeoC	Penn channery silt loam, 6 to 12 percent slopes	11.9	36.4%
PeoD	Penn channery silt loam, 12 to 18 percent slopes	2.4	7.3%
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.1	0.4%
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.0	0.0%
Subtotals for Soil Survey Area		**30.9**	**94.8%**
Totals for Area of Interest		**32.6**	**100.0%**

3.e Additional Maps

No additional maps are needed in this case.

SECTION 4: SOIL HEALTH MANAGEMENT PRACTICES AND OPERATION

4.a Record of Discussed and Chosen Alternatives

Tract Number	PLU (Field) # and/or SHMU label	Practice Code	Practice Name	Planned Amt	Practice Units	Planned Date
2146	CMU 1	340	Cover Crop	1.5	Ac	Oct 1-30, 2024
Description: Plant multi-species grasses, legumes, and forbs for seasonal vegetative cover to improve soil aggregate stability, increase soil biotic activity during winter months, and reduce compaction.						
2146	CMU 1	328	Conservation Crop Rotation	1.5	Ac	May 1-30, 2024
Description: A planned sequence of crops grown on the same ground over a period of time (i.e. the rotation cycle). To meet minimum soil health criteria, a positive SCI must be achieved.						
2146	CMU 1	345	Residue and Tillage Management, Reduced-till	1.5	Ac	May 1-30, 2024
Description: Manage the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round while limiting soil-disturbing activities to meet or exceed a positive SCI rating and a STIR value below 80.						

4b. Implementation Requirements for Chosen Alternatives

See the following Implementation Requirements for complete details on installing each of the chosen practices. The planned location for each of these practices can be seen on the Conservation Plan Map and/or other Practice Maps included in this plan.

Cover Crop (340)

Source: NJ NRCS Conservation Practice Standard, Cover Crop, May 2022

A cover crop is grasses, legumes, and/or forbs planted for seasonal vegetative cover. Cover Crop (340) is applied primarily to reduce soil erosion from water and minimize soil compaction.

Soil loss reduction is benefited from Cover Crop (340), as shown in the RUSLE2 table above, and will help to reduce soil loss from all crops grown on the farm at this time. Cover Crop (340) is necessary for this plan to reduce soil loss to the NRCS conservation planning criteria.

Benefits associated with this cover crop design include:

- minimize soil compaction,
- suppress weeds and break pest cycles,
- maintain or increase soil health and organic matter content,
- reduce erosion,
- improve soil moisture efficiency,
- plus, the added benefits of biological nitrogen fixation and increasing biodiversity.

Contact your conservation planner or the NRCS office if the following apply:

- The recommended seed is not available, or there is a desire to use other species,
- Or there is a desire to broadcast rather than drill seed.

Operation and Maintenance

Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

Seed Spreader Recommendations

Lowe's (online)

Chapin 25-lb 8400A Handheld Fertilizer Spreader; Item #1319346; Model #8700A

$90; excellent reviews

https://www.lowes.com/pd/Chapin-Chest-Broadcast-Fertilizer-Spreader/1000803070 mounted-25-lb-

Zoro (online)

Solo Portable Chest-Mount Spreader, 20 lb; Mfr # 421-S Zoro # G3958145

$75 + $5 shipping; very good reviews

https://www.zoro.com/solo-portable-chest-mount-spreader-20-lb-421-s/i/G3958145/?utm_source=google&utm_medium=surfaces&utm_campaign=shopping%20feed&utm_content=free%20google%20shopping%20clicks&campaignid=20749401279&productid=G3958145&v=&gad_source=1&gclid=CjwKCAiA44OtBhAOEiwAj4gpOQPC_ICKVQDBm3FwVV5FFB-JyyMQIrmgmqrXEHqRQYmuLGK-L6-mpBoCsSEQAvD_BwE&gclsrc=aw.ds

There are also lots of bag seeders available for half the money. The reviews for those produces are not as good as the ones listed here.

See the attached implemetation requirements on the following pages.

- Cover Crop (340)

NEW JERSEY COVER CROP DESIGN WORKSHEET PAGE 1

Clear Page 1 Cells

Name:	Bellemont Farm c/o Michael Ehrenreich	Program:	EQIP - Soil Health
Address:	22 Valley Road, Lambertville, NJ	Contract#:	
Field Number(s):	CMU 1	CIN(s):	
Tract Number (s):	2146	Farm # (s):	2316

Location: The location of the planned cover crops is shown on the Conservation Plan Map included in the folder.

Purpose(s) of the cover crop (check all that apply):

Minimize Soil Compaction	X	Suppress Weeds and Break Pest Cycles	
Maintain or Increase Soil Health and Organic Matter Content	X	Reduce Erosion **% Full Rate must be between 130% to 160%** Small grain based seedings must have a minimum of 25 seeds/ft^2 Annual ryegrass based seedings must have a minimum of 125 seeds/ft^2	X
Utilize Excessive Nutrients		Improve Soil Moisture Effeciency	

Additional considerations for planning cover crop (check all that apply):

Biological Nitrogen Fixation		Seedbed Preparation for Grass Seeding	
Attract Pollinators		Increase Biodiversity	
Supplemental Hay or Grazing **% Full Rate must be ≥ 150%**			

Soil Health Concerns (Only applicable to EQIP - Soil Health contracts)

Nutrient Losses		Weeds	
Nitrogen Fixation		Subsoil Compaction and Infiltration	
Organic Matter and Overall Structure		Topsoil Compaction and Infiltration	
Erosion			

Description of Work

A cover crop will be planted for either fall/winter or spring/summer cover. The cover crop will be planted between growing seasons when the ground is traditionally bare or non-active. The cover crop will not be harvested for seed or burned. The cover crop must be terminated according to the NRCS Cover Crop Termination Guidelines.

Management Considerations

Minimizing and reducing soil compaction is the primary purposes of Cover Crop (340) at this site. Other benefits include increasing biodiversity in the soil, the addition of organic matter, and improvement of overall soil structure. These benefits, in combination with one another will work to increase the health of the soil. Reducing soil erosion is also a management consideration.

Are soil ammendments needed or will soil ammendments be used? If yes, use the NJ Cover Crop Nutrient Sheet to document nutrient recommendations, or attach nutrient recommendations.	No

NEW JERSEY COVER CROP DESIGN WORKSHEET PAGE 2

Clear Page 2 Cells

	Without Cover Crop	With Cover Crop
Soil Erosion - ton/ac/yr (wind, water):	6.8	1.9
Soil Condition Index:	0.41	0.61

Design Soil mapunit(s): PeoB Penn channery silt loam, 2 to 6 percent slopes

Site Preparation: None - Aerial

Seeding Date(s): 8/1 - 9/15

Seeding Method: Broadcast

Acres to be seeded: 0.7

Hardiness Zone: 6a to 6b

Termination Method: Crimper

Fertilizer and/or innoculant: Innoculate

Termination Growth Stage: Terminate cover crop at or within 5 days after planting but before crop emergence.

Species List	Minimum Rate	Lbs PLS / Acre	% Full Rate	% by # seed	Seed/ft^2	Crop Type	Seed Size	Average Seeding Depth
wheat (winter)	165.0	85.0	52%	59.2%	23	CG	M	Surface
pea, austrian winter	75.0	35.0	47%	8.3%	3	CBL	L	Surface
canola /rapeseed	7.5	4.0	53%	32.5%	13	CB	S	Surface
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
LBS PLS/ ACRE =		**124.00**	**152%**		**40**		**Total lbs. Needed:**	**86.8**

Planned Average Seeding Depth (in): (if Drilled/Planted) 1.0 - 1.75

All seed rates are represented in Pure Live Seed. It is the responsibility of the producer to ensure the purity, germination, and amount of seed applied equals the planned seeding rates.

Operation and Maintenance

Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

Planned by:		**Date:**	December 8, 2023
***Producer Signature:**		**Date:**	

**The producer is only required to sign the Cover Crop Design Worksheet if it is modified from the original conservation plan.*

Cover Crop Nutrient Sheet

Soil Ammendments (if needed) *or attach nutrient management recommendations*				
Field #	N (lbs./acre)	K_2O (lbs./acre)	P_2O_5 (lbs./acre)	Lime (tons/acre)
CMU 1	30-50 lb/ac N following non-legume crops			as needed
CMU 1	sulfur as needed (leaf tissue test)			

NEW JERSEY COVER CROP DESIGN WORKSHEET PAGE 1

Clear Page 1 Cells

Name:	Bellemont Farm c/o Michael Ehrenreich	Program:	EQIP - Soil Health
Address:	22 Valley Road, Lambertville, NJ	Contract#:	
Field Number(s):	CMU 1	CIN(s):	
Tract Number (s):	2146	Farm # (s):	2316
Location:	The location of the planned cover crops is shown on the Conservation Plan Map included in the folder.		

Purpose(s) of the cover crop (check all that apply):

Minimize Soil Compaction	X	Suppress Weeds and Break Pest Cycles	
Maintain or Increase Soil Health and Organic Matter Content		Reduce Erosion **% Full Rate must be between 130% to 160%** Small grain based seedings must have a minimum of 25 seeds/ft^2 Annual ryegrass based seedings must have a minimum of 125 seeds/ft^2	X
Utilize Excessive Nutrients		Improve Soil Moisture Effeciency	

Additional considerations for planning cover crop (check all that apply):

Biological Nitrogen Fixation		Seedbed Preparation for Grass Seeding	
Attract Pollinators		Increase Biodiversity	
Supplemental Hay or Grazing **% Full Rate must be ≥ 150%**			

Soil Health Concerns (Only applicable to EQIP - Soil Health contracts)

Nutrient Losses		Weeds	
Nitrogen Fixation		Subsoil Compaction and Infiltration	
Organic Matter and Overall Structure		Topsoil Compaction and Infiltration	
Erosion			

Description of Work

A cover crop will be planted for either fall/winter or spring/summer cover. The cover crop will be planted between growing seasons when the ground is traditionally bare or non-active. The cover crop will not be harvested for seed or burned. The cover crop must be terminated according to the NRCS Cover Crop Termination Guidelines.

Management Considerations

Minimizing and reducing soil compaction is the primary purposes of Cover Crop (340) at this site. Other benefits include increasing biodiversity in the soil, the addition of organic matter, and improvement of overall soil structure. These benefits, in combination with one another will work to increase the health of the soil. Reducing soil erosion is also a management consideration.

Are soil ammendments needed or will soil ammendments be used? If yes, use the NJ Cover Crop Nutrient Sheet to document nutrient recommendations, or attach nutrient recommendations.	No

NEW JERSEY COVER CROP DESIGN WORKSHEET PAGE 2

Clear Page 2 Cells

	Without Cover Crop	With Cover Crop
Soil Erosion - ton/ac/yr (wind, water):	6.8	1.9
Soil Condition Index:	0.41	0.61

Design Soil mapunit(s): PeoB Penn channery silt loam, 2 to 6 percent slopes

Site Preparation: None - Aerial

Seeding Date(s): 8/1 - 10/31

Seeding Method: Broadcast

Termination Method: Crimper

Fertilizer and/or innoculant: Innoculate

Termination Growth Stage: Terminate cover crop at or within 5 days after planting but before crop emergence.

Acres to be seeded: 0.7

Hardiness Zone: 6a to 6b

Species List	Minimum Rate	Lbs PLS / Acre	% Full Rate	% by # seed	Seed/ft^2	Crop Type	Seed Size	Average Seeding Depth
rye (cereal)	135.0	200.0	148%	100.0%	83	CG	M	Surface
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			
			0%	0.0%	0			

LBS PLS/ ACRE = 200.00 | 148% | 83 | **Total lbs. Needed:** 140.0

Planned Average Seeding Depth (in): (if Drilled/Planted) 1.0 - 1.75

All seed rates are represented in Pure Live Seed. It is the responsibility of the producer to ensure the purity, germination, and amount of seed applied equals the planned seeding rates.

Operation and Maintenance

Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

Planned by: _____ **Date:** December 8, 2023

***Producer Signature:** _____ **Date:** _____

**The producer is only required to sign the Cover Crop Design Worksheet if it is modified from the original conservation plan.*

Cover Crop Nutrient Sheet

Soil Ammendments (if needed) *or attach nutrient management recommendations*				
Field #	N (lbs./acre)	K_2O (lbs./acre)	P_2O_5 (lbs./acre)	Lime (tons/acre)
CMU 1	30-50 lb/ac N following non-legume crops			as needed
CMU 1	sulfur as needed (leaf tissue test)			

Penn State **Extension**

Agronomy Facts 11

Inoculation of Forage and Grain Legumes

Legumes have the ability to form a mutually beneficial (symbiotic) relationship with certain soil bacteria of the type or "genus" *Rhizobia*. The benefit to the plant, and thus to the grower, is that these bacteria can take (fix) nitrogen from the air (in soil spaces) and make it available to the plant (see Symbiotic Nitrogen Fixation, page 3). The amount of nitrogen fixed can meet the needs of the plant and leave nitrogen in the soil for following crops.

SPECIES-SPECIFIC INOCULATION

The genus *Rhizobia* is divided into various species and subdivided into multiple strains. *Rhizobia* bacteria are fairly specific as to which legumes they will infect, form nodules on the roots of, and for which they will fix nitrogen. Legumes effectively nodulated by the same *Rhizobia* species are termed cross-inoculation groups (Table 1). The specific bacteria to nodulate the legume you are planting may be present in the soil, especially if that legume has been previously grown in the same field. However, to ensure the availability of the correct species and an effective strain of that species, inoculation—adding the bacteria—is practiced. Inoculation is recommended when the legume being planted has not been grown in that field in the past three years or with every planting of a high-value crop. Because inoculant is inexpensive and easy to apply, it is good insurance of proper nodulation and nitrogen availability. But be sure to buy an inoculant specific for the legume you are planting.

INOCULATION TECHNIQUES

Inoculum is not magic dust—it contains bacteria that must be kept alive. All packages of inoculum have an expiration date. After this date, the bacteria may not be alive and the inoculum should not be bought or used. Heat and direct sunlight kill bacteria in stored inoculum, even while packaged. Since a short period of heat can reduce the number of live *Rhizobia*, the package should be kept in a cool place and out of direct sunlight—even when taking it home from the store (keep it off the dashboard). The preferred storage place for inoculum is the refrigerator (do not freeze).

Live bacteria may be added to the soil (direct-soil application) or to the seed (seed-applied inoculant).

Direct-soil Application

Granular forms of inoculum may be placed in the seed row via the insecticide box of a planter or through the fertilizer or grass seed box of a drill. (Clean the box before inoculum is placed in it.) The granules flow freely through field planting equipment, and their flow should be calibrated and metered.

Frozen or concentrated liquid cultures of inoculant may be diluted to a slurry, then added to a water-filled tank for spray application into the seed row.

Inoculant should not be mixed with either pesticide or fertilizer if applied to the seed row. When seeding forage legumes, it is recommended that fertilizer be applied separately.

Application of inoculant directly to the soil has been quite effective. However, the greater surface area being covered by the inoculant requires more of the material. This is especially the case when narrow-row soybean planting is practiced. Therefore, the method is more expensive than seed inoculation.

Seed-applied Inoculant

Inoculum to be mixed with seed before planting is available on a variety of carriers; the most common carrier is peat. Peat has proved to be better than most other carriers in preserving live bacteria under unfavorable conditions (high temperature, late planting).

Inoculating seed. When inoculating seed, two conditions must be satisfied to get good nodulation: (1) the roots must

Table 1. Cross-inoculation groups of legumes and *Rhizobia*.

LEGUME GROUP	INOCULANT GROUP*	*RHIZOBIA* SPECIES
Alfalfa and sweet clover	A	*R. meliloti*
True clovers	B	*R. trifolii*
Peas and vetch (true)	C	*R. leguminosarum*
Soybean	S	*R. japonicum*
Birdsfoot trefoil	K	*R. loti*
Crownvetch	M	*R. spp.*

*Letters indicate manufacturer's reference to cross-inoculation groups.

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be in contact with the *Rhizobia* bacteria, and (2) the *Rhizobia* must be alive and able to infect the plant root.

For the bacteria to be in contact with the roots of every plant, inoculum should cover each seed. To achieve the best distribution, the inoculum should be mixed with seed in a large space rather than in a planter seedbox—on a tarp-covered floor, in a tub, in a cement mixer (paddles removed), or in the bed of a pickup.

Using an adhesive (a "sticker") helps the inoculant adhere to each seed. This is especially important with small-seeded forage legumes, which need more inoculant per unit of seed-surface area. Table 2 shows the advantage, in number of nodules formed, of using a sticker during inoculation. Both commercial and homemade stickers are effective. A homemade sticker can be prepared as a 1-in-10 dilution of syrup or molasses; diluted cola or milk also can be used.

Mix seed with enough sticker to just moisten all seeds. Too much liquid may cause premature germination of the seed. To the moistened seed add inoculant and mix to coat the seeds. Air-dry by spreading the coated seed in the shade. Drying may be speeded by adding additional peat-based inoculant or finely ground limestone. The seed must be dry to flow properly through the planter. Calibrate the seeder with inoculated seed when setting desired seeding rate. Seed should be planted as soon as possible after inoculation because bacteria begin to die in the drying process. If not planted within 24 hours, reinoculate.

The rate of inoculant to use depends on the amount of time elapsed since the legume was last grown in that field and the conditions for bacteria survival at the time of planting. Start with the manufacturer's recommendations. If the soil is dry and germination of the seed is expected to be delayed, then a higher rate of inoculant is required to make up for loss of some *Rhizobia*. For soybeans being planted into a new field, three times the normal rate of inoculant is recommended. A good way to achieve this is to moisten the seed with liquid inoculant applied at the normal rate, then mix seed with twice the normal rate of peat-based inoculant.

Preinoculated seed. Forage seed may be purchased already inoculated. One of two methods of preinoculation is generally used: (1) impregnation with *Rhizobia* by a vacuum process or (2) pelleting with fine limestone. The pelleted type of preinoculated seed is generally preferred on the basis of research that shows that bacteria live longer on pelleted seed and that this type of preinoculated seed results in formation of a greater number of root nodules.

Table 2. Effect of inoculant and use of sticker on soybean root nodulation.

TREATMENT	NODULES PER PLANT
No inoculant	0.0
Inoculant, no sticker	0.7
Inoculant, plus commercial sticker	2.7
Inoculant, plus sugar sticker	2.7

Source: University of Kentucky.

Preinoculated seed should be handled in the same way as packaged inoculum. Several precautions can ensure better results. Check for an expiration date on the seedbag tag, store and transport the seed out of direct sunlight and heat, and plant the seed as soon as possible. If you believe that bacteria may have died, then reinoculate the seed. Since water or the sticking solution causes the lime content of pelleted seed to gum up, use mineral oil (0.5 to 1.0 ounce of oil per pound of seed) to adhere new inoculum to seed. Plant immediately.

OTHER FACTORS AFFECTING NITROGEN FIXATION

Rhizobia bacteria require the availability of molybdenum (Mo), a soil element. In Pennsylvania, Mo is generally present in soils in sufficient quantity, but its availability is affected greatly by the soil pH (Figure 1). Soil into which a legume is being planted should be limed to raise the pH to between 6.5 and 7.0.

Some inoculants or preinoculated seed may be sold with combinations of Mo and a fungicide. These additional treatments tend to reduce the number of live *Rhizobia* and generally are not recommended.

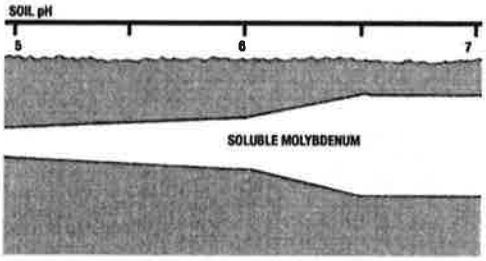
When establishing forage legumes, 20 pounds of nitrogen per acre is often recommended as a starter application. However, if conditions at planting are favorable for quick seed germination and seed has been inoculated, this starter nitrogen fertilizer is often unnecessary.

Do not apply nitrogen fertilizer to established legumes. Legumes can fix all the nitrogen they need for growth. Research has shown that nitrogen fertilizer does not increase yield of established legumes if the plants are effectively nodulated. In fact, fertilizer nitrogen discourages nodulation and inhibits nitrogen fixation.

CHECKING ROOTS FOR EFFECTIVE NODULATION

To check for effective nodulation two to four weeks after germination, carefully dig around and remove several plants. Then wash the roots in a bucket of water. Look for nodules and examine their distribution. Effective nodules generally are clustered around the taproot (Figure 3). Slice and observe the interior of several nodules. Nodules that have been actively fixing nitrogen have a red or pink interior. Nodules with white or pale-green interiors are ineffective.

Figure 1. The relationship of soil pH and molybdenum availability. (The width of the band indicates the relative amounts of soluble molybdenum in the soil solution as influenced by pH.)



SYMBIOTIC NITROGEN FIXATION

Air is almost 80 percent nitrogen (N). Although air-supplied nitrogen is the primary source of N for the fertilizer industry, as well as the source used by legumes, it does not come free. Nitrogen in air exists as two N atoms that are triple-bonded together; in effect, the atoms are glued, stapled, and taped together, not to be undone without a great expenditure of energy.

In the industrial (Haber) process, petroleum energy is used to break the triple bond, and three hydrogen ions from natural gas or another petroleum product are added to each N atom. Therefore, N fertilizer prices increase as energy prices rise.

In symbiotic N fixation, as is the case with legumes, these same steps are required of the *Rhizobia* bacteria. Sugars or carbohydrates of a legume infected with *Rhizobia* are the energy and hydrogen source used by the bacteria to fix N from the air at high energy costs to the plant. If the plant can avoid these costs by taking up N from the soil, it will. Therefore, N fertilization inhibits nodule formation and N fixation.

Infection by the *Rhizobia* bacteria is somewhat similar to an infection in the body. The bacteria enter through a susceptible location, travel inward, establish themselves, and multiply (Figure 2). In the case of legumes, the bacteria are welcome as long as they are of a certain species that the plant somehow recognizes. Infection enters through a root hair, then grows back to the base of the root hair. Multiplication of the bacteria and enlargement of the root cells form a nodule.

Inside the nodule, an enzyme called nitrogenase drives the N-fixation reaction. Similar to the catalyst used in the industrial process, the enzyme also contains molybdenum (Mo). Therefore, availability of this element in the soil is important to the legume. Nitrogenase is peculiar in that contact with oxygen ruins the enzyme. The bacteria and the plant are faced with an engineering problem: how to get the nitrogen out of air that also contains oxygen. A sophisticated system to accomplish this involves a protein called leghemoglobin that is capable of binding to oxygen and removing it from the presence of nitrogenase. Leghemoglobin, like the protein hemoglobin in our blood, binds to and transports oxygen. The combination of the protein with oxygen makes both blood and the inside of an oxygen-free nodule red or pink, which is why these colors indicate an active N-fixing nodule.

Fixed N is used in the plant to make amino acids, the building blocks of proteins. The amount of N that is fixed depends on many factors that include the specific legume and the health of the plant. Because the *Rhizobia* rely on the plant to supply carbohydrate, maintaining a healthy stand fosters N fixation. The majority of the N fixed is removed with the crop; however, residual N is often available to the next crop. That residual N reduces the requirement for applied N. Table 3 lists the amounts of N that may be available to the crop that follows various legumes.

Figure 2. The infection process of legume roots by *Rhizobia* bacteria.

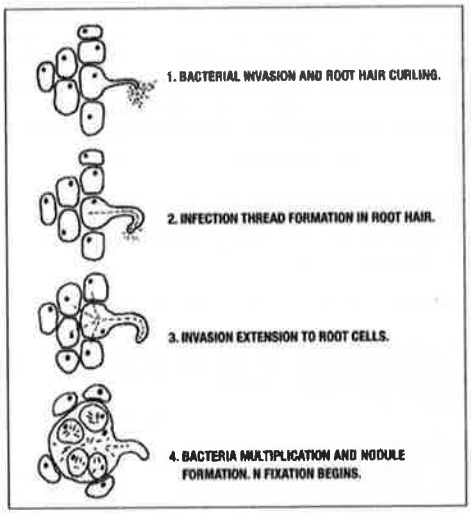


Table 3. Residual nitrogen contributions from legumes.

Alfalfa	
First year after alfalfa	
50–75% stand	110 lbs/A
25–49% stand	80 lbs/A
<25% stand	40 lbs/A
Second year after alfalfa	
50–75% stand	60 lbs/A
Red clover and trefoil	
First year after clover or trefoil	
25–75% stand	40 lbs/A
Soybeans	
First year after soybeans harvested for grain	40 lbs/A

Source: *1985–86 Penn State Agronomy Guide.*

EMERGENCY INOCULATION

If the lack of effective nodulation on a newly seeded crop is known or feared, then inoculant can be applied to the crop in the field. Nodulation deficiencies can be corrected, although not entirely overcome, by salvage (emergency) inoculation up to four weeks after seedling emergence. The grower may use one of several techniques and expect equal results. Rate of application of actual inoculant should be in the range of 1¼ to 1¾ pounds per acre regardless of the application method. The methods are:

1. Drilled application of a granular peat-based inoculant 1 inch deep.
2. Drilled application of inoculated sand. In this case, you need to inoculate sand just as you would seed and use a sticker. Inoculate an amount of sand for an application rate between 60 and 90 pounds per acre and drill 1 inch deep.
3. Sprayed application of a water-inoculum suspension. Prepare the treatment by combining powdered peat-based inoculant with about a quart of water and shaking to ensure adequate saturation. After sieving to remove large peat particles, add this suspension to a water-filled sprayer tank. Remove nozzle screens and spray uniformly over soil surface. Application by this method should be made only on a cloudy day just before rain is expected or irrigation is scheduled.

If the crop was fall seeded and cold weather has set in, then salvage inoculation should be delayed until early spring when the soil is warmer.

Figure 3. Distribution of nodules on seedling and established legume roots.

Prepared by Philip Durst and Sidney Bosworth, extension agronomists.

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Produced by Ag Communications and Marketing

Code UC048 05/14pod

Conservation Crop Rotation (328)

Source: NJ NRCS Conservation Practice Standard, Conservation Crop Rotation, August 2015

Conservation Crop Rotation (328) is a planned sequence of crops grown on the same ground over a period of time (the rotation cycle). This practice is applied to CMU 1 to support the following purposes: maintain or increase soil health and organic matter content. This practice goes beyond the agronomic reasons to use a crop rotation: i.e., help with the management of diseases, weeds and insect pests; benefits to plant nutrition; and support of healthy soil principals.

Criteria to Maintain or Increase Soil Health and Organic Matter Content

Grow crops that will produce a positive trend in the Organic Matter (OM) subfactor value over the life of the rotation, as determined by the Soil Conditioning Index. Make appropriate adjustments for additions to or subtractions from biomass.

Each bed will be rotated for agronomic purposes such as disease and pest management and allelopathic relationships. In addition to these factors, ensure that beds are rotated based on the amount of tillage that is required to properly establish the crop.

Category	Subcategory	Plant	Harvest	Cover Crop Plant Date	Cover Crop Termination Date	Termination Method (preferred)	Cover Crop
Fruit	strawberries - early	4/15 - 5/1	6/1 - 6/30	8/1	4/1	tillage (rototill)	wheat, pea, canola
Fruit	strawberries - late	5/15 - 5/30	8/15 - 11/15	10/31	5/1	tillage (rototill)	rye (cereal)
Fruit	strawberries - mid	5/1 - 5/15	7/1 - 7/31	9/15	5/1	tillage (rototill)	rye (cereal)
Greens	Baby arugula	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Black kale	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Green oak leaf lettuce	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Lacinato kale	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Red oak leaf lettuce	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Red spinach	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola
Greens	Spring mix	3/15 - 4/15	5/20 - 7/15	8/1	3/1	tillage (rototill)	wheat, pea, canola

Herbs	basil	5/1 - 7/31	6/1 - 10/31	10/15	5/1	tillage (rototill)	rye (cereal)
Herbs	dill	4/1 - 7/31	7/1 - 9/30	10/15	5/1	tillage (rototill)	rye (cereal)
Herbs	lavender	5/1 - 7/31	6/1 - 9/30	10/15	5/1	tillage (rototill)	rye (cereal)
Herbs	oregano	5/1 - 6/31	6/1 - 9/30	10/15	5/1	tillage (rototill)	rye (cereal)
Herbs	sage, asters, marigold, zinnia, cosmos, snap dragons, celosia, straw flower, echinacea, basil	5/1 - 7/31	6/1 - 10/31	10/15	5/1	tillage (rototill)	rye (cereal)
Melons	Cantaloupe	5/1 - 6/15	7/1 - 9/31	10/15	5/1	flail mower	rye (cereal)
Melons	Honeydew	5/1 - 6/15	7/1 - 9/31	10/15	5/1	flail mower	rye (cereal)
Melons	Watermelon	5/1 - 6/15	8/1 - 10/31	10/15	5/1	flail mower	rye (cereal)
Peppers	Chili plants	5/15 - 6/30	7/15 - 10/31	10/31	5/15	flail mower	rye (cereal)
Peppers	green peppers	5/15 - 6/30	7/15 - 10/31	10/31	5/15	flail mower	rye (cereal)
Squash and Pumpkins	Acorn squash	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Butternut squash	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Dunja Zucchini	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Green machine zucchini	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Kabocha turban squash	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	yellow squash	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Multiple pumpkin varieties	5/1 - 6/15	10/1 - 10/15	10/31	5/1	flail mower	rye (cereal)
Squash and Pumpkins	Patty Pan Yellow	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Sun stripe Yellow	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola
Squash and Pumpkins	Yellow squash	5/1 - 6/15	6/25 - 9/1	9/15	5/1	flail mower	wheat, pea, canola

Tomatoes	Blush tomatoes	5/15 - 6/30	7/10 - 9/15	10/15	5/15	flail mower	rye (cereal)
Tomatoes	German Johnson tomatoes	5/15 - 6/30	7/10 - 9/15	10/15	5/15	flail mower	rye (cereal)
Tomatoes	Green tomatoes	5/15 - 6/30	7/10 - 9/15	10/15	5/15	flail mower	rye (cereal)
Tomatoes	Jasper tomatoes	5/15 - 6/30	7/10 - 9/15	10/15	5/15	flail mower	rye (cereal)
Tomatoes	Martha Washington	5/15 - 6/30	7/10 - 9/15	10/15	5/15	flail mower	rye (cereal)
Vegetables	Beets	5/1 - 6/15	7/1 - 10/31	10/31	5/1	flail mower	rye (cereal)
Vegetables	Broccoli de Cicco	3/31 - 4/30	6/10 - 10/31	10/31	3/1	tillage (rototill)	rye (cereal)
Vegetables	Brussels sprouts	5/1 - 6/15	10/1 - 10/15	10/31	5/1	flail mower	rye (cereal)
Vegetables	Chioggia "candy stripe"	5/1 - 6/15	7/1 - 10/31	10/31	5/1	flail mower	rye (cereal)
Vegetables	cucumber	5/1 - 6/15	7/5 - 8/15	9/15	5/1	tillage (rototill)	rye (cereal)
Vegetables	beets	5/1 - 6/15	7/1 - 10/31	10/31	5/1	flail mower	rye (cereal)
Vegetables	Daikon radish	3/31 - 5/15	10/1 - 10/15	10/31	3/1	tillage (rototill)	rye (cereal)
Vegetables	Green beans	5/15 - 7/15	6/20 - 8/1	8/1	5/15	flail mower	wheat, pea, canola
Vegetables	onions	3/15 - 4/15	6/25 - 7/31	8/1	3/1	tillage (rototill)	wheat, pea, canola
Vegetables	Pole beans	5/15 - 7/15	6/20 - 8/1	8/1	5/15	flail mower	wheat, pea, canola
Vegetables	Sweet corn	5/1 - 6/15	7/5 - 8/31	10/15	5/1	tillage (rototill)	rye (cereal)
Vegetables	Sweet potatoes	5/1 - 6/15	9/15 - 10/15	10/31	5/1	tillage (rototill)	rye (cereal)
Vegetables	Thai eggplant	5/15 - 6/30	8/1 - 9/30	10/15	5/15	flail mower	rye (cereal)
Vegetables	Turnips	3/15 - 4/15	7/5 - 8/31	9/15	3/1	tillage (rototill)	rye (cereal)

Operation And Maintenance

Maintain the existing conservation crop rotation by following this Operation and Maintenance plan:
Rotations shall provide for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons. Acceptable substitutes are crops having similar properties that will accomplish the purpose of the original crop.
Evaluate the rotation and the crop sequence to determine if the planned system is meeting the planned purpose.

See the attached implemetation requirements on the following pages.

- Conservation Crop Rotation (328)

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

328 Conservation Crop Rotation
NJ Implementation Requirements

Producer: Michael Ehrenreich
Project or Contract: 2023 Soil Health
Location: 22 Valley Lane, Lambertville, NJ
County: Mercer
Farm Name: Bellemont
Tract Number: 2316
Farm Number:
Field Number: CMU 1

Practice Location

✔ The practice location is represented on the Conservation Plan Map or Practice Detail Map. The practice is represented by the following symbol and corresponding name in the map legend:

Symbol:

Name In Legend: Noted as "Crop Rotation (328)" in table on plan map

___ The practice location is represented on the attached design.

Description of Work:

Plant a sequence of crops in the same field(s) that includes high residue crops such as corn, wheat, and/or forages along with low residue crops such as soybeans or vegetables. Crops will be grown in a rotation for the designated purpose.

Each bed will be rotated for agronomic purposes such as disease and pest management and allelopathic relationships. In addition to these factors, ensure that beds are rotated based on the amount of tillage that is required to properly establish the crop.

Index

811 Know what's below. Call before you dig.

Utility Safety / One-Call System Information:

N/A

The Practice Purpose(s):

_____ Reduce sheet, rill, and wind erosion

✔ Maintain or increase soil health and organic matter content

_____ Reduce water quality degradation due to excess nutrients

_____ Improve soil moisture efficiency

_____ Reduce the concentration of salts and other chemicals from saline seeps

_____ Reduce plant pressures

_____ Provide feed and forage for domestic livestock

_____ Provide food and cover habitat for wildlife, including pollinator forage and nesting

Specifications:

Crop Rotation Design: Complete the following table displaying the crop rotation design - or, attach a RUSLE2 or WEPS					
✔ RUSLE2 and/or WEPS Management Printout Attached					
Field(s)	**Acres**	**Designated Purpose (from above)**	**Total Length of the Rotation**	**Crops to be Grown (in order of rotation)**	**Length Each Crop is Grown in the Rotation**
CMU 1	1.8	Maintain or increase soil h	annual	Base the order on the following:	one season
				1. agronomic considerations	
				2. cover crop termination method	
				alternate rototill and flail mower	
				3. crop and following crop	

Crop Tillage Information: Complete the following table displaying the crop tillage information - or, attach a RUSLE2 or WEPS			
✔ RUSLE2 and/or WEPS Management Printout Attached			
Field (s)	**Crop**	**Primary Tillage**	**Secondary Tillage**
1	vegetable crops on beds	Reduced Tillage (345)	no

Additional Planning Considerations:
Considerations: agronomic/bollogicial (production) should be the first priority, then planned cover crop termination method. Where possible, alternate vegetables in beds based on the cover crop termination method and tillage requirements for the crop and the following crop.

Attachments:

✔ **RUSLE2 Printouts**

_____ **WEPS Printouts**

Operation and Maintenance:

__X__ Rotations shall provide for acceptable substitute crops in case of crop failure or shift in planting intentions for weather related or economic reasons. Acceptable substitutes are crops having similar properties that will accomplish the purpose of the original crop.

__X__ Evaluate the rotation and the crop sequence to determine if the planned system is meeting the planned purpose(s).

Acceptable Crop Substitutions			
Field (s)	Planned Crop	Substitutable Crops	Additional Criteria (ex. Cover crop needed)

Residue and Tillage Management, Reduced Tillage (345)

Source: NJ NRCS Conservation Practice Standard, Residue and Tillage Management, Reduced Tillage, October 2017

Residue and Tillage Management, Reduced Tillage (345) is managing the amount, orientation, and distribution of crop and other plant residues on the soil surface year-round while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting. This practice is used to reduce sheet, rill, and wind erosion and excessive sediment in surface waters and to improve soil health and maintain or increase organic matter content. Additional benefits include reduction of tillage-induced particulate emissions and reduced energy use.

In order to meet the NRCS conservation planning criteria for the practices the soil condition index (SCI) must be positive, and the Soil Tillage Intensity Rating (STIR) value must be below 80. These ratings can be accomplished by continuing to implement Conservation Crop Rotation (328) and Residue and Tillage Management (345) and by beginning to implement Cover Crop (340). Current calculations predict that the soil loss will be 1.9 T/ac, the SCI will be 0.61, and the STIR will be 11.8. See the enclosed RUSLE2 reports for specific information.

Carbon loss is directly related to the volume of soil disturbed, intensity of the disturbance and soil moisture content, and soil temperature at the time the disturbance occurs. The following guidelines can make this practice more effective:

- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical slot created by these implements is closed at the surface.
- Planting with a single disk opener no-till drill will release less CO2 and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50° F will oxidize less organic matter and release less CO2 than operations done when the soil is warmer.
- Maximizing year-round coverage of the soil with living vegetation and/or crop residues builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation.
- Use a diverse crop rotation by incorporating multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) into the crop rotation.
- Plant a cover crop after every cash crop in the rotation. Multispecies cover crop mixes provide greater benefits than single-specie cover crops.
- Using undercutting tools rather than burying tools will enhance accumulation of organic material in the surface layer.

Conducting any soil-disturbing field operation when soil moisture is optimal, neither excessive nor too dry, will help maintain soil tilth, and reduce the need for additional tillage in the future.

Implement Options:

"Rotary tillers (rotovators, rototillers) do very intensive soil mixing and create fine uniform tilth that is advantageous when establishing horticultural crops that are small seeded or sensitive to compaction. But it is quite damaging to soil in the long term, which can only be sustainable if the soil also regularly receives organic materials like cover crop residue, compost or manure." (MAGDOFF, 2021)

There may be a better option for crops that are established in plugs prior to the season then out-planted. "Cover crops should be mowed as close to the ground surface as possible to encourage the plant to die. In general, flail mowers do a better job than rotary mowers. Flail mowers chop the cover crop residue more

finely and drop the residue more evenly in place. Rotary mowers tend to leave large clumps of residue that may be more difficult to incorporate." (Southern Cover Crop Council, 2023)

Vegetable Crop Tillage:

Intensive tillage is commonplace for many vegetable crops; especially those that are planted as seeds instead of transplanted. Where transplanted crops are grown, consider using only the flail mower and plastic mulch to prepare the planting bed. Avoiding tillage where possible will have big benefits for the soil. "Shallow compaction is especially common with repeated soil disturbance. Tillage operations often become part of a vicious cycle in which a compacted soil tills up very cloddy (Figure 6.11a) and then requires extensive secondary tillage and packing trips to create a satisfactory seedbed (Figure 6.11b). Natural aggregates break down, and organic matter decomposes in the process—contributing to more compaction in the future. Although the final seedbed may be ideal at the time of planting, rainfall shortly after planting may cause surface sealing and further settling (Figure 6.11c) because few sturdy aggregates are present to prevent the soil from dispersing." (MAGDOFF, 2021)

RUSLE2 predicts a benefit to soil health when a flail mower is used to terminate cover crops instead of a rototiller. The soil loss will remain at 1.9 tons per acre, but the SCI will increase to 0.64 (from 0.61 using a rototiller) and the STIR will decrease to 8.01 (from 11.8). Both SCI and STIR are better under this flail mower scenario.

Operation And Maintenance

Evaluate/measure the crop residue cover and orientation for each crop to ensure the planned amounts and orientation are being achieved. Adjust management as needed to either plan a new residue amount or orientation; or adjust the planting, tillage, or harvesting equipment. If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue prior to planting so it does not interfere with planter operation.

See the attached implemetation requirements on the following pages.

- Residue and Tillage Management Reduced Tillage (345)

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

345 Residue and Tillage Management, Reduced Till
NJ Implementation Requirements

Producer: Michael Ehrenreich
Project or Contract: 2023 Soil Health
Location: 22 Valley Lane, Lambertville, NJ
County: Mercer
Farm Name: Bellemont
Tract Number: 2316
Farm Number:
Field Number: CMU 1

Practice Location

✔ The practice location is represented on the Conservation Plan Map or Practice Detail Map. The practice is represented by the following symbol and corresponding name in the map legend:

Symbol.

Name in Legend: Noted as "Reduced Till (345)" in table on plan map.

___ The practice location is represented on the attached design.

Description of Work:

Full width tillage and operations will be performed using implements such as chisel plowing, field cultivating, tandem disking, vertical tillage, or ridge till. The amount, orientation, and distribution of the crop residues on the soil surface will be managed to limit soil disturbing activities used to grow and harvest crops. Specific tillage implements approved for this system can be found in the attached RUSLE2 and/or WEPS reports.

Use a rotary tiller where necessary - however, use only a flail mower to terminate the cover crop prior to laying plastic mulch.

See Conservation Crop Rotation (328) for the specific crop rotation.

Index

___ Cover Sheet
___ Specifications (utilize the RUSLE2 Profile or WEPS Printouts that show operations and residue amounts. Fields will be specified on the printouts)
N/A Drawings
N/A Cost Estimate and Bid Form
___ Operation & Maintenance
___ Certification Documentation *(when practice is implemented)*
___ Other:

811 Know what's below. Call before you dig.

Utility Safety / One-Call System Information:

N/A

The Practice Purpose(s):

✔ Reduce sheet, rill and wind erosion

_____ Reduce tillage-induced particulate emissions

✔ Maintain or increase soil quality and organic matter content

_____ Reduce energy use

_____ Increase plant available moisture

Specifications:

RUSLE2 and/or WEPS Profile Summary Printout	
✔	Planned Crops *(management view printout)*
✔	Specific equipment for each crop *(management view printout)*
✔	At a minimum specify the planned residue amounts for: 1) after harvest of the prior crop and 2) for planned residue cover after seeding the planned crop *(crop residue chart)*
✔	The Soil Tillage Intensity Rating (STIR) and Soil Condition Index (SCI) *(summary printout with the individual STIR values handwritten on the summary printout)*

Additional Specifications to Increase Plant – Available Moisture (check all that are appropriate)	
Reducing Evaporation from the Soil Surface	
	Maintain a minimum of 60% surface residue cover throughout the year
Trapping Snow – Maintain a crop stubble height during the time significant snowfall is expected to occur:	
	At least 10 inches for crops with a row spacing of less than 15 inches
	At least 15 inches for crops with a row spacing of 15 inches or greater
*Fall tillage operations shall leave the crop stubble in an upright position **All fall field operations that disturb residue shall be done as close as perpendicular as possible to the direction of prevailing winds during the time that significant snowfall is expected to occur.	

Operation and Maintenance:

__X__ Evaluate/measure the crop residue cover and orientation for each crop to ensure the planned amounts and orientation are being achieved. Adjust management as needed to either plan a new residue amount or orientation; or adjust the planting, tillage, or harvesting equipment.

__X__ If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue prior to planting so it does not interfere with planter operation.

4.c Existing Conservation Practices

Existing conservation practices have not been implemented prior to SHMP.

4.d Operation Equipment Inventory – needed for operation

Figure 1: Flail mower - walk behind. Image for illustration purposes only.

Figure 2: Flail mower - self powered pull behind. Image for illustration purposes only.

4.e Planned Nutrient Strategies

The benchmark nutrient management strategies are as follows:

The farm employs a customized nutrient management approach that prioritizes the individual needs of each plant. Without relying on calculated nutrient requirements, the strategy involves the application of Fertell 3-4-3, fish plant food 5-1-1, and granular organic super lawn 3-2-3 directly at the roots of every plant. In addition to these targeted nutrient sources, lime is strategically introduced at each plant site to promote optimal soil pH. This hands-on method ensures that each crop receives a tailored nutrient mix that has resulted in robust growth and vitality without strictly adhering to pre-determined nutrient calculations. The farm's commitment to this personalized nutrient management approach aims to maximize plant health and productivity while maintaining a focus on sustainability.

Epsom salt is also used on the farm. Scientifically known as magnesium sulfate, it serves as a beneficial fertilizer due to its content of magnesium and sulfur. When applied to soil, Epsom salt provides essential nutrients that contribute to plant health and development. Magnesium is a crucial component in chlorophyll, aiding in photosynthesis and overall plant energy production, while sulfur plays a vital role in enzyme formation and nutrient uptake. As a fertilizer, Epsom salt helps address magnesium and sulfur deficiencies in plants, promoting robust growth, improved nutrient absorption, and overall enhanced plant vitality.

Planned changes to the nutrient management strategy include the following:

The nutrient analysis of the crop field indicates strong numbers for the quantity of plant available phosphorus, potassium, calcium, and magnesium; 107, 127, 1351, and 195 respectively. The soil pH is ideal at 6.7. Nitrogen is supplied from organic fertilizers and from the breakdown of soil organic matter.

The plant available nitrogen varies throughout the year. Implementing a leaf tissue test for vegetables that are underproducing may be helpful on an as-needed basis.

4.f Planned Pest Management Strategies

Planned Pesticides

Active Ingredient	Product Trade Name	EPA Registration #	Rate	Method of Application aerial or ground (Incorporated, foliage, capsule)	Link to Label
BORAX	Borax - 20 Mule Team	n/a	unknown	foliar	Product Information Safety Data Sheet
Acetic acid 30%	Vinegar 30%	n/a	Unknown	foliar	Safety Data Sheet 1 Safety Data Sheet 2
Neem oil	Neem oil	09377100001	Standard	foliar	Safety Data Sheet
None	Dr. Bronner's All-One Castile Peppermint	n/a	Standard	Foliar	Safety Data Sheet

	Soap				

4.g Planned Soil Amendments

Consider 30-50 lbs N following non-legume crops when planting cover crops.

Sulfur is becoming a limiting factor in soils since the US has been more effective at removing it from out rainfall. Use a leaf tissue test to determine if your plants need additional sulfur. Epsom salt, aka magnesium sulfate, is an effective sulfur amendment for soils.

Consider using Penn State's Soil Test Recommendations for Commercial Vegetables for soil fertility needs for a wide range of crops. The site is easily accessible via an internet browser search or can be accessed through this URL: https://agsci.psu.edu/aasl/soil-testing/fertility/handbooks/vegetables. This guide provides valuable recommendations tailored specifically for commercial vegetable cultivation. From interpreting soil test results to implementing targeted amendments, this resource is designed to empower farmers, agronomists, and agricultural professionals with the knowledge and insights needed to maximize the productivity of commercial vegetable crops.

In general, the phosphorus and potassium numbers in your soil test are good. It would be wise to take soil tests on each bed where specific crops are cultivated. Compare the soil fertility with the recommendations in the Soil Test Recommendations for Commercial Vegetables listed above. Additionally, the following are two excerpts from Penn State Extension's article Organic Vegetable Production: https://extension.psu.edu/organic-vegetable-production#section-11.

Soil Fertility

The goal of soil fertility management is to maintain or improve the condition of the soil and minimize soil erosion. This is done by using sound crop rotations, green manures and cover crops, plant and animal matter, and fertilizers or soil amendments allowable according to the National List. Soil testing should be used to determine pH and levels of phosphorus, potassium, calcium, and magnesium. Penn State soil test kits are available through local extension offices or from the Agricultural Analytical Services Laboratory. Kits can also be obtained from other soil testing laboratories. The nutrient levels in the soil will indicate the amount of additional nutrients needed for optimal vegetable crop growth and development.

Fertilizers and Soil Amendments

Fertilizers and soil amendments allowable according to the National List are available to complement other fertility practices. In addition, mined materials of low solubility can be used to supply plant nutrients. Plant or animal ashes can also be used to improve soil fertility as long as they have not been combined or treated with a prohibited substance and are not themselves a prohibited substance. Be aware that some fertilizers and soil amendments labeled as "natural" or "organic" may not be allowed in organic production. Check with your certifying agency before applying any material to your fields.

One of the limitations to using organic fertilizers is that allowable fertilizers are sometimes difficult to find commercially, although this is improving as the industry grows. In addition, allowable fertilizers generally cost considerably more than synthetic fertilizers. They tend to be low in the amount of nutrients they supply and therefore may need to be applied in large amounts that can be

difficult to manage. Lastly, organic fertilizers can be difficult to blend. It is best to use them to complement other fertility practices such as compost, cover crops, and animal manures.

4.h Planned Livestock Management

n/a

SECTION 5: SUPPORTING DOCUMENTATION

5.a Soil Health Testing Lab Results

Standard NRCS Soil Health Tests

1. Active carbon measured by permanganate oxidation (POXC_mgPERkg)
   - Active Carbon, also known as POXC when measured by permanganate oxidation, is a soil health indicator of available carbon and represents the amount of microbial food available.
2. Soil organic carbon content measured by dry combustion (PercOrgC)
   - Soil Organic Carbon is a soil health indicator for carbon storage and soil organic matter cycling and is analyzed by high-temperature, dry combustion of soil.
3. Wet macro-aggregate stability measured using ARS or NRCS methods or by sprinkle infiltrometer (PercAgg)
   - Wet aggregate stability is a method of testing how well soil aggregates resist breaking apart under water pressure, which indicates the size and amount of water-stable aggregates.
4. Respiration using 1, 2, 3 or 4-day incubation (Resp_mgCO2PERgSoil)
   - Respiration is analyzed as a soil health indicator of microbial activity and measured by the amount of carbon dioxide gas released from a soil sample over a period of 1 to 4 days.
5. Bioavailable nitrogen measured by ACE Protein method (Protein_gPERkgSoil)
   - ACE Protein (Autoclaved Citrate Extractable Protein) is a soil health indicator method that measures the amount of protein-like substances in soil organic materials, which indicates the amount of nitrogen potentially available for plants and microorganisms.

Name	POXC mgPERkg	Score	Perc OrgC	Score	Perc Agg	Score	Resp mgCO2PERgSoil	Score	Protein gPERkgSoil	Score
CMU 1	614.6	H	2.18	L	39.1	M	0.431	L	8.7	H-VH

VL = very low, L = low, M = medium, H = high, VH = very high

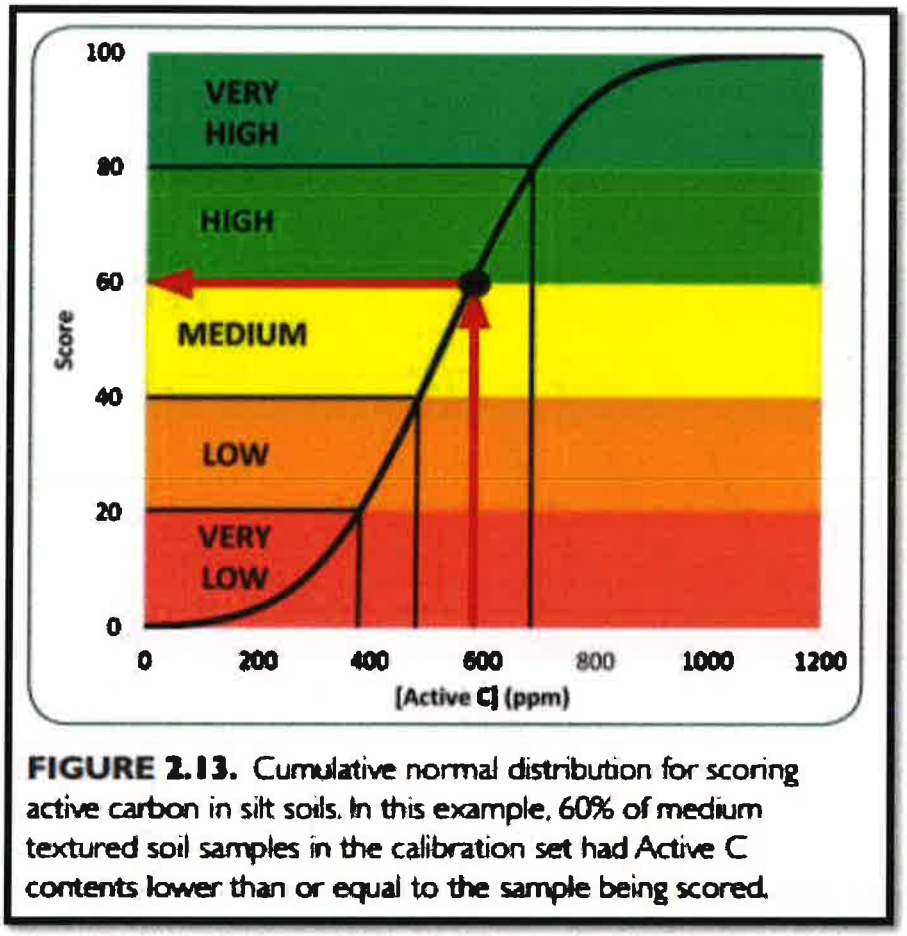

FIGURE 2.13. Cumulative normal distribution for scoring active carbon in silt soils. In this example, 60% of medium textured soil samples in the calibration set had Active C contents lower than or equal to the sample being scored.

Figure 3: scoring graph for active carbon measured by permanganate oxidation (POXC_mgPERkg) (Moebius-Clune & et. al., 2017)

Active Carbon currently has a solid score of 615 which gives it a score of HIGH.

Active carbon is a good indicator of the amount of food that is available to the soil's microbial community. It's also positively correlated to other indicators; as active carbon moves, either up or down, so will organic matter, aggregate stability, biological activity (respiration), and microbial biomass (Moebius-Clune & et. al., 2017). Therefore, it is also a leading indicator of the health of the soil.

Active carbon responds quickly to changes in crop and soil management, "often years sooner" than the percent of total organic matter (Moebius-Clune & et. al., 2017). "This is likely because when a large population of soil microbes is fed plentifully over an extended period of time, well decomposed organic matter builds up. Thus, monitoring the changes in active carbon can be particularly useful to farmers who are changing practices with the goal of building up soil organic matter."

Considering that the soil samples were taken mid-November immediately following "clean up" it is likely that the POXC (availability of microbial food) had not stopped for the winter. All the vegetation had been recently removed from the surface and no new growth had been established. The Active Carbon score is something that the farm should attempt to preserve. This farm operates as an organic farm. Therefore, Active Carbon is going to be very important for organic nitrogen. Cover Crop (340) and Residue Management Reduced Tillage (345) are conservation practices that are recommended to maintain Active Carbon.

Scoring function

The graph below depicts Organic Matter scoring functions and upper value limits for coarse, medium, and fine textured soils (Figure 2.31).

The red, orange, yellow, light green and dark green shading reflects the color coding used for the ratings on the soil health report summary page (see page 73).

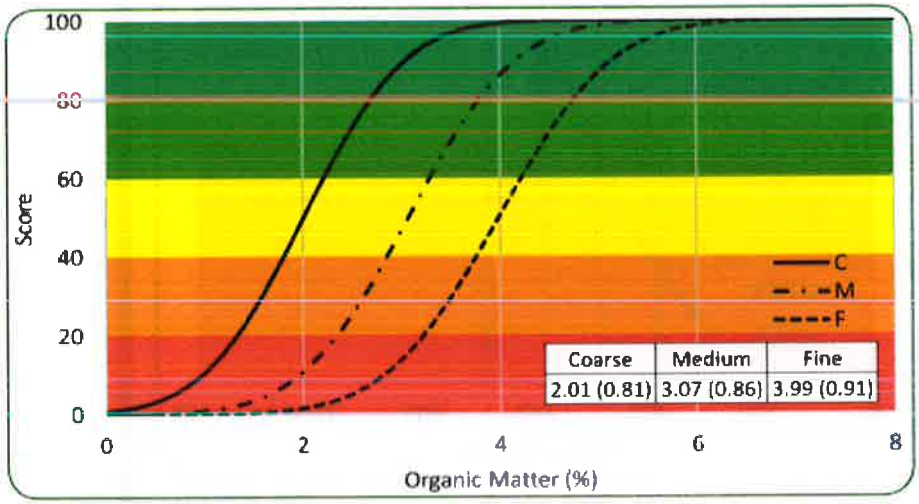

FIGURE 2.31. Soil Organic Matter (OM) scoring functions and upper value limits for Coarse (C), Medium (M) and Fine (F) textural classes. Mean and standard deviation (in parenthesis) for each class are provided. In this case more is better. Soils with higher OM scores generally require lower inputs of nutrients and are more resilient to drought and extreme rainfall.

Figure 4: scoring graph for soil organic carbon content measured by dry combustion (PercOrgC) (Moebius-Clune & et. al., 2017)

At 2.18%, the soil organic content or percent organic carbon is LOW (for 'medium' textured soil). This score will not increase on its own throughout the winter. Consequently, when spring tillage and planting begin, the percentage will be further reduced; season after season, year after year. Actions should be taken to ensure that the soil's organic carbon is increased over time.

Cover crops provide the soil canopy cover, organic matter inputs, increased species diversity, and living root activity for soil protection and improvement between the production of main cash crops. "[Often], the greatest benefits are derived from cover crops that are terminated in place as this prevents damaging soil disturbance, and allows roots to decompose in the field and create continuous pores. Roots are also generally more effective at contributing to soil organic matter than above ground biomass (Moebius-Clune & et. al., 2017)."

Residue and Tillage Management, Reduced Till (345) is a conservation practice that is planned. "Reducing tillage slows decomposition of soil organic matter and release of CO2 into the atmosphere (Moebius-Clune & et. al., 2017)." Continuing to find opportunities to further reduce tillage while adding cover crops to the rotation will increase the quantity of organic nitrogen in the soil profile.

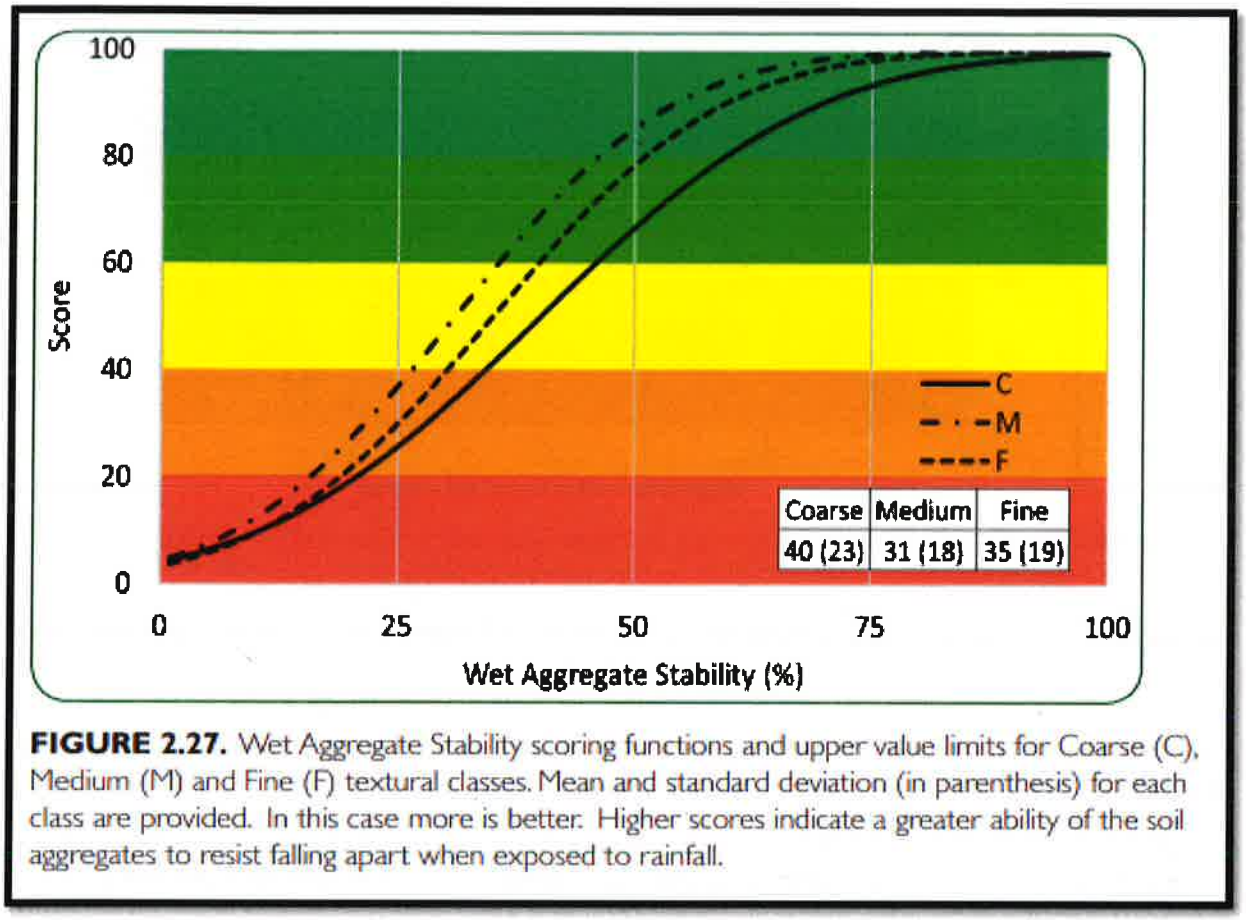

FIGURE 2.27. Wet Aggregate Stability scoring functions and upper value limits for Coarse (C), Medium (M) and Fine (F) textural classes. Mean and standard deviation (in parenthesis) for each class are provided. In this case more is better. Higher scores indicate a greater ability of the soil aggregates to resist falling apart when exposed to rainfall.

Figure 5: scoring graph for wet macro-aggregate stability measured using ARS or NRCS methods or by sprinkle infiltrometer (PercAgg) (Moebius-Clune & et. al., 2017)

Wet aggregate stability is the soil's ability to hold together when exposed to rainfall. The laboratory test resulted in a score of 39.1 which fell in the MEDIUM range. However, the in-filed strainer test did not meet the assessment criteria. My concern is that the aggregate stability is on a downward trend since previously undisturbed soil is now being heavily tilled using a rototiller. My recommendation would be to implement Conservation Crop Rotation (328). Limit tillage of beds to every two years.

Furthermore, one of the symptoms of a low score in wet aggregate stability is reduced water infiltration (Moebius-Clune & et. al., 2017). As Cover Crop (340) is implemented using a multi-species mix designed to treat compaction in subsoil, the wet aggregate stability should increase allowing increased water infiltration into the soil profile. The increased water in the soil profile will make the crop more resilient to weather extremes.

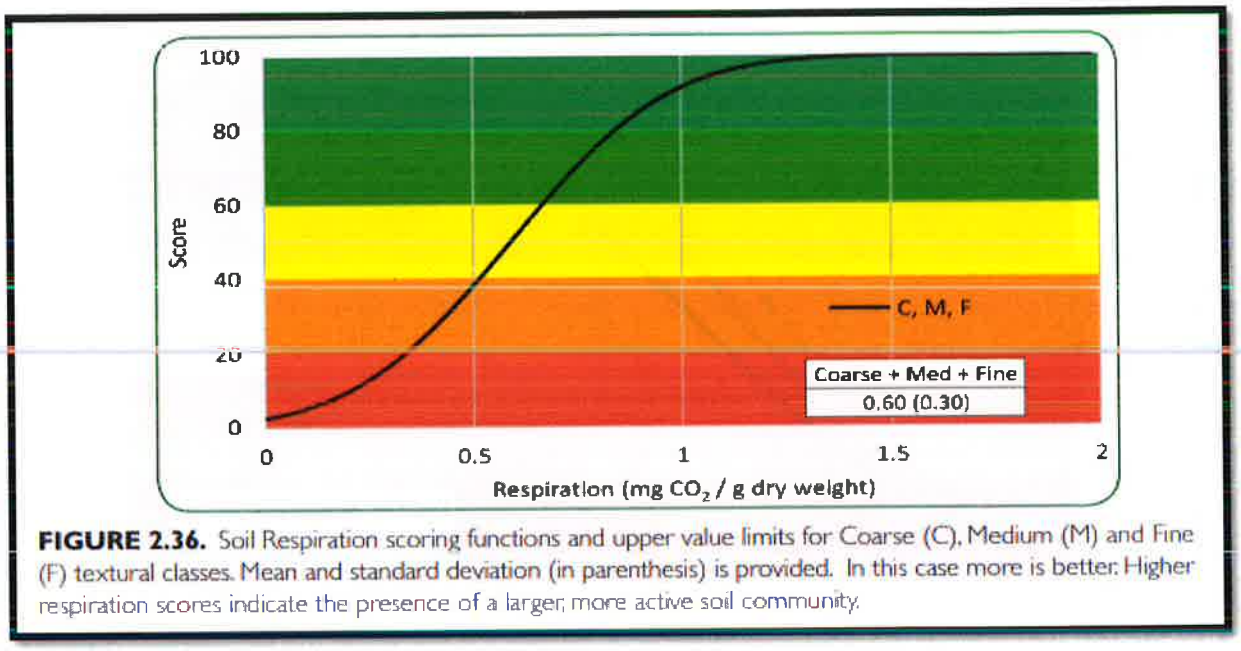

FIGURE 2.36. Soil Respiration scoring functions and upper value limits for Coarse (C), Medium (M) and Fine (F) textural classes. Mean and standard deviation (in parenthesis) is provided. In this case more is better. Higher respiration scores indicate the presence of a larger, more active soil community.

Figure 6. scoring graph for respiration using 1, 2, 3 or 4-day incubation (Resp_mgCO2PERgSoil) (Moebius-Clune & et. al., 2017)

Soil respiration, an indicator of microbial activity, in the hedgerow at 0.431 mg CO2 per gram dry weight is a concern with a score of 35 in the LOW range of the scale.

Biological activity is measured directly by the soil respiration test. Functions that effect respiration include photosynthesis, exchange of atmospheric CO2, and decomposition (i.e. physical, chemical and biological processes) that takes place in the soil profile (Moebius-Clune & et. al., 2017).

The test was conducted on soils after the growing season. However, the respiratory processes typically continues where there are living roots in the soil. Implementing Cover Crop (340) will result in similar soil respiration activity throughout the year in the crop field.

Why does it matter if there is respiration happening in the winter? In a system where respiration has stopped, it takes time for it to begin again. Biological, chemical, and physical processes must get rebooted when a new crop is planted after a "fallow" period. In systems where respiration does not stop (i.e. systems with living plants throughout the winter), the soil function is already carrying out its function when the cash crop is planted in the spring. There is no time lost to regenerating chemical, biological, and physical processes.

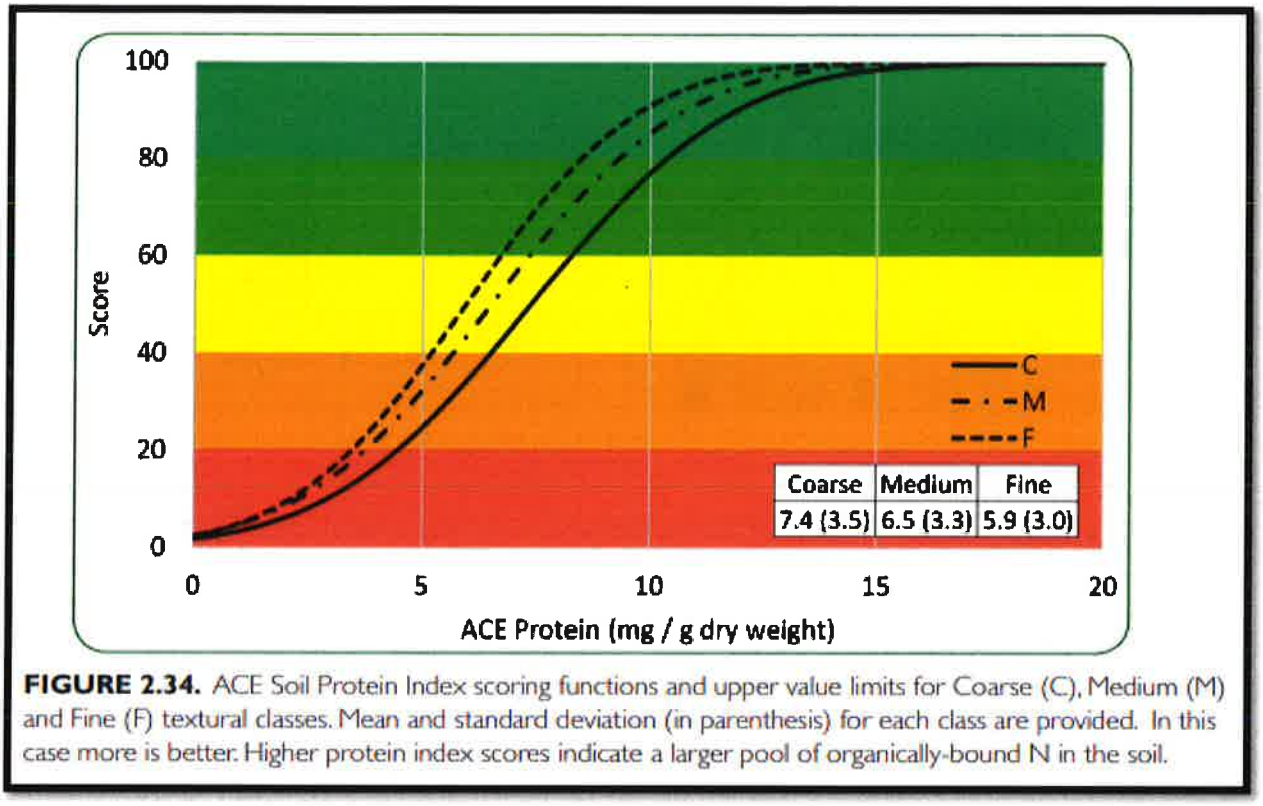

FIGURE 2.34. ACE Soil Protein Index scoring functions and upper value limits for Coarse (C), Medium (M) and Fine (F) textural classes. Mean and standard deviation (in parenthesis) for each class are provided. In this case more is better. Higher protein index scores indicate a larger pool of organically-bound N in the soil.

Figure 7: scoring graph for bioavailable nitrogen measured by ACE Protein method (Protein_gPERkgSoil) (Moebius-Clune & et. al., 2017)

The ACE protein test is the soil protein index that indicates the amount of nitrogen potentially available for plants and microorganisms. CMU 1 showed 8.7 grams per kilogram of soil giving it a score of 60-80 in the HIGH range.

"To store and maintain N in the soil organic matter, we need to accumulate compounds that are relatively stable, rich in N (low C:N ratio), microbially degradable, and potentially abundant in amendments, crops, cover crops, or residues (Moebius-Clune & et. al., 2017)." Adding manure and fresh green biomass increases the quantity of protein in the soil; tillage decreases it. "Building and maintaining healthy, biologically active soil with large reserves of decomposing plant tissue in organic form is a good approach to provide a crop with its N needs over time as opposed to applying soluble forms of N that plants may not use immediately and be lost through runoff, leaching or denitrification." Cover Crop (340) that is terminated without being incorporated into the soil is an excellent way to increase the ACE Soil Protein Index and crop available nitrogen.

Waypoint ANALYTICAL

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SOIL ANALYSIS

Client Information:
Kluthe Environmental Solutions
64 Norma Road
Hampton , NJ 08827

Grower :
Bellemont

Field Id:

Report No: 23-333-0578
Cust No: 15750
Date Printed: 11/30/2023
Page : 1 of 1
Agronomist: BLK
Date Received : 11/29/2023

	Sample Id	Organic Matter %	CEC meq/100g	pH	Buffer pH	P ppm	K ppm	Ca ppm	Mg ppm	S ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Na ppm		Calculated Cation Saturations %K	%Ca	%Mg	%H	%Na
1	CMU1		9.5	6.7	6.41	107	127	1351	195									3.4	71.1	17.1	8.4	
Average :			9.5	6.7	6.41	107	127	1,351	195													

Comments:

Very Low | Low | Medium | Optimum | Very High

Analysis prepared by: Waypoint Analytical Pennsylvania, Inc.

Cropland In-Field Soil Health Assessment Worksheet

Soil Health Resource Concerns
CPT: Compaction
SOM: Soil Organic Matter Depletion
AGG: Aggregate Instability
HAB: Soil Organism Habitat Loss or Degradation
Location: 22 Valley Rd. Lambertville NJ
Field/CMU: 1
Tract #: 2146
Client/Customer: Belcmont Farm Michael Ehrenreich
Plan: SHMP 2023
Date: 11/22/2023
Soil Map Units: PeoB, LenB, DozA
Soil Moisture: higher than field capacity
Surface Horizon Texture: silt loam

Indicator Timing and Use Anytime | After Rain or Irrigation | With Adequate Moisture | Before a Tillage Event Primarily No-Till Systems | Before Growing Season | During Growing Season | Interview	Meets Assessment Criteria (Yes/No)
Soil Cover | **SOM, AGG, HAB** • Surface cover from plants, residue or mulch; cover greater than 75% (estimated)	☐Y ☒N
Residue Breakdown | **SOM, HAB** • Natural decomposition of crop residues or organic mulch is as expected with crop and conditions	☐Y ☒N
Surface Crusts | **AGG, HAB** • Crusting on no more than 5% (estimated) of the field/CMU	☒Y ☐N
Ponding/Infiltration | **CPT, AGG** • No ponding on non-hydric soils within 24 hours following typical rainfall or surface irrigation event; • OR, no infiltration difference between assessment area and fencerow sample in the same soil type; • OR, soil infiltrates 1-inch of water in 30 minutes or less	☒Y ☐N
Penetration Resistance | **CPT** • Penetrometer rating <150 psi within top 6-inch depth and <300 psi in the 6 to 18-inch depth; • OR, slight or no resistance with wire flag inserted to 12-inches	☒Y ☐N
Water-Stable Aggregates | **CPT, SOM, AGG, HAB** • Strainer: soil structure remains intact with aggregates apparent; • OR, Soil Quality Test Kit (SQTK)/Jornada slake box meets stability class 5 to 6; • OR, Cylinder: At least 80% (estimated) remains intact after 5 minutes with little cloudy water	☐Y ☒N
Soil Structure | **CPT, SOM, AGG, HAB** • Granular surface soil structure and no platy or massive structure in top foot of soil	☐Y ☒N
Soil Color | **SOM** • No color difference between assessment area and fencerow sample in same soil type; • OR, value is on the darker range using color chart and official series description	☒Y ☐N
Plant Roots | **CPT, SOM, AGG, HAB** • Roots covered in a soil film (rhizosheaths) or are part of soil aggregates; • OR, living roots if present are healthy, fully branched, extended and unrestricted	☒Y ☐N
Biological Diversity | **SOM, AGG, HAB** • Evidence of more than 3 different types of organisms observed or biological hotspots present	☐Y ☒N
Biopores | **SOM, AGG, HAB** • Presence of multiple intact root or earthworm channels that extend vertically through the soil with some connecting to the surface	☒Y ☐N

Version 1.3

5.c Pasture Condition Score Sheet

N/A

5.d Soil Erosion Prediction with SCI and STIR

The current cropping system uses a rototiller to prepare the planting beds. Using a rototiller on agricultural silt loam soils in the short term can lead to immediate changes. The soil structure will be disrupted, causing a loosening of the top layer; this can enhance seedbed preparation, making it easier for planting. However, the disruption can also expose the soil to erosion, and the incorporation of organic matter may initially increase microbial activity. Continuous tilling may lead to compaction below the tilled layer, affecting water infiltration and root penetration. Erosion risk may persist, and the soil's natural structure will be altered, potentially impacting its resilience and ability to support sustainable crop growth. Additionally, increased microbial activity may contribute to nutrient cycling but can also accelerate organic matter decomposition, affecting the soil's long-term health. A rototiller can offer short-term benefits such as improved seedbed preparation, its long-term effects on soil structure, compaction, and erosion risk should be carefully considered to implement sustainable soil management practices.

- Current Cropping Scenario: For many of the crops, rototilled beds are covered with plastic in the spring. Vegetables are planted in slits that are cut into the plastic. The plastic mulch is removed at the end of October. The site is scraped and left fallow over the winter. Strips that are vegetated with naturalized grasses remain between the beds during the growing season. Those strips are often scrapped of top-growth vegetation after the season and left fallow over the winter.
    - It is important to realize that each of the following calculations for soil loss, soil condition index (SCI) and the soil tillage intensity rating (STIR) are based on an average where the beds and the middle rows are averaged together. The beds
    - Whole field averaged:
        - Soil loss 3.9 tons per acre (Soil's T Value = 2). Soil loss equal to or less than the soil's T value meets conservation planning criteria.
        - SCI 0.41
        - STIR 11.7
    - When the calculation is specific to the cropping system only the values are more accurate to what is happening on the square footage of the bed.
        - Soil loss = 14 t/ac/yr (Soil's T Value = 2)
        - SCI = -0.93; SCI should be positive, negative values indicate that organic matter is trending downward.
        - STIR = 25.1. The STIR value at 25.1 isn't bad. For context, to meet the NRCS standard for the conservation practice Residue and Tillage Management, Reduced Tillage (345) the STIR value should be less than 80 (and no primary inversion tillage implements are to be used). For the conservation practice Residue and Tillage Management, No Till (329) the STIT value should be less 20.
    - Soil Health Benefits: The current cropping system does...
        - Supports a diversity of crops that keeps a wide variety of microorganisms present in the soil.
    - Soil Health "cons." The current system does not...
        - Minimizes soil disturbance
        - Maximize soil cover
        - Maximize biodiversity
        - Maximize living roots

- Alternative Scenario 1:
    - Keep the cropping system the same by using the rototiller to prepare the bed. Cover the bed with plastic mulch. Take up the plastic mulch as soon as possible after the crop and bed are finished for the season. Then plant a cover crop on the bed. Try to get the cover crop planted on or before 9/15 for some beds in the rotation. Get all the beds planted to cover crops by 10/31 (see the Cover Crop Implementation Requirements).
        - This scenario does not take into account the permanent grass strip between the beds. It is for demonstration purposes only so that the effects on the bed can be realized.
    - Calculations for beds only:
        - Soil loss = 7 t/ac/yr (Soil's T Value = 2)
        - SCI = -0.30; SCI should be positive, negative values indicate that organic matter is trending downward.
        - STIR = 25.3.
    - This scenario is selected for vegetable crops that must be started from seed (instead of out-planted plugs).

- Alternative Scenario 2:
    - Keep Alternative Scenario 1 for crops that must be planted in a well tilled seedbed (there is a spreadsheet in the section Conservation Crop Rotation that shows the planned tillage. For crops that will be out-planted after being started in plugs, do not till the soil. Instead, use a flail mower to terminate and chop the cover crop. Cover the bed with plastic mulch just as Alternative Scenario 1. Take up the plastic mulch as soon as possible after the crop and bed are finished for the season. Then plant a cover crop on the bed. Try to get the cover crop planted on or before 9/15 for some beds in the rotation. Get all the beds planted to cover crops by 10/31 (see the Cover Crop Implementation Requirements).
        - This scenario does not take into account the permanent grass strip between the beds. It is for demonstration purposes only so that the effects on the bed can be realized.
    - Calculations for beds only:
        - Soil loss = 6.6 t/ac/yr (Soil's T Value = 2)
        - SCI = -0.24; SCI should be positive, negative values indicate that organic matter is trending downward.
        - STIR = 17.2.
    - This scenario is selected for vegetable crops that can be out-planted as plugs. Deciding against tilling the soil prior to out-planting will help preserve the natural soil structure.

- Alternative Scenario 3:
    - Both Scenario 1 and Scenario 2 will be used depending on the crop rotation.
    - This scenario predicts that half the beds will be managed like Scenario 1 while the other half will be managed like Scenario 2. Between the beds there will be rows of grass that is mowed but is not harvested.
    - Calculations for whole field:
        - Soil loss = 1.7 t/ac/yr (Soil's T Value = 2)
            - Soil loss below the soil's T value meets conservation planning standards.
        - SCI = 0.56; SCI should be positive.
            - A positive SCI meets conservation planning standards.
        - STIR = 10.2.
            - A STIR value below 80 meets the standards for the conservation practice Residue and Tillage Management, Reduced Tillage (345).

- A STIR value below 20 meets the standards for conservation practice Residue and Tillage Management, No-Till (329).
    - Note: In this case, I did not plan No-till (329) because there is no way to guarantee the ratio of the field that is planted according to Scenario 1 or Scenario 2. Field conditions and annual crop selections play an important role the factors. Therefore, Residue and Tillage Management, Reduced Tillage (345) was selected.

USDA NRCS

RUSLE2 Profile Erosion Calculation Record

Info: Bellemont Scenario 3

- This scenario predicts that half the beds will be managed like Scenario 1 while the other half will be managed like Scenario 2. Between the beds there will be rows of grass that is mowed but is not harvested.
  - Scenario 1: Keep the cropping system the same by using the rototiller to prepare the bed. Cover the bed with plastic mulch. Take up the plastic mulch as soon as possible after the crop and bed are finished for the season. Then plant a cover crop on the bed. Try to get the cover crop planted on or before 9/15 for some beds in the rotation. Get all the beds planted to cover crops by 10/31 (see the Cover Crop Implementation Requirements).
  - Scenario 2: Keep Scenario 1 for crops that must be planted in a well tilled seedbed (there is a spreadsheet in the section Conservation Crop Rotation that shows the planned tillage. For crops that will be out-planted after being started in plugs, do not till the soil. Instead, use a flail mower to terminate and chop the cover crop. Cover the bed with plastic mulch just as Alternative Scenario 1. Take up the plastic mulch as soon as possible after the crop and bed are finished for the season. Then plant a cover crop on the bed. Try to get the cover crop planted on or before 9/15 for some beds in the rotation. Get all the beds planted to cover crops by 10/31 (see the Cover Crop Implementation Requirements).
- Calculations for whole field:
  - Soil loss = 1.7 t/ac/yr (Soil's T Value = 2)
    - Soil loss below the soil's T value meets conservation planning standards.
  - SCI = 0.56; SCI should be positive.
    - A positive SCI meets conservation planning standards.
  - STIR = 10.2.
    - A STIR value below 80 meets the standards for the conservation practice Residue and Tillage Management, Reduced Tillage (345).
    - A STIR value below 20 meets the standards for conservation practice Residue and Tillage Management, No-Till (329).

Note: In this case, I did not plan No-till (329) because there is no way to guarantee the ratio of the field that is planted according to Scenario 1 or Scenario 2. Field conditions and annual crop selections play an important role the factors. Therefore, Residue and Tillage Management, Reduced Tillage (345) was selected.

File: profiles\default
Access Group: R2_NRCS_Fld_Office

Inputs:

Location	*Soil*	*Slope length (horiz)*	*Avg. slope steepness, %*
USA\New Jersey\Mercer County	SSURGO\Mercer County, New Jersey\PeoB Penn channery silt loam, 2 to 6 percent slopes\Penn Channery silt loam 85%	150	4.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop w/rotarymower	vegetations\Rye and Hairy vetch, winter cover	lbs	5000
managements\Strip/Barrier Managements\Cool season grass; not harvested	vegetations\Permanent cover not harvested\Grass, cool season permanent not harvested	Ton	2.5
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Tomato, fresh mkt staked	cwt	300
managements\CMZ 59\c.Other Local Mgt Records\tomatoes,summerveg,bush,sp59_Bellemont_w/covercrop	vegetations\Rye and Hairy vetch, winter cover	lbs	5000

Contouring	Strips/barriers	Diversion/terrace, sediment basin	Subsurface drainage	Adjust res. burial level	General yield level	Rock cover, %
a. rows up-and-down hill	(none)	(none)	(none)	Normal res. burial	Base yield	0

Outputs:

T value	Soil loss erod. portion	Detachment on slope	Soil loss for cons. plan	Sediment delivery	Net C factor	Net K factor	Crit. slope length	Surf. cover after planting, %
2.0	3.3	2.4	1.7	0.27				50

Date	Operation	Vegetation	Surf. res. cov. after op, %
4/10/0	Shredder, flail or rotary		72
4/20/0	Fert applic. surface broadcast		71
4/28/0	Plastic mulch applicator 100 percent cover		59
4/28/0	Planting, manual	Tomato, fresh mkt staked	59
5/20/0	Sprayer, insecticide post emergence		52
6/15/0	Sprayer, insecticide post emergence		44
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	39
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	33
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	39
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	55
10/1/0	Plastic mulch, remove		58
10/4/0	Scraper/pan/grader, clearing/cutting		0.27
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.25
4/1/1	begin growth	Permanent cover not harvested\Grass, cool season permanent not harvested	50
4/10/0	Rototiller, on beds		48
4/20/0	Fert applic. surface broadcast		46
4/28/0	Plastic mulch applicator 100 percent cover		37
4/28/0	Planting, manual	Tomato, fresh mkt staked	37
5/20/0	Sprayer, insecticide post emergence		31
6/15/0	Sprayer, insecticide post emergence		24
7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	20
7/15/0	Harvest, hand pick	Tomato, fresh mkt staked	17
8/15/0	Harvest, hand pick	Tomato, fresh mkt staked	29
9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	50
10/1/0	Plastic mulch, remove		54
10/4/0	Scraper/pan/grader, clearing/cutting		0.33
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.30
4/1/1	begin growth	Permanent cover not harvested\Grass, cool season permanent not harvested	50
4/10/0	Shredder, flail or rotary		72
4/20/0	Fert applic. surface broadcast		71
4/28/0	Plastic mulch applicator 100 percent cover		59
4/28/0	Planting, manual	Tomato, fresh mkt staked	59
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4/28/0	Planting, manual	Tomato, fresh mkt staked	37
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7/1/0	Harvest, hand pick	Tomato, fresh mkt staked	20
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9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	50
10/1/0	Plastic mulch, remove		54
10/4/0	Scraper/pan/grader, clearing/cutting		0.33
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.30
4/1/1	begin growth	Permanent cover not harvested\Grass, cool season permanent not harvested	50
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9/12/0	Harvest, hand pick	Tomato, fresh mkt staked	55
10/1/0	Plastic mulch, remove		58
10/4/0	Scraper/pan/grader, clearing/cutting		0.27
10/15/0	Planting, broadcast seeder	Rye and Hairy vetch, winter cover	0.25
4/1/1	begin growth	Permanent cover not harvested\Grass, cool season permanent not harvested	50

SCI and STIR Output

Soil conditioning index (SCI)	*SCI OM subfactor*	*SCI FO subfactor*	*SCI ER subfactor*	*Avg. annual slope STIR*	*Wind & irrigation-induced erosion for SCI, t/ac/yr*
0.56	0.48	0.90	0.052	10.2	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

5.e WIN-PST Evaluation

No change is anticipated in the farm's pest management strategies.

Planned Conservation Practices:

Begin implementing Cover Crop (340), Conservation Crop Rotation (328), and Residue and Tillage Management Reduced Tillage (345).

These practices are not mitigation strategies but do contribute to responsible use of the pesticides used in this operation.

Effect on the Principles of Soil Health:

Implementing conservation practices like Conservation Crop Rotation (328), Residue and Tillage Management Reduced Tillage (345), and Cover Crop (340) work in conjunction with one another to keep soil erosion at a minimum and increase organic matter in the soil profile. These actions will reduce soil compaction and increase aggregate stability over time.

- Soil disturbance well below STIR threshold of 80.
    - Supports soil aggregate development
        - * this is the primary improvement that your soil structure needs for improved soil quality.
    - Protects soil habitat
    - Protects soil organic matter
- Maximizes soil cover
    - Nutrient runoff will be reduced (slight benefit over current system)
    - Buffer soil temperature
    - Reduce evaporation
    - Reduce erosion
    - Reduce aggregate breakdown
    - Protect soil organic matter
    - Provide habitat for biological organisms during much more of the calendar year.
- Maximize biodiversity
    - Use diverse crop rotations and multi-species cover crops to improve nutrient cycling, break disease cycles, and stimulate below ground activity.
- Maximize living roots
    - By using cover crops and perennial crops that will provide soil biota a continuous food source.

5.f Additional Supporting Documentation

Alternative to Further Improve Soil Health:

Consider adding a summer-time cover crop to one or two beds per year. Then, terminate the summer-time cover crop at the end of the season and add a winter-time cover crop.

- Soil loss will be reduced further,
- Soil condition index (SCI) will be increased,
- And the average annual soil tillage intensity rating (STIR) rating will be further reduced.

References

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FOREST MANAGEMENT PLAN
FOR
TAX BLOCK: 57, LOTS: 3 & 4 AND TAX BLOCK: 56, LOT: 3
HOPEWELL TOWNSHIP, MERCER COUNTY, NEW JERSEY

PREPARED FOR:

Bellemont Farm LLC
C/o Michael Ehrenreich
71 South Orange Avenue, #396
South Orange, NJ 07079

PREPARED BY:

George J. Boesze, Land Conservation Services
NJDEP- Approved Forester
125 Sandhill Terrace, Stroudsburg, PA 18360

NJDEP Forestry Number:
Woodland Acreage: 77.34 acres

Plan Date: October 25, 2021
Plan Duration: October, 2021 to October, 2031

FOREST MANAGEMENT PLAN SUMMARY DATA

PROPERTY OWNER: Bellemont Farm LLC
C/o Michael Ehrenreich

DATE OF PLAN: 10/25/21

PROPERTY LOCATION: River & Valley Road Intersection
Hopewell Township
Mercer County

BLOCK: 57 **LOTS:** 3 and 4
BLOCK: 56 **LOT:** 3

MAILING ADDRESS: 71 South Orange Avenue, #396
South Orange, NJ 07079

TELEPHONE NUMBER: (917) 868-7755

E-MAIL: me@somalaser.com

PROPERTY SIZE: 110.34 Acres Total*
77.34 Acres Woodland (forested)
33.00 Acres non-forested

APPROVED FORESTER: Land Conservation Services
George J. Boesze, Forester
125 Sandhill Terrace
Stroudsburg, PA 18360
(570) 992-3686, gboesze@ptd.net

DURATION OF PLAN: October 2021 to October 2031

* Total acreage figures provided by landowner via a property survey map completed by Thomas J. Yuhas of Barry Isett & Associates, Inc. Date of survey February 4, 1999.

I INTRODUCTION

The property detailed in this Forest Management Plan consists of a 110+- acre parcel known as Tax Block 57, Lots 3 & 4 and Block 56 Lot 3 located within the township of Hopewell in the county of Mercer and the state of New Jersey. The property is located at the intersection of River Road and Valley Road. Bellemont Farm LLC (c/o Michael Ehrenreich) presently owns the property. A forest resource inventory was completed in the fall of 2021 for the purpose of assessing woodland conditions within the parcel and to facilitate the preparation of this plan.

This plan was prepared in accordance with the requirements of the New Jersey Farmland Assessment Program for Woodland Owners. The following sections of this plan present a brief explanation of the forest inventory procedure, a description of the landowner's objectives for management, summary descriptions of each forest stand including silvicultural recommendations based upon observed conditions, a description of existing soils, forestry best management practices along with threatened and endangered species information and a schedule of management activities. Maps identifying the location and extent of forest stands, soil types, and prominent man-made and natural features are also included. A map identifying the location and extent of the forest stands with both prominent man-made and natural features is also included. **The location and extent of such features are presented on the scaled Forest Stand Map included as Appendix A in the back of this report.**

II FIELD SAMPLING PROCEDURES

Ideally, the best inventory of a forest or woodland would be to count and measure each tree within the confines of each component stand. Such a procedure is impractical and time consuming. In order to produce reliable results in a timely manner, a statistical sampling procedure was selected. The inventory utilized a point sampling procedure that is frequently used in forestry-related practices for quantifying forest characteristics. The point sampling procedure is a method for selecting trees on the basis of their size, rather than on the frequency of their occurrence. Under this sampling scheme, the probability of tallying any given tree is proportional to its size; larger trees are sampled more intensively than smaller trees, which is desirable from the standpoint of estimating the structure and composition of the forest stand.

Following the location of property boundary lines, a predetermined spacing grid pattern was used to locate sample point centers on the ground. From each point, sample trees identified using a 10 Basal Area Factor (BAF) prism were classified and tallied according to species, size, diameter at breast height (DBH), and quality and product class. A reproduction survey was also made, in which the presence or absence of seedlings and/or saplings of desirable species were noted at each sample plot. Harvesting recommendations must be based on whether a sufficient number of desirable trees exist on the forest floor.

General forest conditions such as defoliation by insects, evidence of disease, shrub layer composition, presence of woody interference and vines, herbaceous ground cover and indications of past land-use were also noted at each sample location. The information obtained during the inventory was processed and analyzed in accordance with procedures that are standard for forest management practices.

During the traverse between sample points, prominent natural and man-made physiographic features such as stand boundaries, rock outcrops, stone walls, wire fences, buildings, streams, roads,

field edges, and other improvements were noted and mapped. **The location and extent of such features are presented on the scaled Forest Stand Map included as Appendix A in the back of this plan.**

III OBJECTIVES FOR MANAGEMENT

The landowner has adopted a series of goals and objectives for the management of the property. It remains an established policy of maintaining the property for optimum use. This policy has resulted in several objectives for forest management:

- Implementation of sound forest management practices designed to conserve the natural resources of the property while simultaneously improving the quality and health of the woodland.

- To maintain the woodland for scenic and aesthetic reasons.

- To promote a productive woodland while maintaining adequate diversity and stocking of species.

- To continue to develop and maintain proper access into and throughout the forest stands in order to facilitate prescribed silvicultural activities.

- To utilize the property recreationally for hiking, camping or other related activities. In addition, to enhance and promote said recreational interests.

- Provide for a monetary gain and future source of income, from the forest products through integrated sawtimber and firewood harvests.

- Protect the water resources through compliance with the New Jersey Freshwater Wetlands Protection Act and the New Jersey Flood Hazard and Control Act.

- Structure forest management activities to provide adequate income for the continued qualification of farmland assessment status for the property under the Farmland Assessment Act.

- To set forth methodology, consistent with all of the above objectives, for protecting and enhancing the environment including soil, water, wildlife, aesthetics and land value.

By implementing these and other objectives the landowner hopes to conserve and improve the quality of the environment, the appearance of the area and subsequently enhance the land as an investment.

IV PROPERTY LOCATION

The landowners' property consists of approximately 110+- acres located at the intersection of River Road and Valley Road. The property is easily accessible from Flemington, New Jersey by taking State Route 202 south towards Lambertville. Once in Lambertville, turn left (south) on State Route 29 (aka River Road). Proceed on River Road (for a little over 3 miles) until you reach the intersection with Valley Road and the property will be on the left-hand side. Note: At the current time there is no residence or any other structures on the subject property.

For a complete layout of this property please refer to the property location, aerial and topographic maps, attached to this report as Appendix A.

V BOUNDARY DESCRIPTION

It is a requirement of the farmland assessment program that all woodland boundaries be clearly field delineated with markers or similar. The eastern, western and southern property boundary lines consist of Moores Creek Tributary, River Road and Valley Road, respectively. The remaining property boundaries are well established and clearly identified via a combination of posted signs and tree-fencerows, similar to that depicted in the attached photos. Neighboring parcels at the current time remain a combination of public and private holdings.

It is recommended that boundaries and corners be painted with long-lasting, highly visible paint as a more permanent method of boundary identification. This will assist the landowner or the forester in re-establishing the property boundaries should posted signs be destroyed or vandalized. In addition, marking of boundary lines can also prevent trespassing or removing trees that belong to someone else.

Please refer to Appendix B, located in the back of this report for suggestions and assistance with boundary line marking.

VI SOIL DESCRIPTION

In order to develop and maintain forest management activities with associated best management practices on the property, soil information is desirable. According to the Web Soil Survey and Warren County Soil Survey, as prepared by the United States Department of Agriculture Natural Resource Conservation Service, the property primarily consists of four (11) main soil types, with four soil types having multiple mapping units due to changing slope or grade. The soil types present on this property are as follows:

SOIL TYPE	CLASS	SLOPE	WOODLAND SOIL GROUP
AbrB – Abbottstown silt loam	III	2-6%	C
BhmB – Birdsboro loam	II	2-6%	B

BhmB2 – Birdsboro loam (eroded)	II	2-6%	C
BhnA - Birdsboro silt loam	I	0-2%	B
DOZA – Doylestown-Reaville variant silt loam	V	0-2%	C
DOZB – Doylestown-Reaville variant silt loam	VI	2-6%	C
KkoC - Klinesville channery loam	IV	6-12%	D
KkoE - Klinesville channery loam	IV	18-35%	E
LemB - Lehigh silt loam	II	2-6%	B
PeoB - Penn channery silt loam	II	2-6%	C
PeoC - Penn channery silt loam	III	6-12%	C
PeoD - Penn channery silt loam	IV	12-18%	C
RedC2 – Readington silt loam (eroded)	III	6-12%	C
RehB - Reaville silt loam	III	2-6%	C
ROPF - Rough broken land shale			F
RorAt - Rowland silt loam	II	0-2%	B
ThoAs – Tioga fine sandy loam	I	0-2%	C

Certain soil types/phases are classified as hydric soils or contain inclusions of hydric components. Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in a major part of the root zone (SCS, 1987a). Soils are considered hydric when they are 1. Somewhat poorly drained and have a seasonal high-water table less than 0.5 feet from the surface or 2. Poorly drained or very poorly drained and has a seasonal high-water table less than 1.0 or 1.5 feet from the surface. This high-water table must be present for a week or more during the growing season (FICWD, 1989). Soils that are ponded or flooded for long or very long duration during the growing season are also classified as hydric. All organic soils (histosols) or mineral soils with a histic epipedon are hydric soils. The soil type/map unit which is identified as meeting the hydric criteria include: DOZA and DOZB (Doylestown and Reaville variant silt loams) as associated with flats and depressions. Interestingly, this soil type is mapped in the southeastern portion of the property, adjacent to Valley Road, however, mapping does not include this area as being a wetland environment.

Note: The scope of this management plan does not include a wetland identification/delineation however; the presence of hydric soils may or may not indicate wetlands. The methodology for wetland determination is based upon the multi-parameter approach outlined in the *1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.* As per this methodology, an area is clearly a wetland if it exhibits each of the following characteristics:

1. The presence of hydric soils or soils exhibiting hydric characteristics.
2. A predominance of hydrophytic vegetation.
3. A hydrologic regime indicating the area is periodically inundated or has soils, which are saturated for long enough duration during the growing season.

Actual wetland delineation, studying all three parameters (soils, hydrology and hydrophytic vegetation) is used to classify wetlands.

Under current state and federal regulations, wetlands may not be filled or degraded without permits from the New Jersey Department of Environmental Protection and Energy and/or the U.S. Army Corps of Engineers. In addition, it is recommended that wetland determinations be verified by the U.S. Army Corps of Engineers prior to any proposed development.

The spatial distribution of each soil phase and a general description of each phase with land-use limitations are presented in Appendix C.

VII THREATENED & ENDANGERED SPECIES

The New Jersey Natural Heritage Program identifies the state's most significant natural areas through an inventory of rare plant and animal species and representative ecological communities. From the inventory, the Heritage Database compiles information on the distribution, biology, status and preservation needs of these communities. The Natural Heritage Database is a continuously updated inventory as it is a compilation of information from a broad range of sources including museum and herbarium collection records, publications, knowledgeable experts and fieldwork. Information from the database is available to assist landowners, foresters and planners in the conservation and preservation of habitat for rare species and ecological communities.

A data request was made to the NJ DEP Office of Natural Lands Management to complete a Natural Heritage Database search for Threatened or Endangered Species along with a web search of the US Fish & Wildlife's List indicated that the following species may occur on or within the immediate vicinity of the property:

US Fish & Wildlife: [Threatened: T, Endangered: E]

- Indiana Bat – E (potential – may be present)

NJ Office of Natural Lands Management: [SC: Special Concern, ST: State Threatened and SE: State Endangered]

- Bald Eagle – SE, Brown Thrasher – SC, Eastern Meadowlark – SC, Kentucky Warbler – SC, Veery – SC, Wood Thrush – SC, Worm-eating Warbler – SC, Yellow-breasted Chat – SC, Northern Copperhead – SC, Wood Turtle – ST and Shortnose Sturgeon - SE

Natural Heritage Priority Site: [ST: State Threatened, SE: State Endangered]

- Goat Hill: Extending from parts of West Amwell Township (Hunterdon County) to Hopewell Township (Mercer County). Area consists of steep, wooded diabase hillside, adjacent to Delaware River. Includes habitat for LL rare plant species plus some buffer. The site also contains three state listed endangered plant species.

A copy of the report including a specific list along with the conservation status of selected species can be found in Appendix D.

It is recommended that areas, which may include habitat and/or presence of rare wildlife species, be closely evaluated and monitored as to the potential impacts on the habitat prior to engaging in any large-scale activities in those associated areas.

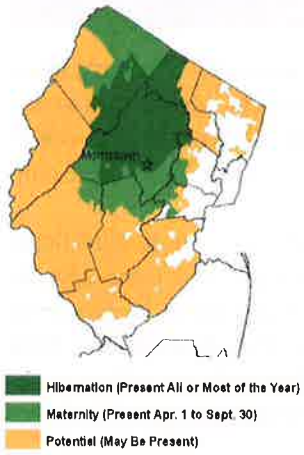
In addition, there is the potential for vernal pool habitat both on and adjacent to the subject property. These waterbodies (i.e., vernal pools and ponds) provide for great blue heron foraging areas as well as food and shelter for a variety of assorted wildlife. Lastly, a check for occurrences of rare plant species revealed multiple records mostly associated with Goat Hill Natural Priority Area. **The listing of rare plant species on or within ¼ mile of the site is also located in Appendix D of this report.**

Prohibitions on Forestry Activities

State Prohibitions

It is recommended that due to the possible presence of State; Threatened or Endangered Species tree harvesting should not occur during the period of **April 1 to August 1**.

Federal Prohibitions



Indiana Bat is an endangered species on the federal list and tree harvesting should not occur each year between the months of

April 1st to November 15 in the Hibernation Area [Dark Green]

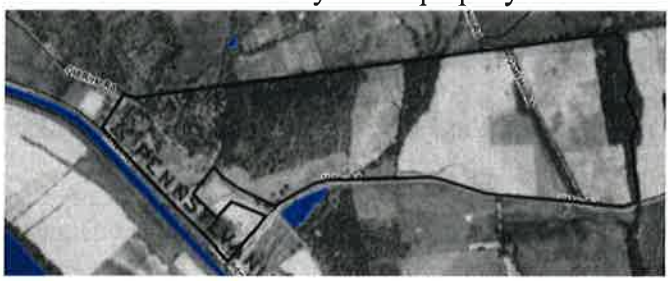
And

April 1st to September 30th Maternity Area [light green and brown]

Please review the adjoining map for your specific timeframe.

VIII PROPERTY HISTORY – FOREST STANDS

The field inventory of the property resulted in the identification of five (5) distinct forest stands. **The location and spatial distribution of the forested stands is presented on the Forest Stand Map in Appendix A.**



When reviewing old aerial photos of the property (reference photo to the left, circa 1930's) it is evident that outside of the western portion of the

property, the pre-dominant land-use category was traditional agriculture activities, pasture and/or cropland. As these farming activities ceased some of the existing forested stands developed via naturally regenerating with hardwood trees.

Since the mid-1950's this property has been under the ownership of a series of different public utility companies. While under said ownership there has been little if any forestry activities including that of any large-scale timber harvests. The current landowner took ownership of this property in and around the spring of 2021. Since acquisition efforts have been made to bolster access into the property via the maintenance of an access road (locally known as Old River Road) along the western portion of the property adjacent to forest stands A and B. In addition, a lateral trail traversing a portion of stand A, as depicted on the forest stand map is now passable. The current condition of the existing access roads on the property are depicted in the photos below:

Another activity completed recently is the field delineation of the property boundary lines. Major storm events have also impacted all but one forest stand. While not totally devastating to any particular stand, blowdowns were evident with some sections getting impacted heavier than others throughout the property. By all account, clean-up efforts by previous ownership have been non-existent.

Lastly, the emergence of the emerald ash borer into the state has become a more significant natural event in this and surrounding forest stands. Identified in New Jersey a few years ago, its potential widespread movement, the white ash trees on this property have been significantly impacted. Current field observations noted that throughout all forest stands, the ash trees have been hit by the borer with a high percentage of the trees showing decline, mortality and/or various stages of decay. Stand C has been hit the hardest being that it contained the highest percentage of ash trees by species count.

This forest management plan will suggest ten-year's worth of management activities for all of the forested stands on the property.

IX STAND DESCRIPTION AND RECOMMENDATIONS FOR MANAGEMENT

A forest is made up of management units or stands. A stand is best defined as an aggregation of trees within a specific area, of more or less uniform composition, condition, or age and easily distinguishable from other woods on adjacent areas or properties. Stands occur in all shapes and sizes.

Based upon location, environmental factors, species composition and land-use history and past forestry activities, this property consists of five (5) distinct forest stands. Forest stand data was collected and analyzed using procedures standard to the forest products industry. The following is

a description and analysis of each forest stand. The stands are described qualitatively and quantitatively. Management recommendations (taking into account landowner goals and objectives) are provided following the description of each stand.

Description – Stand A

This forest stand is located in two sections/areas of the subject property. Throughout the far eastern portion of the property, a small section flanks the western side of a stream, locally known as Moores Creek Tributary. The larger of the two areas begins within the central portion of the property and traverses in a westerly direction culminating at an existing access road (Old River Road). Located pre-dominantly on top of a ridge, slopes and drainage throughout the western (larger) section favors a westerly direction, while the smaller area drains in an east direction into the stream. Stand topography ranges from very slightly sloping to localized steep. The western (larger) section contains more variation in slope conditions. The photos below depict the varying degree of slope and terrain throughout the western (larger) section of this stand.



Access into the western section comes directly from an existing road (Old River Road) as well as adjacent non-forested, field areas. Tree spacing allows for relatively easy internal navigation via ATV or similar size vehicle. There are two waterways (locally known as UNT Delaware River) flowing through this stand as depicted on the forest stand map. Currently, Old River Road provides for existing, stable streams crossings of these waterways. Blowdowns as a result of previous hurricane storm events are more concentrated along the eastern portion of this section adjacent to Stand C.

The eastern area/section of this stand exhibits more of one continuous slightly steep sloping condition. A view of this area is depicted in the attached photo to the left. At the current time access is only available via foot travel. This area/section shall serve better as a forested buffer to the on-site stream. Both areas/sections exhibit dry upland, mesic conditions.

This stand contains tree species that would be consistent in a Mixed Oak Forest Cover Type. During field data collection the most prevalent tree species found in this stand included white oak, northern red oak, hickories, chestnut oak, sugar maple and black oak. These hardwoods occupied the dominant and co-dominant crown class and comprised 92 percent of the basal area. In simpler terms, almost 87 percent of the standing trees is comprised of the aforementioned species. Other species present (to a lesser degree) in the dominant to co-dominant canopy crown class include but are not limited to yellow poplar, American beech, black walnut, birches, red maple and white ash (of which none were tallied but

dually noted if seen throughout the stand). There appeared to be little to no evergreen cover within this stand. The suppressed layer favored maples, beech and hickory while the sapling class was close to non-existent with the exception of a few scattered pockets of maple.

Stand Data Information

Acreage: 26+- total (western section – 21 and eastern section – 5)
Average tree diameter: 18.3 (large sawtimber stand)
Effective stand age: 110+/- years
Approximate number of trees per acre: 97
Basal Area per acre: 104 sq.ft./acre
Relative Stand Density: 69% (middle level of the fully stocked range with stocking percent slightly above 80%)
Average Tree Volumes: 5,900 board feet per acre (International 1/4" log rule)
29 cords per acre pulpwood

For an individual tree species breakdown please refer to the species composition, stand/stock tables and stand stocking guide located in Appendix E in the back of this report.

The following chart represents a basal area distribution by diameter classes.

Tree Diameter Class	Basal Area per acre
Sapling size trees (0"-4" DBH)	0 sq.ft.
Pole size trees (5"-11" DBH)	17 sq.ft.
Small sawtimber size trees (12"-16")	26 sq.ft.
Medium sawtimber size trees (17"-21")	28 sq.ft.
Large sawtimber size trees (22+ DBH)	33 sq.ft.

Approximately 55% of the trees are considered AGS (acceptable growing stock). AGS make up approximately 57 of the 103 square feet of basal area per acre. Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves at this time.

A closed canopy is common throughout this forest stand. The resulting site characteristic is little to no sunlight penetrating beyond the upper canopy onto the ground surface. This results in minimal understory vegetation. Field observations revealed that current understory vegetation remains non-existent making foot travel easy, outside of the areas that have been affected by storm damage and contain blowdowns. The average vertical site distance of 150+ linear feet remain somewhat uniform throughout the stand. Where natural canopy openings have occurred, the understory species present favored non-native, invasive species such as Japanese barberry, autumn olive, green briar with scattered multi-flora rose and Rubus species. The growth of grapevine, honeysuckle vine and other vine-like vegetation was evident but minor at this time.

There is evidence of crown/branch dieback on some of the oaks. While this may not be necessarily attributed to a specific disease in the oaks, it has been documented that this is a sign that trees are becoming overmature both from a physical and/or financial prospective. Outside of an occasional slope condition, foot travel ranges from moderate to easy.

For the most part, tree quality and vigor is being compromised by the age of this stand as a high percentage of trees are reaching a level of maturity and/or are overmature. Site index is the average height that a tree will grow in 50 years in an unmanaged forest and is often used in forestry to determine the productivity of a site. Site index for the soils present is 75' for oaks, 80'for poplar and 65'-70' for maples.

Silvicultural Recommendation(s) – Stand A

Western Section

There remains a unique opportunity for the landowner to conduct forest management activities throughout this stand. Based upon observed field conditions there are two likely options for future management. The landowner should carefully review each option and decide what method of management best corresponds with outlined objectives and future goals of property utilization.

Option #1

With the apparent closed canopy exhibited throughout this stand, reducing stand density with a focus on enhancing desirable regeneration and capturing some monetary gain before the mature trees begin to die off can be considered. Intermediate thinning this late in stand development will have minimal impact on the future growth of trees. Management can be directed towards the establishment of sufficient desirable understory regeneration in the development of an uneven aged stand either through natural regeneration or by direct planting.

This option correlates more favorably with conventional forestry practices and methodologies given the age of the stand. Choosing this option can ensure the growth and development of a future forest crop and hopefully enhance desirable tree regeneration.

An uneven aged stand is desirable as it allows for a continuous forest cover, which is compatible with landowner objectives. **Silviculturally speaking the best recommendation for the western section of stand A would be a combined single-tree and group selection harvest.** This regeneration cut should favor the re-emergence of shade tolerant species (maples and oaks) in areas of single tree removal and moderately tolerant to shade intolerant species (oaks, hickories and poplars) in areas of group tree removal. Certain areas will have individual trees removed, while more favorable areas will have a concentration of 2, 3 or 4 trees removed.

All trees to be removed should be identified with some type of marking system at both the eye level and on the stump. This ensures an accurate count and inventory of cut trees. Cutting in both the larger (sawtimber) and smaller (firewood) diameter classes allows for the fostering of residual tree growth and establishment of reproduction through natural regeneration. This allows for the continued maintenance of an uneven aged stand and a constant canopy cover. One factor to keep in mind is that there exists little to no advanced regeneration prior to this type of harvest in addition to a heavy deer browsing population. One objective of this harvest is to create large enough openings that will foster an abundance of regeneration which can grow past deer browse height at an accelerated rate. The idea of tree planting (post harvest) with deer protection measures should also remain an option for the landowner.

It is recommended that the forester marks and administers all aspects of this prescribed cutting activity. In addition, if this option is chosen, a site-specific timber harvesting plan should be completed and submitted to the state forestry office prior to engaging in such activity.

This first option provides for the potential of a greater economic return to the landowner as some of the material can be sold as sawtimber. However, only on a temporary basis, aesthetic value of the stand would be jeopardized. Forests do grow back very favorable after a harvest of this nature.

Option #2

While this option includes proper forest management practices with an emphasis on maintaining a healthy crop of residual trees, it remains far less intensive than option #1. In addition, economic gains are not as favorable as most of the cutting activities will yield firewood value.

Utilization of the stand under this option would involve a more conservative cutting approach designed to maintain the growth of the older mature trees. Most all of the taller, older, overstory trees would remain, while cutting would focus on cleanup and the removal of dead, diseased, blowdown trees as well as reducing the white ash component. **This type of cutting activity would best be categorized as a sanitation operation.** It might also include removing some of the understory component creating an almost "parklike" setting in certain portions of the property. The stand is essentially left in a more rustic nature emphasizing its recreational value (trails, camping etc.) which remains compatible with outlined goals and objectives. There exists an amply amount of firewood material through this cutting regime to satisfy the requirements of the farmland assessment tax program.

Eastern Section

Being that is area/section is limited in size, is accessible only by foot travel, remains located adjacent to a waterbody (Moores Creek Tributary) and contains site constraint (namely steep slopes) aesthetics and recreation should be the primary objectives in future management. Maintaining these values lends itself to less intrusive cutting activities and remains compatible with ownership goals and objectives. Activities that compliment requirements for the farmland assessment program while simultaneous maintaining species diversity, overall positive tree health, provide an aesthetically pleasing forest environment and remain safe and doable with respect to the site constraints are encouraged.

Field data analysis demonstrates that this stand is in the mid-levels of the fully stocked range for optimum growth. In order to maintain adequate stocking levels and achieve management goals a **sanitation cleanup is recommended.** This type of cutting activity concentrates on the cleanup of fallen trees, along with the removal of dead, diseased, and/or blowdowns. Note: Dead trees (especially along the stream or in steeper areas) currently being utilized by wildlife (such as wood ducks, woodpeckers etc.) can and should remain. While it is best to treat the entire stand with sanitation cuttings the practicality remains that some areas are too steep and dangerous for such activities. This factor must be considered and remains essential for the safe completion of all forestry related activities. Steep areas may be better left alone allowing the trees to continue to provide quality wildlife habitat, sequester carbon and improve air quality. Where accessible, fallen and or dead trees can be cut and either left stacked or removed for firewood.

This area/section of stand A true asset to the property remains its recreational potential. Specifically, low or minimal impact recreation opportunities consisting of walking/hiking trails or just general nature viewing including scenic vistas can be encouraged. Hand cutting of walking trails or creating a loop type hiking system of trails is also encouraged.

Outside of the afore-mentioned sanitation cuttings and trail work, the desired future condition for this area is to continue to allow it to naturally regenerate, provide quality wildlife habitat, continuing to sequester carbon, and improving air quality.

Description – Stand B

This forest stand is located in the far western portion of the property as depicted on the forest stand map. This stands boundaries remain Old River Road, Valley Road and State Highway Route 29 (new River Road). Consisting of mostly a west to south facing slope, stand topography is best defined as flat to gentle sloping ridgetops intermixed with short but steep valleys which culminate at stream floodplains. In some sections the floodplain widths are greater than 50 feet. There are two waterways (locally known as UNT Delaware River) flowing through this stand as depicted on the forest stand map. The streambeds are rocky and during multiple field visits contained little to no water. The photos below depicted the general terrain including floodplain areas contained in this stand.

Access into the northern portion of this stand comes directly from an existing road, Old River Road, while access to the southern portion of this stand remains a combination of Valley Road or an existing access lane to an outparcel. Currently, there exists little to no internal access roads or trails resulting in mostly foot travel to get around. Some sections of this stand contain favorable topography and generous tree spacing allowing for ATV and/or tractor to negotiate within the stand.

This stand contains tree species that would be consistent in a Mixed Hardwood Forest Cover Type. During field data collection the most prevalent tree species found in this stand included yellow poplar, American sycamore, birches, hickories, black and red oak. These hardwoods occupied the dominant and co-dominant crown class and comprised 81 percent of the basal area. In simpler terms, almost 62 percent of the standing trees is comprised of the aforementioned species. Other species present (to a lesser degree) in the dominant to co-dominant canopy crown class include but are not limited to sugar and red maple, white ash, black walnut, American beech, elm, and white oak with white ash accounting for almost 5%. Little to no evergreen tree species were

noted at this time. While not as prevalent as in stand A, blowdowns were noted throughout this stand.

Stand Data Information

Acreage: 11+- acres
Average tree diameter: 20.2 (large sawtimber stand)
Effective stand age: 110+/- years
Approximate number of trees per acre: 87
Basal Area per acre: 100 sq.ft./acre
Relative Stand Density: 50% (middle level of the fully stocked range with stocking percent approaching 80%)
Average Tree Volumes: 6,200 board feet per acre (International 1/4" log rule)
26 cords per acre pulpwood

For an individual tree species breakdown please refer to the species composition, stand/stock tables and stand stocking guide located in Appendix E in the back of this report.

The following chart represents a basal area distribution by diameter classes.

Tree Diameter Class	Basal Area per acre
Sapling size trees (0"-4" DBH)	0 sq.ft.
Pole size trees (5"-11" DBH)	17 sq.ft.
Small sawtimber size trees (12"-16")	20 sq.ft.
Medium sawtimber size trees (17"-21")	16 sq.ft.
Large sawtimber size trees (22+ DBH)	47 sq.ft.

Approximately 53% of the trees are considered AGS (acceptable growing stock). AGS make up approximately 53 of the 100 square feet of basal area per acre. Trees of acceptable quality for future growing stock provide a fully stocked stand by themselves at this time.

As evidenced on the attached photos, understory thickness varies from non-existent to heavy throughout this stand. Where present understory species appear to be those less favored by deer including but not limited to: Japanese barberry, green briar, honeysuckle, multi-flora rose, stiltgrass, Winesap, Rubus sp., spicebush (minor) and autumn olive (minor).

The growth of grapevine, honeysuckle vine and other vine-like vegetation was clearly evident with concentrations far greater in the southern section of this stand as depicted in the photo to the right. Control measures to eradicate such vines in selected areas where timber management remains a priority will be essential for proper tree growth.

For the most part, tree quality and vigor is being compromised by the age of this stand as a high percentage of trees are reaching a level of maturity and/or are overmature as well as vine growth (mostly in the southern section of this stand).

Site index is the average height that a tree will grow in 50 years in an unmanaged forest and is often used in forestry to determine the productivity of a site. Site index for the soils present is 75' for oaks, 80'for poplar and 65'-70' for maples.

Silvicultural Recommendation(s) – Stand B

The first step in managing this stand would be to reduce the vine growth affecting the standing, live trees. Cut all vines on healthy tree specimens whereby removing a section of the vine, allowing it to naturally die off and fall from the tree. Do not attempt to pull off freshly cut vines. The initial focus area can be the entire southern section of this stand. While this vine cutting acitivity is being completed, capture any firewood resulting from blowdown trees in select work areas.

Once the afore mentioned activities conclude, management of this stand can be similar to that recommended for stand A. Should the timber harvest option be selected, a slight modification can include focusing more on an individual tree selection harvest as well as concentrating the cutting area to the ridgetops and slopes while minimizing cutting activities in the floodplain areas of the stand.

Description – Stand C

Predominantly located in the north central portion of the property (referred to as the eastern section) there is a small sub-section of this stand west of the outparcel as depicted on the forest stand map. The eastern section of this stand contains topography ranging from gentle to moderately sloping terrain. The western section of this stand is more uniform with very gently to flat terrain. Both sections of this stand are currently accessible only via foot travel. Neither section contains any streams or waterbodies as dry, mesic conditions prevail. Tree stocking levels appeared to be a bit greater in the western section of this stand.

This stand contains tree species that would be consistent in a Mixed Hardwood Forest Cover Type. During field data collection the most prevalent tree species found in this stand included red maple and white ash. These hardwoods occupied the dominant and co-dominant crown class and comprised 91 percent of the basal area. In simpler terms, almost 88 percent of the standing trees is comprised of the aforementioned species with white ash accounting for over 40%. Other species present (to a lesser degree) in the dominant to co-dominant canopy crown class include but are not limited to hickories, black cherry and a few scattered oaks. There appeared to be no evergreen cover within this stand. Each data plot contained on average 5+- dead trees all of which were white ash which succumbed to the effects of the emerald ash borer.

Stand Data Information

Acreage: 10.0+- acres (western section – 2 and eastern section – 8)
Average tree diameter: 11.3 (small sawtimber stand)
Effective stand age: 50+/- years
Approximate number of trees per acre: 43
Basal Area per acre: 28 sq.ft./acre (Note: Only live trees were used for this calculation)

Relative Stand Density: 16% (severely understocked range for optimum tree growth)
Average Tree Volumes: 400 board feet per acre (International 1/4" log rule)
8 cords per acre pulpwood

For an individual tree species breakdown please refer to the species composition, stand/stock tables and stand stocking guide located in Appendix E in the back of this report.

The following chart represents a basal area distribution by diameter classes.

Tree Diameter Class	Basal Area per acre
Sapling size trees (0"-4" DBH)	0 sq.ft.
Pole size trees (5"-11" DBH)	12 sq.ft.
Small sawtimber size trees (12"-16")	16 sq.ft.
Medium sawtimber size trees (17"-21")	0 sq.ft.
Large sawtimber size trees (22+ DBH)	0 sq.ft.

Approximately 45% of the trees are considered AGS (acceptable growing stock). AGS make up approximately 12 of the 28 square feet of basal area per acre. Trees of acceptable quality for future growing stock are inadequate to provide enough stocking by themselves to warrant stand management.

Both sections of this stand have been significantly impacted by emerald ash borer infestation. All white ash trees have been impacted with mortality of white ash high. As mentioned before, each data plot contained on average a minimum of 5 dead trees, all being white ash. In addition, recent storm activity has dealt a serious blow to the eastern portion of this stand. Damaged, broken top trees and blowdowns are plenty. While the western portion of this stand was spared from hurricane damage however, vine growth is out of control. Below are a series of photos taken during the field inventory representing site conditions specific to each section.

Eastern Section



Western Section



Given a south facing slope, open canopy conditions resulting from significant storm events and ash mortality, understory thickness in the eastern section of this stand is heavy to impenetrable. Spared from storm damage and ,more favorable slope conditions, the western portion of this stand exhibits a moderate to heavy understory component. Where present understory species was mostly Japanese barberry, autumn olive, honeysuckle, green briar, Rubus sp. and stiltgrass. The growth of grapevine, honeysuckle vine and other vine-like vegetation was evident and as mentioned before very thick throughout the western section of this stand.

Silvicultural Recommendation(s) – Stand C

Eastern Section

Given past natural events (storms and EAB infestation) and its associated damage to the stand, understocked conditions and current lack of accessibility there are few options available at this time for forest management activities in this section of stand C. A salvage cleanup/harvest is highly unlikely as most of the fallen-damaged trees are beyond sawtimber market value. In addition, with other stands on the property warranting greater attention during this management period the best recommendation is to leave this stand alone.

Should the landowner have the time and availability to the necessary equipment, consideration can be given to creating hiking trails which complement the recreational use of the property as a whole. This type of activity would fall within the allowances of the farmland assessment program and any firewood incidentally harvested could be put towards the financial requirements of the same.

Western Section

Being that is area/section is limited in size, is accessible only by foot travel and remains a bit better stocked of trees than the eastern section, aesthetics and recreation should be the primary objectives in future management. Maintaining these values lends itself to less intrusive cutting activities and remains compatible with ownership goals and objectives. Activities that compliment requirements for the farmland assessment program while simultaneous maintaining species diversity, overall positive tree health, provide an aesthetically pleasing forest environment and remain safe and doable with respect to the site constraints are encouraged.

The first priority is to conduct vine cutting activities. Cut all vines, do not remove, on healthy residual trees. Allow the vines to naturally die and fall off the trees. Where accessible, dead trees can be cut and either left stacked or removed for firewood. Walking-hiking trails can be created and maintained throughout this section of stand C.

Finally, the property owner should might also want to consider a tree planting program to supplement for the lack of advanced, natural desirable regeneration and the dialogue of dead ash trees which will be encountered. A well-planned and executed program will also enhance tree species diversity for future generations to manage. Based upon soil types, climate, existing tree cover both in and around this stand the following species are recommended for planting; red maple, black walnut, birches, hickories and sycamore. Consideration must be given to reducing the concentrations of undesirable understory vegetation prior to tree planting so that seedlings have a chance to grow.

Description – Stand D

This forest stand is sandwiched between an old open field area to the north and two, small parking areas to the south. This stand becomes more of a treeline/hedgerow once it passes the upper parking area. Stand topography ranges from flat to gently sloping (mostly along the eastern section of this stand) to moderate and localized steep (mostly along the western portion of the stand. This slope divide begins approximately at the existing access road depicted on the forest stand map. This road is the only means of stand access outside foot travel. Similarly, to stand C, this stand contains a southern aspect. There were no visible signs of streams flowing through this stand.

Western Section

Eastern Section

This stand contains tree species that would be consistent in a Mixed Oak Forest Cover Type. During field data collection the most prevalent tree species found in this stand included black oak, hickories, white ash, northern red and white oak. These hardwoods occupied the dominant and co-dominant crown class and comprised 88 percent of the basal area. In simpler terms, almost 87 percent of the standing trees is comprised of the aforementioned species. The tree inventory further revealed the white ash component accounting for almost 18% of the standing trees in this stand. With a majority of the ash being concentrated throughout the eastern portion of this stand. Other species present (to a lesser degree) in the dominant to co-dominant canopy crown class include but are not limited to red maple, American sycamore, sassafras a few scattered elms, mostly along Valley Road. Evergreen cover was mostly non-existent outside of few scattered cedars.

Stand Data Information

Acreage: 8.3+- acres
Average tree diameter: 12.7 (small sawtimber stand)
Effective stand age: 70+/- years
Approximate number of trees per acre: 129
Basal Area per acre: 92 sq.ft./acre
Relative Stand Density: 60% (mid-level of fully range with stocking percent of almost 80%)
Average Tree Volumes: 2,800 board feet per acre (International 1/4" log rule)
25 cords per acre pulpwood

For an individual tree species breakdown please refer to the species composition, stand/stock tables and stand stocking guide located in Appendix E in the back of this report.

The following chart represents a basal area distribution by diameter classes.

Tree Diameter Class	Basal Area per acre
Sapling size trees (0"-4" DBH)	0 sq.ft.
Pole size trees (5"-11" DBH)	31 sq.ft.
Small sawtimber size trees (12"-16")	46 sq.ft.
Medium sawtimber size trees (17"-21")	15 sq.ft.
Large sawtimber size trees (22+ DBH)	0 sq.ft.

Approximately 47% of the trees are considered AGS (acceptable growing stock). AGS make up approximately 43 of the 92 square feet of basal area per acre. Trees of acceptable quality for future growing stock are inadequate to provide a fully stocked stand by themselves at this time.

Understory thickness varies throughout the stand. In general, the eastern section consists of moderate to heavy understory vegetation while the western section ranges from light to sparse. Slope conditions and variations in understory thickness results in foot travel ranging from difficult to easy. Where present understory species was mostly Japanese barberry, autumn olive, green briar and Rubus sp. The growth of grapevine, honeysuckle vine and other vine-like vegetation was evident and ranged from light (western section) to moderate/heavy throughout the eastern section of the stand.

Site index is the average height that a tree will grow in 50 years in an unmanaged forest and is often used in forestry to determine the productivity of a site. Site index for the soils present is 75' for oaks, 80'-85'for poplar and 65'-70' for maples and birches.

Silvicultural Recommendation(s) – Stand D

Management should be directed at the growth and enhancement of desirable tree species such as oaks (red, black and white) and to a lesser degree maples and hickories. In addition, maintaining species diversity throughout the stand should be encouraged. Residual trees of good form, vigor and longevity should be favored.

In keeping with the landowner's management objectives, **sanitation cleanup** activities should be adopted as the primary silvicultural activity over the course of the next management period. It is anticipated that the forest products to be removed will be mostly of firewood value, size or quality. Within the forest stand, trees to be cut will be focused first and foremost on quality and acceptable vs. unacceptable growing stock thus resulting in a wide range of tree sizes and heights to be harvested. Trees most likely to be cut include; dead, leaning trees, blowdowns and undesirable species (namely white ash). Examples of undesirable growing stock which should be cut are depicted in the photo's below:



By performing this cultural work, the growth and quality of the stand will be increased and thus its value at maturity. This is because the competition, for sunlight and nutrients, has been reduced and growth is now concentrated on the desirable (residual) trees throughout the stand.

Eradicate invasives in select areas where practical, feasible and necessary to promote natural seeding and/or establish areas suitable for direct tree planting. Methods of eradication can include both mechanical and chemical or a combination of the same. The landowner should contact the forester for species specific information on invasive control. Lastly, cut vines on all healthy residual trees.

Description – Stand E

This stand is located east of Goat Hill Road and represents the youngest stand studied during the most recent tree inventory. Aerial photographs depict that this area as recently as the mid 1970's-1980's was predominantly used for agriculture purposes. The neighboring forested stands provided the primary seed source for existing tree cover. Seeds dispersed via wind or buried by animals seeking winter forage, resulted in a mosaic pattern of brushy vegetation to a bit more established areas of forested cover. In addition, there remains very few scattered fencerow trees left from back in the day when the area was predominantly open agriculture land. In general, the edges contain more advanced tree cover versus the interior of the stand. The photos below depict the on-site conditions at the time of the most recent field inventory.

Consisting of mostly gently to moderately sloping topography, drainage from this stand meanders in a southern direction towards the utility lines and Valley Road. Currently, the only access into and throughout this stand is foot travel via the use of mostly deer paths/trails. There are no streams, wetlands or water bodies in this stand.

This stand remains a combination of non-native invasive species coupled with a splattering of hardwood trees introduced overtime via the local seed source. As a result, the species make-up is such that it remains an unknown stand or forest cover type. During field data collection the most

prevalent tree species found in this stand included white ash, red maple and black walnut. These species occupied what is in the dominant and co-dominant crown class and comprised 84 percent of the basal area. In simpler terms, almost 83 percent of the standing trees is comprised of the aforementioned species with white ash accounting for slightly over 30%. Other species present (to a lesser degree) in the upper canopy crown class include but are not limited to black cherry, mulberry, sweet and black gum hickories and sycamore.

Stand Data Information

Acreage: 22+- acres
Average tree diameter: 7.1 (small poletimber stand)
Effective stand age: 40+/- years
Approximate number of trees per acre: 128
Basal Area per acre: 42 sq.ft./acre (Note: Only live trees were used for this calculation)
Relative Stand Density: 32% (severely understocked range for optimum tree growth)
Average Tree Volumes: 5+- cords per acre pulpwood

For an individual tree species breakdown please refer to the species composition, stand/stock tables and stand stocking guide located in Appendix E in the back of this report.

The following chart represents a basal area distribution by diameter classes.

Tree Diameter Class	Basal Area per acre
Sapling size trees (0"-4" DBH)	3 sq.ft.
Pole size trees (5"-11" DBH)	39 sq.ft.
Small sawtimber size trees (12"-16")	0 sq.ft.
Medium sawtimber size trees (17"-21")	0 sq.ft.
Large sawtimber size trees (22+ DBH)	0 sq.ft.

Approximately 57% of the trees are considered AGS (acceptable growing stock). AGS make up approximately 23 of the 41 square feet of basal area per acre. Trees of acceptable quality for future growing stock are inadequate at the current time to provide enough stocking by themselves to warrant stand management.

Understory thickness, due to a combination of vegetative cover, lack of an overstory cover and understocked conditions makes for difficult foot travel at this time, with some areas of the stand being impenetrable. The average vertical site distance of 25-50 linear feet remains somewhat uniform throughout the stand.

This stand exhibits below average productivity. Site index is the average height that a tree will grow in 50 years in an unmanaged forest and is often used in forestry to determine the productivity of a site. Site index for the soils present is 65-70 for the hardwood species currently present.

Silvicultural Recommendation(s) – Stand E

Given the relatively young age of this stand, understocked conditions and other forest stands having greater priority the only recommendation would be to promote the recreational value of this stand and conduct management activities accordingly. A series of hiking trails and paths can be constructed. These trails can loop throughout the stand promoting points of interest such as scenic vistas, thickets for bird watching and/or general wildlife viewing. Lastly, if this landowner would ever want to promote hunting as a recreational use on the property, this stand would clearly fall in favor of the same.

Outside of the afore-mentioned activities it is best to leave this stand alone with the desired future condition being to continue to allow it to naturally regenerate, provide quality wildlife habitat, continuing to sequester carbon, and improving air quality.

Forest Health and Protection

Forest health will be enhanced using sanitation cuttings by removing dead, diseased, windfall and/or other hazardous trees and increasing the growth and vigor of the residual trees via these types of intermediate cutting operations. Access roads will be maintained for fire suppression and forest product extraction as needed throughout the property.

White Ash: Mortality of ash can occur as a result of anthracnose, ash decline, ash yellows and most recently identified pest alert of emerald ash borer. Anthracnose is a fungus which affects the development of new growth. Increases in anthracnose are believed to be affected by cool, damp spring weather. The anthracnose pathogen retards new growth during the early part of the growing season and then over winters on the shoots of the infected tree. Symptoms of this may include water-soaked appearance on leaves or green brown lesions which cause dropping or shriveling of new growth.

Ash yellows is initially thought as being brought on by microplasma-like organisms or MLO's. This disease affects various ash species however is said to have its greatest impact on white ash. Trees of any size are affected or can be affected by this forest problem. Signs that a tree may be infected include but are not limited to witches' brooms, sparse crowns of v-shaped leaves, shortened twig elongation and cracked bark (similar to forest cracks) on the trunk. This problem may be passed from tree to tree by leafhoppers or the meadow spittlebug. There is no known remedy for this problem however a sanitation cutting of the infected trees can be made to try and combat it.

Ash decline may also be initiated by MLO's however it is also coupled with other environmental factors of which may include stresses from drought, frost damage and insect or fungal attacks. Symptoms of decline are similar to that of yellows however cankers may also indicate an infected tree. If noticed in an early stage, a tree may be saved by improving its growing condition (through thinning or other intermediate cutting activities).

Another problem this species may face is the **emerald ash borer (Agrilus planpennis)**. This is an introduced insect that was first discovered in Michigan around 2002. The insect has a negative effect on ash population because the early life cycle of the pest inhibits the daily functions of the infested tree. When in larval stage, S-shaped feeding galleries are produced in the cambial layer resulting in the girdling of the tree by making nutrient transport and water transfer impossible. After the larvae stage the adult emerges from under the bark leaving a D-shaped exit hole

approximately 1/8" in size. Adults are approximately ½" in size and are metallic green in color. If infested, the tree will most likely die in 3+- years.

As anticipated, in the spring of 2014, this insect has been located in Somerset County, NJ. While there are little to no safeguards against an infestation there also is no guarantee that it will attack this property and if so to what degree of intensity. Landowners and foresters equipped with the realization that the EAB is coming, should invoke a management strategy that includes having white ash as a minor component of any managed forest stand. With little to no clear preventative methods to combat an EAB infestation a few proactive things that can occur. First, a yearly monitoring of the white ash trees for signs of infestation and if spotted, the immediate removal of the specific trees is suggested. Second, consideration to harvesting potential mature ash trees so that their values do not decline overtime should the EAB take hold in a forest stand. Some of the initial signs of EAB infestations include: flecking or "sandpaper" effect on the bark, increase in woodpecker activity on individual trees, tunneling or channeling inside the bark, sprouting or epicormic branching of new limbs along the main stem (although these branches remain short lived) and of course the D-shaped exit hole. Photos of some of these sign indicators are noted below:



Oak: Gypsy moth caterpillars may cause mortality to all species of oaks. These forest pests have varying stages to their life cycles. The gypsy moth caterpillar may first be seen emerging from their egg masses around the end of April. When of adequate size these caterpillars will scale the tree and begin defoliating leaves in the canopy. This is the period which may lead to the decline of the affected tree(s). Without leaves the tree will find it difficult to carry on the vital process of photosynthesis. This is the period when trees sequester nutrients which are needed for survival. This is the most destructive stage of caterpillar. In approximately the middle of July the caterpillars will cocoon for a period and thereafter emerge as moths. Once becoming a moth, the species begins laying next year's populations. Male and female can be identified by color. The male moths are a darker brown in color while the females are light brown to white. Male moths are the only ones that can fly.

If problematic, these pests may occur on 7-10-year cycles and can be treated with the use of an aerial application of Bt. (Bacillus thuringiensis) a bacterial pathogen, if populations are high. Other control agents may also be available. Defoliations of this forest pest in combination with other site conditions may cause the decline of some less vigorous individuals, especially if a cycle is repeated. If weakened by defoliation, an individual may be further attacked by shoestring root rot or hypoxlyn canker which attack oak species and may kill trees that were originally weakened by fire, lighting, moisture stress, insects or a host of other diseases.

Black Cherry, Black Birch, and Black Walnut:

Perennial target cankers, also known as Nectria canker, occurs on these tree species throughout its range, but seems to be more common in the Northeast and the southern Appalachians. In Warren County, NJ the effects of cankers are most visible on black cherry (referred to as black knot fungal canker) and black birch (known as Nectria fungal canker, see photo to the left).

Old cankers are easily recognized because of their typical target shape, caused by rings, each of which represents a year's growth of callous tissue around the infected area. Young cankers are not as easily recognized because overgrown callous tissue may hide the affected area. Tiny, red fruiting bodies of the Nectria fungus may be present around the diseased area.

Cankers usually occur on the main stem of the tree, often at a point where a branch broke off and left an open wound. Nectria canker results in defects in the wood, stunting the growth or death (if the canker becomes large enough to girdle the stem). Trees may also break at canker locations during high winds. Best treatment is to cut and remove all infected trees from within a woodlot area.

Other Threats: Sunlight is vital for promoting photosynthesis within trees. Without this process trees can decline and eventually dieback. Various vine species such as summer grape, poison ivy, Japanese honcysuckle and oriental bittersweet can out-compete tree canopies for sunlight if able to persist on trees. Vines can do considerable damage by growing through and over the tops of trees. They are particularly damaging to ash and poplars. These vines can, on smaller specimens, actually break off or topple over the entire tree. On more mature ones, the leaves of the vines are so large that they shade out the leaves of the tree themselves. Both cases could result in the death of the tree.

In conjunction with any tree cutting activity, woodland owners should conduct a "weeding" operation. This consists of the cutting of vines and vine-like growth on all residual trees. The vines should be cut cleanly at the base of the tree, with a piece taken out, and allowed to decay for several months to a year before any attempts are made to pull them down.

Overall, any trees which are under a form of stress whether it is from drought, difficulty with nutrient transport, etc. may reflect stress through the production of stump sprouts, epicormic branching, crown dieback, etc. If these trees become evident, they may be good candidates for removal to produce the required level of annual activity under the requirements of the farmland assessment program. In regards to other species, monitoring for insect or disease outbreaks should continue now and, in the future, as well.

Carbon Sequestration

Carbon sequestration is the ability to capture and sore carbon dioxide where it remains isolated from the atmosphere. Carbon that is captured and stored in vegetation, such as trees, and

soil is sequestered. In New Jersey, terrestrial carbon is primarily sequestered in forests and wetlands that, at 3 million acres, comprise a substantial share of the state's land area.

Forest management can help with carbon sequestration in the following ways:

- **Timber Harvests** – Processing wood into long lived products, such as lumber, can enhance carbon sequestration from terrestrial ecosystems. For example, carbon stored in trees that are converted into lumber used in the construction of homes is sequestered and will remain out of the atmosphere until that wood fully decays, burns or is otherwise released into the atmosphere.
- **Afforestation** – Tree planting on lands previously not forested. (I.e. fields, mine reclamation etc.)
- **Reforestation** – Tree planting in areas with little to no natural regeneration.
- **Substitution of renewable biomass for fossil fuel energy** – Use of firewood instead of fossil fuels. The use of fossil fuels releases carbon into the atmosphere that has been in sequestration for a long period of time. Carbon contained in renewable fuels, such as firewood, will be sequestered in a relatively short time by regeneration of the forest from which the firewood was harvested.
- **Increased productivity and growth rates** – Trees that are healthy and growing at their optimum growth rates, sequester carbon much faster than slower growing trees.

In summary, more productive forests being the direct result of managed forests, along with the use of forest products, helps to maintain and/or lower the amount of carbon in the atmosphere.

General Property Management Notes:

- ❖ Start and diligently maintain accurate records of all work you perform or hire out. Records in the form of activity maps, income receipts and wood tallies can be kept to serve as a continual reference.
- ❖ Your consulting forester can assist in marking out various cutting operations within the forest stand.
- ❖ Continue opening and maintaining roads and trails to areas not presently accessible for easy removal of wood and protection of the stand. Maintain existing roads.
- ❖ Care should be taken during any cutting/harvesting operations to avoid interference with wetlands and/or streams.
- ❖ Plan and appropriately schedule all equipment, chemical and labor needs. Local tree experts or garden centers deal with certain chemical companies and you should confer with them as to your needs.
- ❖ Monitor deer and rodent damage to regeneration and/or plantings. Deer repellants and lethal bait for mice and rabbits are available for severe problems. Open hunting, as a control measure may have to be considered.
- ❖ To keep informed of the most up-to-date management practices consider becoming a member of the New Jersey Forestry Association. You should attend as many forestry short courses as possible and contact your local agriculture extension agent or forestry consultant with questions concerning forestry practices.

X FORESTRY BEST MANAGEMENT PRACTICES

The effective date of the updated NJDEP Flood Hazard Area Control Act (FHACA) rules was November 5, 2007. Currently as written, the rules can affect ongoing silvicultural work on some properties with wetlands or riparian areas. The FHACA and the Freshwater Wetlands Protection Act (FWPA) allows for a permit-by-rule (PBR) or exemption if several points are addressed within a state approved plan. Some requirements have already been addressed in previous sections of this report and more are contained within this section.

The landowner of this parcel is required to maintain a specified level of sustainable forestry work in order to continue to qualify for farmland assessment status while protecting the soil and water resources that may exist on this property. This is primarily accomplished through the utilization of Best Management Practices. Best Management Practices (BMP's) are those measures, designs, performance standards and other practices which prevent or reduce adverse impacts upon wetlands, streams and other sensitive natural areas. Forestry best management practices are designed to minimize soil erosion, protect water quality by preventing or minimizing the impact of non-point source pollution, enhance fish and wildlife habitat as well as improve recreational opportunities.

BMPs are developed from standard silvicultural, soil conservation and water resources guidelines. In summary, silvicultural guidelines are designed to perpetuate the timber resource. Specifically, they are used to control the establishment, growth, composition, health and quality of forests and woodlands. Soil conservation guidelines are used to provide protection against soil erosion while water resources guidelines are used to provide protection from non-point source pollution and siltation. Non-point source pollution being any pollution not traceable to a single identifiable source.

Streamside Management Zones

The purpose of a Streamside Management Zone (SMZ) is to protect a water body from adjacent land-use activities by providing a relatively undisturbed vegetative zone. This zone traps and filters out sediment and other pollutants before they can enter a water resource. In addition, SMZ's also have benefits, including: maintaining stream base flow, minimizing thermal impacts to water temperature, providing a wildlife corridor/greenway and serving as an aesthetic buffer or screen.

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The width of a SMZ is determined through on-site evaluation. Variation in topography along a water course or surrounding body of standing water may require changes in the width of an SMZ. Generally speaking, the stepper the slope, the wider the SMZ, and the gentler the slope, the narrower the SMZ. Similar standards would also apply for erodible soils: the more erodible the soil the wider the SMZ and the less erodible the soil the narrower the SMZ. The width of a

SMZ should range from at least 50 feet (on each side of a streambed) in level, slightly erodible soils to almost 200 feet in severely erodible soils where slopes perpendicular to the stream are in excess of 25 percent.

It remains important to also be aware of special site conditions such as, the depth of water table in the soil, the vigor, concentration and type of streamside vegetation as well as the degree and intensity of management activities being practiced which may require a change in the width of the SMZ from what is generally recommended.

As mentioned before, there are multiple waterbodies associated with this property. Located in the far eastern portion of the property, as depicted in the photo to the right and representing the boundary line for the same area is Moores Creek Tributary. The forest stand adjacent to this tributary includes stand A with terrain ranging from moderate sloping to localized steep. As such, the area labeled as stand A immediately west of this tributary should serve as the riparian forest buffer to the same. With terrain ranging from moderate to localized steep it is recommended that a **200-foot-wide** section along the western edge of the stream be viewed upon and treated as a streamside management zone.

Throughout the western portion of the property, as depicted on the forest stand map, are multiple waterbodies locally identified as unnamed tributaries to Delaware River. Forest stands A, B, C and D remain adjacent to these tributaries. Photos of the areas are depicted below.

As the photos reflect, the streamside terrain ranges from gentle to localized steep topography. It is recommended that all forested areas adjacent to these unnamed tributaries should serve as the riparian forest buffer to the same. With terrain ranging from gentle to localized steep it is recommended that a **200-foot-wide** section along both sides of the streams be viewed upon and treated as a streamside management zone. Note: None of these streams/waterbodies are categorized as category 1 waters.

Activities and maintenance of this zone should be consistent with best management practices. The following is a list of recommended Best Management Practices (BMP's) in Streamside Management Zones (SMZ's):

1. A site evaluation is necessary identifying topography, soil type, vegetative cover and site conditions to adequately determine the proper SMZ width.
2. Harvest or fell trees away from streams, lakes, ponds or marshes to prevent logging slash and organic debris from entering the water resource.
3. Protect and nurture trees that provide necessary streambank stabilization and shade.
4. Avoid rutting and soil compaction by limiting logging equipment use within the SMZ.

5. Use harvesting systems that minimize soil disturbance.
6. Remove all debris from marshes, streams, lakes and ponds unless specific fish or wildlife habitat will be enhanced, as confirmed by DEP's Division of Fish, Game and Wildlife.
7. Minimize the effects and spread of fire and disease outbreaks in the SMZ area.
8. Avoid any type of mechanical site preparation and machine planting. Hand plant or direct seeding is recommended.
11. Locate logging decks and portable sawmills sites on well drained sites at least 50 feet outside of the SMZ.
12. Application of pesticides is acceptable as long as they are applied by a certified applicator.
13. Ground application vehicles should not enter the SMZ.

Filter Strips

Filter strips are best defined as undisturbed areas consisting of naturally occurring vegetation located between a wetland or water course (i.e., stream, creek etc.) and skid/truck roads or harvest and loading areas. Filter strips are most effective when placed in close proximity to the activity most often being used outside the SMZ.

Filter strips are used to help slow down the velocity of water runoff so that any sediment load is deposited into the strip, thereby preventing it from washing into the adjacent wetland or water course. The width of the filter strip depends on the slope between the road and the stream/wetland. In general, widths increase as slopes adjacent to streams and wetlands increase. In addition, factors such as soil type and vegetative cover can affect the width of a filter strip.

Slope of Land Between Road and Stream (%)	**Minimum width of Filter Strip (feet)**
0	25
10	45
20	65
30	85
40	105
50	125
60	145
70	165

Maintaining an adequate filter strip adjacent to the ponds and associated stream outlets remains essential. Vegetative cover should be promoted within this filter strip. It should be noted that down or dead material which potential contributes to flooding can be removed as needed. Beyond that little to no additional tree cutting and or vegetative removal should occur. Equipment operation should be restricted in filter strip areas.

Filter strips also remain important in helping to maintain water temperature, stream base flow and preserve wildlife habitat. By implementing these and other management practices the filter strips will be allowed to maintain the current diverse and unique habitat and water resource this property has to offer. In addition, the quality of these water courses will not be depleted.

Stream Crossings

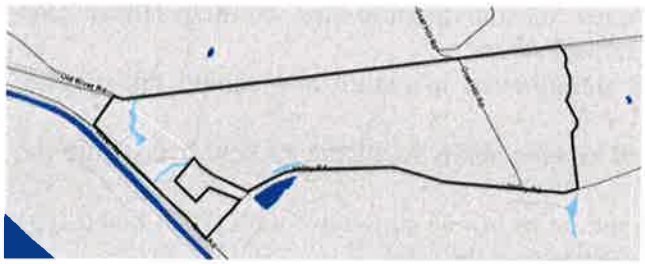
Stream crossings represent the point at which a forest road or skid trail comes in contact with a body of water. The purpose of a stream crossing is to provide a stable bottom or surface that allows for equipment to cross intermittent or perennial streams without increasing stream sedimentation resulting in decreased water quality. When properly located and constructed, stream crossing structures can also prevent damage to the bed and banks of streams. As mentioned earlier in this report, Old River Road, located throughout the western portion of the subject property, includes multiple existing stream crossings of the unnamed tributaries to Delaware River. All forested stands on this property are accessible from a combination of Old River Road, Valley Road, Goat Hill Road and/or open field areas found on the property. As such, it is not anticipated that any stream crossings are proposed now or in the future.

Forest Buffers – (Wetland Transition Area)

The Freshwater Wetlands Protection Act (FWPA) regulates forestry activities conducted within forested wetlands and transitional areas (buffers). Specific forestry activities have been granted a conditional exemption of the requirement of needing a wetland permit.

The FWPA regulates all freshwater wetlands. Newly created and isolated wetlands, regardless of size, also are regulated, provided they meet the three-parameter wetland delineation methodology. In addition, to wetland areas, their associated buffers or transition areas come under regulation of the FWPA. The width of the buffer area is based on the resource value of the wetland.

Woodland owners implementing normal harvesting of forest products, in accordance with a forest management plan approved by the State Forester, are not required to obtain a wetland permit to work in forested wetlands. In New Jersey, normal silvicultural activities, ongoing as of 1987, are exempt from the requirement of a wetland permit without an approved forest management plan, as long as the practices are conducted in accordance with best management practices. These silvicultural practices may include activities such as: thinning, tree planting, seeding, cultivating, harvesting for the production of food and fiber, upland soil and water conservation practices, the construction and maintenance of forest roads and fencing.



The DEP, through the Land Use Regulation Program, has established a procedure to obtain a formal letter of exemption for these activities. While this document is not required before conducting normal harvesting activities approved by a forest management plan, to may be helpful to ensure compliance with the law. As delineated on the map to the left isolated wetland areas are identified in light blue coloration with respect to the property. These areas, being minor in size, appear to be associated with the on-site waterbodies previously discussed in this report. **A larger, more detailed version of this map can also be found in Appendix A of this report.**

It is recommended that **200-foot transition area buffer** to this wetland complex be supported due to the potential presence of threatened or endangered species within or in the immediate vicinity of the subject property.

Access Roads

Access to forest land is often accomplished through the use of existing or newly constructed roads. When not properly constructed, roads are considered a major source of erosion contributing upwards to 90% of the total sediment production from forestry operations. In addition, poorly constructed roads also can reduce and degrade wildlife and fish habitat.

Access systems should generally be designed to minimize the total number of roads; the miles or acres used in their construction; the size and number of landings; the number of skid trail miles and the number of water course crossings. Construction and maintenance of forest roads must not impede the flow and circulation patterns and chemical and biological characteristics of freshwater wetlands areas.

Permanent roads are constructed to provide year-round access for forestry operations and fire protection. In essence they become a permanent part of the forest landscape. Temporary roads are constructed to provide access into a specific area for a limited amount of time for a particular operation. Once the operation is complete, temporary roads should be closed and/or permanently stabilized.

The following is a list of recommended Best Management Practices (BMP's) for Access Road Construction and Maintenance. Some of the BMP's listed below may not be relevant for this property but are still worthy of mention.

1. Locate access roads outside of the SMZ and wetlands, unless no other alternative exists.
2. When available, use existing roads to help minimize the total amount of road construction necessary for forestry operations.
3. Build roads to follow the contour of the land.
4. In a moderately sloping terrain, road grades should be less than 10 percent, with optimal grades between 3 and 5 percent. In steep terrain, short sections of road at steeper grades may be used as long as the grades are broken at regular intervals.
5. Road grades should vary frequently to minimize the amount of road surface water flow entering culvert and road drainage ditches. Grade variation also will help reduce road surface erosion and concentrated culvert discharges.
6. All roads are to be rudimentary and unimproved in nature and should not employ alignment grading.
7. Keep roads free of obstructions, ruts and logging debris so water can flow freely from the surface.
8. The width of any wood's road will be minimized to be consistent with the size and type of light truck vehicle or ATV needed to operate on the road.
9. To help ensure proper road-surface drainage, construct roads on the sides of ridges or water divides. Roads should not be constructed on the top of ridges where water tends to collect, resulting in poor drainage.
10. Locate roads above flood plains, floodways and wet areas.
11. The alignment of all roads should avoid soft soil and seasonably wet areas taking full advantage of high points in the landscape. Crossings of streams, seeps or springs should

be avoided to the maximum extent possible. Should a stream or wetland need to be crossed proper permitting from all regulatory agencies must be obtained prior to commencement of activities.

12. To ensure proper road-surface water drainage, construct access roads so that water flow is directed to the outside of the road. The standard practice used to achieve outside drainage is referred to as outsloping.
13. Use insloping when constructing a road where road gradients are greater that 15 percent; toward sharp turns; or when constructed on clay and/or slippery soils. In such cases, the use of an under-road culvert positioned at a 30-degree angle to ensure proper inside road drainage is recommended.
14. Construct road widths adequate enough to accommodate the necessary forestry equipment to be used. (Usually, 10-12 feet in width will accommodate most tractors, log skidders, pickup trucks)
15. Avoid road construction during wet periods.
16. Good road drainage can be ensured through the use of properly constructed and spaced water turnouts; waterbars; broad-based dips; rolling dips; ditches; culverts and bridges.
    a. Use broad based dips at appropriate intervals to channel water off the road. The bottom of these dips should be outsloped slightly at approximately three percent to allow for the removal of surface water.
    b. Use waterbars only when retiring temporary access roads.
    c. Locate and install water turnouts before a stream crossing to disperse runoff water through undisturbed areas of the SMZ.
    d. Do not channel water from roadside drainage ditches directly into a stream. If a ditch comes in close proximity to a stream, end the ditch and divert the runoff away from the stream and into the SMZ.
17. Do not locate road fills in close proximity to a public water supply intake.
18. If a road is to be seeded, do not compact the final layer of road surface. This will help create better conditions for an acceptable seed bed.
19. Cover roads with gravel, grass, wood chips or crushed rock where the road grade has increased the potential for surface erosion.
20. Use road materials, such as gravel or crushed rocks for the appropriate size and particle hardness, to protect road surfaces from rutting and eroding under heavy traffic during wet periods. Ditch runoff should not be visibly turbid during these conditions.
21. Use natural road materials, such as stone, sand or other soil aggregates that do not contain hazardous material or high sulfide ore.
22. Shade trees along road sides can be removed to help dry out road beds.
23. When access roads intersect public roadway/highways use adequate size clean stone with a combination geotextile underlayment to help keep mud off of the public right of ways.
24. Restrict traffic on access roads during unfavorable conditions, such as wet soil. Gravel, wooden mats, or a combination of geotextile and gravel may be used to help facilitate operations during these wet periods. Under extreme conditions, silt fencing may be required.
25. Restrict construction activities and staging of fill to the construction of right-of-way access roads or to adjacent uplands out of wetlands or their transition zones.

26. When all forestry activities are complete, close and stabilize all access roads that were used. Stabilizing may include: cleaning ditches; mulching and seeding the road bed; laying brush barrier riprap; installing silt fences and/or constructing waterbars.
27. Use gates or other barriers to completely close roads to travel and restrict access to unauthorized persons.
28. Periodically inspect closed roads to ensure that vegetative stabilization measures along with drainage structures are operating efficiently. Perform reseeding, mowing, patching, resurfacing and drainage structure maintenance as needed.

Information for this section is taken directly from: New Jersey Bureau of Forest Management, 1995, *New Jersey Forestry and Wetlands, Best Management Practices Manual.*

XI SPECIES DESIRABILITY

The desirability of different species varies from one's viewpoint. Proper forest management involves a merging of the scientific findings of the professional forester with the hopes, goals and ideals of the landowner. Sometimes a tree or tree species will be very desirable simply because the landowner likes it, often for aesthetic reasons. That view is just as valid as a forester's is. Notwithstanding the above, however, both the economic and wildlife benefits of various species should be outlined here for guidance.

From an economic standpoint, the best timber trees in New Jersey (where we have strong markets for hardwoods) are all of the oaks except pin oak, tulip poplar, white ash and sugar (hard) maple. Good populations of mature trees of these species can easily run appraisals of timber over $1,500 per acre. Where site conditions permit, growing these species and doing everything possible to favor them makes good economic sense. Trees with timber market value, but of less importance are beech, hickory, birch and basswood. Except for special markets which, develop from time-to-time other species are generally utilized for fuelwood.

Wildlife benefits most from an actively managed forest with different age classes in different areas. Variety of habitat and food is key to abundance and diversity. Young stands provide cover and browse. Mature forests provide roosting and denning sites. The mast crops from oaks, beech and hickory are valuable for deer, bear and turkey. Large pines and hemlocks are favored roosting sites for turkeys. Woodpeckers and flickers favor dead trees. Hollow trees are used by raccoons, owls, wood ducks and other wildlife needing hideaways for nesting.

Harvesting of forest products can frequently accomplish the realization of economic goals, creation of better browse and cover conditions for wildlife and the encouragement of new trees to grow in the space created.

XII ADDITIONAL WILDLIFE CONSIDERATIONS

All of the forestry activities that have been discussed can enhance the habitat for wildlife occupying the site. This is accomplished through a variety of different activities some of which include: stump sprouting, felled trees allowing additional sunlight on the forest floor that will favor a wider variety of annuals and perennials along with the continued management of the vertical edge within the woodlot.

Tree cuttings can take place during the winter months to produce browse for deer through the felled tree tops, during these months, when available food is at its lowest. The stumps will then sprout and provide browse for the immediate and future years. Leaving a few living and dead hollow trees, particularly along woodland edges and streams will offer refuge and resting areas for many forms of wildlife, including bee colonies.

Other improvements to the habitat can be achieved by releasing important nut (mast) producing trees such as beech, hickories and oaks. Hard mast production increases as a timber matures, then decreases as timber becomes over-mature. Woodlands that attract and hold the greatest number of deer, turkey and squirrels produce in excess of 100 pounds of acorns per acre per year. To do this, these areas must have a minimum of 22 to 25 dominant, good acorn producing oaks per acre that are at least 14" in diameter and have at least 1/3 of their total tree height in living crown. Maintaining stands of oak and hickory will provide this necessary hard mast (acorns/nuts) food source. This can be accomplished by yearly monitoring of gypsy moth infestations and selective removal of non-oak tree species (i.e., red maples) in areas of the stand(s) where they are found in concentrated levels. During the years of bumper crops, deer, turkey, grouse and even bear would visit these trees.

Tree cuttings can also be directed towards improving wildlife habitat. The cuttings can be conducted in such a manner as to create openings within the canopy to stimulate desirable shrub and herbaceous growth for wildlife forage and shelter. One or two dead trees per acre can remain as wildlife trees for cavity-nesting mammals and birds.

Snags of decaying trees can provide a ready source of insects, which are a major component of the diets of most cavity nesters. Retain naturally occurring snags that do not present a danger to property users. Cavity trees located near water are used by a variety of birds and mammals, however it takes about 30-40 years for a cavity to properly develop. To maintain a quality supply of natural cavities and roosting areas, construct nest boxes in a variety of sizes and place them in the stand edge within 50 yards of the stream.

During the cutting of trees, any material that is determined to be unsuitable for firewood can be utilized in the creation of brush piles. Brush shelters serve primarily as cover for wildlife. Many species of small mammals use this type of cover when available, but brush piles are especially important to cottontail rabbits. When constructed and located properly, brush piles are heavily used by cottontails as resting and escape cover.

At first, it may seem that building a brush pile is so easy that no instruction is needed. It would seem to be simply a matter of throwing an armful of brush (crowns, limbs of felled trees, or shrubby growth) in a pile. But wildlife biologists have found that certain construction specifications for brush shelters increase the use of brush piles. To build a base for the brush shelter, use:

1. 4 poles, 6 feet long and 4-8 inches in diameter, placed parallel to each other on the ground 8-12 inches apart. Then place 4 more poles of the same size perpendicularly across the top of the first 4 poles, or
2. stones 8-12 inches in diameter, placed in 3 pie-shaped groups such that the spaces between the groups form a "Y",

or

3. 3 or 4 poles, 6 feet long and 4-8 inches in diameter, placed parallel to each other on the ground 8-12 inches apart. Then, place large, flat rocks across the top of these, or
4. If these other bases are not possible to make, use a stump as a base to raise the shelter off the ground in the center.

Any of these types of bases will work well. They serve to keep "tunnels" open under the pile once the brush is stacked on top. A slightly more elaborate design uses a 3 feet long piece of 4-6-inch tile, slightly buried at the far end (the end farthest into the brush pile).

After the base of the brush shelter has been built, you can add the brush. Start with larger (stout) limbs first and then gradually add smaller pieces. The pile should be about 6-8 feet high, or higher, and of about the same diameter.

Brush piles should be located near feeding areas, along field borders, or interspersed at reasonable intervals (10-50 yards) in overgrown fields. Such placement will provide a relatively safe access to more food and, in essence, increase the amount of space available to them. Brush shelters can be a beneficial by-product of thinning or timber cutting operations in a woodlot.

AVERAGE BRUSHPILE

TAJ MAHAL OF BRUSHPILES

Living Brush Piles

Like the brush shelter described in the Brush Piles heading, "living" brush piles provide shelter for a variety of small mammals. But living brush piles also provide food. Those of the hardwood species may supply buds, twigs, and foliage for several years. These foods are used by wildlife such as white-tailed deer, cottontail rabbits, ruffed grouse, and wild turkey.

Partially cut through a branch or stem, leaving as much of the bark intact as possible. The layer just under the bark is the "blood stream" of the tree; if not completely severed, it may keep the tree alive for some time. However, the tree's (or affected limbs') vigor is greatly diminished; and with the cut portions being exposed to disease, death after a few years is certain.

A living brush pile can be made by cutting part way through the lower limbs of a conifer having limbs low on the trunk. The first two or three whorls of branches should be sliced and pushed down, forming a "teepee."

A second type of living brush pile can be made by first locating a group (preferably 6 or more) of deciduous saplings 6-10 feet in height. These can be cut partially through at height of 6-10 inches and toppled over toward one another. This creates a dense growth in the following years. When the saplings eventually die, they can be cut through completely and used to construct another brush pile as described above.

XIII FOREST MANAGEMENT ACTIVITY SCHEDULE

Stand	Management Recommendation	Year(s)	Activity	Productivity Level
A western section	Maintain adequate stocking levels, species diversity and acceptable growing stock.	2021-2031	Conduct **sanitation cuttings**. Focus on blowdowns and unacceptable growing stock. In addition, review harvest option for this section and continue with management activities accordingly.	Harvest 4+-cords per year.
A eastern section	Promote recreational use within this section of forest stand.	2025 2027	Establish walking-hiking trails, scenic vistas or other points of interest. Conduct sanitation cuttings of dead-dangerous trees in vicinity of established trails.	
B southeast section	Promote residual trees, improve stand health and aesthetics. Develop internal stand access.	2021-2023	Conduct vine and sanitation cuttings. Firewood generated from existing blowdowns.	Harvest 4+-cords per year.
B All	Promote natural regeneration and maintenance of younger growing stock. Reduce overmature tree component, capitalize on monetary returns.	2022-2025	Conduct individual tree harvest. Keep harvest directly away from floodplain areas of stand. Note: This harvest can coincide with harvest in stand A.	
C	Monitor stand health, promote growth of acceptable growing stock. Promote recreational use within stand.	2023-2026	**Eastern section:** Establish and maintain hiking trails. **Western section:** Conduct vine cuttings, remove ash component and establish trails.	

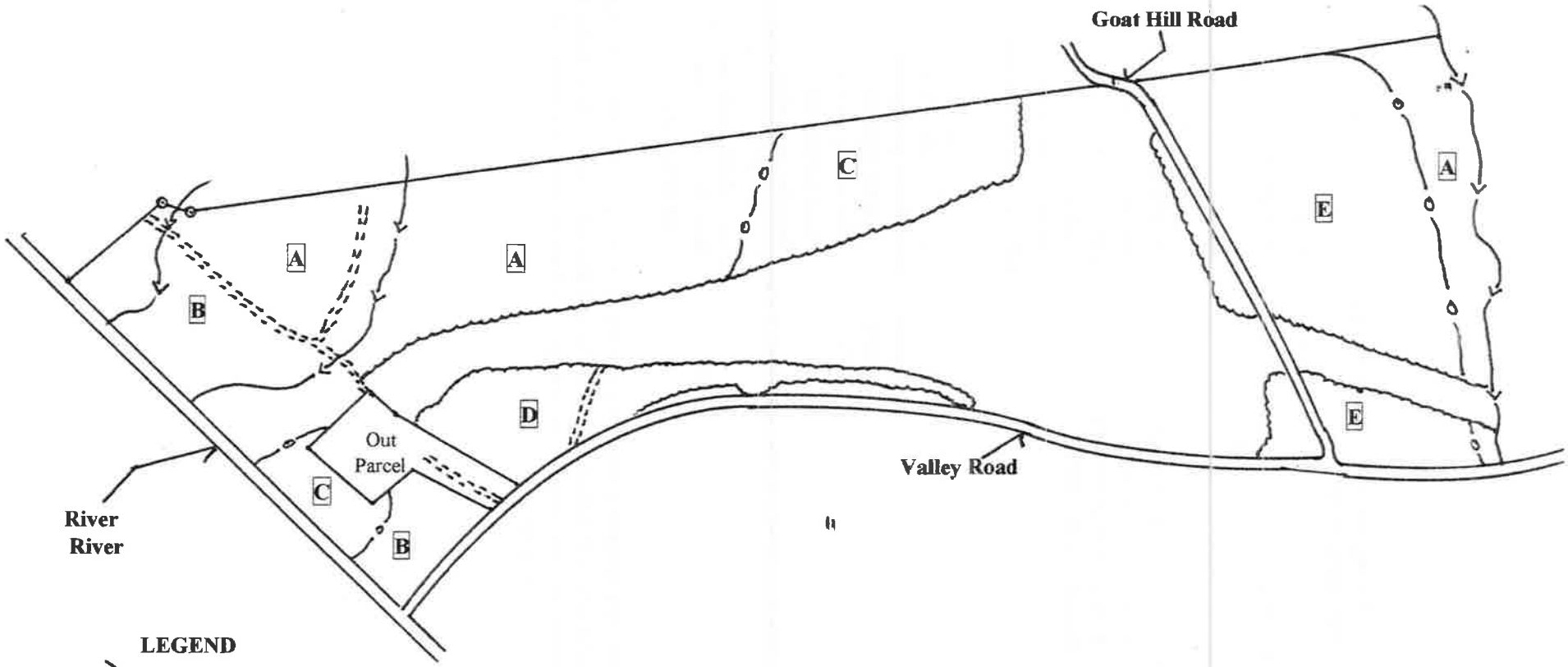
Stand	Management Recommendation	Year(s)	Activity	Productivity Level
D	Maintain acceptable growing stock, species diversity, vigor and tree health.	2022-2029	Conduct **sanitation cuttings** as directed in plan. Focus on white ash and unacceptable growing stock.	Harvest 4+- cords per year.
E	Promote recreational use within forest stand. Promote growth of existing natural regeneration.	2025-2031	Establish walking-hiking trails, wildlife viewing areas or other points of interest. Note: Trails should traverse around pockets of established tree cover.	
General		Every couple years.	Have boundary lines field delineated, paint, posted signs etc.	
General		2021-2031	Maintain primary access roads and develop secondary roads as needed during future cutting activities.	
General		2031	Have forester revise and update plan.	

Note: This management schedule is not intended to be a definitive scheduling of forestry activities. The schedule is intended to be flexible and should be revised or changed as landowner objectives or environmental conditions change. Changes may be made after consultation between the landowner and forester.

FOREST STAND MAP

Property of:
Bellemont Farm LLC (Ehrenreich)
Valley Road
Hopewell Township, Mercer County
Block: 57 Lots: 3 and 4, Block: 56 Lot: 3

Prepared by:
George J. Boesze, Consulting Forester
October, 2021
Total: 110+- acres, Woodland: 77+- acres
Forestry Number:



LEGEND

... Property corner
... Forest access road
... Edge of woods
... Stream or creek
A ... Forest Stand
... Stand Delineation Line

N

SCALE
1": 480'

B A N I S C H
ASSOCIATES, INC.
Planning and Design

Memorandum

To: Hopewell Township Zoning Board of Adjustment

From: Francis J. Banisch III, PP/AICP

Date: September 20, 2023

Re: Bellemont Farm, LLC
22 Valley Road
Block 57, Lot 4
MRC District
Interpretation of the Zoning Ordinance

BACKGROUND

The applicant is seeking an interpretation of the Township's zoning ordinance to determine if a "farm brewery" use is a permitted agricultural use on a commercial farm.

In accordance with N.J.S.A. 40:55D-70.b., the Board of Adjustment has the power to:

> "Hear and decide requests for interpretation of the zoning map or ordinance or for decisions upon other special questions upon which such board is authorized to pass by any zoning or official map ordinance, in accordance with this act."

DISCUSSION

State Rules and Policies

The New Jersey State Agriculture Development Committee (SADC) administers the Right to Farm Act, farmland preservation program, and other agricultural programming in the State. The Right to Farm Act (NJSA 4:1C-1) provides protection to farm operators against nuisance complaints while mediating such conflicts between neighbors, municipalities, and other parties. To be eligible for Right to Farm, a farm operation must meet the definition of a commercial farm, which is (NJSA 4:1C-3):

> "Commercial farm" means (1) a farm management unit of no less than five acres producing agricultural or horticultural products worth $2,500 or more annually, and satisfying the eligibility criteria for differential property taxation pursuant to the "Farmland Assessment Act of 1964," P.L.1964, c.48 (C.54:4-23.1 et seq.), (2) a farm management unit less than five acres, producing agricultural or horticultural products worth $50,000 or more annually and otherwise satisfying the eligibility criteria for differential property taxation pursuant to the "Farmland Assessment

Act of 1964," P.L.1964, c.48 (C.54:4-23.1 et seq.), or (3) a farm management unit that is a beekeeping operation producing honey or other agricultural or horticultural apiary-related products, or providing crop pollination services, worth $10,000 or more annually.

Should a farm meet the criteria for Farmland Assessment and qualify as a commercial farm under the Right to Farm Act, the SADC provides rules for specific approved activities on commercial farms, known as Agricultural Management Practices (AMPs).

Recently, the SADC adopted a general AMP for on-farm direct marketing facilities, activities, and events (NJAC 2:76-2A.13), which provides rules and regulations for on-farm direct marketing such as festivals, tours, educational activities, harvest fairs, and the like. Wine-tastings and wine-related activities are included in the AMP, and the SADC has established vineyards and wineries, and associated direct marketing activities, such as wine-tasting rooms and retail, on both commercial farms and preserved farms are permitted. *However, the SADC rules and regulations have remained silent on breweries, and, therefore, are currently not protected under Right to Farm or an associated AMP. Thus, the jurisdiction for including breweries as a permitted agricultural use on a commercial farm is within the NJ SADC jurisdiction and outside the purview of the Zoning Board.*

Hopewell Township Regulations

The next evaluation is to review the Township's land development ordinance for permitted uses as it relates to the request to permit a "farm brewery" as an agricultural use.

Breweries are currently not permitted in any zone of the Township, however, the question before the Board is if a "farm brewery" would be qualified as an agricultural use under the Township's Right-to-Farm ordinance, and thus permitted and protected. The site is located in the Mountain Resource Conservation district, which does permit farm and agricultural uses in accordance with the Township's Right-to-Farm ordinance (Chapter 22). However, the Right-To-Farm ordinance is part of the Township's general code, and not part of the Land Development ordinance therefore, a determination on commercial farm use, as outlined in Right to Farm ordinance, is a matter for the governing body and not a function of the zoning board. Furthermore, the Township's Right-to-Farm ordinance reflects the State Right to Farm regulations and is superseded by State as applicable:

22-1 "Right to Farm Activities Protection"
Farming activities may be conducted up to and along the property line of the property being farmed. In accordance with the purposes and preambles set forth herein, the following farming activities shall be deemed established as acceptable, recognized and entitled to encouragement and protection as the collective embodiment of the "Right to Farm" *subject in all cases, however, to any supervening applicable Federal, State or county laws* or regulations respecting the public health, safety or otherwise:" (*Emphasis added*)

Similar to the definition provided by the State, Commercial Agriculture in the Township's Right to Farm ordinance is defined as:

> "Shall mean the production principally for sale to others of plants and animals or their products, including, but not limited to, forage and sod crops, grain and feed crops, dairy animals and dairy products, livestock including beef cattle, poultry, sheep, swine, horses, ponies, mules and goats; the breeding and grazing of such animals; bees and apiary products, fruits of all kinds, including grapes, nuts and berries, vegetables, nursery, floral, ornamental and greenhouse products, and tree farming or woodland management."

The Township's Right to Farm ordinance permits wholesale and direct marketing of the agricultural output of a farm (Section 22-1c).

However, given that the State does not currently permit breweries, and the Township's Right to Farm is superseded by the State, the Township's permitted agricultural uses would not include a brewery.

Finally, as identified previously, "agricultural uses" are permitted in the MRC district and defined in the Township ordinance as (Section 17-181)

> "Shall mean land which is devoted to the production for sale of plants and animals, including but not limited to: forages and sod crops; grain and feed crops, dairy animals and dairy products; poultry and poultry products; livestock, including beef, cattle, sheep, horses, ponies, mules or goats, including the breeding and raising of any or all such animals; bees and apiary products; fur animals; trees and forest products; or when devoted to and meeting the requirements and qualifications for payments to other compensation pursuant to a soil conservation program under an agreement with an agency of the Federal government. For purposes of this chapter, agricultural use does not include a dwelling. See definition of "Farm.""

The definition of agricultural uses is also silent on the manufacturing of products such as breweries and not part of the agricultural use definition.

Summary

The applicant is seeking an interpretation of the ordinance to permit a "farm brewery" as a permitted agricultural use on a commercial farm. Commercial farms are defined through the Township's Right to Farm ordinance, which is part of the Township's general code and not the Township's land development ordinance and is not subject to interpretation by the Zoning Board. In addition, the State Right to Farm Act, and associated rules and regulations are silent on breweries, breweries are not currently a permitted activity. While wineries have been afforded protection and are permitted to produce and market on-site, breweries have not been provided the same protection. Since the Township's ordinance reflects the State regulations, it can be assumed that breweries were not contemplated as a separate farm use, as further evidenced by the fact that breweries are not permitted in any zone in the Township.

Mr. Kyle's report cites a press release from 2015 on the Screamin' Hill Brewery in Cream Ridge, which is located on a preserved farm, as evidence that the SADC endorses brewery use. However, the press release promotes Jersey Fresh products from locally sourced farms and does not provide any policy directives on such uses throughout the state. It is unclear what approvals

or process resulted in permitting a tap room on the property and the SADC has not since provided any additional AMP or guidance on breweries in the State.

In conclusion, I believe the requested interpretation is outside of the Board's jurisdiction to evaluate. The applicant may seek a d(1) use variance to permit a brewery on their property or seek additional information or guidance from SADC on breweries on commercial farms. In addition, the applicant may request a zoning amendment from the governing body to consider brewery uses in the Township's ordinance, but an interpretation by the zoning board is not the appropriate vehicle to advance this change of use.

May 31, 2023

Dr. Michael Ehrenreich, MD
354 Charlton Avenue
South Orange, NJ 07079

KMA
KYLE+MCMANUS ASSOCIATES
POLICY
PLANNING
DESIGN

Re: Planning Analysis- Interpretation Request
Bellemont Farm
Block 56, Lot 4 – Valley Road and Goat Hill Road
Hopewell Township, Mercer County NJ

Dear Dr. Ehrenreich:

Pursuant to your request, below you will find planning analysis related to your application before the Hopewell Township Zoning Board of Adjustment requesting an interpretation as to whether the farm brewery use contemplated for the above referenced property is permitted as an agricultural use in the Township's Mountain Resource Conservation District. As we understand it, the current proposal is to grow hops, barley and other produce on the farm, which will represent at least 51% of the ingredients utilized in the brewing of beer, which would be sold as a value-added product produced from the output of a commercial farm. To facilitate the sale of the value-added product, the farm will include a farm market where customers can sample and purchase beer for consumption either on or off the premises.

The property that is the subject of this request is an approximately 33 acre parcel located at the corner of Goat Hill Road (to the east) and Valley Road (to the south) and designated as Block 56, Lot 4 on the Township tax map. Located in the Township's Mountain Resource Conservation District, which permits a variety of principal uses, §17-147 of the Hopewell Township Land Use and Development Ordinance states "Farms and other agricultural uses are permitted as principal uses in all districts. Barns, silos, tool sheds, fences, walls and other facilities which are customary for agricultural pursuits are permitted as accessory uses." It is therefore clear that agricultural use is permitted on the property.

The New Jersey State Agriculture Development Committee (SADC) defines a number of terms in N.J.A.C. 2:76-2A.13(b) that help provide context to your request and are important for the Zoning Board of Adjustment to consider. These are noted below.

> **"Agricultural output of a commercial farm"** means the items specified in N.J.S.A. 4:1C- 9.a that a commercial farm produces and the value-added or processed products produced from those items, provided that the primary and predominant ingredients used to produce such products are grown or raised by the commercial farm. Examples of unprocessed agricultural output include, but are not limited to: fruits, vegetables, nursery stock, bedding plants, cut flowers, Christmas trees, and forest and livestock products. Examples of value-added or processed agricultural output include, but are not limited to: meat products, dairy products, cider, canned goods, baked goods, prepared foods, cut firewood, and wreaths.
>
> **"Commercial farm"** means: 1. A farm management unit of no less than five acres producing agricultural or horticultural products worth $2,500 or more annually, and satisfying the eligibility criteria for differential property taxation pursuant to the Farmland Assessment Act of 1964, P.L. 1964, c. 48 (N.J.S.A. 54:4-23.1 et seq.); or 2. A farm management unit less than five acres, producing agricultural or horticultural products worth $50,000 or more annually and otherwise satisfying the eligibility criteria for differential property taxation pursuant to the Farmland Assessment Act of 1964, P.L. 1964, c. 48 (N.J.S.A. 54:4-23.1 et seq.).

"Farm market" means a facility used for the wholesale or retail marketing of the agricultural output of a commercial farm and products that contribute to farm income, except that if a farm market is used for retail marketing at least 51 percent of the annual gross sales of the retail farm market shall be generated from sales of agricultural output of the commercial farm, or at least 51 percent of the sales area shall be devoted to the sale of agricultural output of the commercial farm, and except that if a retail farm market is located on land less than five acres in area, the land on which the farm market is located shall produce annually agricultural or horticultural products worth at least $2,500.

"On-farm direct marketing facility" or **"facility"** means a type of farm market including the permanent, temporary, and/or moveable structures, improvements, equipment, vehicles, and apparatuses necessary to facilitate and provide for direct, farmer-to-consumer sales of the agricultural output of the commercial farm and products that contribute to farm income. Such facilities include various types and sizes of direct marketing operations, including, but not limited to: farm stands; farm stores; CSA market and distribution areas; and pick-your-own (PYO) market areas. A facility may include one or more structures or a portion of a structure, and a facility may utilize new or existing structures. A facility's structures may also be used for the commercial farm's other farm purposes, for instance: equipment storage, equipment maintenance, and the production, processing, packaging, storage, or wholesale marketing of the agricultural output of the commercial farm.

Critical to analysis of whether the farm brewery use proposed can be considered a permitted agricultural use is the intended operation and how it relates to the SADC's agricultural management practice for on-farm direct marketing activities set forth in N.J.A.C. 2:76-2A.13. Provided a commercial farm complies with these standards, it is entitled to protection under the Right to Farm Act, N.J.S.A. 4:1C-1 et. seq. Reviewing the definitions noted above, the brewing of beer to create a value-added or processed product qualifies as "agricultural output of a commercial farm", as the primary and predominant ingredients used to produce the beer will be grown or raised on the commercial farm. This will include the growing and harvesting of hops, barley and perhaps wheat and produce such as pumpkins, berries and herbs, all ingredients typical to beer production. In order to facilitate the sale of the value-added or processed product, the farm will engage in on-farm directing marketing through a farm market that in this case will include a tasting room similar to one found in a winery. Customers will be able to sample beer and purchase directly from the farm brewery. Provided 51 percent of the annual gross sales or 51 percent of the sales area is devoted to the sale of agricultural output of the commercial farm, it qualifies as a farm market under the SADC's rules. It should be noted that under the Township's definition in §17-181 of the Land Use and Development ordinance, "the growing and harvesting of crops" qualifies as "agriculture".

While there are not a significant number of farm breweries in New Jersey such as the one proposed, there is one example that is important to note. Screamin' Hill Brewery, located in Cream Ridge, Monmouth County, was touted by New Jersey Secretary of Agriculture Douglas Fisher in 2015 as ".....the example of how our state's agriculture and craft brewery industries can work together to create unique products consumers can enjoy."[1] What is most important about Screamin' Hill Brewery is the fact that it is located on a farm permanently preserved in 1989 through Monmouth County's direct easement purchase program and is restricted for agricultural use under its deed of easement. The deed of easement was certified by the SADC, which contributed 64% of the fair market value of the easement to the County. What this clearly demonstrates is that the SADC considers the Screamin' Hill Brewery to be an agricultural use, as it would otherwise be in violation of the deed of easement.

[1] https://www.nj.gov/agriculture/news/press/2015/approved/press150825.html, accessed on May 30, 2023.

Based on the analysis and evidence contained in this letter report, it is my professional opinion that the farm brewery use you propose at Bellemont Farm qualifies as a permitted agricultural use under §17-147 of the Hopewell Township Land Use and Development Ordinance. The production of beer qualifies as a value-added or processed product under the SADC's rules, as the primary and predominant ingredients will be grown and raised on the commercial farm. Under the SADC's agricultural management practices set forth in N.J.A.C. 2:76-2A.13, on farm direct marketing may be undertaken as proposed.

Sincerely,

James T. Kyle, PP/AICP
NJ Professional Planner #5667
Principal