PENNSYLVANIA'S
NUTRIENT MANAGEMENT ACT PROGRAM
TECHNICAL MANUAL

Version 11.0

Provided by:
The Pennsylvania State Conservation Commission
(With the assistance of the PDA, PSU and NRCS)

The Technical Manual Version 11.0 released in October 2019 supports:
Version 7.x of the Nutrient Management Plan Standard Format
Version 5.x of the Nutrient Balance Sheet Standard Format
Version 2.x of the Pennsylvania Phosphorus Index

The guidance in Technical Manual 11.0 is required for:
Nutrient Management Plan submissions for crop year 2021 and beyond.

Preface

The *Pennsylvania Act 38 Nutrient Management Program Technical Manual* has been developed in order to provide consistent program guidance, further refining the requirements in the regulations, to be utilized in the development, review, and implementation of Act 38 nutrient management plans. This manual describes how the various decisions are made during plan development, review, and implementation. Additional program refinements will be incorporated into later revisions of this manual as time and resources permit.

In addition to the Technical Manual, a Nutrient Management Program Spreadsheet User's Manual has been developed that describes how the various calculations are made during the plan development process.

The State Conservation Commission (Commission) is pleased to provide this guidance document to assist you in understanding the provisions of Pennsylvania's Nutrient Management Act (NMA) program. We hope that this manual will provide the needed program guidance to assure consistent implementation of the program statewide. This manual is a compilation of guidance directives providing further refinement of the nutrient management regulations; however, the guidance in this manual does not supersede the regulations. Where conflicts may be perceived the regulations take precedence.

The main audience for this manual is the Certified Nutrient Management Specialists who will be developing, reviewing, or assisting with implementing plans to meet the NMA or related programs. All specialists are encouraged to become very familiar with the information in the manual and are directed to follow this guidance closely in order to ensure consistent program implementation throughout the state.

The Act 38 program strives to provide consistent program requirements throughout Pennsylvania and this document has been developed to assist in this effort. Program staff are directed to follow the program guidance provided in this manual and to implement the program in accordance with Commission direction in order to maintain this important program consistency. For questions relating to the implementation of program requirements, policies, or general use of this manual, please contact NMA program staff from the Commission, Pa Department of Agriculture (PDA) or Pa Department of Environmental Protection (DEP) for assistance.

Information in this manual has been provided by the Commission, PDA, Penn State University (Penn State), the Natural Resources Conservation Service (NRCS), and DEP and other contributing program staff throughout the state. The Commission thanks all of those people who provided excellent input into the development of this eleventh version of the technical manual. Please keep this manual up to date by including into the manual any updates provided by program staff, as well as, program direction provided in NMA newsletters, program notes or program bulletins.

This manual is organized to reflect the various sections and appendices of an Act 38 nutrient management plan. For each section or appendix of the plan, the manual

provides technical and policy guidance of how that portion of the plan is to be completed. The supplement section of the manual provides examples and blank forms that may be useful in the development of Act 38 nutrient management plans. A sample plan has been developed for the program and is provided in Supplement 2 of this manual to provide direction on how the information is to be shown in an Act 38 plan.

If you have any questions or comments relating to the format or use of the manual, please contact the Commission office at 717-787-8821.

How to Use This Manual

This manual, and the associated User's Guide, has been developed to assist both planners and reviewers in consistently carrying out the requirements of Pennsylvania's Nutrient Management Act Program. The format of this manual has been developed to provide an "easy to read" description of the technical aspects and program policies related to the various elements of the plan and other program elements.

The manual includes a detailed table of contents of the various topics discussed in the manual. This reference source can assist the user in finding where the various topics are discussed in the manual.

If you have questions on how to complete a certain element of an Act 38 plan, you can simply turn to the section or appendix of the manual or the Nutrient Management Spreadsheet (NMP) or Nutrient Balance Spreadsheet (NBS) User's Guide that covers that portion of the plan to read the documented policies or technical guidance on how to address the issue. This manual is formatted to follow the various sections and appendices of an Act 38 nutrient management plan. For each 'section' or 'appendix' of a plan, the manual provides technical and policy guidance of how that portion of the plan is to be completed. The 'supplement' portion of the manual provides examples and blank forms that may be used in the development of the nutrient management plan.

The Penn State Agronomy Guide, the Agricultural Analytical Services Lab (AASL) Soil Test Recommendations Handbooks, NMP Spreadsheet User's Guide, NBS Spreadsheet User's Guide, and the Supplements in this manual are the primary references for standardized values utilized in developing Act 38 nutrient management plans. Please note that the both the Users Guides and the spreadsheets themselves contain the reference information for the different data sources and databases used for program calculations. Nutrient management specialists working within the program are directed to use the most recent versions of these documents for their planning and review activities. The specialist can be assured that the values in these documents are acceptable under the program, except where directed to use different figures through further program guidance such as program newsletters, fact sheets, program bulletins or notes developed by Commission staff, other program approved written materials, or state staff direction. When using values other than those found in these documents, the planner will need to justify the use of these numbers.

This manual and NMP and NBS spreadsheet User's Guide will be updated periodically as additional information is developed to assist in plan development, review and implementation. Updates will most likely be in the form of revised pages or sections that can be inserted into the manual to replace outdated information. A full manual update will take place as the need arises. You may reference the program website (http://extension.psu.edu/plants/nutrient-management) in order to determine if you have the most recent edition of all components of this manual. The website will list each of the various sections, appendices and supplements to the manual, along with the date of the most recent update to that portion of the manual.

Nutrient Management Act Program Technical Manual

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Nutrient Management Plan Submission
Required Appendices and Supplemental Information

Act 38 requires review and approval of nutrient management plans in order for these plans to be considered official under the program. This review and approval activity requires the submission of all relevant data and information so that the plan reviewer can determine if all program requirements have been met.

Only new plans and plan amendments developed using the most current version of the standardized Act 38 Nutrient Management Plan Spreadsheet or Nutrient Balance Sheet Spreadsheet Excel programs, will be accepted for review and approval under the Act 38 program.

The most current version of the standardized Act 38 Nutrient Management Plan Spreadsheet or Nutrient Balance Sheet Spreadsheet will be identified by a "version number" and can contain any edition of the "update number". For example, Version 5 is initially released as Version 5.0. Subsequent updated of Version 5 would be designated as 5.1, 5.2, 5.3, etc. If Version 5.3 is the most current edition of the spreadsheet, Versions 5.0, 5.1, 5.2 and 5.3 would all be considered the "current" version and could be used for planning. Each of these designations would be acceptable for review and approval under the Act 38 program. When a version with a new "version number" is released, in this example Version 6.0, all previous versions and updates would no longer be acceptable for planning purposes. Version 6.0 would become the current version.

A copy of the most recently approved plan is required to be maintained at the farm and copies of the most recent Nutrient Balance Sheets need to be provided to the importers. Note: When a NMP that contains NBSs for importers is amended, the NBSs are to be updated to the most recent planning version of the Nutrient Balance Sheet Spreadsheet.

Nutrient Management Plan Submission Requirements
All of the following plan components and Appendices are required to be submitted with the **initial Act 38 plan or any plan amendment submissions**.

1. Cover Page
2. Nutrient Management Plan Summary (along with summary notes, the manure rate calibration table, and additional NM plan requirements and the operator management map)
3. Appendix 1: Nutrient Management Plan Agreement and Responsibilities
4. Appendix 2: Operation Information
5. Appendix 3: Manure Group Information
6. Appendix 4: Crop and Manure Management Information
7. Appendix 5: Phosphorus Index
8. Appendix 6: Manure Management
9. Appendix 7: Stormwater Control
10. Appendix 8: Importer/Broker Agreements and Nutrient Balance Sheets

11. Appendix 9: Operation Maps (including topographic maps and soils maps)
12. Appendix 10: Supporting Information and Documentation

Submission of the following worksheets and forms is required when they are relevant to a plan.

- Rainfall Additions Worksheet - Submission is required when manure generation is calculated and includes the addition of rainfall and/or runoff.

- Winter Manure Application Matrix – Submission is required when winter manure application is included in the plan. A winter Application Matrix is also required to be included along with the NBSs where winter manure application is planned to occur on these importing sites.

- Manure storage setback waiver forms – Submission is required if a manure storage setback waiver is required in order to implement the plan as proposed.

- Manure N Residual Calculator Worksheet – Submission is required when residual manure nitrogen availability is calculated using Agronomy Guide Table 1.2-15. Refer to Appendix 4: Crop and Manure Management Information for more information about the use of Agronomy Guide Table 1.2-15.

- 5-year manure analysis averaging table.

- Table 3 Worksheet – Submission is required when crops are entered into the NMP Spreadsheet**.**

- Table 4 Worksheet – Submission is required when a legume nitrogen residual management scenario is entered into the NMP Spreadsheet.

- For CAFO Operation only, supporting information, calculations and references for manure storage winter capacity planning levels must be included in Appendix 10: Supporting Information and Documentation. This may include, as applicable, worksheets from the Manure Storage Winter Capacity Planning Level Determination Spreadsheet for Sloped Waste Storage Facilities.

The plan must include separate Nutrient Management Plan Summary and Nutrient Management Plan Summary Notes tables for each individual crop year included in the plan. The crop year is entered in the Nutrient Management Plan Summary.

A crop year is typically understood as the growing season when the crop is harvested. However, for manure management planning purposes, the manure and nutrient planning year actually begins following the harvest of the previous crop. Therefore, plan implementation for a specific crop year actually begins in the late summer/fall timeframe. Based on this understanding, crop years in Act 38 nutrient management plans are understood to begin on October 1.

Under Act 38, nutrient management plans can cover three crop years. Two approaches can be used to address the multiple crop years in a single plan.

- One option is to plan for one crop year in the initial nutrient management plan. Updates for subsequent crop years would be submitted and acknowledged annually prior to the beginning of the next crop year. The updates may use the soil and manure analysis results from the first crop year plan or update each annual submission using the most recent soil and manure analysis results. See NMP Submission: Required Appendices and Supplemental Information for guidance on what is to be included in these annual updates. Plan updates must be submitted, but are not considered plan amendments, and therefore do not require approval. See Section VI: Plan Amendments and Transfers for more information on plan amendments.
- Another option is to submit three sets of annual plans for each of the three crop years in the nutrient management plan time-frame. See NMP Submission: Required Appendices and Supplemental Information for guidance on what is to be included in these three-year plan submissions.

The plan must be approved before any manure is applied or transferred (exported), for the crop years identified in the plan. If the plan is not approved manure may not be applied or transferred (exported) until plan approval**. Any manure applications or manure transfers (exports) made during a crop year, when there is not an approved plan, are not in compliance with the law.** In layman's terms **"**no manure application or export without a plan" is the bottom line. It is very important to remember that the review and approval process can take up to 180 days, so we cannot stress more the need to plan ahead so that the NMP is submitted in time to be approved before manure is planned to be applied or transferred (exported).

For CAOs and VAOs the plan should be submitted at a minimum 4-5 months prior to the planned 1st manure application or manure transfer (export), to give time for the plan review and approval process. For those CAOs and VAOs that plan fall manure application, the plan should be submitted 4-5 months prior to application, so plan submission should be before May/June. For those CAOs and VAOs that do not plan fall manure application, the plan should be submitted 4-5 months prior to spring application, so plan submission should be before October/ November.

For CAFOs, the NMP must be approved before the beginning of the crop year (October 1), to remain in compliance with the CAFO National Pollutant Discharge Elimination System (NPDES) permit. CAFO NMPs should be submitted at a minimum 5-6 months before the start of the crop year the plan is to cover, as to allow time for public noticing and the plan review and approval process.

For animal operations which fail to submit plans or plan amendments prior to applying, exporting or utilizing manure in a current crop year, they are to be considered out of compliance with Act 38 requirements.

Delegated Conservation Districts shall follow the compliance strategy outlined in Chapter 4 of the Nutrient and Manure Management Administrative Manual for these operations.

For operators to gain compliance they will be required to submit two NMPs. The first (1st) NMP will cover the current crop year and be a single year plan. The second (2nd) NMP will cover the next three crop years (or a single crop year if that is how the operator plans). Both the current crop year plan (1st plan identified above) and the future three-year plan (2nd plan identified above) should be submitted at the same time so these plans can be reviewed simultaneously.

Delegated conservation districts will review the current crop year plan (1st NMP identified above) to meet Act 38 requirements and will acknowledge this plan when it meets the Act 38 standards, since manure has already been applied, exported or utilize on the operation. Delegated conservation districts, once confirmed that the 1st plan meets the standards will send out the standard form letter in Appendix 6 of the Administrative Manual for this acknowledgement.

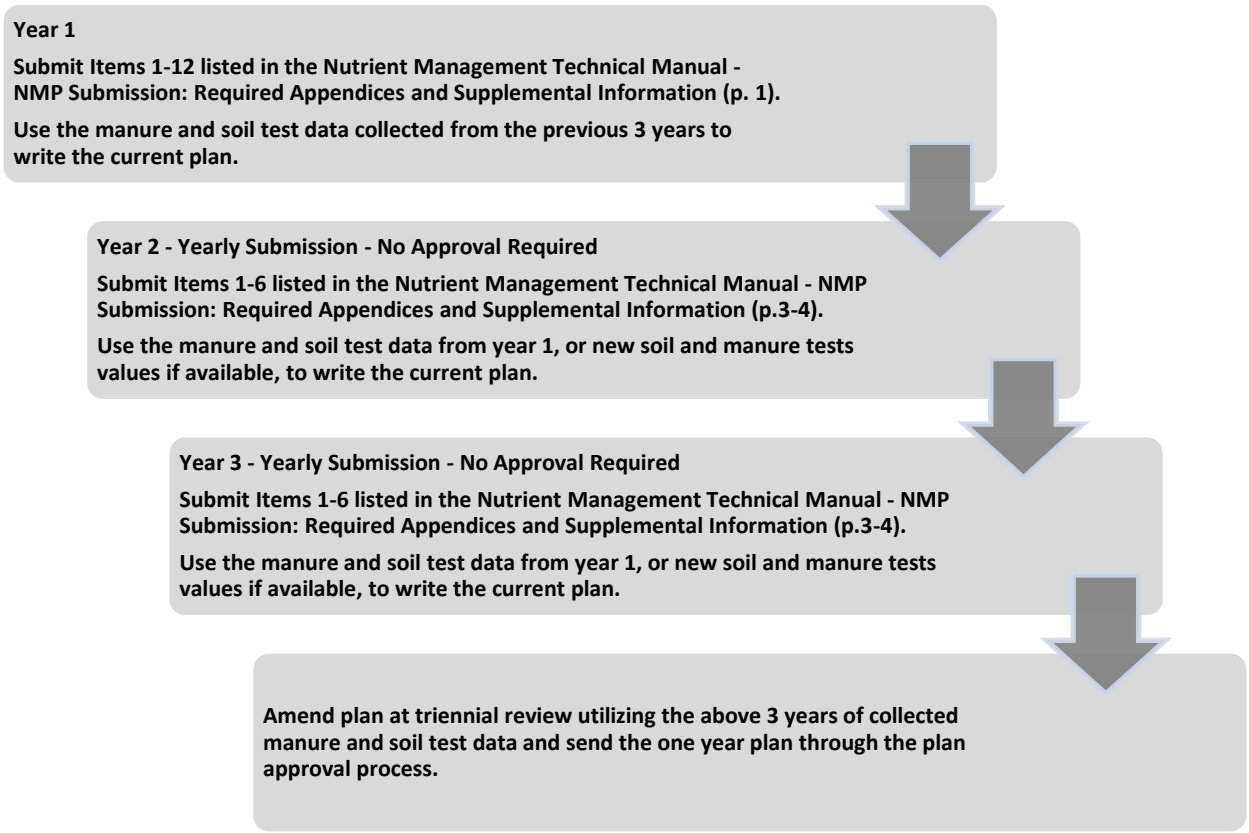
Delegated conservation districts will review the future three-year crop plan (2nd NMP identified above), as they would any new NMP or NMP amendments.

All **NMP yearly submissions** must include all of the following materials:

1. Cover Page
2. Nutrient Management Plan Summary
3. Nutrient Management Plan Summary Notes (along with the Manure Rate Calibration table)
4. Appendix 3: Manure Group Information (only the first page is required, addressing each of the manure groups used in the plan, if no changes in the manure group are expected)
5. Appendix 4: Crop and Manure Management Information
6. Appendix 5: Phosphorus Index

The yearly submissions must be submitted, but do not require conservation district board or SCC formal approval unless an NMP amendment is required. District and SCC staff may provide a cursory review of the yearly submission if their resources permit, to ensure the yearly submission is complete and accurate, prior to filing the yearly submission in the operator's Act 38 plan file. When the yearly submission is accepted to be included in the operator's Act 38 plan file, the district or SCC should send the standardized plan update acknowledgement letter to the operator (and copy the planner) indicating that the yearly submission has been accepted and that it is valid until the end date identified in the letter. See Section VI: Plan Amendments and Transfers for additional information about NMP amendments.

Below is a flow chart that assists in explaining the yearly submission option:



A second option (3 year plans) is to submit all elements (1-12 as outlined above) along with additional:

1. Nutrient Management Plan Summary chart
2. Nutrient Management Plan Summary Notes (along with the Manure Rate Calibration table) for each of the three crop years covered under the NMP with the initial NMP submission
3. Appendix 3s (only the first page is required, addressing each of the manure groups used in the plan, if no changes in the manure group are expected)
4. Appendix 4s
5. Appendix 5s

At the end of the triennial planning period, formal plan amendments will need to be submitted. For scenario 1 listed above, yearly submissions, the triennial review is to incorporate all the yearly submissions, as well as any new information and new soil and manure test values. For scenario 2 listed above, three year plans, the plan amendment is to incorporate all changes that have occurred including new soil and manure test values.

Below is a flow chart that assists in explaining the 3-year plan option:

All 3 parts are submitted simultaneously
Part 1 covers year 1 of the 3-year plan
Part 2 covers year 2 of the 3-year plan
Part 3 covers year 3 of the 3-year plan
Part 1
Submit Items 1-12 listed in the Nutrient Management Technical Manual - NMP Submission: Required Appendices and Supplemental Information (p. 1).

Part 2 and Part 3
Submit Items 2-6 listed in the Nutrient Management Technical Manual - NMP Submission: Required Appendices and Supplemental Information (p.2).

Use the manure and soil test data collected from the previous 3 years to write the current plan.

↓

Amend plan at triennial review incorporating the above 3 years of collected manure and soil test data and send through the plan approval process.

It is possible that some plans will not need formal amendments at the triennial review but is probably only relevant to total manure export plans, especially those using a broker.

All formal plan amendments are required to submit all the information that is listed above in the Nutrient Management Plan Submission Requirements section.

The NMP provided to the farmer must include all of the NMP requirements (items 1-12) described above. The following plan elements must be provided to the farmer in a separate ***Farmer Packet*** so the farmer can focus their attention on those plan elements most relevant to his day-to-day activities:

1. Cover Page
2. NMP Summary (including the NMP summary application chart, summary notes, manure rate calibration table, and the farm management map)
3. Appendix 1: Nutrient Management Plan Agreement and Responsibilities
4. Appendix 8: Importer/Broker Agreements and NBSs

Only **new plans and plan amendments** developed using the standardized Act 38 Nutrient Management Plan Spreadsheet (Excel and Word) program, will be accepted for review and approval under the Act 38 program.

Even though particular farms may be operated where one or more of the above appendices are not relevant, all of the appendices for an Act 38 plan must be submitted. For these situations where a particular appendix is not relevant, the non-relevant appendix must be submitted with the plan along some indication (either on the appendix

cover page or in the beginning of the appendix) informing the reader that the given appendix is not relevant to this operation.

For example, a farm that has no acreage included in the plan (such as a total export broiler operation where the owned fields are rented out to another farmer and no manure from the broiler operation is applied on these rented out lands) the Nutrient Management Plan Summary, Nutrient Management Plan Summary Notes, Appendices 4, 5 and 7 and possibly Appendix 10 would not be necessary. These non-relevant appendices would have an entry (preferably on the cover page or alternatively on the first line of the appropriate appendix) that would read; "This appendix is not relevant to this farm situation since no cropped fields are included in the plan." If a farm situation is such that any given required section of the plan (as outlined above) is not necessary, it is not acceptable to leave that section blank or to leave it out of the submitted plan. It is required to submit either the section cover page or the section cover page and first page, with an indication that the information in that section is not relevant for this plan.

The standardized Act 38 plan development computer spreadsheet program defaults to the basic required elements of an Act 38 nutrient management plan.

In addition to the above listed required plan components and appendices, certain farm management practices may require the completion and submission of supplemental plan information. Completion of additional plan components is required for the following farm management scenarios. These additional plan components must be included with the initial plan submission.

- Farms that **apply manure in the winter**: Include the Winter Manure Application Matrix in Appendix 10: Supporting Information and Documentation of the plan. A sample copy of the matrix is provided in Supplement 10: Winter Manure Application Matrix, and is provided in a computer spreadsheet format on the Nutrient Management Program website.

- Farms proposing to **build a storage within the property line setback area**: Include a completed neighbor waiver form as part of Appendix 10: Supporting Information and Documentation of the plan. A sample neighbor waiver form is provided in Supplement 16: Sample Manure Storage Setback Waiver.

- Farms proposing to **build a storage within the stream, sinkhole or active water well setback area**: Include a completed waiver request form, or a letter from the conservation district or SCC approving the setback waiver, as part of Appendix 10: Supporting Information and Documentation of the plan. A sample waiver request form is provided in Supplement 15: Waiver Request for Manure Storage Setback Requirements. The plan cannot be approved until the manure storage setback waiver is approved (these actions, acting on the waiver and the plan, can take place at the same board meeting).

Concentrated Animal Feeding Operation (CAFO) Nutrient Management Plans (NMP) or plan amendment submissions should be submitted by the plan writer to both the

Pennsylvania Department of Environmental Protection (DEP) regional office and to the Act 38 reviewing agency (either the conservation district or SCC) for review and action under the Act 38 program. The plan writer should initially submit the NMP or plan amendment to the conservation district (or SCC) for administrative review. Once the planner is informed that the NMP is administratively complete, the planner should then send a copy of the administratively complete NMP to the DEP regional office for their concurrent review. DEP accepts these NMP submissions in electronic format. DEP may communicate any comments regarding the CAFO NMPs to the reviewing entity (generally the conservation district or alternatively to the SCC) within the 30-day comment period afforded by the PA Bulletin Public Notice (see below). DEP comments will be included with the district review comments to the plan writer. As a result, the plan writer only has one person to work with for review comments. If the district does not receive comments, or a request for additional days to submit comments, from DEP during the 30-day PA Bulletin review period, the CD will assume DEP has no comments on the administratively complete NMP.

CAFO NMPs submitted for review are required to be noticed in the PA Bulletin prior to action by the Conservation District Board (or SCC). The conservation district or Commission is not permitted to act on this NMP or plan amendment until at least 30 days have elapsed since the date when receipt of the plan or plan amendment was published in the PA Bulletin. Once the PA Bulletin notice is submitted to DEP for publication, DEP will inform the district of the anticipated PA Bulletin publish date, which in turn the CD will notify the plan writer.

If a plan writer withdraws a CAFO NMP prior to action by the Conservation District Board (or SCC) when the NMP is resubmitted, it will be treated as a new NMP submission (administratively completeness, etc.) and must be re-published in the PA Bulletin.

If a plan writer makes significant changes to the CAFO NMP, due to comments received by the plan reviewer, then the CAFO NMP should be re-published in the PA Bulletin for another 30 day comment window, before plan action can occur. Example of significant changes may include such items as the number of AEU's increasing by more than 10% or the operation not being described correctly in the initial PA Bulletin publication. Additionally, if there is significant public interest in the NMP the final form of the NMP should be advertised in the Pa Bulletin for an additional 30 days.

If at any time, there is a question about whether to re-publish a NMP, please reach out to the SCC Regional Coordinator to discuss and for a final determination. The SCC Regional Coordinator may also discuss with legal counsel.

The Act 38 program does accept electronic submissions of certain sections of initial Act 38 nutrient management plan and plan amendment submissions developed using the standardized Act 38 computer spreadsheet (Excel and Word) program. It should be noted that when the plan or plan amendment is determined to be in its final form for board action, a hard copy of the entire plan, and all plan maps, will need to be provided

to the district or Commission for formal action. The electronic submission allowance is only for the initial submissions of certain sections of new plans or plan amendments and any follow up plan correction submissions, and these electronic submissions need to be followed up with a hard copy once the plan or plan amendment is determined by the reviewer to be ready for final action. This allowance is not provided for the submission of yearly submissions to the conservation district, for filing in the farmer's approved plan file.

Electronic submission of an Act 38 nutrient management plan is only relevant to the following plan sections:

- Appendices 3, 4, 5, 6, 7, 8, 9, and 10
- Winter Manure Application Matrix (if developed using the Act 38 program winter matrix spreadsheet)
- Signed exporter agreements
- Nutrient Balance Sheets (if developed using the Act 38 program nutrient balance sheet spreadsheet)

The parts of the plan submission that **must always be submitted in hard copy** include:

- Cover Page
- Plan Summary (including the Farm Management Maps)
- Appendix 1: Nutrient Management Plan Agreement and Responsibilities
- Appendix 2: Operation Information
- Any relevant approved manure storage setback waivers or waiver request forms

Appendix 1: Nutrient Management Plan Agreement and Responsibilities is where the farmer and planner sign the plan. These signatures are required with the initial plan or plan amendment submission in order to consider the plan to be administratively complete. If there are significant changes made during the review process that affect the rates, timing or method of nutrient applications or the BMPs to be installed on the operation, new signatures by the farmer and the planner on Appendix 1: Nutrient Management Plan Agreement and Responsibilities will be required for SCC or district approval of the plan or plan amendment.

The planner is required to review the plan with the farmer (focusing on the Nutrient Management Plan Summary, Appendix 1: Nutrient Management Plan Agreement and Responsibilities, and Appendix 8: Importer/Broker Agreements and NBSs) prior to submission to ensure that the farmer understands and agrees with the obligations outlined in the plan. The farmer's signature on the plan is his acknowledgement that he will follow the plan, and he cannot make that statement until he understands what the plan is requiring.

Section I
Identification of CAOs

The Nutrient Management Act requires all Concentrated Animal Operations (CAOs) to develop, submit, and implement a nutrient management plan meeting the requirements of the Act and the regulations. **A "Concentrated Animal Operation" (CAO) is defined as an agricultural operation that meets both of the following criteria: 1) contains 8.00 or more Animal Equivalent Units, AND 2) has an animal density in excess of two (2.00) animal equivalent units (or 2,000 lbs.), on an annualized basis, per acre of land suitable for manure application.** It should be noted that this definition was changed significantly in 2006, by adding the "8.00 or more AEUs" portion of the determination and non-production livestock, such as boarding horses, to the animal density calculation. There has been much work to define what is meant by this definition, and this work is detailed in this section. The following topics are included under this section.

1. Conservation district assistance with the CAO calculation
2. The CAO calculation
3. Example calculation
4. Appendix 10 CAO Calculation Worksheet

Conservation district assistance with the CAO calculation.
Delegated conservation districts have the **responsibility to assist** with these calculations (other agencies and individuals may also assist) when requested.

What is required of commercial Nutrient Management Specialist (NMS) to submit to delegated CDs /SCC to prove an operation is not a CAO?
From time to time, a CD/DEP/SCC may identify an operation as a suspected CAO and will require a certified commercial NMS to perform an official CAO calculation that will be submitted, reviewed, and approved by either the delegated CD or the SCC.

In these cases, the commercial NMS shall submit the following documents:

1. CAO calculation (similar in format to PSU Agronomy Facts 54).
2. Maps, meeting Act 38 mapping requirements, to show acres available for manure application.

If questions arise in the review of the submitted documents that CD or SCC may ask for additional clarifying information such as lease agreements, affidavits, etc.

What is required of commercial Nutrient Management Specialist (NMS) to submit to delegated CDs /SCC to prove an existing CAO is no longer a CAO and wishes to withdrawal from the program?
If a CAO or CAFO reduces animal numbers or increases acres, so they are no longer considered a CAO or CAFO they must hire a certified commercial NMS to prepare a new CAO calculation that shows they are no longer a CAO or CAFO.

1. This new CAO calculation will be reviewed, verified, and acknowledged by the delegated CD or the SCC

i. Verification could include review of lease agreements or require the operator to provide written verification of a “hand shake” agreement.

2. The delegated CD or SCC will acknowledge in writing if the new CAO calculation is accepted or not and if the operation is now considered a VAO.
3. Once recognized as a VAO, the operation is now eligible to follow the VAO withdraw guidance provided in the Nutrient Management Program Technical Manual, Section VI Plan Amendments and Transfers, for additional details.

The CAO Calculation

The **equation to calculate the animal density of an operation, for the purpose of determining CAO status, takes into account** the number of animals, the weight of the animals, the amount of time during the year that the animals are located on the operation, and the number of acres to be used for manure application. The generic equation and detailed description below lay out the steps to be followed to complete this calculation.

In general, the equation for calculating the animal density of an operation for the purpose of determining the CAO status of an operation is as follows:

the number of animal equivalent units ÷ the number of acres

The total AEU figure for the operation, necessary to determine if the operation meets the “at least 8 AEUs” portion of the CAO determination, is calculated during the process of determining the animal density of the operation. In determining the number of animals to use, the weight of those animals, and the number of acres to include, the program has developed some guidelines to follow to assure consistency in completing this equation. These issues are described below within the detailed description of the equation.

The ‘Standard Animal Weights’ table (Supplement 5 of this manual) provides the necessary “book value” animal weights information that may be needed to complete the CAO calculation described below. A discussion on the use of actual animal weights versus standard animal weights is provided below under *Step 1, (b) Weight per animal*.

Fact sheet 54 entitled “*Agronomy Facts 54: Pennsylvania’s Nutrient Management Act (Act 38): Who Is Affected?*” provides helpful information and examples related to the topic of calculating animal density for the purposes of determining Act 38 regulatory status.

Detailed description of the AEU and AEU per Acre (CAO) calculation

"AEU and AEU per Acre" CAO status calculation

Step 1 (calculate AEUs for each animal type and for the operation)

no. of animals **X** weight per animal **X** no. of days on the operation ÷ 365 (days/yr.)) ÷ 1,000 (lbs./AEU) **=**

(a) *(b)* *(c)* *(d)* *(e)*

AEUs

(f)

Step 2 (calculate the total AEUs for the operation)

AEUs for animal group 1 + AEUs for animal group 2 + AEUs for animal group 3 + etc. =

(f) *(f)* *(f)* *(f)*

total AEUs for the operation

(g)

Step 3 (calculate the AEUs per acre)

total AEUs for the operation ÷ acres suitable for manure application **= *AEUs per acre***

(g) *(h)* *(i)*

Step 1. Calculate AEUs for each animal type and for the operation:

(a) **Number of animals** = the average number of animals of a particular animal type, on a typical production day *(Information is obtained from the operator)*.

Act 38 requires nutrient management plans on larger scale agricultural operations with a high density of livestock per acre. These basic elements of the law have directed the Commission to develop a program that regulates the agricultural community in the management of all livestock animals. For this reason **the CAO status determination is to include all livestock on the operation including animals raised and/or maintained for generating income, food, fiber, work, recreation or transportation**. This determination would not include a family's companion animals such as the family dog(s), cat(s) (including barn cats), etc. This calculation would include all horses, donkeys, lamas, and other animals raised on the operation that would be considered livestock and would not be considered a family's companion animal(s). .

Dogs being raised, maintained or produced in commercial dog kennels (such as boarding kennels, rescue and adoption facilities, and breeders) are not considered livestock in Pennsylvania and therefore are not addressed as livestock within the Act 38 program. The handling of the manure generated at these commercial dog facilities is overseen by the DEP regional office under their residual waste regulations. When dealing with nutrient management issues on operations containing a commercial dog kennel, the DEP regional office must be contacted in order to determine how to address the handling of the manure coming from the dogs.

It should be noted that not only are all livestock now considered in the CAO determination, but all livestock on the operation are to be included in all elements of the plan to ensure that the manure they generate is handled appropriately.

See Appendix 3 (Manure Group Information) (Small Quantities of Manure) for more information on allocating the manure from these "small animal groups"

(b) **Weight per animal** = estimated weight of the animal *(refer to Supplement 5 , "Standard Animal Weight Table" of this manual or use documented weights averaged over the production cycle).*

The **operator may use weights other than those listed in** Supplement 5 (the "Standard Animal Weight Table") in determining if his/her operation is a CAO. These non-standard weights must be justified. There may be circumstances where non-standard weights need to be used because of non-standard animals or production cycles used on the operation. For the purposes of this program, justification for non-standard animal weights shall be documented (and furnished upon request to the Commission or delegated district) by the operator in writing. For existing operations, non-standard weights is to be based on past weights of the animals and for proposed operations, non-standard weights are to be based on the animal weights of an identical operation. A statement justifying the need for use of non-standard animal weights, along with the summarized data and calculation that was used for determining these non-standard weights, are to be included in Appendix 10 of the nutrient management plan when non-standard weights are used. Where there is no data to support the non-standard weights, generally the standard weights in Supplement 5 of this manual shall be used.

There is no specific requirement that animals must be weighed by a representative of the program. The farmer using non-standard weights in their plan must maintain on site, the documentation or data used for determining the non-standard weights in the plan. The preferred method of documenting these non-standard weights is to **maintain on site copies of actual weight slips representing animals on the operation.** Because the CAO calculation will often utilize an average weight over a production cycle, a final market weight may not directly provide this information. An average of the weight at the start and finish of the production cycle would then be used.

For those **animal types not included in Supplement 5 (the "*Standard Animal Weights Table*") of this manual**, the average animal weight for the particular operation shall be used for this calculation, taking into account, if applicable, the range of animal weights throughout the production cycle of the animal.

(c) **Number of days on the operation =** the actual number of days out of 365 that these animals are on the operation *(information from operator)*

(d) **365 (days in a year)** = conversion factor to put calculation into a yearly basis *(constant)*

(e) **1,000 (lbs. per AEU) =** conversion factor to change total pounds into AEUs *(constant)*

(f) **AEUs =** the number of Animal Equivalent Units for the particular animal type *(calculated)*

Note: repeat this calculation for each animal group on the operation

Step 2. Calculate the total AEUs for the operation:

(g) **Total AEUs for the operation** = total animal equivalent units for the operation *(calculated, by adding together the AEUs for all the animal types on the operation to determine the total AEUs for the operation).* If an operation has less than a total of 8.00 AEUs based on this calculation, the CAO status determination is complete and the operation is not a CAO. But, if this calculation comes out to 8.00 or more total AEUs for the operation, then you need to continue on with the calculations below to determine animal density and therefore CAO status.

Step 3. Calculate the AEUs per acre:

(h) **Acres suitable for manure application =** acres of the operation suitable for manure application (determined using the criteria described below and information from the operator)

According to the regulations, acres that **can be included** in this calculation are:

- cropland, hayland, or pastureland (owned or rented) that is an integral part of the operation. Those areas that may not have mechanical manure application due to manure application setbacks, are included in the acres available calculation. The entire mapped CMU acres for cropland, hayland, or pastureland should be included.
- land that is or will be used for the application of manure from the operation

Acres that **cannot be included** in the AEU per acre calculation are.

- farmstead and forestland

Lands to be counted in the AEU/acre calculation are those **lands under management control** of the operator **where manure is or will be applied** under the normal cropping sequence of the operation. Management control generally includes the authority to determine what crops are grown and what nutrients are to be applied. In addition, management control generally relates to those situations where the operator or a person working for the operator is doing the actual farming practices on the land. This includes all owned lands (that are not rented out to another farmer) under the management control of the operator and all rented acres where manure from this operation will be applied to meet crop needs sometime during the normal cropping system. If an operator has rented his owned land to another operator those lands are generally not considered under the owner's management control for the purpose of the CAO calculation. It should be noted that

Commission does not require a written rental agreement for rented land, but the operator must be willing to sign a form indicating the amount of rented lands that the operator is managing or in some other way document their control of this land if the Commission would require such documentation.

Only one operator may count the acres of any given field for the purpose of the CAO calculation. For example, where the landowner of a given field rents that field out to a tenant farmer, the landowner in this case cannot count the acres of that field in his/her CAO calculation. The renter of the field may be able to count these acres (based on whether or not he applies manure to this site) because these acres are considered under his management control for the purposes of the CAO calculation.

(i) ***AEUs per acre*** = This is the final AEU per acre figure used to determine if the particular operation is a CAO or not *(calculated)*. A CAO is an operation having at least 8.00 AEUs, **and** where the animal density of the operation exceeds two (2.00) AEUs per acre on an annualized basis.

- For the purposes of determining if a particular operation is a CAO or not, the AEU/acre calculation **may be rounded off to the nearest 100th** of an AEU/acre. Two examples are:

  1.638 AEUs/acre would equal 1.64
  1.9523 AEUs/acre would equal 1.95

For operations that have no acres to count in this determination (such as operations that rent out all their owned acres, or operations that just rent a barn but no acres), the AEU per acre calculation assumes 1 acre of land under their management control. So in the case where an operator has no land to include in this calculation, the AEU figure for the operation will match the AEU per acre figure. For example, a farmer raising 2,400 finishing hogs (calculated to be 320 AEUs) in a rented barn, and they do not rent any acres at the site or elsewhere for application of the manure, would be calculated to have an AEU per acre figure of 320 AEUs per acre.

3. Example Calculation

An example of this calculation is shown below and how this information is to be listed on the standard plan is **shown in the sample nutrient management plan** (Supplement 2).

Example Farm Data:

Animal Inventory 110 Holstein dairy cows @ 1,450-lb.
35 Holstein heifers @ 1,000-lb. average weight
20 Holstein calves @ 425-lb. average weight
15,000 large broilers @ 3.55-lb. average weight

(Average weights taken from Supplement 5)

Production Period Cows, heifers, and calves = 365 days per year
Broilers = 5 flocks for 57 days each, or 285 days per year

Land Inventory Farmstead = 5 acres; Woodland = 3 acres; Pasture = 4 acres; Cropland, home farm = 60 acres; Cropland, rented farm = 36 acres

Using this example data and the worksheet, the calculation of animal density (AEUs per acre) for this farm would be as follows:

Animal Type	No. Animals	x Animal Weight (lbs.)	x Prod. Days	÷ Factor =	AEU
Dairy	110	x 1,450	x 365	÷ 365,000 =	159.5
Heifers	35	x 1,000	x 365	÷ 365,000 =	35
Calves	20	x 425	x 365	÷ 365,000 =	8.5
Broilers	15,000	x 3.55	x 285	÷ 365,000 =	41.58
Total* =					**244.08**
Acres available for manure**				÷ 100	
AEUs/acre				**= 2.44**	

* If this figure is less than 8, then the farm would not be a CAO, regardless of the AEU/acre figure calculated below.
** Includes only cropland, hayland, and pastures; for this example, there are 96 acres of cropland/hayland and 4 acres of pasture.

Cover Page

This page of the plan is to be provided consistent with the format provided in the Act 38 standard plan. The cover page is to be no longer than one page in length and can include additional company related logos or symbols in order to indicate to the farmer the company used to develop the plan.

The standard plan format wording outlining the required information on the cover page is not to be included with the completed cover page. For example, the Operator Name states "John and Missy Brown" and does not state "Operator's Name: John and Missy Brown". The dates area should include what that date relates to, such as "Administratively Complete Date": June 29, 2016".

<u>For Crop Year(s)</u>
The cover page will indicate what Crop Year(s) the plan is written to cover (such as: "2017 – 2019" or "2017". Specific guidance on crop years is provided in the NMP Submission section of this manual.

<u>Operator's Name, Address and Telephone Number</u>
The cover page will include the following:

- Operator's Name
    - The operator's name for a family run farm is to include both the husband and wife, if the wife is part owner of the business.
    - The farm name can and should be included in this part of the plan, but also the main contact person's contact information should immediately follow the farm name (such as: "Happy Acres Farm; Bob and Brenda Smith
    - If the operation is a CAFO and the CAFO operation has a name, that CAFO name should be included here.
- Operations Physical Address
- Operators Mailing Address, if different from physical address
- Telephone Number.
    - The phone number should be whatever number is most appropriate for contacting the operator if program staff would need to contact the operator for setting up farm visits or the like.

<u>Planner's Name, Certification Number, Address and Telephone Number</u>
The cover page will include the Nutrient Management Specialist's Name, Address and Telephone Number as well as the PDA Nutrient Management Specialist Program Certification Number for the planning specialist.

<u>Date of Administrative Complete Plan Submission</u>
The "dates" part of the cover page is important to help ensure that the plan is kept current as required through the regulations. The Administrative Complete Date of Plan Submission date is to be completed by the conservation district or Commission staff reviewing the nutrient management plan and would refer to the date the administratively

complete plan was officially received in the district or Commission office for review. Therefore, the planner should leave this date blank when submitting a plan or plan amendment for review. This date would not change when the plan submission is revised during the review process to address technical comments provided by the plan reviewer.

It should be noted that a plan amendment would have a new cover page submitted with the amendment, and an Administrative Complete Date of Plan Submission date would be used indicating when the administratively complete plan amendment was submitted. Also note that this plan submission date would change if the plan was officially withdrawn during the review process. In the case where a plan is officially withdrawn, a new Administrative Complete Date of Plan Submission date would be filled-in by the reviewing entity indicating when the administratively complete plan resubmission was received. In summary, this line addresses initial plan submissions and would also be completed for plan amendments. The submission dates for plan updates are handled in a separate line, as explained below.

The administrative completeness letter sent to the farmer (and copied to the planner) indicating that the submitted plan or plan amendment was determined to be administratively complete and a technical review will now begin, should indicate the date the district received the administratively complete plan (which would be the same date entered onto the Administrative Complete Date of Plan Submission line on the cover page).

Date of Plan Approval

The Date of Plan Approval line is to be completed by the Conservation District or Commission staff reviewing the nutrient management plan and would refer to the date that the plan was approved by either the Conservation District Board of Directors or the State Conservation Commission. The planner should leave this date blank when submitting a plan or plan amendment for review.

Date(s) of Plan Update Submissions

The Date(s) of Plan Update Submissions (not requiring board action) would be completed by the conservation district or Commission staff receiving the nutrient management plan updates indicting when the plan update was received in the district or SCC office. The cover page (which would include the original plan submission date) would be submitted by the planner with the plan updates date blank for completion by the conservation district or Commission staff.

Nutrient Management Plan Summary

The Nutrient Management Plan Summary is comprised of five components:

- Nutrient Management Plan Summary
- Nutrient Management Plan Whole Farm Notes
- Nutrient Management Plan Summary Notes
- Additional Nutrient Management Plan Requirements
- Operator Management Map

The purpose of this section is to summarize for the farmer all that is required to implement the nutrient management plan for this operation. The information generated by the planning process, such as manure and crop information, manure and storm water management evaluations, and excess manure provisions, is summarized succinctly in the Nutrient Management Plan Summary. More detail is provided in the various appendices but everything required to be implemented is summarized here to assist the farmer in easily identifying the plan requirements.

The planner is required to review the contents of each section of the Nutrient Management Plan Summary with the farmer prior to submission of the plan for review. "Agronomy Facts 76: Nutrient Management to Improve Nitrogen Use Efficiency and Reduce Environmental Losses" is an excellent educational resource to help farmers understand and evaluate how to effectively implement their nutrient management plan.

Nutrient Management Plan Summary

The plan shall include a summary of the application rates by field or crop management unit for all nutrient sources applied to meet crop nutrient needs for all fields on the entire operation (owned and rented acres). The farmer should be able to tack this portion of the plan up on the wall of the barn or carry it in the tractor cab. Using this information alone, the farmer should be able to direct manure and other nutrient applications to each field.

The plan must include separate Nutrient Management Plan Summary and Nutrient Management Plan Summary Notes tables for each individual crop year included in the plan. Each set of NMP tables must identify the specific crop year the plan information addresses. Specific guidance on crop years is provided in the NMP Submission section of this manual. The development of one summary covering a number of crop years is not a valid submission unless there are explanatory circumstances on the farm in which fields are not expected to change from year to year (such as a farm that is comprised of all pasture or hayland throughout the plan's lifespan, etc.).

Also, the development of a plan which provides a plan summary covering all cropping options for each field on one summary is not a valid submission unless there are explanatory circumstances with the farm, and the Commission has specifically approved this planning approach for the farm. The plan summary is expected to document the farmer's decisions on what specifically is planned to be done on each individual CMU/Field during that specific crop year.

The NMP Summary chart columns for pasture fields are filled in the same manner as crop fields except for the "Planned Manure Rate" column. Instead of an actual application rate a note is inserted to direct the farmer to the NMP Summary Notes which must include the management practices and information which was used to calculate the amount of uncollected manure in that pasture. The required pasture notes information is outlined below.

The sample nutrient management plan in Supplement 2: Sample Nutrient Management Plan illustrates how this section of the plan should look when completed appropriately.

Operation Acres / Animal Equivalent Units / Animal Equivalent Units per Acre
Please refer to Appendix 2 (Operational Information) for a detailed discussion on Operation Acres / Animal Equivalent Units (AEUs) / Animal Equivalent Units per Acre (AEU/Ac)

Nutrient Management Plan Whole Farm Notes
At the top of the Nutrient Management Plan Summary, there is a place to include notes to the farmer that apply to the whole plan. These may be notes about global management changes or general information that the farmer needs to be aware of when he implements the plan. For example, if the starter fertilizer program was changed for all of the corn fields in the plan that could be included here as a Whole Farm Note.

The following standard notes are automatically included by the NMP Excel Spreadsheet in the "Whole Farm Note" box at the top of the NMP Summary chart:

1. "If manure runs out for any field, consult Appendix 4 of the plan for that field. The fertilizer required on any part of the field that does not receive manure can be determined from the 'Net Nutrients Required' for that field."

This standard Whole Farm Note details what the farmer should do when the manure from a manure group planned for a field or several fields runs out. The specific purpose is to provide instruction to the farmer on how to determine the amount of fertilizer required to meet that crop's nutrient needs.

2. *"*Fall manure applications require at least 25% cover unless the crop management unit is planted to a cover crop in time to allow for appropriate growth to control runoff until the next growing season, or the manure is injected or mechanically incorporated within 5 days using minimal soil disturbance techniques consistent with no-till farming practices."

This standard Whole Farm Note details the requirements for fall manure applications that require at least 25% cover. Section 83.294(f)(5) states "*Fields where manure will be applied in winter must have at least 25% residue, or an established cover crop. The BMPs contained in the Pennsylvania Technical Guide may be used to satisfy this requirement. Other practices shall be approved by the Commission"*

Nutrient Management Plan Summary Notes

This area of the summary is provided to help the farmer implement the plan on individual fields. Generally, (with two exceptions), there are no required elements to this section of the plan summary. Planners are encouraged to use the notes section to provide additional explanation or clarification to the farmer on specific aspects of the NMP Summary that may be confusing or unclear. Common examples are multiple applications, split applications, or the use of the PSNT or chlorophyll test. Other information, such as manure application setbacks may be helpful for the farmer to have noted here. This section is for the farmer, not others who may read the plan, and should focus on helping the farmer implement the nutrient management plan.

There are four scenarios where plan summary notes are required to be included in the plan.

The first scenario requiring plan summary notes is for pasture fields. For each of the pasture fields included in the plan, the planner must list the following in the NMP Summary Notes:

1. The animal group(s) using the pasture,
2. The number of animals in that group,
3. The grazing season(s),
4. The amount of hours/day animals are planned to spend on the pasture, and
5. Where the animals are fed and watered in scenarios where grazed animals have unrestricted access to both a barn and/or lot where manure is collected and a pasture.

The second scenario requiring plan summary notes is for winter application fields. For each of the fields in the plan that are to receive winter manure applications, the planner must note the following field conditions for the winter application of manure in the NMP Summary Notes:

1. 25% cover requirement
2. Whether or not the field will be allowed to be used if it is snow or ice covered
3. Additional setbacks proposed to be used for added water quality protection, etc.

Additional requirements for winter manure applications are outlined below.

The third scenario is for small quantities of manure. If manure from the small quantity manure group will be applied to cropland, a note for the crop management unit(s) receiving the manure must be included in the NMP summary notes.

The forth scenario requiring plan summary notes is for when the total combined manure application rate in Appendix 4 of the NMP Spreadsheet is above 9,000 gallons. A note must be included in the NMP Summary Notes indicating that the planned rate must be applied in separate applications (no more than 9,000 gallons per event) during the same application season with adequate drying time between the applications. In addition, the note must include the specific calibrated rates for each separate application.

Manure Spreader Settings to Meet Planned Manure Application Rates

The Nutrient Management Plan Summary includes a "Manure Spreader Calibration Notes" table. For each planned manure application rate listed in the nutrient management plan the equipment and settings used to obtain that calibrated rate must be recorded in the table. Calibrated and planned manure application rates for liquid manure should be rounded to the nearest 100 gallons. Solid manure rates less than 5 tons per acre should be rounded to tenths. Solid manure rates equal to or greater than 5 tons per acre should be rounded to whole numbers.

The "Manure Spreader Calibration Notes" table provides an accessible reference for the farmer or other applicators to use to find the appropriate equipment and settings used to achieve the various manure application rates included in the nutrient management plan.

The following data, recorded during the spreader calibration for each planned manure application rate included in Appendix 4: Crop and Manure Management Information is required to be included in the Nutrient Management Plan Summary: Manure Spreader Calibration Notes table:

- Planned manure application rate
- Manure spreader used
- Spreader settings
- Tractor used (if applicable)
- Tractor settings (speed, gear, rpm, pto, etc.)

If a farmer uses more than one piece of equipment to achieve a particular application rate a separate line is needed for each piece of equipment used to meet a particular application rate.

Following are two examples of completed Manure Rate Calibration tables, one using a tractor and one using horses

Example 1: Tractor Driven

Manure Application Rate	***Manure Spreader Used***	***Spreader Settings***	***Tractor Used (if applicable)***	***Tractor Settings (speed, gear, rpm, pto, etc.)***
7850 gallons	*Nuhn 6500*		*John Deere 8300*	*1.8 mph @ 1700 rpm*
18 tons	*Knight 8018 Pro-Twin*		*John Deere 8300*	*2.8 mph @ 1700 rpm*
10 tons	*Knight 8018 Pro-Twin*		*John Deere 8300*	*4.5 mph @ 1700 rpm*

Example 2: Horse Driven

Manure Application Rate	***Manure Spreader Used***	***Spreader Settings***	***Tractor Used (if applicable)***	***Tractor Settings (speed, gear, rpm, pto, etc.)***
4500 gallons	*Stoltzfus 800-gal tank*	*valve fully open*	*horse driven*	*5 horses*

Actual manure spreader calibration data is required to be included in the NMP.

If an operator uses a commercial applicator to apply their manure, the planner should indicate in the chart or plan notes that this plan element is not applicable (by indicating "*NA, commercial applicator used*") for the given plan. Planners should list the commercial applicators name and manure hauler/broker certification number.

If manure spreader calibration is impractical at the time of plan development due to situations such as the operation being new and there is no manure to use to calibrate their equipment, the planner should indicate in the chart that calibration of equipment will be completed as soon as manure is available.

If manure spreader calibration is impractical at the time of plan development due to the operator renting application equipment, and not receiving the same equipment year after year, the equipment still needs to be calibrated and records of those calibrations should be maintained with the manure application records.

Winter Manure Application Season Requirements

The 'Nutrient Management Plan Summary' chart (under the "Application Season" column) indicates whether or not specific fields or crop groups are proposed to have manure applied to them in the winter. Winter is defined as a time when <u>any **one**</u> of the following conditions exists:

1. the date is on or between December 15 and February 28, **or**
2. the ground is frozen at least 4 inches, **or**
3. the ground is snow covered

All fields identified for winter manure application must be assessed using the most recent version of the Winter Manure Application Matrix (Supplement 10). A completed Winter Manure Application Matrix assessment, addressing each field proposed for winter application, must be submitted for review for any nutrient management plan that includes fields proposed for winter manure application. Along with the winter matrix, the P-Index will need to be submitted addressing winter manure application for any fields proposed for this practice. Lastly, the additional winter application setbacks will also need to be assessed for these fields.

This Winter Manure Application Matrix is a guidance tool developed to highlight the field characteristics that are most relevant for assessing a field for potential manure runoff during the winter season. The planner or reviewer may disagree with the results of the winter matrix based on specific understanding of how this particular farm site has, and is planned to be managed. Considerations that may affect whether or not the winter matrix can be fully relied on for assessing these fields can include:

- Ground cover at the time of application
- Whether the fields will be snow or ice covered at time of application
- Whether there are environmentally sensitive areas adjacent to the application fields
- If the farmer is using some unique on-farm management practices to further address winter runoff from the application fields.

For those situations where the results of this guidance tool are questioned due to additional site specific knowledge of the area, the results should be discussed with SCC staff to determine if the fields should be accepted for winter application or not.

Recognize that winter application of manure is generally not a preferred practice for addressing water quality, and therefore should only be considered for use where it is a necessary practice for operation of the farm, and where fields identified for winter manure application are situated in such a way as to minimize the potential for manure or nutrient runoff during the winter season.

On farms where winter manure application is a necessity, either planned or written as a contingency to the approved plan, these applications should be minimized as much as possible. This would include:

- Spreading only that amount of manure that is absolutely necessary to spread during the winter (such as not completely emptying the storage during the winter, but only drawing it down to a sufficient level to allow for storage of the manure through the remainder of winter). If the farm produces solid manure, winter application of this manure is easily avoided by stockpiling that manure during the winter, rather than applying the manure if fields and conditions are not fully suitable for this practice.
- Manure application on snow or ice provides for the highest level of risk for runoff of the applied manure and therefore should only be approved for unique situations that have a very low risk of runoff to a water body. If winter application is proposed, the plan, if possible, should indicate that application will only take place at times when the ground is neither snow nor ice covered. Following this direction will open more fields up to the possibility of winter application and can help minimize manure runoff in the winter season.
- When it is necessary to apply manure in the winter, the application fields should primarily be those with a “growing” crop (either cover crop or hay crop) in order to minimize runoff of manure nutrients with this practice. The regulations allow for winter application on approved fields that do not have a growing crop, but have significant crop residue (greater than 25%), but these fields relying solely on residue to hold manure in place will generally need to be of a lower slope and further separated from water conveyances, than fields with a growing crop.
- Significantly reducing the application rate for winter applied manure can help minimize manure runoff at these times of the year, and possibly allow for additional areas of the farm to be considered for winter application.

For additional information of how to assess fields for winter application and for recommendations of winter manure application field ratings, refer to Supplement 10: Winter Manure Application Matrix.

Plans that do not call for the winter application of manure, but due to unforeseen circumstances (such as problems spreading in the fall, or barn issues that generated a significantly higher volume of manure on a given year (such as water control problems)) this practice becomes necessary in a particular year, the plan can be amended by a certified planner to incorporate this practice for the given year. These plan amendments

should be developed and submitted to the reviewing agency prior to spreading in the winter (for situations that are not related to acute situations requiring immediate action). It should be noted that this would only be relevant to liquid manures, as solid manures can be stockpiled on the emergency stacking areas until winter is over.

For acute (unanticipated emergency) winter manure application prior notification to the reviewing agency is not required. Notification is required within 30 days of implementation. See Section VI: Plan Amendments and Transfers for guidance related to unforeseen circumstances.

Note: The Act 38 winter manure application requirements stay with the manure, independent of the final user's animal density classification (i.e. importers of Act 38 manure that plan to spread that manure in winter must develop a winter manure application matrix for each importer that plans winter applications). Importing operations should assess their fields for winter application using the same criteria that is used and explained above for CAO and/or CAFOs.

Manure Management and Stormwater BMP Implementation Summary
This chart is used to list the various stormwater and manure management BMPs required to be implemented on this operation, and when they are to be installed. The BMPs listed on this chart come from 1) the "BMPs to address Manure Management Problem Areas (Appendix 6)" and 2) the "BMPs to address Critical Runoff Problem Areas (Appendix 7)".

This chart lists the structural and management practices necessary to be implemented, and when they are to be implemented, on this farm to provide runoff controls in the farmstead and crop fields. The nutrient application procedures described in the plan (such as application rates and timing, etc.) are to be implemented as soon as the plan is approved and where the cropping sequence, available equipment and facilities allow.

This listing is not to include procedures that are already listed in the record keeping requirements under the plan. Required practices such as soil and manure testing are not to be listed in this section of the plan. Soil and manure testing are addressed in the record keeping requirements on the agreement and responsibilities page, and therefore they are not to be listed here. Conservation planning is a requirement addressed elsewhere in the program (under the review and approval element of the program) and therefore is not to be included here.

The implementation times listed on this chart need not be more specific than the season **(Spring:** April-May; **Summer:** June-August; **Fall:** September-November; or **Winter:** December-March) and year that the given practice is planned to be installed.

A farmer needs to recognize the importance of the need to install these practices and the time frame provided for installation. If a farmer is not able to install a practice by the approved time frame, he/she will need to contact the plan review authority (generally the conservation district) to discuss the requirement to revise the plan or install a different or interim practice.

The structural BMPs outlined in the plan are to be implemented within 3 years. Certain BMPs, such as very severe manure runoff problem areas (i.e. severe barnyard problems) may not be appropriate to be held off for three years, and should be scheduled sooner so that future pollution is minimized.

The BMP summary **does not need to give dimensions or exact locations** for the BMPs to be installed. The plan summary just needs to list the type of BMP to be installed (name of practice and NRCS practice code) and where the BMP is to be installed (field number or location in farmstead). The plan map is required to provide a pictorial location of where the planned BMPs are to be located (as well as existing BMPs).

For new construction on the agricultural operation, such as a new swine barn or broiler house, the chart should be utilized for such BMPs that are integral for the implementation of the NMP, such as manure storage, manure stacking, and/or mortality composting. The chart should also include those BMPs that would be needed to implement manure management and or control stormwater issues on the new site, such as upslope diversions, etc. BMPs that are installed as part of the construction, such as Chapter 102 (construction E&S), Chapter 105, or post stormwater construction, are not included in the BMP chart but should be shown on the operator's map, as they are integral to the operation.

In-Field Manure Stacking Procedures

For operations that plan to stack manure on crop fields for later application to that field, this area of the plan would outline the criteria under which this stacking will be allowed. Information in this section needs to be site specific of how this farmer will manage his in-field stacks of manure. Only describe what direction is needed for this particular farm, and recognize that the location issues will be addressed through the site selection on the map and do not need to be described here. This manual includes a guidance document (Supplement 17) which provides in-field manure stacking criteria for use when stacking manure on farms covered under the Act 38 program.

For <u>farms that will be field stacking manure</u>, this section of the plan would include a statement noting that field stacking of manure is planned to occur on locations as identified on the plan maps, and that the stacks will follow the appropriate shape, and timing of application. Example text could read:

> *"This operation will be field stacking manure on the locations identified on the plan maps. These stacks cannot be maintained on these crop fields for longer than 120 days without the stacks being covered with a watertight covering, [or the plan could read "stacks will be maintained on sites meeting the NRCS manure stacking pad standard"].*
>
> *Stacks will be shaped in a cone or windrow shape to best shed rainwater falling on the stacks.*

Stacks must be rotated every year, with a minimum 4-year rotation, to ensure that the stack is not located on the same footprint that it was on within the past 4 years."

For farms that will not be field stacking manure, this section will still need to be completed and could read:

"No in-field stacking of manure will take place on this operation."

Note: The Act 38 and/or CAFO in-field stacking requirements stay with the manure, independent of the final user's animal density classification.

Additional CAFO Requirements
This is the section of the plan where any additional CAFO program requirements would be listed. Those requirements may relate to:

- **Additional manure stacking requirements**. These additional requirements relate to shortening the time allowed for manure to be stacked uncovered on the CAFO's application fields. This would be worded as follows: "Manure may not be stacked in crop fields on this operation for greater than 14 days without covering the stack with an impermeable cover to keep rainwater from falling on the pile."
- Addressing the **Manure Storage Winter Capacity Planning Level** for the storage in the nutrient management plan: For CAFOs that will be storing their manure over the winter (liquids, semi-solids, and solids), useable space and capacity must be maintained in the manure storage to sufficiently manage manure over the winter. Documentation of useable space and winter storage capacity must be listed in the NMP and must account for multiple factors.

The specific factors that must be considered when determining the manure storage winter capacity planning level, as well as, supporting example calculations and conversions are referenced in the "Manure Storage Winter Capacity Planning Level Guidance" publication located on the Nutrient Management Program website at: http://extension.psu.edu/plants/nutrient-management/planning-resources/other-planning-resources/cafo-manure-storage-winter-capacity-planning-level-guidance

For a CAFO operation, the winter manure storage capacity planning level expressed in feet must be documented in the NMP Summary materials of the NMP Standard Format. Supporting information, calculations and references must be documented in Appendix 10 of the NMP Standard Format.

Technical questions regarding Manure Storage Winter Capacity Planning level questions can be directed to USDA-NRCS Nutrient Management Program staff. Contact information is located at https://extension.psu.edu/programs/nutrient-management/directory
Regulatory questions regarding Manure Storage Winter Capacity Planning level questions can be directed to PA DEP Nutrient Management Program staff. Contact information is located at http://extension.psu.edu/plants/nutrient-management/directory

Proposed Manure Storage Description
When construction of a new manure storage is proposed for the operation the following information must be listed here:

- Type of the proposed manure storage system such as above ground cylindrical concrete manure storage tank, under the barn concrete manure storage tank, or HDPE lined structure, etc.
- Dimensions of the proposed manure storage facility. If the facility is sloped sided; the top dimension and the bottom dimension, as well as the depth and the slope of the inside of the berm are to be listed.
- Calculated volume of the proposed manure storage facility such as 450,000 gallons, or 3,000 cubic feet, taking into account the appropriate freeboard for any liquid or semi-solid storage facility.
- Freeboard for the proposed facility such as 6" or 2', etc.

The location of the proposed facility must be shown on the farm map.

- If the location is within the setback distance, and a waiver is applicable for the operation, the waiver is to be approved prior to, or at the same time as the approval of the plan. If a waiver is not available or not able to be approved, the location will need to be changed to ensure that the storage is in compliance with setback requirements.

Please note that this is the location in the plan where any **proposed** manure storage facilities would be described. This is **not** where existing manure storage facilities are documented. Existing manure storage facilities are documented in Appendix 2 ("*Operation Information*"), under the topic "Manure Storages and Capacity".

Description of Planned Alternative Manure Technology Practices
If the operation is planning to implement alternative technologies to address manure management issues on the operation, this area of the plan is where those proposed practices would be listed.

Alternative manure technologies are those activities implemented by farmers to process raw manure in order to make it easier to transport and/or apply; as well as treatments that assist in segregating the nutrient content of the manure so that it will better address farm nutrient balance issues. Several alternatives include: composting, incineration, and solid/liquid manure separation (with and without binding agents).

For these situations, the plan would list what practice is planned, what volume of manure is to be processed annually with this practice, and the expected result of the implementation of the practice. Text for this section could read:

"The operation will be mechanically separating solids at the facility using a screw press system. All 1.2 million gallons of the manure coming from the dairy barn will be processed through this system. This process will remove a majority of the solids from the manure, taking the manure effluent coming out of the screw press down to 1% solids (99% liquid). This will also reduce the phosphorus in the dairy manure coming from the dairy barn, taking the manure content down from 13 lbs. per 1,000 gallons to

1.5 lbs. per 1,000 gallon (based on other operations using this system). The solids will be handled separately and exported off the operation to areas in need of phosphorus."

Exported Manure Summary

The exported manure portion of the plan summary shall include **a general description** of how the operator plans to use manure for other than agricultural land application on the operation. This portion of the summary is not intended to provide a high level of detail, but to give a general concept of how much, where, and when manure will be utilized in this manner.

Some examples of how this might look include:

1. If the farmer was planning to export 200 tons to neighbor Jones in the spring, 300 tons to neighbor Robinson in the fall, and 500 tons to neighbor Zimmerman in the summer for agricultural land use, the summary would say:

   "1,000 tons of manure will be exported to neighboring landowners various times throughout the year for agricultural land use."

2. If the farmer was planning to export 500 tons of manure to neighbor Mains for agricultural land use and 300 tons to Organo-King for bagging and use as a commercially sold fertilizer, the plan summary would say:

   "500 tons of manure will be exported to a neighboring landowner for agricultural land use and an additional 300 tons of manure will be exported to a commercial company to process for use as a commercially sold organic fertilizer."

This information is a **concise summary** of the information contained in Appendix 8 (*Importer/Broker Agreements & Nutrient Balance Sheets*), which generally shall contain all the necessary documentation related to manure exported from the operation.

For operations that will be implementing an unusual exporting procedure, such as relying on small quantity importers (as may be the case with horse operations exporting less than 25 tons of manure per year for any given importer), this section of the plan will provide a brief description of what is being proposed. These unusual situations are generally not detailed in Appendix 8 and therefore need to be described here for review and approval. See Appendix 8 for further detail on what needs to be documented in this section of the plan for farms that export small quantities of manure, or if manure is exported or used on site for other than agricultural land application.

For the case of the small quantity exporter, the wording required in this section of the plan could look something like the following:

"This operation will export its manure to neighboring land owners who will use it to fertilize their gardens or other small parcels. No individual importer will receive more than 25 tons of manure during any calendar year. I recognize that I need to keep manure exporting records documenting who took manure, the date they took it, and

how much they received. I also recognize that I will be required to maintain these records at my operation for at least three years."

"If an importer wishes to import more than 25 tons of manure during any calendar year, I recognize that I will be required to submit a signed agreement and Nutrient Balance Sheet(s) to address this importer taking more than 25 tons in a year's time, prior to the manure being exported to the importer."

Operator Management Map

There are three map types required in an Act 38 nutrient management plan. Those three types include 1) Topographic Map, 2) Soils Map, and 3) Operator Management Map. The Operator Management Map is to be included in the Nutrient Management Plan Summary section to provide easy reference for the farmer. This is the map that is considered to be the most valuable to the farmer on a day-to-day basis for the implementation of the approved nutrient management plan. It is highly recommended that Arial Photography be used as an underlay on the Operator Management Map. The Topographic and Soils maps described here belong in Appendix 9 (*Operations Maps*).

The operator map is to include the following:

1. farm boundary,
2. field boundaries,
3. field identification,
4. field specific acreage (this information can be shown directly on the map for each field, or can be included as part of the map legend indicating the field acreage for each individually identified field),
5. manure application setbacks and buffers in accordance with 83.294 (f) and (g)
    a. there should be identification of the <u>landscape feature</u> that requires the setback, such as an indication of where the stream or sinkhole are, well locations, etc.
    b. The map should show only show the chosen setback (either 100 foot or a 35-foot buffer). Maps should be clear as to which setback the operator needs to follow and if both setbacks are chosen for a specific field it will cause confusion.
6. location of existing and proposed structural BMPs (including manure storage facilities),
7. location of existing or proposed emergency manure stacking areas or in-field manure stacking areas, and
8. roads and road names adjacent to and within the operation.

It is recommended that the operator map also include the following:

1. Aerial Photography as an underlay
2. Stream, Lake, Pond names, if available
3. For operations that contain multiple farms, a county or township map, that shows the location of each individual farm, that make up the larger operation.

The above items must be clearly identified on the operator management map, either by direct notation on the map, or through a clear legend. Manure application setbacks and vegetative buffers must be clearly identified on the map with an indication of the required setback or buffer width. The farmer and program staff need to be able to interpret the information provided on the legend, so the legend needs to identify the given feature using legible font sizes and easily understood words or symbols. Avoid using cryptic symbols or phrases that are not well understood by those using this map.

Only setback landscape features on the map that are relevant to actual setbacks or buffers required on this operation need to be identified. Landscape features on adjoining properties that do not require a setback should not be included on the farm map. For example, a neighbor's well which is beyond 100' from fields on the operation does not need to be included on the nutrient management plan operator management map, although any wells on adjoining properties that fall within the 100 foot setback need to be identified.

To test if this map is adequate, just imagine if you were a new manure hauler brought into this operation to help them apply their manure. Would the direction given on this map, in conjunction with the application rates in the Nutrient Management Plan Summary, be adequate to allow someone new to find the field and apply manure properly on this operation.

Act 38 Manure Application Setbacks

Manure application setbacks, for the purposes of the Act 38 program, are defined as areas where manure will not be mechanically applied next to an environmentally sensitive area such as a wells, sinkholes, streams, lakes or ponds, for the purpose of minimizing the potential for applied manure (or nutrients associated with the applied manure) to run off into the environmentally sensitive area. This setback area has no cropping limitations on it through Act 38, but where used to meet regulatory requirements, does have a mechanical manure application limitation.

The specific manure application setback options provided in the Act 38 regulations are a 100 foot manure application setback next to environmentally sensitive areas or, with the exception of wells, a 35 foot permanent vegetative buffer. Nutrient Balance Sheets using options 1 or 2 require a 150 foot manure application setback from streams, lakes and ponds. In the case of the importing farms, this 150 foot setback serves as the importing operation's method for addressing phosphorus loss without having to run the full P-Index on the importing operation. If option 3 is used, the 100 foot setback or 35 foot permanent vegetative buffer may be used. The setbacks for Nutrient Balance Sheets for wells and sinkholes are the same as for Nutrient Management Plans.

The manure application setback area is not restricted under Act 38 from being cropped to the extent that the crops and cropping practices used in this area are consistent with the setback criteria. If this management includes the application of fertilizer (non-organic) nutrients, the setback area should be broken out as a new field or sub field for the purposes of determining nutrient application rates and final nutrient balances.

Act 38 Buffers
The purpose of a buffer is to reduce runoff velocity, increase infiltration of runoff water, provide a filter area for manure contaminated water, and minimize the risk of nutrient pollution. This area is not restricted under Act 38 from being cropped to the extent that the crops and cropping practices used in this area are consistent with the buffer criteria.

A permanent vegetative buffer, for use in the Act 38 program, must meet the following general requirements. Specific requirements for cropland and pastures are outlined below:

- A permanent strip of perennial vegetation (existing or established) parallel to the contours of, and perpendicular to, the dominant slope of the field.
- Located between the field and the protected land feature (stream, lake, pond, and sinkhole).
- Flow characteristics are primarily sheet flow with no obvious concentrated flow (converging rills, ephemeral gullies, classic gullies) into/within/leaving the buffer.

The vegetative buffer area is not restricted under Act 38 from being cropped to the extent that the crops and cropping practices used in this area are consistent with the buffer criteria. If this management includes the application of fertilizer (non-organic) nutrients, the buffer area should be broken out as a new field or sub field for the purposes of determining nutrient application rates and final nutrient balances.

Cropland Buffer Criteria
If the CMU/Field being evaluated is **cropped and not a grazed pasture**, then the following criteria must be met for the 35 foot area adjacent to the stream, lake, pond or sinkhole to be considered a 35 foot buffer in an Act 38 nutrient management plan. If the following criteria cannot be met then the mechanical manure application must be setback 100 feet from a stream, lake, pond or sinkhole.

1. Thirty-five feet of perennial vegetation (woody, herbaceous or any combination).
    a. Plants identified by PDA as noxious weeds must be eliminated and controlled in these areas. For a listing of noxious weeds refer to Pennsylvania's Weed Control list (http://plants.usda.gov/java/noxious?rptType=State&statefips=42).
    b. The vegetation must be maintained in a healthy condition such that it provides at least an 80% vegetative canopy across the 35-foot area during the growing season.
    c. Vegetation in these 35-foot buffer areas may be harvested periodically. This includes using buffer areas for hay production.

2. Manure may not be applied mechanically within the 35 foot buffer. Chemical fertilizer may be applied according to the nutrient management plan to maintain adequate plant growth for situations where the buffer vegetation is harvested, or when nutrients are required to establish or reestablish a non-harvested buffer.

3. Criteria 1 must be met and implemented at the time the manure will be mechanically applied to the CMU/Field.

Pasture Buffer Criteria

If the CMU/Field is a **grazed pasture**, then the following criteria must be met to use the pasture for the 35-foot area adjacent to the stream, lake, pond or sinkhole to be considered as a 35-foot buffer in an Act 38 nutrient management plan. If the following criteria cannot be met then the mechanical manure application must be setback 100 feet from a stream, lake, pond or sinkhole. In addition, the pasture must be assigned a "9" for the Contributing Distance factor in the Pennsylvania Phosphorus Index (P Index).

1. Ground cover provided by perennial vegetation must be maintained at a level of 80% or more to minimize soil erosion and nutrient runoff. Plants identified by PDA as noxious weeds must be eliminated and controlled in these areas. For a listing of noxious weeds refer to Pennsylvania's Weed Control list (http://plants.usda.gov/java/noxious?rptType=State&statefips=42).

2. Livestock access to the 35 foot buffer area must be managed to maintain the minimum 80% vegetative cover at all times across the entire buffer area. Established stabilized stream crossings or watering areas are exempted. Meeting this requirement can involve:
   a. Fencing off the 35 foot buffer area and controlling the duration, intensity, and frequency of the grazing season.
   b. Establishing alternate off-stream water sources or watering systems, and/or establishing stabilized stream access for crossings or watering access for livestock.
   c. Installing other alternative management systems, structural practices or management techniques.

3. All animal concentration areas (such as feeding, watering or shade areas) within the pasture must be addressed in such a manner as to eliminate the direct discharge of runoff from these areas from entering any adjacent water bodies.

4. Fields with poor, somewhat poor, or very poor drainage characteristics must limit grazing on these areas during times of high water table.

5. No manure may be mechanically applied within the 35 foot buffer area.

6. Criteria 1 thru 4 must be met and implemented at the time the animals are grazing the pasture.

Appendix 1
Nutrient Management Plan Agreement and Responsibilities

This section of the nutrient management plan (plan) identifies what programs are being satisfied with this plan, implementation requirements for the operation, record keeping requirements, compliance with certain program efforts, and signatures from the planner and the operator. This is a key element of the plan documenting the operator's agreement to follow the plan and other program requirements.

It should be noted that the plan **MUST** be reviewed with the operator prior to submission to the conservation district for review. **This is the planner's responsibility**. The plan cannot be submitted until the farmer understands and agrees with all the provisions of the plan. The plan reviewer is to verify, during their on-site review of the plan, that the planner explained the plan to the farmer (at least the following sections: Nutrient Management Plan Summary, Appendix 1: Nutrient Management Plan Agreement and Responsibilities, and Appendix 8: Importer/Broker Agreements and NBSs) and that the farmer is in agreement with the provisions in the plan. If the reviewer finds that the planner has not reviewed at least the Nutrient Management Plan Summary, Appendix 1 and Appendix 8 with the farmer, the plan reviewer is to relay that information, in writing, to the certification program staff for their consideration. It is the intent of this guidance to ensure that the producer is involved with, and agreeable to the provisions outlined in the plan.

Program Checkoff
The planner must check the appropriate boxes indicating what program(s) the plan is being developed to satisfy. This is important to help the reviewer understand under what program provisions the plan is to be reviewed.

If the CAFO box is checked, the district is to coordinate their review with the appropriate regional DEP office that covers the county where the operation is located. The planner is to submit a copy of the plan, as soon as it is determined to be administratively complete, to the DEP office for their review. The DEP office is to send its comments to the district so they can incorporate the DEP comments in with the comments the district may have. The district should copy the regional DEP office on CAFO plan approval letters so DEP is aware if and when the CAFO plan was approved.

A CAFO is defined as any animal operation that meets any of the following criteria:

- A total of 1,000 or more AEUs on the operation, or
- Any CAO with a total of 300 or more AEUs on the operation, or
- Any animal operation with more than the following head numbers: 700 mature dairy cows; 1,000 veal calves; 1,000 cattle other than mature dairy cows or veal calves; 2,500 swine each weighing 55 pounds or more; 10,000 swine each weighing less than 55 lbs.; 500 horses; 10,000 sheep or lambs; 55,000 turkeys; 30,000 laying hens or broilers if using a liquid manure handling system; 125,000 chickens (other than laying hens) if using a dry manure handling system; 82,000 laying hens if using a dry manure handling system; 5,000 ducks if using a liquid manure handling system; or 30,000 ducks if using a dry manure handling system.

Additional conditions to be addressed with CAFO nutrient management plans include:

1. 14-day limitation to dry manure stacking on the CAFO, unless the stack is protected. There needs to be a statement in the plan addressing this issue if it is relevant to the particular farm situation (this statement would not be necessary for plans that address only liquid manure).
2. Manure application setbacks may be imposed on additional water conveyance areas than those outlined in the Chapter 83 nutrient management regulations. These additional setback areas will be identified by DEP and will need to be addressed in the plan map(s).

Verifications

Agricultural Erosion and Sedimentation Control Plan (Ag E&S): The planner is to indicate here that the operation has a completed Agricultural Erosion and Sedimentation Control Plan (Ag E&S), or conservation plan, which meets DEP Chapter 102 requirements for the acres listing in the NMP. The planner should only check this box if they have developed or seen the completed Ag E&S plan for the operation. The Ag E&S plan does not need to be submitted with the Act 38 plan submission, but it needs to be located on the farm and easily retrieved by the operator. The farmer will be asked to show this Ag E&S plan during the district's on-site plan review and future status reviews, to make sure the Ag E&S plan and NMP submitted are consistent with one another. If an operation is not required to have an Ag E&S plan, as they have no farm fields (export all manure) and they have no ACAs/AHUAs, the planner should check the No Ag E&S Plan Required box.

Emergency Response Plan: The planner is to indicate here that the operation has a completed Emergency Response Plan (ERP) on the farm. The planner should only check this box if they have developed or seen the completed ERP for the operation. The Commission has developed a standardized ERP format to use for this purpose. That standardized format is included as Supplement 13: Emergency Response Plan. The ERP does not need to be submitted with the Act 38 plan submission, but it needs to be placed somewhere on the operation, easily accessible to the farmer and relevant farm workers. The farmer will no doubt be asked to show this ERP during the district's on-site plan review and future status reviews. Farmers and their employees and contractors need to know where this plan is at all times, and how to carry it out in case of an emergency.

Communications with the landowners of rented lands: The planner is to indicate that the operator has communicated with those landowners that he rents land from, letting them know that a nutrient management plan has been developed which calls for manure to be applied to their lands and that they have no objections to the plan requirements. The various landowners renting land to this operator do not need to sign the plan, but they need to be contacted during the planning effort and the landowners must not object to the renters applying the planned manure to their lands. Again, this box should only be checked if the planner is fully aware that this obligation has been met. If the plan contains no rented lands, than the "no rented/leased lands" box must be checked.

Signatures
It is important the planner understands that it is his/her responsibility to review the plan with the operator prior to submission and, the operator understands the content of the plan and agrees to follow the plan. This is an important step in the planning process that can avoid a lot of future problems with approval and implementation of the plan. These required signatures provide important confirmation ensuring that a plan approved under the program is accurate and that the operator agrees to implement the plan.

Planner signature: The planner, completing his/her signature, is indicating that the information used to develop the plan is accurate and complete to the best of their knowledge. The planner's signature affirms that the planner has reviewed the contents of the plan and the implementation schedule of the planned management practices with the operator prior to submission of the plan for review.

Operator's signature: The operator, completing his/her signature, is indicating that the information in the plan is accurate and correct and reflects the current and planned management practices for the operation, and that the plan writer has reviewed the NMP with them. By signing Appendix 1, the operator is affirming that he/she understand the contents of the plan, understands the implementation schedule of the plan and understands their record keeping obligations outlined in Appendix 1. The operator's signature on the plan also affirms that he/she understands when a commercial hauler or broker is used for transport, application or export of manure, that a commercial manure hauler or broker must hold a valid certification issued by the Pa Department of Agriculture (PDA). PDA and conservation districts can provide operators with a list of certified manure haulers and manure brokers for their use in implementing their nutrient management plan.

Operator Title: The operator needs to list their title when signing Appendix 1. This is especially important for plans developed for farms operated by management companies. Titles would include entries such as "Owner/Operator" for owned farms, and "Operator" for farmers renting their livestock production facilities. If the operation is a **partnership**, then the title of the signing individual would need to be "General Partner". If the operation is a **corporation**, the title of the signing person would need to be "President" or "Vice President" or another individual authorized by the corporation to sign the plan. If the operation is a corporation, then the plan must include an attached letter (on corporation letterhead) developed and signed by the secretary of the corporation stating that the person signing on behalf of the corporation is authorized to do so.

Please note that an initial plan submission is not considered to be administratively complete until the operator's and planner's signatures are completed on Appendix 1. Also, note, the planner and operator may need to sign a new (second) Appendix 1 if the final form of the plan has significant changes to either the nutrient application provisions or the BMPs proposed to be implemented on the farm, as compared to the initial version of the plan submitted for review.

Appendix 2
Operation Information

Completing Appendix 2
This section of the nutrient management plan (plan) identifies the operational information. It includes an operation description, county, name of receiving stream, notation of special protection waters, operation acres, names and address of owners of rented land, existing manure storages and capacity, and Manure Application Equipment Capacity & Practical Application Rates.

Operation Description
The nutrient management plan (NMP) must include an agricultural operation identification sheet which includes a brief description of the operation including the following information:

- Animal types and numbers included on the operation.
- Acreage of cropland, hayland and pastureland.
- Acreage of farmstead.
- The crop rotation planned to be used on the operation. The crop rotation includes, the crops grown, the sequence of crops grown and the number of years each crop is grown in the rotation.
- Provide a brief description of how the various manure groups on the operation are generated, stored, and handled, including a description of any compost (including mortality) and how it will be handled, and any atypical manure handling strategies. Below is an example of information to be included and integrated into the Operation Description:

  "The manure from the cows is collected in gutters behind the animals and scraped two times a day into a reception pit which is then pumped to the circular concrete storage once a day. Milkhouse wastewater and barnyard runoff is collected in a reception pit at the bottom of the barnyard and pumped when ready into the circular concrete storage. Manure from all of the calf and heifer pens is scraped once a month into a roofed manure storage that is part of the heifer facility. Both storages are emptied in the spring and fall and the manure is land applied on the operation."

County(s)
This information is to be obtained from the operator. This is to include all the counties that are included in the NMP within the state. The physical address of the animal housing facility determines which county reviews and acts on the NMP.

Name of Receiving Stream(s)/Watershed(s)
The regulations require that the watershed(s) where this operation is located be included in the NMP. To meet this requirement, the planner shall identify the "blue line streams" at this operation.

The **"blue line stream"** would be the nearest blue line stream (taken from the appropriate USGS topographic map) that would receive runoff from this operation.

Where there is more than one named stream that would take runoff from this operation, all should be listed. Every NMP should indicate a "blue line stream" regardless of the distance from the operation.

Notation of Special Protection Waters

The NMP is required to **list any special protection watersheds** that this operation lies within. Special Protection Waters are those areas that have waters with an **Existing Use or a Designated Use** as High Quality (HQ) or Exceptional Value (EV) as defined in Chapter 93 (Water Quality Standards) of the DEP regulations. This list of Special Protection Waters is continuously revised based on water quality assessments and public comment.

Information on special protection waters can be found online in the following locations

1. An interactive map format called eMapPA - http://www.depgis.state.pa.us/eMapPA/
2. Designated uses are listed in Title 25 Chapter 93.9 of the PA Code – http://www.pacode.com/secure/data/025/chapter93/chap93toc.html.
3. DEP's listing of Statewide Existing Use Classifications - https://www.dep.pa.gov/Business/Water/CleanWater/WaterQuality/StreamRedesignations/Pages/Statewide-Existing-Use-Classifications.aspx

On the eMapPA site, locate the farm and all the fields which will be included in the NMP. Then turn on the stream use layers by doing the following:

1. Turn on the stream use layers by clicking on the "Features" Tab on the left hand side of the page.
2. Scroll down the features list, click on the symbol next to "Streams and Water Resources" to see all of the options available.
3. Check the square boxes next to the "Streams Designated Use" and "Streams Existing Use" items.
4. Click on "Refresh Map" at the bottom. The streams that were found to receive runoff from the farm and fields on the USGS map should be visible on the map.

The uses can be determined as follows:

1. Click on the round circle next to "Streams Designated Use," then click on the ❶ symbol, and then click on the first stream receiving runoff from the farm/fields on the map. An "Attribute Data" table with the heading "Streams Designated Use" will pop up in a new window. The designated use will be shown in the column "Use Description." If there are additional streams receiving runoff, check their uses in the same manner.
2. Click on the round circle next to "Streams Existing Use," then click on the ❶ symbol, and then click on the first stream receiving runoff from the farm/fields on the map. Either an "Attribute Data" table with the heading "Streams Existing Use" or a box stating "Streams Existing Use: No Feature Found!" will pop up in a new window. If an attribute table pops up, the existing use will be shown in the column "Use Description." If there are additional streams receiving runoff, check their uses in the same manner.
3. If either the Designated or Existing Use has HQ or EV the farm and/or fields are in a Special Protection watershed.

4. The Designated or Existing use determination should be verified with Chapter 93 or the current Existing Use list.
5. In the case that a designated or existing use is not listed for one or more of the streams, please contact DEP for assistance.

For additional information on using the DEP eMapPa website tool refer to "Using eMAP to Identify Special Protection Watersheds" posted on the PA Nutrient Management Program website (http://extension.psu.edu/plants/nutrient-management/planning-resources/other-planning-resources/using-emap) under the Planning Resources section.

Nutrient Management Plans developed for farms in these areas do not have to include any additional information but additional planning procedures (see Appendix 5: Phosphorus Index) may be required.

Operation Acres: Total Acres

The NMP is to include all the lands that are an integral part of this animal operation. These lands may be different from those lands counted in the AEU/acre calculation. The lands to be included in the NMP are specifically defined as **those lands owned by the operator which are located at the animal production facility, as well as, other lands under the management control (owned or rented) that are an integral part of this animal production facility** (see definition of Farming Resources in the regulations). There may be a number of situations that will require an individual determination based on the specific circumstances of a given farm but the following examples are shown in order to give you an understanding of how the program interprets this provision.

This definition in the regulations provides direction to the planner concerning **owned lands that are contiguous** with the animal operation.

1. If manure produced at the operation is applied to these owned acres, whether or not these acres are rented to another operator, the owned acres located at (contiguous with) the animal facility, would need to be included in the NMP. This can be Appendix 4: Crop and Manure Management Information and Appendix 5: Phosphorus Index or Option 3 of the Nutrient Balance Sheet (NBS).
2. If no manure from the operation is applied to these acres, but they are farmed by the operator or someone under his direction, these acres must be included in the NMP.
3. If no manure from the operation is applied to these acres, and these acres are rented out to another operator, these acres do not need to be included in the NMP.

If the **owned lands are non-contiguous** (even if they are rented to another operator) with the animal facility, the following criteria will be followed in determining if the land is to be included in the NMP.

1. If the owned land is non-contiguous and **is not** used for application of the manure from the animal operation during the normal cropping rotation, those owned, non-contiguous lands **would not** need to be considered in this NMP.

2. If the owned land is non-contiguous and **is** used for application of the manure from the animal operation during the normal cropping rotation, those owned, non-contiguous lands **would be** included in the NMP.

All **rented land** that will be receiving manure generated by the animal production facility at any time within the planned cropping rotation for the operation will need to be included in the NMP.

For those situations **where the animal operator is permitted to apply manure to fields owned and managed by other people**, and the animal operator does not have an agreement (verbal or written) with the landowner allowing for management control (defined in Section I: Identification of CAOs) of that land related to crop production, that land is not required to be included in the NMP and the manure sent to those lands shall be considered to be exported and applied by the animal facility operator.

Operation Acres: Total Acres Available for Nutrient Application Under Operator's Control

List the number of **acres, from the total acres in the NMP that will receive nutrients** during the normal cropping rotation for the operation. This includes nutrients from manure, sewage sludge or bio-solids, chemical fertilizers, etc. Provide the number of acres of owned land and also include, separately, the number of acres of rented ground. Rented or leased lands, under the management control of the operator of the facility, which are used for the application, treatment, or storage of manure generated at the facility shall be included in the NMP.

Names & Addresses of Owners of Rented or Leased Land and/or Facilities

The NMP must include the names and complete mailing addresses of owners of the rented or leased lands and/or facilities.

Animal Equivalent Units

An AEU is 1,000 pounds of live animal weight on an annualized basis. Annualized means that if the animals are not present on an operation for a whole year, the animal units are adjusted for the proportion of time during the year the animals are present on the operation. The calculation involves determining the number of AEUs of all animals on the farm based on the number of animals and their average weights and then adjusting that for the actual number of days (out of 365) that the animals are on the operation. A description of the information that goes into this calculation is covered in Section I: Identification of CAOs.

Animal Equivalent Units Per Acre

A description of the information that goes into this calculation is covered in Section I: Identification of CAOs.

Existing Manure Storages & Capacity

For each manure storage utilized by the operation, briefly describe the type of storage, storage dimensions, useable design capacity, freeboard, top or bottom loaded, dimensions and description of contributing run-off area, description of wastewater

additions, and types and amounts of bedding. Additional detail is provided in Supplement 8: Manure Storage Volume Calculations.

Additionally:

1. Briefly describe the manure storage management during removal for each manure group. As applicable, describe the degree of agitation, method of manure removal, extent that the storage is emptied, type and/or amount of unremoved manure, and any other pertinent information. This description must also detail the manure sampling procedures for each manure group.
2. Detail, if applicable, emergency manure stacking areas located within the farmstead and on crop management units. Those areas described shall correspond with the areas show on the operation map.

Manure Application Equipment Capacity & Practical Application Rates

The purpose of the manure application equipment capacity and practical application rates section of the NMP is to ensure that the **application rates listed in the NMP** have been determined to be practical and achievable by the application equipment used to apply the manure on the operation. There would be no purpose in developing a NMP that would require rates that are not able to be met by the farmer. This is a key element of ensuring the NMP can be implemented.

The Act 38 regulations (83.294) state that manure application rates be consistent with the capabilities of the application equipment, including calibration. It states that **"…the plan must include a statement indicating that the existing equipment has been calibrated to ensure the implementation of the application rates described in the plan…"** The Act 38 standard NMP requires the following information to be included: description of the application equipment, **practical application rates based on calibration and calibration method used. The data recorded during the equipment calibration is to be retained on the farm.**

Manure Spreader Calibration

As noted the NMP requires a description of the application equipment. An important part of that description is the capacity of the equipment. However, capacity is not calibration.

Manure application rates are determined by equipment speeds and settings along with application management, such as overlaps. Therefore, determining actual application rates or manure spreader calibration is an event. It requires that the spreader is filled with manure to the typical full load and applying the manure to the field. It involves recording the applicable speeds and settings such as ground speed and/or PTO speed, gear box settings, gate opening settings, operating pressures, spread widths, spread lengths, and overlaps. Using the recorded information, the actual application rate at those speeds and settings is calculated.

Each rate listed in an Act 38 NMP must be based on equipment calibration. Specific guidance on rounding calibrated and planned rates is provided in the NMP Summary section of this manual. The actual calibration data does not need to be submitted with the NMP, but it does need to be maintained on file at the operation for review by program staff as necessary.

Agronomy Facts 68: Manure Spreader Calibration has been developed by the program to facilitate meeting this planning requirement. It outlines calibration methods for both liquid and solid manures and includes tables to record and calculate application rates. These tables could be filed as documentation on the operation. This factsheet is available in print form or can be downloaded from the Pennsylvania Nutrient Management Website (http://extension.psu.edu/plants/nutrient-management/educational/manure-storage-and-handling/manure-spreader-calibration). Additionally, Conservation District personnel will assist with the manure spreader calibration upon request and availability.

Following is some general guidance from an NMP development standpoint in meeting this NMP requirement.

- **Farms that apply their own manure, with existing equipment:** For farms that can identify their application equipment prior to submitting the NMP, the NMP is to list the type and capacity of equipment they are using, the practical application rates that have been determined by calibration, and the method of calibration should also be listed.

- **Farms not able to complete calibration prior to NMP submission:** Because manure calibration requires actually land applying manure, a good time to complete this management practice is during the application season. Therefore, there will be frequent instances where NMP development and manure application timeframes do not conveniently coincide. For existing operations that were not able to calibrate their spreader prior to NMP submission, the operator is to calibrate the spreader during the next manure application season. These plans will include a statement indicating what equipment is planned to be used, that the equipment is expected to be able to meet the planned rates (so planned rates should be in a realistic range for the planned type of equipment) and that the equipment will be fully calibrated during the 1st manure application event after NMP submission. If, when the equipment is calibrated during the first year and cannot be adjusted to closely match the planned rates, then the NMP will need amended to provide rates that will be realistic for the given equipment.

- **Custom applied manure:** For farms that have their manure custom applied, the NMP would need to indicate that the operator uses a custom applicator and that the application rates listed in the NMP are rates that can be met by the custom applicator. **The NMP shall list the custom applicators name and their current manure hauler or broker license number.** The NMP writer should confirm with the custom applicator what rates he can apply for the manure type in question.

Most custom applicators have calibrated their equipment and have a range of rates that can be achieved with their equipment.

- **For Operations that rent manure application equipment:** If manure spreader calibration is impractical at the time of plan development due to the operator renting application equipment, and not receiving the same equipment year after year, the equipment still needs to be calibrated and records of those calibrations should be maintained with the manure application records. These plans will include a statement indicating what equipment is planned to be rented and that the operator is to calibrate the spreader prior to the first full application of manure in order to properly adjust their equipment to closely match the application rates outlined in the NMP.

- **For proposed animal operations:** For proposed operations that NMP to use their own equipment to spread the manure, the operator is to calibrate the spreader prior to the first full application of manure in order to properly adjust their equipment to closely match the application rates outlined in the NMP. These plans will include a statement indicating what equipment is planned to be used (if it is known at the time, if not, the NMP will list the type of equipment planned), that the specific equipment (or type of equipment) is expected to be able to meet the planned rates (so planned rates should be realistic for the planned type of equipment) and that the equipment will be fully calibrated during the 1st manure application event after NMP submission. If, when the equipment is calibrated during the first year and cannot be adjusted to closely match the planned rates, then the NMP will need amended to provide rates that will be realistic for the given equipment.

In summary, the goal of nutrient management planning is to provide manure application rates that are accurate and achievable. Along with soil testing and manure analysis, manure spreader calibration is a fundamental nutrient management practice necessary to achieve this goal.

Appendix 3
Manure Group Information

Introduction
The purpose of Appendix 3 in the Act 38 Nutrient Management Plan is to identify the manure groups on the operation, inventory the amount of manure generated in each manure group, and record the required manure analysis results for each manure group.

There are two types of manure that are accounted for in the nutrient management plan. The first type is manure that is collected and stored on the operation. It is this manure that is either land applied to specific fields in the nutrient management plan or exported off the operation. The second type of manure is uncollected manure. Uncollected manure is deposited on pastures by grazing animals.

The specific regulatory requirements for this information are outlined in section 83.291 of the Act 38 regulations.

Nutrient Management Plan Format
Act 38 regulations require that all nutrient management plans use a standard format for organizing and presenting the required plan elements. Appendix 3 is included in the standard format spreadsheet developed by the Nutrient Management Program. The standard spreadsheet includes all the required plan elements and performs most of the necessary calculations using the data entered. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to use the spreadsheet and enter data to complete Appendix 3.

All plans developed and submitted for approval must use the current version of the NMP Standard Format. The current version is the one posted on the Nutrient Management Program website (https://extension.psu.edu/programs/nutrient-management).

Manure Production Inventory Method
There are two acceptable methods that can be used to inventory the manure generated on an operation.

- Estimating manure production by using book values to calculate manure amounts.
- Measuring manure production by using operation records.

The preferred, and most accurate, method is to use operation records to determine the amount of manure generated on the operation. The Act 38 regulations state that, “If actual manure production records are available for the operation, these records shall be used for determining the manure produced on the operation.” Field application records (number of loads, spreader capacity) and manure storage dimensions (total capacity and capacity at emptying) are common ways to measure the amount of manure produced.

For new operations, production records from similar operations can be used for planning purposes until the operation generates manure. The source of these

production records should be noted in Appendix 10: Supporting Information and Documentation.

Manure Group Identification

The starting point, regardless of manure inventory method, is the identification of the specific manure groups on the operation. Manure groups are the distinct portions of manure generated on the operation. Determination and labeling of manure groups is critical in the planning process, because manure will be allocated by manure group designation to specific crops and fields on the operation. In most cases, each manure group on an operation will have a unique manure analysis.

Determining Manure Groups

The best way to identify manure groups is to ask two questions regarding all the manure generated on an operation.

1. Where are the specific locations on the operation where manure is stored and equipment is taken to load the manure for land application or export off the operation? Different storage locations usually indicate different manure groups.
2. When is the manure loaded for land application at each storage location? Different application times during the year (seasons) usually indicate different manure groups.

Using this approach means that different animal groups may contribute to one manure group or the same animal group may contribute to multiple manure groups.

The answers to these two questions are included in Appendix 3 for each manure group. See Manure Group Site Description and Season Applied.

Multiple Manure Groups – Same Site and Season

A third question must be considered if the identified manure groups are part of a liquid storage system.

In most liquid manure storage systems, there is stratification of liquids and solids throughout the storage profile. Likewise there is a corresponding variation in nutrient levels. Ideally, the manure should be agitated sufficiently during the emptying of the storage to obtain a homogenous product. To adequately meet the understanding of a manure group, particularly as having a different or unique manure analysis, the manure in a liquid manure storage must be agitated sufficiently to achieve and maintain uniformity throughout the emptying of the storage.

However, if the storage is not adequately agitated and there are obvious changes in consistency of the manure as the storage is being emptied the identification of separate manure groups is required. Correspondingly, this will require an estimation of the volume of manure in each group. This can be done by noting when the manure consistency changes and estimating the percentage of manure volume in that portion. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to include these types of manure groups in Appendix 3.

Daily Haul Operations

Operations, most often dairy, that do not have long term storages and need to haul manure frequently (often called “daily haul”), must include four manure groups in Appendix 3 corresponding to the four seasons: spring, summer, fall and winter. The season must be included in the manure group name. Each season would be three months in length. This is necessary to provide season-specific manure production totals to facilitate manure allocation in Appendix 4: Crop and Manure Management Information to ensure adequate field availability throughout the crop year and permit the selection of the appropriate nitrogen availability factors for each application season. Although represented as four manure groups, daily haul manure requires only one manure analysis annually.

Imported Organic Nutrient Sources

In addition to manure generated on the operation, all imported organic sources of nutrients such as biosolids or manure imported from other operations should be listed as manure groups in the plan.

Small Quantity Manure Groups

Livestock and poultry operations may have minor animal groups that produce a relatively small amount of collected and uncollected manure if on pasture. Examples include a horse for family recreation, animals for FFA or 4-H projects, or a small flock of laying hens.

A small quantity manure group may be created in Appendix 3 if the following two criteria are met:

1. The animal groups included in the manure group represent less than 5 AEUs **and the,**
2. The AEUs of the animal groups included in the manure group is less than 5% of the total AEUs in the nutrient management plan.

The animals in the small quantity manure group can be of multiple species, but only one miscellaneous grouping of animals is permitted in a nutrient management plan.

Likewise, composting of animal mortalities may yield a small amount of manure. Small quantities of mortality compost of less than 5 tons of poultry mortality compost or 25 tons of non-poultry mortality compost do not need to be included in Appendix 3 but must be included in the plan as a small quantity manure group.

Documentation of the small quantity manure group must be included the nutrient management plan according to the following requirements.

- The Operation Description section of Appendix 2: Operation Information must include a description of how the manure in the small quantity manure group will be handled and utilized. The description must include where the collected manure will be applied, and, if applicable, the specific pasture that will receive the uncollected manure.

- If the collected or uncollected manure from the small quantity manure group will be applied to a crop field or pasture, a note for the crop management unit(s) receiving the manure must be included in the NMP Summary Notes.
- The animal types, number and weights must be entered into Appendix 3 but manure production data does not need to be entered. The animal information is necessary to complete the CAO determination for the operation.

Poultry Outdoor Access Areas

Poultry operations that provide access for the birds to outdoor areas can choose to manage the area as a pasture and include it as a field in Appendix 4 or identify and evaluate the area as an animal concentration area in Appendix 6. In both options all Act 38 planning requirements must be met.

Manure Group Names

For planning purposes, each manure group must be given a unique name. This name will be used in Appendix 4: Crop and Manure Management Information to allocate the manure in that manure group to specific crops and fields.

The most important consideration in selecting manure group names is that they are understood by the operator, and, if possible, reflect terminology that the operator uses for particular manure groups. Secondly, the manure group names should be succinct while clearly distinguishing the manure groups on the operation. Consider the following categories to select a combination of terms to label manure groups:

- Species (dairy, turkey, etc.)
- Animal group (cow, heifer, etc.)
- Storage (tank, pit, stack, Slurrystore, etc.)
- Manure type (solid, bedded pack, liquid, slurry, litter, etc.)
- Season (spring, summer, fall, winter)

It is recommended that the season of application be included in the name if there are multiple manure groups from one storage.

Manure Analysis Regulatory Requirements

Manure analysis is required annually for each manure group. Refer to Section V: Plan Review and Implementation for guidance on manure analysis report dates for plan submission. Manure analysis reports used for Act 38 nutrient management plans must include the following results: total nitrogen, ammonium nitrogen, total phosphate, total potash, and percent solids. Manure analysis reports that do not contain these specific results cannot be used for Act 38 planning.

All manure reports used to report the manure nutrient values in Appendix 3 must be maintained on the operation or included in Appendix 10: Supporting Information and Documentation.

Refer to “Section 83.291 – Determination of Available Nutrients” of the Act 38 regulations for the specific regulatory requirements regarding the analysis of manure.

Manure Analysis Exemptions

There are five exceptions to the annual manure analysis requirement:

- **Daily Haul Manure Groups.** Manure analysis is not required for three of the four seasonal manure groups of daily haul manure. The required manure analysis from one of the four seasonal daily haul manure groups is to be used for the other three manure groups in Appendix 3. See guidance above for daily haul operations.
- **Storages Not Receiving Rainwater.** Some storages, such as under-building swine manure storages, receive no rainwater and there is little variation in management such as feeding practices. Although the storage is emptied two or more times each year, the nutrient content in the multiple manure groups will be very constant. Therefore, only one annual manure sample is required for the storage rather one annual sample for each manure group associated with the storage.
- **Manure Exported for Other Than Land Application.** Manure analysis is not required for manure that is not land applied for agricultural production, such as manure exported to composting facilities or mushroom houses.
- **Small Quantity Manure Groups.** Manure analysis is optional for small quantity manure groups from minor animal groups or small amounts of mortality compost. See the guidance above for small quantity manure groups.
- **Mortality Compost.** Analysis is required for quantities exceeding 5 tons of poultry mortality compost or 25 tons of non-poultry mortality compost unless the material used to compost the mortalities is exclusively from a manure group generated on the operation, such as poultry litter. In those cases, that manure group analysis could be used for the mortality compost. However, if other non-manure materials are used in the mortality composting process, the compost must be listed as a manure group in the plan and an annual analysis of this material is required.

Uncollected Manure Analysis

Manure analysis is **not** to be obtained for uncollected manure deposited on pasture. Obtaining representative samples of uncollected manure, including both feces and urine, deposited on pasture is extremely difficult. Therefore, manure sampling and analysis results for nutrient content and PSC values for uncollected manure deposited on pasture will not be accepted for Act 38 nutrient management plans.

Instead of manure analysis results, as excreted book values are to be used for uncollected manure nutrient content. The Nutrient Management Plan Spreadsheet includes a database of as excreted nutrient content values for common livestock and poultry groups. For livestock and poultry species **not** included in the Nutrient Management Plan Spreadsheet, contact Act 38 program staff for the sources of these values. The source of these values should be noted in Appendix 10: Supporting Information and Documentation.

Manure Analysis Running Average

Manure nutrient analysis will vary from sample to sample on a farm, even with consistent management and careful sampling. A running average of manure analyses will better reflect manure nutrient content than any one sample result. Refer to "Agronomy Facts 69: Manure Sampling for Nutrient Management Planning"

(https://extension.psu.edu/programs/nutrient-management/educational/manure-storage-and-handling/manure-sampling-for-nutrient-management-planning) for a detailed explanation of this approach.

The Nutrient Management Plan Spreadsheet includes a Manure Average Input Sheet where the last five years of manure analysis results for each manure group can be entered. The spreadsheet is programmed to calculate a running average of analysis results entered which is used when that manure group is allocated to crop fields in Appendix 4: Crop and Manure Management Information. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to use the Manure Average Input Sheet.

Refer to Section IV: Record Keeping and Informational Requirements for guidance on maintaining manure sampling records.

Phosphorus Source Coefficient (PSC) Value

The Phosphorus Source Coefficient (PSC) Value is one of the source values required in the Phosphorus Index. This value is entered in Manure Average Input Sheet for each manure group.

There are two acceptable sources for the PSC value. PSC book values are available in Appendix 5: Phosphorus Index or "The Pennsylvania Phosphorus Index: Version 2" (https://extension.psu.edu/the-pennsylvania-phosphorus-index-version-2). An alternative to book values is an optional laboratory test that can be requested as part of the manure analysis. The water extractable phosphorus (WEP) test result is converted by the laboratory to provide a Phosphorus Source Coefficient (PSC) value that can be used in the Pennsylvania Phosphorus Index. Refer to Appendix 5: Phosphorus Index for more information on the Phosphorus Source Coefficient.

Manure Sampling Procedures

It is imperative that the manure samples obtained for analysis represent the manure that is actually applied. Representative manure samples should be obtained using accepted manure sampling methods as outlined in "Agronomy Facts 69: Manure Sampling for Nutrient Management Planning" (https://extension.psu.edu/programs/nutrient-management/educational/manure-storage-and-handling/manure-sampling-for-nutrient-management-planning) and Part 1, Section 2, "Manure Nutrient Content" in the Penn State Agronomy Guide. It is recommended that nutrient management specialists work with producers to develop operation specific manure sampling procedures.

Manure Group Site Description & Season Applied

Integral to manure group identification is the storage location and season of application. These two aspects of the manure group are determined in the process of identifying the manure groups on the operation. The specific storage facility or site location and the specific season of application (spring, summer, fall or winter) must be noted in the plan.

Total Rainfall and Runoff
For manure groups that include the addition of rainfall and runoff to the collected manure, the Nutrient Management Plan Spreadsheet includes a Rainfall Worksheet to calculate the Total Rainfall and Runoff. The Rainfall Worksheet uses the monthly rainfall database from Supplement 7: Rainfall, Runoff and Evaporation Data that has been incorporated into the Nutrient Management Plan Spreadsheet.

Follow the instructions provided on the cover page of Supplement 7: Rainfall, Runoff and Evaporation Data to determine:

- No Evaporation or Evaporation
- Paved or Unpaved

Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to complete the Rainfall Worksheet.

Animal Group Information
The required information for each animal group contributing manure to a manure group must be entered in Appendix 3. This includes animal information, pasturing information, and bedding and washwater additions.

Animal Type
For livestock and poultry species **not** included in the Nutrient Management Plan Spreadsheet, refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to enter other animal types using the Add Animal Type Input Sheet. Contact Act 38 program staff for the sources of manure production and analysis values for non-typical animal types.

Animal Number
This is the average number of animals in the animal group on **a typical production day** for the operation.

Animal Weight
This is the average weight for the animals in the animal group. Average animal weight takes into account weight variations during the production cycle. For mature animals this weight will not change significantly over the production cycle. For growing animals the average weight accounts for weight variations during the production cycle by averaging the sum of the beginning and ending weights for the cycle. Animal weights should be taken from Supplement 5: Standard Animal Weights. If the weight used is different than those found in Supplement 5: Standard Animal Weights, the method of determining the alternative weights should be explained in Appendix 10: Supporting Information and Documentation and supporting documentation is required to be maintained on-site and shall be furnished upon request.

Refer to Section I: Identification of CAOs for guidance on animal weights.

Total Days Manure Produced

This is the number of days that this animal group contributes manure to this manure group. It is acceptable to use 30 days per month rather than adding the exact days for each month in the manure group collection period. The exception to this guidance is operations with an AEU/Acre total very close to 2.00 AEU/Acre. In those cases, the exact days for each month should be used. Following are some typical examples:

- A broiler house, emptied yearly, runs seven flocks a year at 45 days per flock; the total number of days for this manure group is 315 days.
- A liquid dairy storage is emptied every six months; the number of days for both manure groups is 180 days.

Days On Pasture

This is the number of days the animals are on pasture during the manure group collection period.

Hours Per Day On Pasture

This is the average number of hours per day the animals are on pasture during the manure group collection period.

For animals that have unrestricted access, 24 hours per day, to move between a barn and/or exercise lot and a pasture, the following guidance should be followed to estimate hours per day on pasture. This guidance applies only to the above scenario and is based on considering whether the animals are fed and/or watered at the barn and/or exercise lot.

- If the animals are both fed and watered at the barn use 12 hours per day on pasture instead of 24 hours.
- If animals are fed at the barn but water is provided in the pasture use 18 hours per day on pasture instead of 24 hours.

Total Bedding

The amount of bedding used is obtained from operation records and information from the operator.

For some manure types the amount of bedding is included in Daily Manure Production values found in the Penn State Agronomy Guide, Table 1.2-13 (refer to comments column). If the Daily Manure Production values include bedding do not include a bedding amount value in the Nutrient Management Plan Spreadsheet.

For solid manure, calculate the amount of bedding by using the following equation:

- Pounds of bedding used per period (day, week, month) x Number of periods (days, weeks, months) during the time frame of the manure group ÷ 2,000 = Tons of Bedding

For liquid manure, calculate the amount of bedding by using the following equations:

- Pounds of bedding used per period (day, week, month) x Number of periods (days, weeks, months) during the time frame of the manure group = Pounds of Bedding Per Manure Group Period

- Use Supplement 6: Density of Bedding Materials to determine the density (pounds per cubic foot) of the type of bedding material used.
- Pounds of Bedding Per Manure Group Period ÷ Density (pounds per cubic foot) = Cubic Feet of Bedding Per Manure Group Period
- Cubic Feet of Bedding Per Manure Group Period ÷ 2 (bedding volume is reduced by one-half during use) x 7.48 gallons per cubic feet = Gallons of Bedding Per Manure Group Period (round to the nearest hundred gallons)

Calculations for bedding used are to be shown in Appendix 10: Supporting Information and Documentation of the Nutrient Management Plan.

If the "Records" inventory method was selected, determining the amount of bedding is not required.

<u>Total Washwater</u>
Calculate the amount of washwater added by using the following equation:

- Gallons of washwater added per period (day, week) to the manure x Number of periods (days, weeks) during the time frame of the manure group
- Note: Gallons can be converted to tons by dividing by 240 gallons/ton.

For some manure types the amount of washwater is included in Daily Manure Production values found in the Penn State Agronomy Guide, Table 1.2-13 (refer to comments column). If the Daily Manure Production values include washwater do not include a washwater amount value in the Nutrient Management Plan Spreadsheet.

If the "Records" inventory method was selected, determining the amount of washwater is not required.

Manure Allocation Information
The printout page for Appendix 3 in the Nutrient Management Plan Spreadsheet includes the following information related to manure allocation balances:

- Manure Used on the Farm
- Balance
- Manure Exported

These values are generated as manure from the manure group is allocated in Appendix 4: Crop and Manure Management Information and from manure export amounts recorded in Appendix 3. Refer to the "Manure Allocation Manure Balance" section in Appendix 4: Crop and Manure Management Information for guidance on manure allocation balances.

Appendix 4
Crop and Manure Management Information

Introduction
The purpose of Appendix 4 in the Act 38 Nutrient Management Plan is to determine a planned manure rate for each field included in the nutrient management plan. It includes a record of the required soil test analysis results, soil test recommendations, planned crop information, adjustments to soil test recommendations, net nutrient requirements, balanced and planned manure rates, and a final nutrient balance which accounts for all nutrients applied to each field.

The specific regulatory requirements for this information are outlined in sections 83.292 – Determination of Nutrients Needed for Crop Production, 83.293 – Determination of Nutrient Application Rates, and 83.294 – Nutrient Application Procedures of the Act 38 regulations.

Nutrient Management Plan Format
Act 38 regulations require that all nutrient management plans use a standard format for organizing and presenting the required plan elements. Appendix 4 is included in the standard format spreadsheet developed by the Nutrient Management Program. The standard spreadsheet includes all the required plan elements and performs most of the necessary calculations using the data entered. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to use the spreadsheet and enter data to complete Appendix 4.

All plans developed and submitted for approval must use the current version of the NMP Standard Format. The current version is the one posted on the Nutrient Management Program website (https://extension.psu.edu/programs/nutrient-management).

Field Identification
The starting point is the identification of fields or crop management units (CMU) on the operation. A CMU is defined in the regulations as “The portion of cropland, hayland and pasture, including a field, a portion of a field, or group of fields, on an agricultural operation that has a unique management history (same rotation and manure history), similar production capability, and that will be managed uniformly as a distinct unit.” For the remainder of this manual section the term “field” will be used to refer to fields or CMUs.

The field identification or labeling used in Appendix 4 must be consistent with the field identification on the operation maps. It is recommended that the Operation Map to be included in the nutrient management plan should be completed before beginning the Appendix 4 planning component.

Field identification on the farm map should be at the individual mono-crop field strip level. A field should have a single crop management – crop, manure, fertilizer, etc. – during each crop year.

In addition, it is important that this identification be meaningful to the farmer. It is recommended that the operator's established field identification system be used.

Fields may be divided into sub-fields (portions) if the crop management is not completely the same during each crop year. For example, a field along a stream could be divided into two strips with the near stream strip receiving no phosphorus while the other strip receives manure and fertilizer phosphorus.

Pastures that are grazed by animals in a small quantity animal group must be included in Appendix 4 and meet all the requirements of a CMU, including soil test results, fertilizer applications and manure applications from other manure groups. The amount and rate of uncollected manure from a small quantity manure group does not need to be included in Appendix 4. Refer to the Small Quantity Manure Groups guidance in Appendix 3 – Manure Group Information.

Poultry operations that provide access for the birds to outdoor areas can choose to manage the area as a pasture and include it as a field in Appendix 4 or identify and evaluate the area as an animal concentration area in Appendix 6. In both options all Act 38 planning requirements must be met.

It is recommended that the nutrient management plan be developed on a field-by-field basis. Grouping of fields is permitted in a nutrient management plan only if the regulatory requirement defining a CMU above is met. If several fields are grouped into a CMU in Appendix 4, each of those fields must have an identical cropping history, i.e., same crop, same fertilizer applications (rate and analysis), same manure applications (type, rate, and analysis), and the same overall management through each crop year of the crop rotation on the operation. In summary, these fields "will be managed uniformly as a distinct unit."

Soil Testing

All soil tests used in the nutrient management plan must be current within three years. Refer to Section V: Plan Review and Implementation for guidance on soil test report dates for plan submission.

<u>Soil Sampling Guidelines</u>

Representative soil samples should be obtained using accepted soil sampling methods as outlined in Part 1, Section 2, "Soil Testing" in the Penn State Agronomy Guide.

It is recommended that a single soil test sample not represent more than 20 acres. If a single field is larger than 20 acres, a single soil test sample may be used to represent this field. One soil test sample can represent multiple fields grouped in a CMU provided the following conditions are met:

- The combined acreage of the fields does not exceed 20 acres.
- The criteria for grouping of fields into a CMU outlined above are met.
- The sample submitted to lab is an aggregate of subsamples from all of the fields.

A group of fields planned as a CMU are not required to be managed uniformly in the

implementation of the nutrient management plan, but, in that case, could not be grouped on one soil test in the next plan.

Soil Test Laboratory

There is no requirement to use only the Penn State Agricultural Analytical Services Laboratory (AASL) for soil analysis. However, the laboratory used must follow recommended procedures for Pennsylvania soils. The recommended soil testing methods for PA are: Water for pH, Mehlich Buffer for Lime Requirement, and Mehlich 3 for P, K, Ca, and Mg. **All soil tests used for Act 38 nutrient management plans must use the Mehlich 3 test for phosphorus.**

The laboratory must follow recommended procedures outlined in "The Recommended Soil Testing Procedures for the Northeastern United States", Bulletin #493, published by the University of Delaware, or other Commission approved procedures.

Soil Test Levels (Mehlich 3 P & K)

Soil analysis levels reported in Appendix 4 must be Mehlich 3 ppm P, and Mehlich 3 ppm K and pH. If the laboratory used does not report P & K in ppm the reported levels must be converted to ppm. Use the following factors to convert other units to ppm for P and K:

- lbs P_2O_5/A ÷ 4.6 = ppm P
- ppm P_2O_5 ÷ 2.3 = ppm P
- lbs P/A ÷ 2 = ppm P
- lbs K_2O/A ÷ 2.4 = ppm K
- ppm K_2O ÷ 1.2 = ppm K
- lbs K/A ÷ 2 = ppm K

Important Note: This only applies to the soil test level. The recommendations are always given as pounds of P_2O_5 and K_2O per acre so no conversions are necessary for the recommendations.

P Index Part A

The Nutrient Management Plan Spreadsheet uses the Appendix 4 Input Sheet to complete the Part A: Screening Tool of the Phosphorus Index. See Appendix 5: Phosphorus Index for guidance on completing the Phosphorus Index.

There are a total of five (1 operation specific; 4 field specific) questions that must be answered for each field on the operation. A "yes" answer to any of the five questions will trigger the requirement that Part B of the P Index be completed for that field. See Appendix 5: Phosphorus Index for specific guidance on answering these questions.

- Is there a specific management change as defined by Act 38?
- Is the field in a Special Protection Watershed?
- Is the soil test Mehlich 3 P level greater than 200 ppm?
- Is the contributing distance from this field to receiving water less than 150 feet?
- Is winter manure application planned for this field?

“Run P Index Part B” can also be selected if the planner choses run the P Index Part B on a field even though all five questions were answered “No”.

An alternative option is provided in the Appendix 4 Input Sheet for a field that would require Part B of the P Index based on the questions. Based on a management decision to apply no phosphorus (fertilizer and/or manure) to a field, a **“No P Applied”** selection can be made.

Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to complete the Part A: Screening Tool of the Phosphorus Index.

Crop Information

Each field should be planned for the crops to grown in that crop year. Refer to the Nutrient Submission section for guidance on crop years.

For crops **not** included in the Nutrient Management Plan Spreadsheet, refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to enter other crops using the Crop List Options Sheet.

Double Crops

Double crops should be planned as two separate crops in the crop year. Manure and fertilizer should be applied to meet the nutrient requirements of each individual crop. By selecting the appropriate double crop designation, the Nutrient Management Plan Spreadsheet will automate nutrient considerations of the double crop in one crop year. These include:

- A 15% (poultry) to 20% (other manures) nitrogen carryover to the summer crop from manure applied to the winter crop. This carryover will adjust the net nutrient requirement for the summer crop.
- The final P_2O_5 and K_2O balances for the winter crop will be carried over to summer crop and subtracted from that crop’s net P_2O_5 and K_2O nutrient requirements.

Planned Yield

The plan must include realistic expected crop yields for each crop.

If actual yield records are available during the development of the initial plan, it is recommended that the expected crop yields be based on these records. At the time of the required three-year reviews of approved nutrient management plans, yield goals for the updated or amended plans are required to be based on yield records.

For the development of the initial plan where actual yield records are not available, realistic expected crop yields are determined by the operator and the specialist, and approved by the Commission or delegated conservation district. These yields should be consistent with soil type and climate production capabilities. Pennsylvania soil capability and productivity guidance is available in the Penn State Agronomy Guide, Table 1.1-1.

Yields significantly higher than those generally acceptable for the given soil type will need to be documented and justified through the use of various records such as yield records or an acceptable explanation of the particular management practices that will be implemented on the farm to increase yields over those generally expected. Various management practices, such as plant populations, crop variety selection, irrigation, subsurface drainage, pest and disease scouting, etc. can have an impact on the crop yields for a given operation or field. Therefore, it may be appropriate to set expected yield goals at a level different than the book values found in the Penn State Agronomy Guide and county Soil Surveys. Professional judgment should be used in determining if a particular yield goal is realistic for an individual operation in a given location.

Again it should be stressed that after the first 3-year time frame, yield goals used in the plan are to be based on the yield records that are required to be maintained for the operation. After three years of implementing the nutrient management plan, if yields do not average at least 80% of the planned yield, the plan must be amended to be consistent with the documented yield levels.

Pasture Yields

Pastures provide a unique challenge in determining yields. While it is difficult to measure the amount of dry matter removed by grazing animals, there is a substantial amount of research that has documented yield potential based on soil fertility, forage species, and management. This information has been summarized in a one-page factsheet. Planners should use "Estimating Forage Yields For Pastures" (https://extension.psu.edu/programs/nutrient-management/planning-resources/other-planning-resources/estimating-forage-yields-for-pastures) when determining pasture yields to be used in nutrient management plans.

Fallow Fields

Fields that are planned to be fallow with no harvested crop for the crop year should not be included in the nutrient management plan. The Act 38 regulations require that fields receiving manure applications have a growing, harvested crop. Therefore, the nutrient management plan cannot plan for manure applications on fallow fields.

Soil Test Recommendations

The nutrient recommendations for nitrogen, phosphorus, and potassium must be based on the current soil test results recorded in Appendix 4 for each field. Typical crop nutrient removal rates are not to be substituted for soil test nutrient recommendations. An exception is the nitrogen recommendation when manure is being applied to legume crops.

The Nutrient Management Plan Spreadsheet includes a database of the AASL Soil Test Recommendations Handbook for Agronomic Crops. The spreadsheet will automatically provide the AASL recommendations based on the soil analysis results, crop, and yield entered in Appendix 4. Recommendations from labs other than AASL may be used in place of the AASL recommendations. While soil testing labs that do business in Pennsylvania use the appropriate methods and do high quality analyses, there are often significant differences in recommendations from these labs compared to Penn State

recommendations. Because Penn State recommendations are based on research done under Pennsylvania soil and climate conditions and management systems, **the recommendations used for the development of Act 38 plans must be consistent with the AASL recommendations.**

Conservation Reserve Program Recommendations

Recommendation tables are provided for Conservation Reserve Program (CRP) cool and warm season grasses. AASL recommendation tables for CRP grasses can be used for Conservation Reserve Enhancement Program (CREP) recommendations.

All CRP cool season plantings must include a legume. A one-time manure application may be used to meet part or all of the recommended nutrient requirements before or at planting. Additional nitrogen is not recommended after the establishment year. No manure or nutrients may be applied before or at planting of CRP warm season plantings. Any recommended nutrients may be applied during the second growing season following germination. Manure may be applied at the rate limited by phosphorus or potassium recommended rate. Manure applications may not be made to meet nitrogen uptake rate. CRP grasses should be evaluated every 5-10 years for acceptable plant cover. At that time the soil should be retested to determine if pH and nutrient levels are still adequate to maintain cover.

Commercial Vegetable & Other Non-Agronomic Crop Recommendations

Only recommendations for agronomic crops are programmed into the Nutrient Management Plan Spreadsheet. The AASL Soil Test Recommendations Handbooks for commercial vegetables, small fruits, tree fruits and turf should be used to determine the recommendations for these non-agronomic crops. Soil test levels (ppm) that are above optimum for P and K should use a soil test recommendation of zero for P_2O_5 and K_2O. These recommendations should be entered in the “User Recommendations” of the Nutrient Management Plan Spreadsheet - Appendix 4 Input Sheet.

Mixed vegetable fields of less than 10 acres should use the Mixed Vegetable Crop recommendation table. Mixed vegetable fields that are 10 acres or greater should be subdivided to plan for each specific vegetable crop in the field.

Commercial Vegetable Crop Removal Values

The following standard removal values should be used for all commercial vegetable crops: 100 lb N, 50 lb P_2O_5, and 215 lb K_2O per acre.

Adjustments to Soil Test Recommendations

In order to determine balanced manure rates for nitrogen and phosphorus the soil test recommendations must be adjusted for other known sources of nutrients to obtain the net nutrient requirements for the crop. There are three of these nutrient sources that must be considered.

Starter Fertilizer

These are planned fertilizer applications, such as starter and liquid N fertilizer that may be applied as a pesticide carrier, that will occur regardless of the amount of manure

applied. It does not include supplemental fertilizer applied to meet crop requirements not met by planned manure applications. This is a farmer management decision that must be determined during data collection for plan development.

Residual Nitrogen Carryover from Previous Manure Applications

A significant amount of manure nitrogen is organic nitrogen and not available for crop production in the year it is applied. This organic nitrogen becomes available for crop production over a period of years. The accumulated organic nitrogen from past manure applications can contribute a considerable amount of nitrogen to the current crop.

There are two ways to determine the amount of residual manure nitrogen. These options are outlined in the Penn State Agronomy Guide. Both options rely on the manure application history, particularly the frequency of manure application, provided by the operator for each field. This is noted as the number of years out of the past five years that a field has received manure. In addition, option 2 requires the type of manure, the manure analysis and the application rates for each year in the past 5 that manure was applied to a field.

- Option 1 uses the Penn State Agronomy Guide, Table 1.2-14B. This method is commonly called the "Total N Method". Based on the frequency of manure application over the past five years the appropriate residual nitrogen value is determined.

- Option 2 uses the Penn State Agronomy Guide, Table 1.2-15. This method provides a more refined estimate of residual manure nitrogen that utilizes the chemical manure analysis that provides the amount of ammonium N and organic N in the manure to calculate the amount of residual nitrogen. This method is commonly called the "N Fractions Method".

  The Nutrient Management Plan Spreadsheet includes a Manure N Residual Calculator that must be completed for Option 2 and must be included in Appendix 10: Supporting Information and Documentation. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to use the Manure N Residual Calculator.

Either of these options can be used for both typical and atypical manures.

Atypical manure is defined as the end product of any manure treatment process in which the typical ratio of ammonium and organic nitrogen is altered and thereby influencing the nitrogen availability when this manure end product is land applied for crop production. The nitrogen availability for atypical manure in Act 38 nutrient management plans must be determined by utilizing the "N Fractions Method" using the Penn State Agronomy Guide Table 1.2-15. Below is a partial list of several types of manure treatment processes that result in atypical manure types that require the "N Fractions Method" of nitrogen availability determination.

1. **Mechanically Separated Manure** – The end products of manure that is run through equipment that separates or removes the solids from the liquids.

2. **Manure Separated by Settling** – The end products of manure that is run through a treatment system using a series of settling tanks or ponds in order to separate the solids from the liquids.
3. **Unagitated Liquid Manure –** The liquid and solid portions of manure (layers created by the settling of solids in a liquid storage) that are land applied without the manure being sufficiently agitated to create a homogenous product.
4. **Composted Manure** – Manure that is actively composted by adding the appropriate amount of a carbon source, routinely turning or mixing and monitoring temperature.
5. **Mortality Compost** – Livestock and poultry mortality that is actively composted by adding the appropriate amount of a carbon source, turning or mixing and monitoring temperature.
6. **Biogas Manure –** Manure that has gone through the digestion process for methane gas production.
7. **Manure Treated with Additives** – Manure in a liquid or semisolid manure storage that has been treated with an additive.

For legume crops that are not receiving manure, no manure residual nitrogen value is listed in the plan. However, if a manure application is planned for legume crops, manure residual nitrogen must be accounted for in the plan.

For double crops the residual manure N is split between the two crops.

No adjustments are needed for residual phosphorus and potassium from previous manure application because these nutrients are accounted for through the soil test and soil test recommendations.

Residual Nitrogen Carryover from Previous Legume Crops

As legume crop fields are converted to non-legume crop production, nitrogen fixed in the soil by the legume crop can provide a significant amount of nitrogen for the following non-legume crop. No legume credit is given to a legume following a legume within a continuous legume stand.

The amount of residual legume nitrogen contributed by legumes is dependent on the type of legume crop, soil productivity group and the percent of stand and by yield for soybeans. The amount of residual legume nitrogen that each rotated legume crop will contribute to the next crop is based on the Penn State Agronomy Guide, Table 1.2-6~~7~~.

For double crops the residual legume N must be allocated to the summer crop.

Many crop production systems in Pennsylvania will have fields or crop groups that have both a manure and legume history. In these cases, the nitrogen recommendation should be adjusted for both manure and legume N residuals.

Net Nutrients Required

Net nutrients required values are obtained by subtracting amounts of starter fertilizer and residual manure nitrogen and residual legume nitrogen from the soil test nitrogen

recommendation and subtracting the amount of phosphorus and potassium applied in the starter fertilizer from the soil test phosphorus and potassium recommendations. The amount of net nutrients required can also be used by the operator to determine fertilizer needs if the planned manure is not applied to the field. Refer to the NMP Summary section for additional information and guidance.

Selection of Manure Groups & Application Management
Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to select manure groups and application management for a field and crop.

Manure Group
A list of both collected manure groups and uncollected manure groups is developed from Appendix 3.

Planned Application Season & Management
Nutrients must be applied to fields during times and conditions that will hold the nutrients in place for crop growth, and protect surface water and groundwater in accordance with the approved manure management practices as described in the plan. The application season and method of application must be entered for each planned manure application. The options for season and method of application are based on the nitrogen availability tables described in the next section. The longer manure is in or on the soil before crops use the nutrients, the more those nutrients, especially nitrogen, have the potential to be lost through volatilization, denitrification, leaching, and erosion. The season in which manure is applied will also affect the nutrient availability for crops.

Availability Factors
Only a portion of total manure nitrogen is available to the crop during the season of application. A significant amount of manure nitrogen is in the organic form and not available during the first growing season. Under even the best of conditions only about 50% (75% for poultry manure) of the nitrogen in the manure is available to the crop in the year it is spread. In addition, varying amounts of nitrogen are lost due to volatilization. The incorporation of applied manure and the timing of incorporation control the amount of nitrogen loss due to volatilization after application. Surface-applied manure can potentially lose large amounts of nitrogen to the air if it is not incorporated mechanically or by at least ½ inch of rain or other added water soon after application.

The planned manure incorporation time provided by the farmer, the type of manure, the season of manure application, and the expected time of crop utilization of the nitrogen are used to determine the appropriate nitrogen availability factor.

There are two options which can be used to determine availability factors and to calculate the amount of available nitrogen in the manure.

- Option 1, the “Total N Method”, is the most common method and uses the Penn State Agronomy Guide, Table 1.2-14A. **This option cannot be used for atypical or treated manures.**
- Option 2, called the “N Fractions Method”, provides a more refined estimate of

available manure nitrogen that utilizes the amount of ammonium N and organic N in the manure determined by chemical analysis and uses the Penn State Agronomy Guide, Table 1.2-15. **This option must be used for atypical or treated manures.**

For typical manures only, values for manure N availability and residual manure N from Tables 1.2-14 and 1.2-15 may be used interchangeably throughout one nutrient management plan or within one field.

The Nutrient Management Plan Spreadsheet includes a database of the Penn State Agronomy Guide Tables 1.2-14 and 1.2-15 to provide selection options for application season and management.

Planned Winter Manure Applications
All fields with planned winter applications must be assessed by the Supplement 10: Winter Manure Application Matrix and Part B of the P Index. The completed Winter Application Matrix, evaluating each of the fields designated for winter application must be included in Appendix 10: Supporting Information and Documentation.

N Balanced & P Removal Balanced Manure Rates
The Appendix 4 Input Sheet in the Nutrient Management Plan Spreadsheet provides both N and P removal balanced manure rates.

This P Removal Balance Manure Rate must be used for fields on the operation that require a P removal manure rate as determined by the Part B of the P Index. The P Removal Balance Manure Rate would maintain but not increase soil P levels thus reducing the probability that high P levels will become an environmental issue over time. This rate will usually not meet the N requirement of the crop and thus will have to be supplemented with fertilizer N.

Planned Manure Rate
The planned manure rate will be based on either nitrogen or phosphorus as determined by the P Index.

1. If the P Index, Part A above is “N-Based” any planned manure rate less than or equal to the calculated N balanced manure rate is acceptable and may be used for these fields. Selection of an actual planned rate is discussed in more detail below under “Considerations for Selecting a Planned Manure Rate.”

2. For fields that require Part B of the P Index and the P Index values are less than 80, any planned manure rate less than or equal to the calculated N balanced rate is acceptable and may be used for these fields.

3. For fields that require Part B of the P Index and the P Index values are 80 or greater and less than 100, any planned manure rate less than or equal to the calculated P removal balanced rate is acceptable and may be used for these fields.

4. For fields that require Part B of the P Index and the P Index values are 100 or greater, no manure may be applied to these fields.

Considerations for Selecting a Planned Manure Rate

The specific planned manure application rates must be based on the calibration of the manure application equipment used on the operation to ensure that the planned application rate is attainable. The specific calibration information for each manure application rate used in the nutrient management plan must be summarized in the NMP Summary – Manure Spreader Calibration Notes. Refer to the NMP Summary and Appendix 2: Operation Information sections for specific guidance on spreader calibration requirements for Act 38 nutrient management plans and on rounding calibrated and planned rates.

Planned manure application rates for pastures are determined by dividing the amount of uncollected manure on the pasture by the acres in the pasture. If the Grazing Calculator is used to determine the uncollected manure application rate, a printout of the Grazing Calculator should be included in Appendix 10.

Phosphorus Banking

In some cases a P Removal Balanced Rate may be very low and not allow for planning a rate that is practical for the operation's application equipment. **A phosphorus banking rate for up to three years may be allowed contingent on obtaining approval from the State Conservation Commission.** If permission is granted, the rate must not exceed the net nitrogen requirement in the year of application and may not elevate the P Index Value into the Very High management guidance category. In addition, a statement should be included in Appendix 10: Supporting Information and Documentation noting the name of the Commission staff person granting the approval and the date that the approval was granted.

9000 Gallon Rate Limit

Single applications of liquid or semisolid manure applications may not exceed rates of 9,000 gallons per acre. If the planned manure rate exceeds 9,000 gallons per acre, the plan must designate separate applications each less than 9,000 gallons. This can be handled two ways in the nutrient management plan:

1. Entered as multiple applications in Appendix 4 of the NMP Spreadsheet. Each of the separate applications must be calibrated rates and have the same season of application. A note must be included in the NMP Summary Notes requiring that adequate drying time occur between the separate applications.
2. Entered as the total combined rate in Appendix 4 of the NMP Spreadsheet. A note must be included in the NMP Summary Notes indicating that the planned rate must be applied in separate applications during the same application season with adequate drying time between the applications. In addition, the note must include the specific calibrated rates for each separate application.

Application rates greater than 9000 gallons per acre may be used if based on the calculation of infiltration rate and water holding capacity of the application sites contingent **on obtaining approval from the State Conservation Commission**. In

addition, a statement should be included in Appendix 10: Supporting Information and Documentation noting the name of the Commission staff person granting the approval and the date that the approval was granted.

Irrigated Manure

For irrigation of manure, the planned rate must be based on the maximum total quantity of manure that can be applied based on nitrogen or phosphorus, as for all manure applications. In addition, however, the rate of application in terms of inches of manure applied per hour must also be considered. The speed that the manure can be irrigated onto a field or the maximum amount of manure that can be applied per hour is limited by the soil infiltration rate and other soil characteristics such as the soil texture, whether the soil is covered or bare, the slope, and the soil moisture at the beginning of irrigation.

The factsheet "Irrigation of Liquid Manures (F254)" (https://extension.psu.edu/programs/nutrient-management/educational/manure-storage-and-handling/irrigation-of-liquid-manures) should be used to determine appropriate manure irrigation rates.

These calculations must be included in Appendix 10: Supporting Information and Documentation to document the planned irrigation application rate. Details of how the irrigation equipment will be operated to achieve this rate must be included the "Manure Spreader Calibration Notes" section of the "Nutrient Management Plan Summary".

Manure Group Allocation Balance

As manure is allocated in the Appendix 4 Input Sheet the spreadsheet provides a running balance of manure, both collected and uncollected, that is unallocated or has been over allocated. The amount of manure listed in the "Total Manure Collected Per Manure Group" row in Appendix 3 must be allocated to fields on the operation or exported off of the operation.

The amount of unallocated manure must not exceed 5% of the total amount of manure collected in the manure group. This limit does not apply to manure groups with small quantities of collected manure:

- 5 tons of poultry manure
- 25 tons of non-poultry manure
- 10,000 of liquid manure

Over allocation of the manure in one or more manure groups in a nutrient management plan is permitted as long as the following conditions are met:

- Planned application rates on any one field/CMU from two or more manure groups must be planned as multiple applications so as to ensure that those multiple applications do not exceed the appropriate (nitrogen or phosphorus) balanced rates for that field/CMU.
- Planning different application scenarios for a particular field/CMU is not permitted in the approved plan. For example:
    - Including planned applications rates for multiple manure groups in the plan to allow the operator to choose between them is not allowed. Notes to the

operator such as, *"Application planned on corn fields for the fall may be moved to the spring and application planned for the spring may be moved to the fall."* are not permitted.
  - Including rates of 4,500 gallons, 6,000 gallons, and 7,500 gallons from one manure group in the plan to allow the operator to choose between them is not allowed.
- The planned application rate should be what the operator realistically plans to utilize.

When manure is over allocated, there is a high probability that enough manure will not be available during application to cover all the planned fields for that manure group. A standard whole farm note is included in the Nutrient Management Plan Spreadsheet NMP Summary that provides guidance for this scenario. Refer to NMP Summary for more information on the Whole Farm Note.

Planners may plan additional options for fields/CMUs beyond what is in the submitted plan. If the operator decides to utilize one of the additional planned options in place of the planned application rate in the approved plan, the operator should have the plan writer make the substitution(s) in the already submitted/approved plan and submit this as a plan update.

Note that plan updates are also required if the operator applies the planned manure group at a rate greater than the planned application rate. However, plan updates are not required if an operator applies the planned manure group at a rate less the planned application rate. If lower rates are applied, additional nutrients (particularly nitrogen) will most likely be required to achieve the expected yield.

Supplemental Fertilizer

The need for supplemental fertilizer must be addressed in the plan. If the planned manure rate is less than the balanced rate, it may be necessary to supplement with other fertilizer nutrients to meet the total nutrient requirements of the crop. If the amount of supplemental nutrient need after manure nutrients are accounted for is significant, and this is not applied, it is unlikely that the planned yields will be achieved.

The amount of supplemental fertilizer is determined from the "Balance after Manure" values. The supplemental fertilizer amount cannot exceed the amount of N recorded in "Balance after Manure". If the P Index, Part B evaluation limits the P application to crop P removal, the supplemental fertilizer P cannot result in total P application greater than the crop P removal.

In many cases the planner will simply include any net nutrient need as supplemental fertilizer. This will tell the operator the maximum amount of supplemental nutrients that can be applied. The farmer can then decide if any supplemental fertilizer will be actually applied. In some cases the farmer may request specific practical supplemental fertilizer application rates be provided in the plan. This is a farmer preference.

Pre-Sidedress Nitrogen Tests

For corn crops, the use of the pre-sidedress nitrogen or chlorophyll meter tests for corn can be recommended to determine supplemental nitrogen fertilizer needs for those instances where manure applications may not meet the total nitrogen needs of the corn crop. If these tests are used, supplemental nitrogen may be applied at rates determined by the tests regardless of the calculated nitrogen balance. Operators must document these rates by maintain records of the test results.

Appendix 5
Phosphorus Index

Introduction

The purpose of Appendix 5 in the Act 38 Nutrient Management Plan is to evaluate the planned phosphorus (P) inputs to each field on the operation using the Pennsylvania Phosphorus Index (P Index) in order to identify the fields vulnerable to phosphorus loss and guide appropriate P management to protect water quality. The P Index considers critical P source and transport factors to effectively evaluate the P loss potential from land applications of nutrients.

Phosphorus source factors considered in the Pennsylvania P Index are Mehlich 3 soil test P, fertilizer P application rate and method, and manure P application rate, method, and P source coefficient. The transport factors considered are soil erosion, runoff potential, subsurface drainage, distance to a receiving water body, and an evaluation of management practices impacting P transport. These factors are combined in a simple calculation to arrive at a P Index Value for the field. The P Index Value indicates whether the nutrient application rate may be limited and/or other management practices may be required to address P concerns. Management practice recommendations may include installation of best management practices to reduce transport potential, such as common erosion control practices or buffers. Alternatively, changes in the timing or method of P application may reduce risk of P loss allowing for N-based nutrient application.

The specific regulatory requirements for this information are outlined in section 83.293 of the Act 38 regulations.

Nutrient Management Plan Format

Act 38 regulations require that all nutrient management plans use a standard format for organizing and presenting the required plan elements. Appendix 5 is included in the standard format spreadsheet developed by the Nutrient Management Program. The standard spreadsheet includes all the required plan elements and performs most of the necessary calculations using the data entered. Refer to the Nutrient Management Plan Spreadsheet User Guide for guidance on how to use the spreadsheet and enter data to complete Appendix 5.

All plans developed and submitted for approval must use the current version of the NMP Standard Format. The current version is the one posted on the Nutrient Management Program website (https://extension.psu.edu/programs/nutrient-management).

Also available on the Nutrient Management Program website is a standalone version of the P Index Spreadsheet (https://extension.psu.edu/programs/nutrient-management/tools/phosphorus-index) and a factsheet “The Pennsylvania Phosphorus Index: Version 2” (https://extension.psu.edu/the-pennsylvania-phosphorus-index-version-2).

Phosphorus Index Information Required for Each Field

The Nutrient Management Plan Spreadsheet integrates Appendices 3, 4 and 5 so that many of the inputs required to complete Appendix 5 come from data entered in Appendices 3 and 4. Table 1 below provides a list of information required for each field to complete a P Index field evaluation and the source of that information. Details on these items are provided in following sections.

Table 1. Information Required for Appendix 5

Information	Source of information
CMU/Field ID	Taken directly from Appendix 4
Special Protection Watershed	Taken directly from Appendix 4
Significant Management Change	Taken directly from Appendix 4
Mehlich 3 Soil Test P (ppm P)	Taken directly from Appendix 4
Distance to Water	Taken directly from Appendix 4
Winter Manure Application	Taken directly from Appendix 4
Mehlich 3 Soil Test P (ppm P)	Taken directly from Appendix 4
Fertilizer P Rate (lb P_2O_5 /A)	Taken directly from Appendix 4
Fertilizer Application Method	Taken directly from Appendix 4
Manure P Rate (lb P_2O_5 /A)	Taken directly from Appendix 3 and 4
Manure Application Method	Taken directly from Appendix 4
P Source Coefficient	Taken directly from Appendix 3
Erosion - Soil Loss (ton/A/year)	Calculated using the Revised Universal Soil Loss Equation (RUSLE) in PA USDA-NRCS Conservation Plan or PAOneStop Farm Mapping and E&S Planning System
Runoff Potential	Based on soil type from Soils Map and PA County Drainage Class Tables
Subsurface Drainage	Determined from the farmer interview or farm conservation plan
Contributing Distance	Determined from Operation Map or measured in the field
Modified Connectivity	Determined from the farmer interview and/or field inspection

Frequency of Phosphorus Index Evaluation

Because Appendix 5: P Index is integrated in the standard format spreadsheet Appendix 5 will immediately reflect all changes and updates made in Appendices 3 and 4. The exception is the transport factors. If there are management practice changes that impact the transport factors, particularly erosion, subsurface drainage, and modified connectivity, the category selections for these factors should be done at the time of required nutrient management plan updates or amendments. Refer to NMP Submission: Required Appendices and Supplemental Information for complete guidance on plan updates and amendments.

"No P Applied" Management Decision

In a farm management system where a management decision has been made to not apply any P to a field from manure, other organic nutrient sources, or fertilizer, including starter fertilizer, for the life of a nutrient management plan, Part B of the P Index evaluation is not required.

However, if at any time there is a change in management for that field and P from manure, other organic sources or fertilizer, including starter fertilizer, will be applied (such as when the field is rotated to a crop that will receive manure), the

field must be evaluated with the P Index: Part B and the nutrient management plan updated or amended accordingly before this application can occur.

Phosphorus Index Guidance for Pastures

The Act 38 nutrient management regulations have established guidance for pastures receiving less than or equal to N balanced nutrient application rates and a Very High P Index Rating. According to §83.294(j) of the Act 38 regulations the following four conditions **must be met for grazing to continue on these pastures**.

1. Grazing may not be conducted within 50 feet of a perennial or intermittent stream, a lake or a pond.
2. A prescribed grazing system shall be used to maintain an established stand of forage on the pasture area.
3. The stocking rate shall be limited to ensure that the level of phosphorus deposited by the animals does not exceed the level of phosphorus removal from the soil by vegetation in the pasture.
4. BMPs contained in the Pennsylvania Technical Guide may be used to meet the requirements in paragraphs (1) and (2). Other BMPs shall be approved by the Commission.

Refer to the Pennsylvania Field Office Technical Guide (https://extension.psu.edu/programs/nutrient-management/planning-resources/pa-technical-guide) for more information on these management practices.

CMU/Field ID

Determining land area to be included in each crop management unit (CMU) or field is a critical step in developing a nutrient management plan using the P Index because field location and topography are important considerations in the P Index. Factors such as distance to receiving water, erosion, runoff potential, and modified connectivity may be very different from field to field. If multiple fields are combined into a single CMU, only one value is selected for all P Index source and transport factors. **If all P Index factors are not the same for the each of the fields in a CMU, then the worst case scenario values must be used for the entire CMU.**

For example, if one of the combined fields in a CMU is close to receiving water and has a high erosion rate then all fields in that CMU must be considered close to receiving water and to have a high erosion rate in the P Index. This applies regardless of the actual individual field properties.

Often there is considerable variability within fields; therefore, the same approach detailed above is used to address within field variability. Part of a field may be at high risk for P loss while another part of the field may be at low risk. For the P Index, the worst case part of the field must be used to determine its P Index Rating and Value.

There may be situations where splitting a field into subfields for P Index evaluation is advantageous. For example, a field may have a relatively small steep sloping area close to a stream. For the P Index, the whole field would be considered to be steep

sloping and close to the stream. Splitting off this small, steep sloping area and managing it differently (e.g. applying less manure or applying manure at a different time or in a different way) may remove P-based restrictions on the remainder of the field.

Part A: Screening Tool

Part A of the P Index is a Screening Tool used to determine if a more detailed analysis using Part B of the P Index is needed. The Part A approach is to evaluate several simple criteria including watershed classification, distance from receiving water and soil test P level. Every field must be evaluated by P Index Part A answering the five Part A questions. If any Part A questions are answered "Yes", Part B of the P Index must be completed.

If all Part A questions are answered "No", no further P Index analysis using Part B is required. Completion of Part A with all "No" answers meets the regulatory requirement for running the P Index on all fields as part of a nutrient management plan.

PART A: SCREENING TOOL	CMU/Field ID
Is the CMU in a Special Protection Watershed?	If the answer is yes to <u>any</u> of these questions, Part B must be used.
Is there a significant farm management change as defined by Act 38?	
Is the Soil Test Mehlich 3 P greater than 200 ppm P? (enter soil test value in ppm P)	
Is the Contributing Distance from this CMU/field to receiving water less than 150 ft.?	
Is winter manure application planned for this field?	

<u>Special Protection Watershed</u>

The watershed classification provides an indication of the sensitivity of the receiving waters to potential nutrient pollution. Streams that are designated "Exceptional Value" or "High Quality" are considered as Special Protection Watersheds.

Information on special protection waters can be found on the web in an interactive map format called eMapPA (http://www.depgis.state.pa.us/eMapPA/). To use this site, turn on the "Streams Designated Use" feature and zoom in on the farm location on the map. Refer to the map key to determine if the stream is "Exceptional Value" or "High Quality". For additional information on using this website tool refer to "Using eMapPA to Identity Special Protection Watersheds" (https://extension.psu.edu/programs/nutrient-management/planning-resources/other-planning-resources/using-emap). County Conservation Districts or The Pennsylvania Department of Environmental Protection (DEP) may also be able to provide Special Protection Watershed listings.

Part A designations must be consistent with the eMapPA guidance and Appendix 2: Operation Information; Notation of Special Protection Waters.

<u>Significant Farm Management Change</u>

Soil test P level is a key factor in Part A because it reflects P management history. In stable management systems, past and current planned nutrient management practices are similar and soil test P level is a valid indictor of P sources. However, when the current planned practices are not consistent with historical practices soil test level P is not a valid indicator for P sources because of the management change.

Typically in these situations, planned manure application rates are significantly higher than historical rates. Management changes resulting in this discrepancy are generally obvious and can include addition of new lands to or expansion of an agricultural operation, a change in P nutrient sources, or a change in animal type. A significant management change is defined by the following four Act 38 criteria:

- Net increase of greater than 10% in AEUs per acre
- Change in crop management that results in a farmwide reduction of greater than 20% in nitrogen necessary for realistic expected crop yields
- Alternative organic sources will replace all or some of the nutrient sources listed in the plan
- Additional lands are brought into the operation (purchased or rented)

A significant management change for an operation will remain in effect for the duration of the three years of an approved nutrient management plan. After the triennial review the significant management change status will be terminated for Part A of the P Index.

Soil Test Mehlich 3 P Level

Fields with Mehlich 3 P soil test results greater than 200 ppm P require completion of the P Index: Part B.

Contributing Distance

Distance to water is a good general indicator of the potential for P transport to that water. Fields within 150 feet of receiving water require completion of the P Index: Part B. See the section below on Contributing Distance for details on how this distance is determined for the P Index.

Winter Application

There is an increased risk of P loss from winter applied manure. Fields that are planned for mechanical winter manure application require the completion of the P Index: Part B.

Part B: Source Factors

Soil Test

SOIL TEST	Mehlich 3 Soil Test P (ppm P)
	Soil Test Rating = 0.20 * Mehlich 3 Soil Test P (ppm P)

The soil test level is Mehlich 3 P in parts per million (ppm) taken directly from a soil test report. This is the same soil test value used in P Index Part A. Refer to Appendix 4: Crop and Manure Management Information for guidance selecting soil test laboratories and understanding soil test report nutrient levels.

Soil Test Rating

Soil Test P Rating is calculated by multiplying *Soil Test* in ppm P by 0.2. This calculation appropriately weighs soil test P relative to the other source factors.

The Fertilizer section of the P Index must be used to evaluate all inorganic P applications to a field.

FERTILIZER P RATE	**Fertilizer P (lb P_2O_5/acre)**				
FERTILIZER APPLICATION METHOD	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in November - March	1.0 Surface applied to frozen or snow covered soil
Fertilizer Rating = Fertilizer Rate x Fertilizer Application Method					

Fertilizer Rate

This factor is the fertilizer P rate reported in pounds of P_2O_5/A that will be applied to the field from planned fertilizer applications.

Fertilizer Application Method

The Fertilizer Application Method provides five descriptions of typical fertilizer application methods from which the category that most closely describes the planned fertilizer application method is selected. Following is additional information on these categories:

Placed or injected 2" or more deep	The category applies to starter fertilizer P placed several inches deep in the soil with the planter or to immediate injection. The next category applies to application followed by mechanical incorporation as a separate operation.
Incorporated <1 week following application	The category applies to mechanical fertilizer incorporation with primary or secondary tillage within 1 week following application. This includes same day incorporation. This does not include incorporation by rainfall.
Incorporated > 1 week or not incorporated following application in April – October	The category applies to mechanical fertilizer incorporation more than 1 week after application or no fertilizer incorporation from April to October.
Incorporated >1 week or not incorporated following application in Nov. – March	The category applies to mechanical fertilizer incorporation more than 1 week after application or no fertilizer incorporation from November to March.
Surface applied to frozen or snow covered soil	The category applies to fertilizer application on frozen or snow covered soil.

Fertilizer Rating

The Fertilizer Rating is calculated by multiplying the *Fertilizer Rate* by the *Fertilizer Application Method* factor. If more than one fertilizer application is made to a given field, each individual fertilizer application must be included in the P Index and summed to calculate the final Fertilizer Rating.

The Manure section of the P Index must be used to evaluate all organic P applications to a field. This includes manures, composts, biosolids, etc.

MANURE P RATE	Manure P (lb P_2O_5/acre)				
MANURE APPLICATION METHOD	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in November - March	1.0 Surface applied to frozen or snow covered soil
P SOURCE COEFFICIENT	Refer to: Test results for P Source Coefficient OR Book values from P Index Fact Sheet Table 1				
Manure Rating = Manure Rate x Manure Application Method x P Source Coefficient					

Manure Rate

This factor is the manure P rate reported in pounds of P_2O_5/A, that will be applied to the field from planned manure applications. This is determined by multiplying the planned manure rate times the manure P analysis.

Manure Application Method

The Manure Application Method provides five descriptions of typical manure application methods from which the category that most closely describes the planned manure application method is selected. Following is additional information on these categories:

Placed or injected 2" or more deep	The category applies only to directly injected manure such as with a chisel or disk injector. The next category applies to application of manure followed by separate mechanical incorporation.
Incorporated <1 week following application	The category applies to mechanical manure incorporation with primary or secondary tillage within 1 week following application. This includes same day incorporation. This does not include incorporation by rainfall.
Incorporated > 1 week or not incorporated following application in April – October	The category applies to mechanical manure incorporation more than 1 week after application or no manure incorporation from April to October.
Incorporated >1 week or not incorporated following application in November – March	The category applies to mechanical manure incorporation more than 1 week after application or no manure incorporation from November to March.
Surface applied to frozen or snow covered soil	The category applies to manure application on frozen or snow covered soil.

When using the following equipment, the associated factors are recommended:

- A shallow disk injector, select *Placed or injected 2" or more deep* category.
- A spike aerator or a straight disk vertical tillage tool, select *Incorporated <1 week following application* category.

- A rotary harrow, select either *Incorporated > 1 week or not incorporated following application in April – October or November – March* category depending on the time of year.

When the nutrient management plan includes uncollected manure from year-round grazing, use one of the following options to select the appropriate factor(s):

- Use the worst case scenario "Surface applied to frozen or snow covered soil" for all of the uncollected manure groups for the pasture field.
- Apply the uncollected manure groups as multiple applications to the pasture field in Appendix 4 of the NMP Spreadsheet, selecting the factor corresponding to the uncollected manure group season. In some cases this may require creating separate manure groups in Appendix 3 of the NMP Spreadsheet.

Phosphorus Source Coefficient

The P source coefficient (PSC) accounts for P available for loss directly from organic P sources to surface runoff. It is not related to P crop availability. The appropriate PSC value can be selected two ways.

The first option is to have the organic P source analyzed using a commercially available manure test for water soluble P. This test provides a PSC for a specific organic P source and can be performed at the same time as the standard agronomic manure analysis. The PSC is a calculated value based on the water soluble P manure test. The minimum PSC analytical value is 0.10 and the maximum PSC analytical value is 1.0. Ensure that the testing lab is using the correct formula to calculate the PSC. The factsheet "Obtaining a P Source Coefficient" (https://extension.psu.edu/programs/nutrient-management/planning-resources/other-planning-resources/p-source-coefficient) provides more information about the water soluble P test.

The second option is to select a PSC book value from the table below. For all organic P sources not listed, a water soluble P analysis should be conducted. If the analytical results are not available and the organic P source is not listed below, use a default PSC value of 1.0 in the P Index.

Phosphorus Source Coefficients (PSC) Book Values [1]

Manure	
Swine manure	1.0
Broiler	0.8
Layer	0.8
Turkey	0.8
Duck	0.8
Dairy – Liquid	0.8
Dairy – Bedded Pack	0.8
Beef	0.8
Horse	0.8
Biosolids	
BPR Biosolids	0.8

All biosolids (except BPR) 0.4

[1] Coale, F., T. Basden, D. B. Beegle, R. C. Brandt, H. A. Elliott, D. J. Hansen, P. Kleinman, G. Mullins, and J. T. Sims. 2005. Development of Regionally-Consistent Phosphorus Source Coefficients for Use in Phosphorus Index Evaluations in the Mid-Atlantic Region. USDA-CSREES, The Mid-Atlantic Regional Water Program, MAWQP# 05-04.
Available at http://www.usawaterquality.org/conferences/2005/Posters/Poster_Abstracts/Pest_Poster_Abstracts/Coale.pdf

Manure Rating

The Manure Rating is calculated by multiplying the *Manure P Rate* by the *Manure Application Method* factor by the *P Source Coefficient*. If more than one manure application is made to a given field, each individual manure application must be included in the P Index and summed to calculate the final Manure Rating.

Source Factor Sum

Source Factor = Soil Test Rating + Fertilizer Rating + Manure Rating

The overall Source Factor is calculated by adding together the three source factor ratings values: ***Soil Test Rating***, ***Fertilizer Rating***, and ***Manure Rating***.

Part B: Transport Factors

Erosion

EROSION	Soil Loss (ton/acre/yr)

The erosion rate estimates soil loss based on crop management, tillage practices, regional location, and best management practices. The erosion value for the P Index is calculated using the Revised Universal Soil Loss Equation (RUSLE) and is reported in tons/acre/year. This is usually determined by Pennsylvania USDA-NRCS as a part of the conservation plan development process. For operations that do not have a Conservation Plan, the PAOneStop Farm Mapping and E&S Planning System (https://extension.psu.edu/programs/nutrient-management/planning-resources/paonestop) can be used to determine soil loss values for use in the P Index.

For the P Index, the actual (A) erosion value should be used and not the tolerable (T) soil loss value. However, **if the conservation plan is fully implemented to meet T** then the T soil loss value can be used in the P Index.

Runoff Potential

RUNOFF POTENTIAL	0 *Drainage Class is* Excessively	2 *Drainage Class is* Somewhat Excessively	4 *Drainage Class is* Well/Moderately Well	6 *Drainage Class is* Somewhat Poorly	8 *Drainage Class is* Poorly/Very Poorly

Surface runoff potential is based on the USDA-NRCS Drainage Class. Based on soil properties, Drainage Class values are classified into Very Poorly, Poorly, Somewhat Poorly, Moderately Well, Well, Somewhat Excessively, and Excessively. Pennsylvania USDA-NRCS has developed tables that list the Drainage Class by soil mapping unit for each Pennsylvania county. To determine this factor for each field the "Pennsylvania County Drainage Class Tables" (https://extension.psu.edu/programs/nutrient-management/planning-resources/other-planning-resources/pennsylvania-county-drainage-class-tables) should be used.

When determining the appropriate Runoff Potential category for a field, first determine the predominate soil type in the field. Then use the table for the county where the operation is located from the "Pennsylvania County Drainage Class Tables" to find the predominate soil type on the table, and select the Drainage Class value. If there are multiple soil types, first look at the table because they may all have the same drainage class. Where there is multiple soil types with different drainage classes generally use the predominant soil. Or, if there is a significant part of the field that would be considered environmentally sensitive, use that soil type to determine the drainage class for the Runoff Potential.

Subsurface Drainage

SUBSURFACE DRAINAGE	0 None or No direct outlet to receiving water		1 Random – Outlets directly to receiving water		2* Patterned – Outlets directly to receiving water
* OR rapid permeability soil near a stream					

Subsurface drainage accounts for the presence of artificial drainage in a field. There are three options provided in the P Index: *None*, *Random*, and *Patterned*.

None refers to a field that has no artificial drainage. It also refers to a field with subsurface drainage that does not outlet directly to receiving water bodies.

Random applies to fields with one or more drains that address wet conditions in a section(s) of a field. Generally, field drainage qualifying as *Random* will be spaced more than 75 feet apart. Subsurface drainage for this category must outlet directly to receiving water bodies.

Patterned applies to fields that have multiple connected drains designed to address wet conditions across an entire field. Patterned drainage is most commonly found in northwestern Pennsylvania, specifically in Crawford, Erie, Lawrence, Mercer, Warren, Butler, and Beaver counties. Generally, these systems have tile drain lines spaced 35 to 50 feet apart. When the tile drain line spacing equals or exceeds 75 feet the system

is considered *Random*. Subsurface drainage for this category must outlet directly to receiving water bodies.

In assigning the appropriate category, the type of subsurface drainage needs to be determined using farm maps, farm records, or information from the farmer interview. An important piece of information is whether the drain outlets directly into receiving water bodies. Once it has been determined that a field has *Random* or *Patterned* drainage, and that has been accounted for in the P Index, the presence of the tile drain and the location of its outlet are not considered as a part of the Modified Connectivity determination. Therefore, tile drains are only considered and accounted for in the *Subsurface Drainage* category.

An additional consideration in the Subsurface Drainage category determination is whether a rapidly permeable soil exists within 100 feet of a receiving water body. Information for determining whether a soil is rapidly permeable is found in the county soil survey report or by using the USDA-NRCS Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm).

For the P Index, a rapidly permeable soil is defined as having a Permeability greater than 6 in/hr and includes soil types with both Rapid and Very Rapid Soil Permeability Class designations. If a field has soils 1) identified in the soil survey as having a permeability greater than 6 in/hr and 2) within 100 feet of a receiving stream then the *Patterned Subsurface Drainage* category must be selected.

Contributing Distance

CONTRIBUTING DISTANCE	0 > 500 ft.	2 350 to 500 ft.	4 200 to 349 ft.	6 100 to 199 ft. OR <100 ft. with 35 ft. buffer	9‡ < 100 ft.

‡ A "9" Contributing Distance factor does not apply to fields with a 35 ft. buffer receiving manure. For these fields, a "6" Contributing Distance factor must be used. Specific guidance for assigning a Contributing Distance factor for these fields is described in this section under the heading 35 ft. Wide Buffer.

Contributing distance assesses the distance of a field from a receiving body of water. In the Contributing Distance determination, a receiving water body can include: ponds, lakes, and perennial and intermittent streams with channels (bed and bank). Other conveyances such as ditches are accounted for in the Modified Connectivity section of the P Index (see below). The distance categories were developed using landscape properties in combination with the potential occurrence of storms with varying intensities. The closer a field is to a receiving body of water, the more likely it is that P leaving the field will reach the body of water.

To determine the contributing distance for a field, the lower edge or edges of the field in the direction of water flow to the receiving water body must be used. It is necessary to determine how the P Index distance categories correspond with the farm field

boundaries. This is most easily done by plotting distance lines at 100, 200, 350, and 500 feet on a farm map with field boundaries and receiving water bodies delineated. Then determine which Contributing Distance category accounts for a majority (50% or more) of the lower edge or edges of the field in the direction of water flow to the receiving water body. This method of determining Contributing Distance and the same lower field edge or edges in the direction of water flow to the receiving water body must be used in Part A and Part B. Therefore, all distance determinations and methods must be consistent between P Index Parts A and B.

Depending on the landscape, when determining the lower edge of a field in the direction of water flow, two or more field edges or boundaries may need to be evaluated. In these cases, the total length of all of the field edges or boundaries are considered when determining which Contributing Distance category accounts for 50% or more of the lower edges in the direction of water flow.

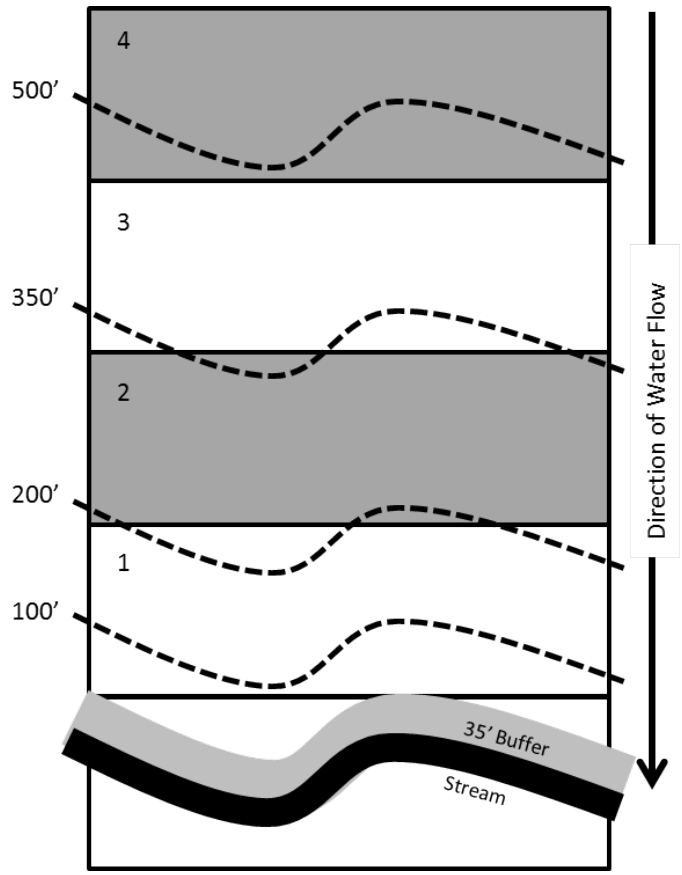
The figure below illustrates how to determine the distance category for fields.

1. Distance factor = 6
   < 100 ‘ with 35 ft. buffer
   All of the lower boundary in the direction of water flow is within 100 feet of the stream **but** with a 35 ft. vegetative buffer

2. Distance factor = 4
   200 - 349 ‘
   Less than ½ of the lower field boundary is inside the 200 ‘ line and all of the lower boundary in the direction of water flow is within the 350’ line.

3. Distance factor = 4
   200 - 349 ‘
   More than ½ of the lower field boundary is inside the 350’ line, but outside the 200’ line. Even though most of the field is outside the 350’ line, the determination is based on the lower boundary.

4. Distance Category = 2
   350 - 500 ‘
   All of the lower boundary is between the 350’ line and the 500’ line.



Contributing Distance Considerations

Near stream areas require special considerations which must be evaluated and addressed prior to completing the P Index Contributing Distance evaluation. Refer to the Nutrient Management Plan Summary for specific requirements for manure application setbacks and buffers.

A category of *9 < 100 ft.* is assigned to a field when the field has been determined to be less than 100 feet of a receiving water body and when either of the two conditions are met:

1. Phosphorus is applied to the field only as inorganic fertilizer.
2. Animals are grazed in this field and the buffer pasture criteria are not met. Refer to the Nutrient Management Plan Summary for the specific buffer pasture criteria.

A category of *6 100 to 199 ft. OR <100 ft. with 35 ft. buffer* is assigned to a field when either of the following conditions are met:

1. The field has been determined to be between 100 and 199 ft. of a receiving water body, and
2. The field distance has been determined to be less than 100 ft. and the 35 ft. buffer criteria for cropland or pastures have been met. Refer to the Nutrient Management Plan Summary for the specific 35 ft. cropland buffer and 35 ft. pasture buffer criteria.

A category of *4 200 to 349 ft.* is assigned to a field when the field has been determined to be between 200 and 349 ft. of a receiving water body.

A category of *2 350 to 500 ft.* is assigned to a field when the field has been determined to be between 350 and 500 ft. of a receiving water body.

A category of *0 > 500 ft.* is assigned to a field when the field has been determined to be greater than 500 ft. from of a receiving water body.

Transport Sum

Transport Sum = Erosion + Runoff Potential + Subsurface Drainage + Contributing Distance

The Transport Sum is calculated by summing the *Erosion, Surface Runoff Potential, Subsurface Drainage, and Contributing Distance* factors.

Modified Connectivity

MODIFIED CONNECTIVITY	0.85 50 ft. Riparian Buffer APPLIES TO DIST. < 100 FT		1.0 Grassed Waterway or None		1.1 Direct Connection APPLIES TO DIST. > 100 FT

The previous transport factors account for the landscape or inherent properties of a field that influence P transport and with the exception of erosion cannot be changed. However, the Modified Connectivity factor accounts for management practices that can change, inhibiting or facilitating, how P moves from a field to receiving water.

There are two possible modified connectivity situations for fields that are within the <100 feet from water category.

- First, the regulations require that manure cannot be applied within 100 feet of a water body unless there is a 35 foot permanent vegetative buffer established. This 35 foot permanent vegetative buffer or the 100 foot manure application setback modifies the connection between a near-stream field and the water. This is accounted for by selecting the "6" Contributing Distance factor for these situations. However, in this case, no further adjustment for a modified connectivity is selected.
- Second, a further reduction in the risk of P loss can be obtained if a buffer is designed and managed to meet Pennsylvania NRCS-FOTG standards which includes a minimum width of 50 feet. In this situation, the additional modified connectivity factor is used. This factor is 0.85 which is multiplied times the transport sum effectively reducing the transport sum reflecting the lower potential for transport of P to water with the designed riparian buffer compared to the simple 35 vegetative buffer. **Fields within 100 feet of receiving water with 50 foot wide buffers designed to meet the sediment and dissolved nutrient control criteria of either Pennsylvania NRCS-FOTG Practice Standards 390 (Riparian Herbaceous Cover), 391(Riparian Forest Buffer), or 393 (Filter Strip), should receive BOTH a Contributing Distance factor of 6 and the Modified Connectivity factor of 0.85.** If a buffer has not been designed by Pennsylvania USDA-NRCS, but appears to be functioning as if it were, it MUST be certified by Pennsylvania USDA-NRCS to receive credit in the P Index.

If a field is outside of 100 feet from receiving water, it is necessary to determine if a direct connection conveys surface runoff and erosion leaving a field and discharges into or near receiving water. Direct connections can include: pipe outlets and ditches or other concentrated flow paths not meeting the definition of a perennial or intermittent stream. See the Act 38 regulations §83.201.

The location of the direct connection outlet is important. If the outlet discharges into a grassed or vegetated area, it is not a direct connection. However, if the outlet discharges directly into receiving water or an area with no vegetation, it is a direct connection. For fields with a qualifying direct connection and a Contributing Distance greater than 100 feet from receiving water select a *Modified Connectivity* factor of 1.1.

A grass waterway is considered a special case direct connection. Even though it is a type of direct connection, if properly designed and maintained, a grass waterway should reduce sediment and P transport. Therefore, properly designed and maintained grass waterways do not count as direct connections for the P Index.

Tile drains are evaluated and accounted for in the Subsurface Drainage section of the P Index. Therefore, tile drains and their outlets should not be considered direct connections in the Modified Connectivity section. Tile drains can transport P; however, this P loss is properly accounted for in the Subsurface Drainage category.

For fields at any distance from receiving water determined to have a grass waterway or no buffers or direct connections select a Modified Connectivity factor of 1.0.

Transport Factor

Transport Sum x Modified Connectivity ÷ 24

The *Transport Sum* is multiplied by the *Modified Connectivity* value and this product is divided by 24. Twenty-four is the maximum *Transport Sum* value and dividing by this value allows the *Transport Factor* to generally vary between 0 and 1.0. A *Transport Factor* value of 1.0 is the value at which the full (100%) field transport potential is reached. Other *Transport Factor* values represent a percentage of the field's full transport potential. The *Transport Factor* only exceeds 1.0 when erosion losses are exceptionally high.

Phosphorus Index Calculation and Interpretation

P Index Value = 2 x Source x Transport

The final P Index Value for a field is calculated by multiplying the *Source Factor* x *Transport Factor* x *2.* The factor of "2" allows P Index Values over 100 to receive a Very High P Index Rating consistent with other Mid-Atlantic states. The P Index Rating is a relative description of the vulnerability or risk of P loss to surface water bodies. The nutrient management recommendation for the calculated P Index Value and associated P Index Rating can be interpreted using Pennsylvania P Index Table 2 below.

In addition to providing an indication of the relative risk of P loss, the P Index Ratings determine recommendations for nutrient application. At Low or Medium P Index Ratings, the maximum nutrient applications are based on N balance. The amount of available N from all nutrient sources cannot exceed the N crop requirement. For Low and Medium P Index Ratings, standard best management practices for manure management should be followed. Although the nutrient application recommendation is the same for Low and Medium Ratings, the Medium range indicates a higher risk of adverse impact on surface water and warns to evaluate management practices to ensure P loss risk does not increase. Practices to consider include the manure application rate, timing and method of manure application and the adequacy and function of conservation practices.

Table 2. Phosphorus index management guidance.

Value	Rating	Management Guidance
0 to 59	Low	**Nutrients can be applied to meet the Nitrogen crop requirement.** *Low* potential for P loss. Maintenance of current farming practices is recommended to minimize the risk of adverse impacts on surface waters.
60 to 79	Medium	**Nutrients can be applied to meet the Nitrogen crop requirement.** *Medium* potential for P loss. The chance for adverse impacts on surface waters exists. An assessment of current farm nutrient management and conservation practices is recommended to minimize the risk of future P losses.
80 to 99	High	**Nutrients can be applied to meet the Phosphorus crop removal.** *High* potential for P loss and adverse impacts on surface waters. Soil and water conservation measures and P-balanced management plans are needed to minimize the risk of P loss.
100 or greater*	Very High	• **No Phosphorus can be applied.** *Very high* potential for P loss and adverse impacts on surface waters. Conservation measures and management plan not allowing any phosphorus to be applied on these fields must be implemented to minimize the P loss. • **For pastures - Nutrients can be applied to meet the Phosphorus crop removal.** To allow this application to occur specific BMPs must be installed and other criteria must be met under the Act 38 regulations. See the Pasture Guidance section at the beginning this document and §83.294(j) of the Act 38 regulations.

** Refer to the section **Phosphorus Index transition guidance for crop management units or fields receiving a Very High P Index Rating** of this document to review phase-in nutrient management guidance for CMUs or fields receiving a Very High P Index Rating. This phase-in guidance was established through the Act 38 regulations and is effective until December 31, 2010.*

For the High P Index Rating, nutrient applications are limited to the lower of the N balanced or P removal rate. The total of all P applications must be reduced so that no more P is applied than will be removed by the current crop. This will significantly reduce the amount of P applied compared to an N balanced rate and should not result in further buildup of soil P. Other management practices such as timing and method of manure application and conservation practices should also be considered. In some cases, changes in other management may lower the risk of P loss, and thus the P Index Value and Rating, so that the nutrient application rate is not restricted to crop P removal A Very High P Index Rating indicates a very high risk of P loss and no P from any source can be applied. Even if P is not applied, management practices, such as soil conservation practices, should be evaluated to ensure P is not lost from the field. As with the High category, changing management practices such as manure rate, timing or method of application may reduce the P Index Value allowing some P application.

At a High or Very High P Index Rating, the planner should go back to the individual P Index factors to determine why the field received a High or Very High Rating. This information can be used to guide management changes that may reduce P loss risk to surface water. For example, a High Manure Rating may be reduced by changing the time or method of manure application. A high erosion factor may be reduced by implementing conservation practices. Thus, the final plan for a field with a High or Very High P Index Rating will likely result from an iterative process of changing planned management and re-evaluating the field with P Index to ensure final planned management is within limitations specified in Table 2.

Appendix 6
Manure Management

Introduction
The purpose of Appendix 6 in the Act 38 Nutrient Management Plan is to summarize the scope of the on-site evaluation of existing manure practices on the operation; record inadequate manure management practices and conditions identified, and list the planned best management practices to address those problems.

The Act 38 regulations require the nutrient management planner to conduct an on-site review of existing manure management practices on the agricultural operation. The purpose of this on-site review is to evaluate and document the adequacy of manure management areas, conditions and practices to prevent surface or groundwater pollution from storm events up to and including a 25-year, 24-hour storm intensity.

The specific regulatory requirements for this information are outlined in section 83.311 of the Act 38 regulations.

Nutrient Management Plan Format
Act 38 regulations require that all nutrient management plans use as standard format for organizing and presenting the required plan elements. Appendix 6 is included in the Word standard format developed by the Nutrient Management Program.

All plans developed and submitted for approval must use the current version of the NMP Standard Format. The current version is the one posted on the Nutrient Management Program website (http://extension.psu.edu/plants/nutrient-management).

Involve Local Expertise
The nutrient management planner should conduct this review in conjunction with individuals who have nutrient runoff control expertise such as the local NRCS, conservation staff or specialized and qualified consultants. **It is recommended that the commercial planner inform local conservation district staff immediately upon agreement with an operator to develop a nutrient management plan to allow for a joint site visit on the farm.** Involving these technicians as early as possible in the planning process helps the plan writer to meet this obligation of plan development, and will also expedite the plan review and approval process.

Purpose and Scope of On-Site Evaluation
The scope of this portion of the on-site evaluation must encompass the following criteria and considerations:

- Storm events up to and including a 25-year, 24-hour storm. County specific 24-hour storm rainfall in inches information is provided in Supplement 9: Pennsylvania 25-Year 24-Hour Storm Rainfall Data.
- Prevention of surface water pollution. Surface water areas include streams, lakes, and ponds.

- Prevention of groundwater pollution. Areas that are high risk sources of groundwater pollution include wells, springs, open sinkholes, bedrock outcroppings, and sandy soils.
- Potential of stormwater commingled with manure and nutrients to directly runoff into surface water or groundwater without adequate collection or treatment.

In general, the on-site evaluation must consider all manure management practices related to manure handling, manure collection, manure storage and animal concentration area management and runoff control. Specifically, three different categories of sites and practices need to be evaluated. These are outlined below.

Manure Storage & Handling Facilities and Areas

The on-site evaluation must identify and evaluate the manure management practices related to the following manure storage and handling areas:

- Manure storage facilities (including collection and transfer systems and loading areas)
- Permanent manure stacking and composting areas
- Temporary manure stacking areas
- Animal mortality composting areas
- In-Field manure stacking areas
- Emergency manure stacking areas

For the Act 38 program, milking center wastewater should be treated like manure. Therefore, the following areas on the operation need to be considered:

- Milking centers and milkhouse wastewater treatment facilities and areas

Animal Concentration Areas

Animal concentration areas are barnyards, feedlots, loafing areas, exercise lots or other similar animal confinement areas that will not maintain a growing crop. Areas that are managed as pasture or other cropland are excluded from this designation. These areas include:

- Surface treated lots (concrete, packed stone, etc.)
- Earthen lots
- Large non-vegetated congregation areas in pastures
- Winter feeding or confinement sites (most often vegetated and cropped during growing season)
- Calf hutch areas
- Existing BMPs related to the above areas (diversions and terraces, roof runoff structures, vegetated treatment areas, filter strips, fencing, stream crossings, access lanes, etc.)

There may be smaller animal congregation areas in pastures that are non-vegetated. These include feeding areas, watering areas, shade areas, or access lanes. These are areas where animals congregate frequently or for extended periods of time that results in the accumulation of significant amounts of manure. Therefore, the entirety of all pasture areas on the operation need to be assessed as part of this on-site

evaluation for the purpose of identifying and evaluating these pasture animal congregation areas.

Each of these pasture animal congregation areas must be evaluated to specifically determine if there is a direct flow of manure contaminated and untreated runoff water to surface or groundwater. A specific pasture animal congregation area is listed in Appendix 6 **only** if a direct flow connection is established.

Silage & Feed Storage Areas

These areas should be evaluated and addressed in the nutrient management plan **only** if there is observable direct runoff of leachate or feed-laden runoff from these areas into surface or groundwater that is observed during the course of evaluating the other manure management areas. These areas include:

- Upright silos
- Bunk or trench silos
- Ag bag stacking areas
- Feed or commodity storage areas
- Feed mixing areas

Completing Appendix 6

Appendix 6 organizes the results of the on-site evaluation under the following headings:

- Date of Site Evaluation
- Statement Documenting Areas Evaluated During Site Evaluation
- Identification of Inadequate Manure Management Practices and Conditions
- BMPs to Address Manure Management Problem Areas

Date of Site Evaluation

The nutrient management planner should list the date(s) of the on-site evaluation.

Statement Documenting Areas Evaluated During Site Evaluation

The first step of the on-site evaluation requires the identification of the sites or areas that need to be evaluated for water quality impacts. In this part of Appendix 6, the nutrient management planner should provide a comprehensive list each of the specific areas that were assessed as part of the on-site evaluation. Listing general categories of areas is unacceptable. For example, if there are multiple manure storages on the operation, the storages need to be listed individually not with a general notation such as, “all the manure storages”.

Following is an example of how this section should be completed:

“The following areas were evaluated: concrete exercise lot associated with the free stall barn, bare dry cow exercise lot, and the existing manure storage, located in front of the free-stall barn.”

Identification of Inadequate Manure Management Practices and Conditions
The second step of the on-site evaluation is to assess each of the identified areas and note the existence of inadequate manure management practices and conditions. According to the regulations, **only those areas and related conditions and practices where there is potential for manure or nutrient contaminated stormwater from storm events, up to and including a 25-year, 24-hour storm intensity, to directly runoff or discharge into surface or groundwater without adequate treatment** are to be documented in the nutrient management plan.

Following is an example of how this section should be completed:

> *"Concrete exercise lot – no problems identified. Bare dry cow lot – runoff from lot discharges directly into the adjacent stream; no roof runoff controls in place. Manure storage – no problems identified."*

Resolution of Disputed Determinations related to Manure Storages
Disputed determinations and evidence of leaking or unstable manure storage facilities will require resolution by a Professional Engineer (Registered in PA). The owner is responsible for retaining the services of a Professional Engineer.

BMPs to Address Manure Management Problem Areas
The nutrient management plan must list the Best Management Practices (BMPs) that will be implemented to address each of the inadequate manure management practices and conditions listed in the section above. There is no one solution or set of solutions for all problems. The BMPs listed in the nutrient management plan must be site and operation specific and must meet all the requirements of the Act 38 regulations. It is important to involve the operator in the selection of the BMPs that will be included in the nutrient management plan. All BMPs must follow the Pennsylvania Technical Guide criteria.

For a list of common BMPs refer to the Pennsylvania Technical Guide (http://extension.psu.edu/plants/nutrient-management/planning-resources/pa-technical-guide). If a proposed BMP is not included in the Pennsylvania Technical Guide it must be approved by the State Conservation Commission.

The BMPs listed in the nutrient management plan must list the Pennsylvania Technical Guide standard name and number. This will ensure that the operator understands what is expected. In addition, the plan reviewer will be able to determine if the BMPs listed adequately address the problems listed.

The plan will identify and note general locations of the planned BMPs on the nutrient management plan maps.

No design calculations, drawings or specifications need to be included in the plan. Designs must be developed during the implementation of the plan to meet the specifications contained in the Pennsylvania Technical Guide. The BMP designs shall be kept on record by the operator as a supplement to the plan.

The siting, design and installation of permanent manure storage facilities shall meet the requirements relating to minimum standards for the design, construction, location, operation, maintenance and removal from service of manure storage facilities and the Pennsylvania Technical Guide. Manure storage criteria are explained in more detail in Section III: Minimum Standards for Manure Storage Facilities. The installation of manure storage facilities is not required unless necessary to protect surface water and groundwater as part of an integrated nutrient management system. This will be determined by the storage time needed to implement the nutrient management plan, or by a problem identified in the required evaluation described above.

Following is an example of how this section should be completed:

"Bare dry cow lot – a concrete lot (Heavy Use Area Protection - 561) will be constructed, roof gutters and downspouts (Roof Runoff Structure - 558) and underground outlets (Underground Outlet - 620) will be installed and all contaminated runoff will be treated by a wastewater treatment strip (Vegetated Treatment Area - 635)."

All BMPs listed in Appendix 6 to correct inadequate manure management practices must also be listed in the NMP Summary: Manure Management and Stormwater BMP Implementation Summary.

For additional information operating and maintaining common BMPs, refer to Supplement 20: Common Best Management Practices – Basic Operation and Maintenance Guidelines in this manual.

Considerations for Conducting the On-Site Evaluation

Both nutrient management planners and reviewers should follow the following guidance and considerations when conducting the on-site evaluations.

Evaluating Manure Storage & Handling Facilities and Areas

The following manure storage and handling practices and conditions must be evaluated:

Design Requirements

For liquid or semi-solid manure storages built after January 22, 2000, the storage must have a Professional Engineering certification to document the design and the integrity of the storage facility construction.

Manure Storage Capacity

Manure storage facilities (made of concrete, steel, timber, plastic or soil lined) must be designed and operated to include capacity to accommodate freeboard, a 25 year, 24 hour storm event, and net rainfall over evaporation in addition to the manure, wastewater and other wastes to be collected. Some sites will also include additional storm runoff from a heavy use area. Required freeboard is 6 inches for exposed or covered vertical walled storages and 12 inches for sloped storages.

Several exceptions apply to CAFO operations. New or expanded swine, poultry or veal CAFOs after April 13, 2003 require using the 100 year, 24-hour storm event, instead of the 25 year, 24-hour event. All other CAFO operations that are new or expanded after January 20, 2000 and over 1,000 AEU require a minimum freeboard for exposed storages of 24 inches. Covered storages require 6 inches. Questions on CAFO sites should be directed to the appropriate DEP regional office if not answered in the landowner's permit copy.

The capacity of each manure storage structure or area must be adequate for the planned amount of manure (including wastewater, stormwater, and bedding) to be stored based on the collection periods, planned application season and management set forth in the nutrient management plan for the associated manure groups. The size of storage will, in many cases, dictate the time periods for manure application on the operation. An operation with a storage designed to store two months of manure production will need to ensure that land is available every two months for manure application

The amount of storage volume available can be determined from the storage design on file or it can be calculated. The manure storage volume is documented in Appendix 2: Operation Information. Supplement 8: Manure Storage Volume Calculations explains how to do this calculation.

Evidence of Manure Storages Overflowing or Maintained Above Design Full Levels
Each manure storage facility or site must be evaluated for evidence of current or past management that indicates that storage design capacity has been exceeded. A coating of manure, a debris line, or accumulated manure at an elevation higher than the levels described above are all evidence of storage levels above design full. On any given day the facility should have the required freeboard and associated 24 hour storm event available, unless that storm event recently happened. Check original design values against current conditions. Increased animal numbers or milk production will result in shorter storage periods or encroachment on the required freeboard as a result of more manure production.

Evidence of Leaking or Unstable Manure Storage Facilities
Each manure storage facility or area must be evaluated for evidence of leaking or structural weaknesses that could compromise the ability of the storage to contain the stored manure. This should include an evaluation of both surface and subsurface losses.

The foundation or perimeter drain outlet must be inspected for evidence of manure odor or color of the discharge which may indicate leakage. Such evidence would be cause to test the water quality of the drain discharge and possibly investigate more thoroughly before coming to a conclusion. If the drain is dry and clear no further evaluation is necessary.

The storage facility, walls, embankments, and accessories, shall be inspected for structural defects such as active or leaking cracks, valves, hoppers, or pipes, open joints, displaced walls, severely pitted or perforated steel, lack of or damage to liner material, slope failures, settled walls, lids, or embankments, woody growth or rodent burrows on embankments, exposed structural steel, spawled concrete, and exposed footings are all causes for concern.

Upslope and Roof Stormwater

Each manure storage area must be evaluated for evidence of uncontrolled flow of stormwater into or across the area. This is particularly critical of manure storage areas where there is stormwater runoff from the upslope area. In general, the axiom "Keep Clean Water Clean" applies. This "clean water" includes up-slope and roof runoff water. The intent is to divert clean water away from or around the manure sources. This will minimize the amount of contaminated runoff that must be treated before reaching surface or ground waters.

In some cases, the manure storage is designed to receive stormwater. This is acceptable as long as the manure storage capacity and integrity are not compromised.

Contaminated Runoff Water

Each manure storage area must be evaluated for the existence of direct runoff or discharge of contaminated, inadequately treated water into surface water or groundwater. These conditions, when identified, must be listed as inadequate manure management practices and conditions. When evaluating runoff from these areas, consider the adequacy of storage or treatment facilities, downslope filter areas to control and treat the flow of contaminated runoff water before discharging into surface water or groundwater. Analysis of the treatment of water in filter areas should consider the use of sheet flow and the use of conservative locations of the filter areas.

Evaluating Animal Concentration Areas (ACAs)

In general, the evaluation of the adequacy of ACA practices and conditions should consider the ability of the current practices and management to keep clean water clean and to collect, handle and treat contaminated runoff water before discharging into surface water or groundwater, and removal of accumulated manure. Following are some general factors to consider as part of the evaluation:

Site Characteristics

- Topography in and around the ACA
- Soil type in the ACA
- Soil cover or surfacing of the ACA
- Contributing drainage area up-slope of the ACA
- Roof runoff management
- Downslope of the ACA (impacted or buffer)
- Runoff controls or containment within the ACA
- Practices and facilities used to address runoff

Management and condition of the ACA

- Accumulation of manure on the ACA
- Standing water or muddy conditions
- Gullies or irregular surface
- Stocking rate (ft^2/head)

Climatic Conditions

- 25-year, 24-hour storm event (see Supplement 9: Pennsylvania 25-Year 24-Hour Storm Rainfall Data for county rainfall data).

Following are some specific factors to consider as part of the evaluation:

Location and Sizing

ACAs must be located and sized appropriately to minimize the impact on surface water and groundwater. These areas should meet the appropriate criteria set forth in PA Technical Guide Standard 561 (Heavy Use Area Protection) and Standard 528 (Prescribed Grazing). Runoff from a 561 (Heavy Use Area Protection) must be treated to meet Standard 635 (Vegetated Treatment Area) or collected in a storage to meet Standard 313 (Waste Storage Facility).

Manure Collection

Collection of accumulated manure for land application or export from the operation is required on all ACAs. It must be determined if manure collection is practical and feasible based on the condition of the ACA surface. In addition, it must be determined if the operator has the equipment needed to collect manure from the ACA. Finally, the operator must agree to remove accumulated manure. The frequency of this removal must be described in the planned management of the ACA.

Upslope and Roof Stormwater

Each ACA must be evaluated for evidence of uncontrolled flow of stormwater into or across the area. This is particularly critical of ACAs where there is stormwater runoff from the area. In general, the axiom “Keep Clean Water Clean” applies. This “clean water” includes up-slope and roof runoff water. The intent is to divert clean water away from or around the manure sources. This will minimize the amount of contaminated runoff that must be treated before reaching surface or ground waters.

Contaminated Runoff Water

Each ACA must be evaluated for the existence of direct runoff or discharge of contaminated, inadequately treated water into surface water or groundwater. These conditions, when identified, must be listed as inadequate manure management practices and conditions. When evaluating runoff from these areas, consider the adequacy of storage or treatment facilities, downslope filter areas to control and treat the flow of contaminated runoff water before discharging into surface water or groundwater.

Animal Access To Streams
Animal access to surface water in animal concentration areas must be limited to properly installed stream crossings as needed for livestock and equipment.

Pasture Animal Congregation Areas
The primary focus in evaluating animal congregation areas around feeders, waterers, shade and within access lanes is the "Contaminated Runoff Water" consideration listed above. If a direct connection of contaminated runoff to surface or groundwater is established, some aspects of the other specific considerations above will be helpful in determining how to eliminate the problem.

Emergency Manure Stacking Areas
When emergency manure stacking areas are necessary during the implementation of the plan, the plan shall identify those areas where solid manure can be stored in emergency situations such as adverse weather conditions or unforeseen circumstances (an emergency situation where the normal manure handling system fails). **This requirement applies only to operations that manage stackable manure as part to their manure handling system and do not have a permanent manure stacking area.**

An emergency manure stacking area is defined as an unimproved area located outside water concentration areas, areas where manure application is restricted or prohibited, and preferably located in a crop field.

The planner is responsible for identifying an appropriate site for a temporary stacking area, and indicating its location on the plan map. The site selection should be based on all-weather access, near a paved road on high ground with soil that is neither poorly nor excessively well drained.

Manure shall be completely removed from temporary stacking areas for utilization on cropland or other acceptable uses as soon as feasible, preferably before or during the upcoming cropping season.

Appendix 7
Stormwater Control

In the preparation of an Act 38 nutrient management plan, the nutrient management planner is required to conduct a review of the **adequacy of existing runoff control practices** on cropland and pasture included in the plan. This requirement is described in **Chapter 83.321**.

It is understood that nutrient management planners have varying levels of experience and expertise in this area; therefore, it is strongly recommended that planners with limited expertise receive assistance from local NRCS field staff or conservation district personnel. That being said, it is the responsibility of all nutrient management planners to acquire the training necessary to develop these planning skills.

Regardless of experience and skill level, it is recommended that the nutrient management planner performs this evaluation concurrently with plan review staff from the appropriate plan approval entity (county conservation district or State Conservation Commission). Involving these technical and plan review specialists as early as possible should expedite the plan review and approval process.

This review shall be documented in Appendix 7 of the plan as described below. Please note that an entry is required in each of the four input areas. In some cases, “None”, “Not applicable” or “N/A” may be the appropriate entry (see examples).

The NMP writer and NMP reviewer should work together to identify and offer solutions for the who / what / when / where / how, etc. on existing and proposed stormwater / manure management practices on the operation.

Completing Appendix 7
Appendix 7 organizes the results of the on-site evaluation under the following headings:

- Date of Site Evaluation
- Statement Documenting Areas Evaluated During Site Evaluation
- Identification of Critical Runoff Problem Areas (CRPAs)
- BMPs to Address Critical Runoff Problem Areas

<u>Date of Site Evaluation</u>
The nutrient management planner shall list the date(s) of the on-site evaluation.

<u>Statement Documenting Areas Evaluated During Site Evaluation</u>
The nutrient management planner shall describe specific areas of the farm evaluated. It is recommended that the planner also list other personnel involved in the evaluation.

Following is an example of how this section should be completed:

“Clay E. Knobs (NMS, Hometown County Conservation District) and I evaluated cropland and pasture fields adjacent to Little Muddy Run. Specific fields include: HF1, HF4, HF7, HF9 and HFP1.”

Identification of CRPAs

The nutrient management planner shall indicate whether or not any CRPAs were observed. Examples of CRPAs requiring identification include:

- Non-vegetated gullies and ditches flowing directly to streams or sinkholes
- Non-vegetated and non-buffered, sloping areas immediately adjacent to streams or sinkholes, where manure is applied after the growing season (late fall or winter)

Following is an example of how this section should be completed when **no CRPAs were identified**:

"None."

Following is an example of how this section should be completed **when CRPAs were identified**:

"A 12" wide X 12" deep gully leading directly to Little Muddy Run was observed in the southwest corner of field HF4."

BMPs to Address CRPAs

The nutrient management planner, in consultation with the operator, shall identify and list the Best Management Practices (BMPs) that must be implemented to address any CRPAs identified above. These BMPs cannot be in conflict with other relevant plans, such as a current conservation plan, unless otherwise justified in writing by the nutrient management planner. At this crucial point in the planning process, nutrient management planners with minimal stormwater runoff expertise may find it very advantageous to involve more experienced conservation professionals.

The plan is **not required to include BMP designs** (i.e. depth and width of a waterway, diversion, etc.); however, prior to BMP implementation, the operator is responsible for obtaining the necessary designs. The operator shall keep these designs on-site as a supplement to the nutrient management plan.

For information on commonly used stormwater control BMPs, refer to published information from USDA-NRCS: the Conservation Catalog, Pennsylvania Technical Guide or eFOTG (http://www.nrcs.usda.gov/technical/efotg/). BMPs installed to address CRPAs shall be designed, installed, operated and maintained in accordance with the standards and specifications in the Pennsylvania Technical Guide. BMP(s) required to address CRPAs identified in Appendix 7 shall also be identified on the list of BMPs in the Nutrient Management Plan Summary; Additional NMP Requirements section of the plan.

Following is an example of how this section should be completed when **no BMPs are required**:

"N/A"

Following is an example of how this section should be completed when **BMPs are required**:

"Stripcropping (585) – In the spring of 2010, alternating contour strips of corn and mixed hay will be established in field HF4; minimum strip width will be 100 feet."

Act 38 Interactions with PA-DEP Erosion Control Requirements

As described in great detail above, Appendix 7 of the Act 38 nutrient management plan deals primarily with the identification and treatment of CRPAs. Please know that the treatment of CRPAs, while extremely important in controlling soil erosion and associated nutrient loss, is just a small subset of the operator's total erosion control requirements under Pennsylvania law.

To help ensure that operators are compliant with their erosion control requirements, which support the nutrient (primarily phosphorus) loss controls incorporated in the NMP, verification of a current Agriculture Erosion and Sedimentation Control Plan (Ag E&S Plan) meeting the requirements of the DEP Chapter 102.4 regulations, or a Conservation Plan meeting the same requirements, is now required prior to Act 38 NMP approval. The details of this **Chapter 83.361(f)** NMP review and approval requirement can be found in Section V: Plan Review and Implementation.

Appendix 8
Importer/Broker Agreement and NBSs

This section of the plan is to detail the use of that portion of manure or mortality compost produced on site **that is not land applied on the operation (owned or rented acres) that produced it**. This includes selling or giving the manure or mortality compost to a broker or exporting the manure to other farms for agronomic land application. It also includes sales to others who use it for purposes other than for agricultural land application, such as mushroom producers, or using it on the farm where it was produced for other than agricultural land application.

It should be noted that the program characterizes manure and mortality compost exporting as changing ownership of the manure or compost. When the importer accepts the material, the importer also accepts responsibility for its proper use on his or her land as required by DEP Chapter 91 regulations and the Pennsylvania Manure Management Manual. Therefore, importers of manure from Act 38 operations are required to have, obtain, or develop a Manure Management Plan (MMP) under DEP's Chapter 91 requirements. A NBS developed under Act 38 can be used for the nutrient application requirements of the MMP. Other sections of the MMP may still be applicable, such as ACA management, manure stacking, etc., and will need to be address in a separate MMP document.

a. If an importer of CAO or CAFO manure **does not** have livestock or poultry on its operation, the NBSs would satisfy the Chapter 91 manure management requirements. Because the operation would not have its own manures or Animal Concentration Areas to address, the NBSs would contain sufficient information to demonstrate the land application is being done under current standards and protecting the water quality.
b. If an importer **does** have livestock or poultry on its operation, the NBSs could satisfy some of the Chapter 91 manure management requirements. To comply with §91.36(b), the importer must ensure that their MMP includes a completed General Information section as described in Section 1 of the Manure Management Manual Land Application of Manure supplement. In addition, the MMP must identify any other required information that is related to the specific manure management practices used on the importing operation, such as an ACA worksheet or Pasture Worksheet, and include those additional required elements within their MMP.

Although NBSs are not required to meet all of the planning components of Chapter 91, it would be beneficial to have the information required under Chapter 91 for importers, regardless of whether they have livestock or poultry

The exporter may retain some responsibility for the application or storage of exported manure or compost, if the exporter is involved in the stacking or application of the material on the importing site, or if the exporter contracts with or hires those involved in the stacking or application of the exported material on the importing site.

Not all manure will be used in raw, unprocessed form. Several alternatives include: composting, bio-digestion, solids separation, etc.

Listed below is the program planning requirements, based on six possible usage scenarios, for Act 38 participating operations using manure or mortality compost for agronomic land application or purposes other than agronomic land application on their own operation (including owned and rented acres).

Scenario 1: When manure or mortality compost will be exported to known landowners or operators for agricultural land application, the plan shall include:

1. A signed agreement with the importer on the form provided by the Commission. This form is included in Supplement 11: Exporter Agreements. The exporter is to use this agreement form unless there is prior approval by the Commission to use an alternative agreement.
   - The signed agreement has no end date, but can be cancelled by either party given 30 days' notice.
   - The signed agreements do not need to be re-signed or updated with each NMP Update or Amendment, unless a substantial change has occurred with the template provided (newer version), the parties involved, or the provisions contained in the signed document. Substantial changes could include changes in manure amounts, changes in types of manure, change in application season, and change in acres available.
   - Note that there are different agreements for various importing scenarios. There is an importer agreement for situations where manure will be land applied in Pennsylvania (our most common agreement type), one for situations where manure will be imported for non-land application (such as for mushroom operations or composting operations, this relates more to importing scenario "3" below), and one for exporting to importers that will be receiving the manure on farms outside of Pennsylvania.

2. A completed Nutrient Balance Sheet addressing the fields where exported manure or mortality compost may be applied. You can also use an approved Act 38 nutrient management plan written for the importing operation to address this requirement. If using an Act 38 nutrient management plan, the importer's plan does not need to be submitted with the exporters plan, but the exporters plan needs to reference that the importer has an approved Act 38 plan on file with the relevant district.

3. Nutrient Balance Sheets (NBS) required under the Program must follow the standardized NBS form and process provided by the Commission. Supplement 3: Nutrient Balance Sheet User Guide provides the format, calculation process, and accepted figures to use when completing a NBS for an importing operation. The Nutrient Management Program Website provides the NBS in a Word format, a pdf format, as well as an Excel spreadsheet format. The Commission recommends that planners use the Excel format to ensure that the NBSs submitted have used the proper calculation figures and process, as used in the Excel form.

Scenario 2: When manure or mortality compost will be transferred from an Act 38 participating operation through a manure broker, the plan shall include:

1. A signed agreement with the broker on the form provided by the Commission. This exporter/broker agreement is included in Supplement 11: Exporter Agreements. The exporter is to use this agreement form unless there is prior approval by the Commission to use an alternative agreement.
   - The signed agreement has no end date, but can be cancelled by either party given 30 days' notice.
   - The agreement includes the broker's PDA Broker Certification number so that the certification of the broker can be verified during plan review.
   - The signed agreements do not need to be re-signed or updated with each NMP Update or Amendment, unless a substantial change has occurred with the template provided (newer version), the parties involved, or the provisions contained in the signed document. Substantial changes could include changes in manure amounts or changes in types of manure.

A broker is a person, corporation, or partnership that assumes temporary ownership of manure or compost from a producer and then arranges for a third-party receiver of the manure or compost (different from the producer or broker). A broker is an independent entity that does not work for, or under the control of, the agricultural producer providing the manure or compost to the broker. A broker must be able to demonstrate their ability to independently and adequately address the brokerage of the material from the production facility. Brokers hold a significant amount of liability for the proper handling and application of the manure or compost. A broker is responsible to follow the requirements in DEP's Chapter 91 regulations as they handle and apply manure.

The "broker" designation differs from a "manure hauler". A "manure hauler" works as a contracted agent for the animal producer or importer, under the direction of either of these entities.

If a broker accepts manure and applies it to fields that the broker either owns or rents, the broker is serving as a "known landowner importer" (as described in "1" above) and is not a "broker". For that portion of the manure or compost that is applied by the broker to lands that they own or rent, the program criteria described above (relating to "known landowner importer") must be followed.

Scenario 3: When manure or mortality compost will be transferred from an Act 38 participating operation to a known importer for use other than agricultural land application, the plan, in the Nutrient Management Plan Summary; Additional Nutrient Management Plan Requirements; Exported Manure Summary, shall include the following information:

1. The name and general location of the importing operation.

   The "general location" of the importer should include the "full address" (street, road

or route; street number or P.O. box; town and if necessary the distance from a landmark, etc.) of the site receiving the manure. The "full address" should be complete enough to provide adequate information so that the operation can be located on a street or topo map.

2. A brief description of the planned use of the imported manure or compost.

   This should be complete enough to adequately explain what the importer is planning to do with the manure.

3. The estimated amount of manure or compost the operation plans to transfer to the importer annually.

   The amount of manure or compost that the operation is planning to export to the importer is an agreed upon amount between the exporter and the importer based on the amount of manure that the importer is able to receive and the amount of the material the NMP operation has available for export.

4. The intended season for the manure or compost transfer.

   The proposed timing of the manure or compost exporting needs to be indicated by season. The NMP operation may document a more precise time for export but by season (Spring, Summer, Fall, or Winter) is adequate for the plan. If manure is to be transferred for more than one season of the year, the amount of manure planned to be exported for each season shall be listed in the plan.

5. A signed agreement with the importer on the form provided by the Commission.

This form is included in Supplement 11: Exporter Agreements and is titled "Exporter/Importer Agreement, Manure Used for Other Than Agriculture Land Application". The exporter is to use this agreement form unless there is prior approval by the Commission to use an alternative agreement. The signed agreement has no end date, but can be cancelled by either party given 30 days' notice. The signed agreements do not need to be re-signed or updated with each NMP Update or Amendment, unless a substantial change has occurred with the template provided (newer version), the parties involved, or the provisions contained in the signed document. Substantial changes could include changes in manure amounts or changes in types of manure.

Some examples of uses other than agricultural land applications are: marketing manure to commercial greenhouses and landscape nurseries, golf courses and mine reclamation projects; composting for sale in bulk or packaged for commercial markets; mushroom farming; and as processed feed supplements for production animals.

Scenario 4: Where manure or mortality compost is to be processed or utilized on the Act 38 participating operation in a manner other than for agricultural land application, the plan, in the Nutrient Management Plan Summary; Additional

Nutrient Management Plan Requirements; Exported Manure Summary, shall briefly describe:

1. The planned use of the manure.

2. The estimated amount expected to be processed or utilized annually.

This description needs to be complete enough to adequately explain what the operator is planning to do with the manure or compost. The description should also say when the material will be used and how much will be utilized yearly.

Scenario 5: When manure or mortality compost containing manure is to be marketed from an Act 38 participating operation in existence as of Oct. 1, 1997, using an open advertising system where the importers cannot be identified at planning time, the plan shall describe, in the Nutrient Management Plan Summary; Additional Nutrient Management Plan Requirements; Exported Manure Summary:

1. The proposed marketing scheme.

2. The estimated amount of manure or mortality compost containing manure expected to be marketed annually using an open advertising system.

A description of the marketing scheme should include the amount and the form of the product to be marketed, the prospective consumer markets and general region where the exporter expects to market the manure, and the planned advertising system for the product. The description of the planned advertising system should include how the exporter expects to advertise the product to assure that the potential customers are informed of the product being offered. If the exporter has done this in the past, that should be explained in this description along with how successful the exporter has been in using this alternative method in the past.

It should be noted **that this planning option is not available to newer farms participating in the Act 38 program**. These newer operations need to show in their plan that they have found another method for excess manure or compost distribution or use which will include a signed agreement with an importer or broker to address all the manure they expect to export. This does not mean that these newer operations cannot distribute their excess manure or compost using an open advertising system; this just means that in their plan they need to show that they have arranged for an established alternative importer or broker for all their excess manure or compost at planning time in case their advertising system does not work.

An exporter using this scenario will be required to be **certified by PDA as a Manure Broker**, prior to being authorized to utilize this exporting method. Also, these exporters will be required to fill out NBSs for the importers that will be accepting more than the minimal amount of manure or compost outlined below under in the “Small Quantity Importers” section.

Scenario 6: When manure or mortality compost is to be exported out of state, for agricultural land application, the plan shall include:

1. A signed agreement with the importer on the form provided by the Commission. This form is included in Supplement 11: Exporter Agreements. The exporter is to use this agreement form unless there is prior approval by the Commission to use an alternative agreement.
   - The signed agreement has no end date, but can be cancelled by either party given 30 days' notice.
   - The signed agreements do not need to be re-signed or updated with each NMP Update or Amendment, unless a substantial change has occurred with the template provided (newer version), the parties involved, or the provisions contained in the signed document. Substantial changes could include changes in manure amounts, changes in types of manure, change in application season, and change in acres available.

2. In Appendix #3 you will need to show that all the manure is accounted for in the "Manure Allocation Balance". This will show up as exported manure even though it is being transported to acres in another State.This must be explained in the NMP in Appendix 10.

3. Inform the other State's Nutrient Management Program that this farm is transporting XX amount of manure to the address listed on the agreement. Please provide the other states Nutrient Management Program contact information for reviewing entities to use. Please provide this detailed information in Appendix 10 of the NMP

Scenario 7: When manure or mortality compost will be transferred from an Act 38 participating operation through a manure broker that is located out of state, the plan shall include:

1. A signed agreement with the broker on the form provided by the Commission. This exporter/broker agreement (Out of state) is included in Supplement 11: Exporter Agreements. The exporter is to use this agreement form unless there is prior approval by the Commission to use an alternative agreement.
   - The signed agreement has no end date, but can be cancelled by either party given 30 days' notice.
   - The signed agreements do not need to be re-signed or updated with each NMP Update or Amendment, unless a substantial change has occurred with the template provided (newer version), the parties involved, or the provisions contained in the signed document. Substantial changes could include changes in manure amounts or, changes in types of manure.

If a broker accepts manure and applies it to fields that the broker either owns or rents, the broker is serving as a "known landowner importer" and is not a "broker". For that

portion of the manure or compost that is applied by the broker to lands that they own or rent, the program criteria described above (relating to “known landowner importer”) must be followed.

Review of Exporting Information

The delegated conservation district and/or the SCC should review the submitted exporting operation information (agreements, scenarios, and NBS) for accuracy and completeness, as detailed in Chapter 3 of the Nutrient and Manure Management Administrative Manual (Technical review of NMPs)

Some additional areas of concern that should be reviewed during the technical review may include:

1. Exported manure amount versus amounts of manure planned for in the NBS. The SCC is not concerned if a NBS shows a larger amount of manure that could be applied compared to the amount of manure that is listed in the export agreement. The SCC would be concerned, and a technical comment should be provided, if NBSs are not planned to cover the amount of manure that is proposed to be exported in the export agreement.
2. The SCC is not concerned that the total of exported manure amounts from all NBSs would exceed the total manure produced, as weather and other factors could increase the total amount of manure to be handled. From a planning standpoint, having more importers, or more importer acres than the minimum, is a good thing and provides the exporter with options should an importer drop out, or not be able to import as much manure on a given year as planned. The SCC would be concerned and technical comment should be made, if the operation is 100% export and the agreements and NBS do not cover the total amount to be exported.
3. If other manure is planned to be applied to the same acres that are contained in the export agreement and NBS, the reviewing technician should have a discussion with the importer and review the NBS to make sure they included manure applications for other sources in the overall nutrient balance, if manure from multiple sites will be applied to the same acres. This would include uncollected manure applied to pastures by grazing animals.

Using more than one Export Scenario

There may be more than one alternative manure or mortality compost utilization method used for the exported material. Where this is the case, the plan should list separately, the above items for each alternative method that will be used.

It is possible for Act 38 operations to have multiple importers, as defined under Scenario 1. Planners can add to the appendix 8 cover a listing of importers, for which signed agreements and NBS are attached, and when those importers can receive manure. An example is below:

Summary of Exporter/Importer Agreements

Importer Name	Manure importer can receive			
	Spring	Summer	Fall	Winter

Nutrient Balance Sheets (NBSs)
Nutrient Balance Sheets are designed to address entire crop groups, given a particular application scenario, for an importing operation, thus minimizing the number of these that may be necessary for a particular importing operation. For example, one balance sheet may address all corn silage applications across a farms' entire 150-acre operation, with another balance sheet covering all grass hay over that same 150 acres, etc. Another method to show acres under the NBS is, for example, if a farm is composed of fields 1-20 and these fields total 100 acres, there could be a corn NBS covering fields 1-20 with the acreage figure being 60 acres (where generally 60% of the importing lands are in corn) and a hay NBS covering fields 1-20 with an acreage figure of 40 acres (where generally 40% of the importing lands are in hay).

You may need more than one balance sheet to address a particular crop group if the importer may be applying other nutrient sources to some of the lands, but not all the land. For example, one NBS may address all acres for corn silage if starter was used, and another to address the corn silage acres if no starter was used.

Also, an importer may address some of their fields using one option, where using another option of the remainder of their fields (such as using Option 1 for fields more than 150 feet from a stream, and using Option 3 for fields within 150' of a stream).

Nutrient Balance Sheets need to be reassessed once every 3 years. This reassessment needs to evaluate the new soil tests taken over the past three years (soil tests used in NBSs need to be redone once every three years) and the updated manure analysis (analysis value used in Appendix 3 of the NMP (may be a single test value or running manure average)) for the manure being imported. The NBSs would be required to be redone and reauthorized by the district if any of the following are true:

- the new soil tests require a **change in the planning option** (such as when a soil test for a field goes from 180 ppm P to 210 ppm P and the required planning option changes from Option 2 to Option 3), or
- the new soil tests require a **change in the nutrient application rates** used on the NBSs (such as when a farmer is using Option 3 and the soil test level for phosphorus pushes the farmer from a P-Index of value of 75 to a P Index value of 82, requiring phosphorus removal application rates), or

- the average **manure analysis observed over the past 3 years has changed by more than 20%** over the manure test used in the current NBSs.

A complete NBS includes the following:

- Cover Page
- Nutrient Balance Sheet Summary
- Nutrient Balance Sheet Summary Notes
- Nutrient Balance Worksheet (In Excel includes planning columns for each crop group. In Word includes one-page Nutrient Balance Worksheets for each crop group.)
- Appendix 1 – Operations Maps
- Appendix 2 – Phosphorus Index (Required only if using Manure Plan Basis – Option 3 P Index.)

There are **four scenarios** that require notes to be included in the Nutrient Balance Sheet Summary Notes table.

- **Crop Removal Recommendation Basis** – Use the following note: "Nutrient balances in Row M for P_2O_5 and K_2O are based on crop removal (Row A) and should not be used to determine additional fertilizer needs."
- **Manure Applied to Pastures** – If uncollected manure is accounted for Row C – Other Organic Sources Applied, the following information should be included in the Nutrient Balance Sheet Summary Notes table: animal group(s) using the pasture; number of animals in each animal group; grazing season length; amount of hours/day animals are planned to spend on the pasture; and the location of feed and water in grazing scenarios where animals have unrestricted access to both a barn and/or lot where manure is collected and a pasture.
- **9000 Gallon Rate Limit** – Explanation of how planned manure application rates that exceed a total of 9000 gallons will be handled including a note that adequate drying time occur between the separate applications.

The **NBS summary notes** should also be utilized to assist the operator in implementing the planned NBS. Examples of such notes would include:

1. For the application of other organic sources, the notes must include the type of material and the application rate.
2. For pastures, the specifics of the pasture management must be listed including the animal groups on the pasture, numbers in each animal group, grazing season, hours per day on pasture, and where animals are watered and fed (if applicable).

Late fall and winter applications of imported manure should be avoided if at all possible. Fields receiving late fall and winter applications must have greater than 25% cover at the time of application. In the Act 38 program, cover is defined as living and dead plant material.

It should be noted that the Act 38 definition of winter is not exclusively a calendar consideration. Winter is defined as a time when any one of the following conditions exists:

1. the date is on or between December 15 and February 28, or
2. the ground is frozen at least 4 inches, or
3. the ground is snow covered

If any of these conditions exist, imported manure cannot be applied under Manure Planning Basis: Options 1 and 2, but must use Option 3. Option 3 – P Index requires that each individual field on which the imported manure will be applied must be evaluated by the Phosphorus Index. The P Index must be completed by a certified Act 38 nutrient management specialist or a certified Act 49 Broker 2 who has completed the required P Index training authorizing them to conduct the P Index evaluation. In addition, the Winter Manure Application Matrix must be completed for each field.

The **NBS map** does **not** need to be to scale, or computer generated. An acceptable NBS map must include the following information:

- Roads and road names for roads adjacent to and within the operation.
- Field (CMU) information for each field included in the NBS where imported manure may be applied: identification, boundaries, and acreage.
- Manure application setback areas or vegetated buffers and the associated landscape features (streams and other surface water bodies, sinkholes, and active water wells or springs).
- Location of in-field manure stacking areas, if applicable, including each site in the stacking area rotation. It is highly recommended that an aerial photography underlay be used for the map.

An importer can select any of the 3 options for completing the NBS(s) for their operation.

1. If **option 1** is selected, the importer is not required to have soil tests to implement this option. However, the planned manure application rate must be based on phosphorus removal which is usually much lower than nitrogen based rates. Option 1 cannot be used for importing fields having a current (within 3 years) soil test with soil phosphorus levels over 200 ppm Mehlich P.

   With this option, both the N and P columns need to be completed to show that the application rate does not go over the Nitrogen or Phosphorus crop uptakes.
   - NBSs completed using this option would not need to be updated at any time, as long as the yields for the importing site and the book value nutrient uptake values do not change over time.

2. If **option 2** is selected, the importer will need soil tests to run this option, but it generally provides for larger amounts of manure to be applied to the importing site. This option can only be used for fields with soil test levels of less than 200 ppm P (Mehlich 3 test). When soil test levels equal or exceed 200 ppm P (Mehlich 3 test) Option 3 is used for NBS development. This applies to soil tests taken for initial NBS development and to soil tests taken every three years.
   - Only the N column will need to be completed in order to fill out the NBS using this option.

- The following guidance applies to soil tests taken for use in Option 2. When using Option 2, the soil tests for the importing site need to be run once every 3 years to ensure that the fields used under this option continue to fall within the "< 200 ppm P" range.

Representative soil samples should be obtained using accepted soil sampling methods as outlined in Part 1, Section 2, "Soil Testing" in the Penn State Agronomy Guide.

It is recommended that a single soil test sample not represent more than 20 acres. One soil test sample can represent multiple fields grouped in a crop management unit (must have similar soil capabilities and management histories) as long as the sample does not represent more than 20 acres. If a single field is larger than 20 acres, a single soil test sample may be used to represent this field.

3. If **option 3** is selected, then the NBS for the given operation will need to include the P Index spreadsheet indicating the appropriate rates for the fields falling under this option. Not only will soil tests be needed for these fields, but also the soil loss will need to be calculated, as well as, the other factors included in the P Index analysis. This option can be used for all fields with current soil test values for phosphorus, but it is the only option available for fields (1) with a current soil test showing phosphorus levels of greater than or equal to 200 ppm P (Mehlich 3 test) or (2) for fields that mechanical manure application is planned within 150 feet of a stream, lake, pond, etc. or (3) for fields planned to received mechanical manure applications in the winter
   - When using this option, the P Index result will indicate if the N and/or P columns need to be completed on the NBS.
   - The P Index will need to be reassessed every 3 years for importing operations using this option based on the most recent soil tests (which are required to be redone once every 3 years for these importers) and the most recent average manure test analysis (analysis value used in Appendix 3 of the NMP (may be a single test value or running manure average)). If any fields change over that time frame, they will need to be run on a new NBS if the importer wants to continue to use these fields.
   - If soil P testing does not use the Mehlich 3 test, option 3 is not available. Option 1 for NBS would be the only available planning option.

Small Quantity Importers

The detailed documentation (signed agreements and nutrient balance sheets) and setbacks described above are not needed for small quantity manure or mortality compost importers, specifically importers receiving less than the following amounts a year:

- 5 tons of poultry manure or poultry mortality compost
- 25 tons of non-poultry manure or non-poultry mortality compost
- 10,000 gallons of liquid manure

For farms that will be exporting using small quantity importers (this may be especially relevant to smaller horse operations), the nutrient management plan will need to describe in the "Nutrient Management Plan Summary; Additional Nutrient Management Plan Requirements; Exported Manure Summary section that small quantity importers will be used for implementation of the plan and that records will be maintained to document these small quantity exports.

Records for these exports can be documented on the sample small quantity exports record keeping form included in Supplement 19: Small Quantity Manure Importer List. These records are required to be maintained for all small quantity exports to document who received the manure or mortality compost, how much and when.

It must be noted that importers of small quantities of manure are required to have, obtain, or develop a Manure Management Plan (MMP) under DEP's Chapter 91 requirements. A NBS developed under Act 38 can be used for the nutrient application requirements of the MMP. Other sections of the MMP may still be applicable, such as ACA management, manure stacking, etc., and will need to be address in a separate MMP document.

Manure Application Setbacks

Importers are restricted from applying imported manure any closer to water bodies, than the setbacks established for the Act 38 farms where the manure is generated. So, if Options 1 or 2 are selected for the NBS, no additional setbacks are required on the importing site (other than 100' from active water wells) because the nutrient balance sheet process itself calls for a 150-foot setback; but if option 3 is used, then the setbacks established for Act 38 participating farms will be imposed for the manure imported to these other farms.

Other Organic Sources Applied

When other sources of nutrients are applied to a Crop Management Unit in addition to the imported manure, the following information must be included in the Nutrient Balance Sheet Summary Notes. For the application of other organic sources, the notes must include the type of material and the application rate. For pastures, the specifics of the pasture management must be listed including the animal groups on the pasture, numbers in each animal group, grazing season, hours per day on pasture, and where animals are watered and fed (if applicable).

Appendix 9
Operation Maps

Nutrient Management Plans (NMPs) are required to include a map(s) of the operation that shall include a topographic map drawn to scale identifying the lands included in the agricultural operation. Note; a map scale is required to be on the topographic map. A topographic map represents the exact physical features of a place or region on a map. Section 83.281(a)(5) of the regulations require the watershed(s) in which the lands included in the NMP are located and the existence of any special protection waters as identified in the Department of Environmental Protections' Chapter 93.

The topographical map will give you all the necessary information to look up the required information regarding Watershed and Special Protection Waters.

A listing of Special Protection Waters is revised on a continuing basis and is available through an interactive DEP map program, eMap, at: http://www.emappa.dep.state.pa.us/emappa/viewer.htm. For additional information on using the DEP eMap website tool refer to "Using eMAP to Identify Special Protection Watersheds" posted on the PA Nutrient Management Program website (http://extension.psu.edu/plants/nutrient-management under the Planning Resources page.

Additionally, DEP listing of Statewide Existing Use Classifications can be found at http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/statewide_existing_use_classifications/553974

Copies of the relevant areas of the topographic maps can be obtained from the local conservation district or NRCS office.

Adding 150-foot Phosphorus Index (P Index) lines to the topographic or soils map can be helpful in determining if a crop management unit (CMU) is closer than 150 feet to a receiving body of water, as measured in the direction of water flow from the lower edge of the CMU. It is highly recommended that stream, lake, ponds, etc., names be placed on the map, if available. If the CMU is less than 150 feet (as measured in the direction of water flow) then Part A of the P-Index must be used (see Appendix 5: Phosphorus Index). Contributing Distance lines used in the P Index lines can be helpful on the topographic or soils map but are not required.

Section 83.281(b)(4) of the regulations requires the identification of all soil types and slopes on the agricultural operation. A copy of **the NRCS soil survey map** can be used as the base map for this mapping requirement. The map shall include a soil legend which explains the soil types and slope designations on the map. The NRCS soil survey map is not required to be used in the NMP. Soils and slope information needs to be provided at least to the detail of indicating the soil type and slope for each individual field strip or field. The soil types and slopes are required information when determining the maximum infiltration rates for soils proposed to receive spray irrigation

and also for estimating typical capabilities of major Pennsylvania soils; such as typical ratings of yields based on soil type.

Again, the Operator Management Map is to be included in the NMP Summary section of the submitted NMP as an easy reference for setbacks and other features on the operation (see NMP Summary section).

The Operator Management Map is to be included in the Nutrient Management Plan Summary section to provide easy reference for the farmer. This is the map that is considered to be the most valuable to the farmer on a day-to-day basis for the implementation of the approved nutrient management plan.

It is highly recommended that Arial Photography be used as an underlay on the Operator Management Map and that maps be printed in color when submitted to the reviewing agency and given to the operator.

The operator map is to include the following:

1. farm boundary,
2. field boundaries,
3. field identification,
4. field specific acreage (this information can be shown directly on the map for each field, or can be included as part of the map legend indicating the field acreage for each individually identified field),
5. manure application setbacks and buffers in accordance with 83.294 (f) and (g) (with an identification of the <u>landscape feature</u> that requires the setback, such as an indication of where the stream or sinkhole are, well locations, etc.),
6. location of existing and proposed structural BMPs (including manure storage facilities),
7. location of existing or proposed emergency manure stacking areas or in-field manure stacking areas, and
8. roads and road names adjacent to and within the operation.

It is recommended that the operator map also include the following:

1. Aerial Photography as an underlay
2. Stream, Lake, Pond names, if available
3. For operations that contain multiple farms, a county or township map, that shows the location of each individual farm, that make up the larger operation.

The above items must be clearly identified on the operator management map, either by direct notation on the map, or through a clear legend. Manure application setbacks and vegetative buffers must be clearly identified on the map with an indication of the required setback or buffer width. The farmer and program staff need to be able to interpret the information provided on the legend, so the legend needs to identify the given feature using legible font sizes and easily understood words or symbols. Avoid using cryptic symbols or phrases that are not well understood by those using this map.

Only setback landscape features on the map that are relevant to actual setbacks or buffers required on this operation need to be identified. Landscape features on adjoining properties that do not require a setback should not be included on the farm map. For example, a neighbor's well which is beyond 100' from fields on the operation does not need to be included on the nutrient management plan operator management map, although any wells on adjoining properties that fall within the 100-foot setback need to be identified.

To test if this map is adequate, just imagine if you were a new manure hauler brought into this operation to help them apply their manure. Would the direction given on this map, in conjunction with the application rates in the Nutrient Management Plan Summary, be adequate to allow someone new to find the field and apply manure properly on this operation.

Appendix 10
Supporting Information and Documentation

Attach information and documentation necessary to support plan content not included elsewhere in the plan or appendices.

The following items, if applicable to the nutrient management plan, must be included in Appendix 10:

- Rainfall Additions Worksheet
- Winter Manure Application Matrix (see guidance below)
- Residual N Calculation Worksheet (if using Table 1.2-15)
- NMP Spreadsheet Supplemental Worksheets
- Documentation of animal weights if Agronomy Facts 54 is not used
- Bedding calculations
- Calculations for irrigation rates
- Out of state manure applications (see guidance below)
- For CAFO Operation only, supporting information and calculations/ references for manure storage winter capacity planning levels
- SCC approval for use of Phosphorus Banking in nutrient management plans
- SCC approval for manure applications greater than 9,000 gallons per are per application (see guidance below)
- Completed neighbor waiver for storage setbacks
- Completed manure storage waivers, or a letter from the conservation district or SCC approving the setback waiver, for setbacks to streams, sinkholes, lakes, etc.
- SCC approval of nutrient concentration sources, when manure sampling and analysis is not required by the regulations and the NMS does not use the nutrient content levels contained in the Penn State Agronomy Guide, Table 1.2-13.
- Soil test level conversion calculations

All operations proposing winter manure application must prioritize fields receiving winter manure application by utilizing Supplement 10: Winter Manure Application Matrix. The matrix for those individual fields where the winter application of manure is proposed must be shown in this Appendix.

Approval from the State Conservation Commission must be obtained for manure application rates greater than 9000 gallons/acre or the use of the phosphorus banking option in a nutrient management plan. The name of the SCC person granting the approval and the date the approval was granted is required in this Appendix.

For acres under management control of the Act 38 operator that will be applying manure on crop acres in another state, the following is required. Note that guidance is provided in Appendix 8 of this manual for manure that is exported to another operation for land application in another state.

1. List in the NMP the amount of manure proposed to be transported across state lines.

2. List the number of acres of cropland that are under management control in the other state.
3. List the address where the cropland in the other state is located.
4. List the planned transport time of the manure to those acres in the other state.
5. In Appendix 3 you will need to show that all the manure is accounted for in the "Manure Allocation Balance". This will show up as exported manure even though it is being transported to acres under your management control in the other state.

Section III
Minimum Standards for Manure Storage Facilities

The standards contained in this section relate to the following manure storage facilities on CAO, Volunteers, and operations receiving financial assistance from the Nutrient Management Act or Chesapeake Bay Program.

- New manure storage facilities built to address proposed or existing operations.

- Existing storage facilities that are repaired or expanded in order to implement the Nutrient Management Plan (NMP).

This section of the manual describes what standards are to be followed when designing, constructing, locating, operating, maintaining, and removing from service, manure storage facilities addressed through the nutrient management program.

1. What is a manure storage facility?
A manure storage facility is defined in the regulations as **a permanent facility, or portion of a facility, utilized for the <u>primary purpose</u> of containing manure**. Examples include: liquid manure structures, manure storage ponds, component reception pit and transfer pipes, containment structures built under a confinement building, permanent stacking and composting facilities and manure treatment facilities (such as anaerobic digestion facilities). The term **does not** include the animal confinement areas of poultry houses, horse stalls, freestall barns or bedded pack animal housing systems.

2. To whom do these standards apply?
The minimum standards for the design, construction, location, operation, maintenance and removal from service of manure storage facilities as outlined in the Act **apply to new storage facilities constructed and existing manure storage facilities expanded or repaired as part of an approved plan developed for a CAO, volunteer or an operation receiving financial assistance under the Chesapeake Bay Program**.

a. It should be noted that the setback standards stated in the regulations **do not** apply to manure storage facilities **repaired** as part of an Act 38 nutrient management plan.

b. The location and construction of manure storage facilities need to be coordinated with both the Township Government and the conservation district to ensure all requirements and regulations are met.

c. The **expansion** of a manure storage facility is the enlargement of an existing storage to accommodate needed extra storage and is defined as any enlargement to the facility. Such manure storage enlargements will be included in the nutrient management plan or plan amendment and therefore must meet all setback requirements and Pennsylvania Technical Guide standards.

d. As of January 2000, all liquid and semi-solid manure storage facilities built in Pennsylvania must be designed by a Professional Engineer and must be certified by a Professional Engineer after construction, indicating the storage facility was built in accordance with PA Technical Guide Standards.

3. Technical requirements for manure storage facilities.
Manure storage facilities shall be designed, constructed, located, operated, maintained, and, when no longer used for the storage of manure, removed from service, to prevent the pollution of surface water and groundwater, and the offsite migration of pollution. These facilities must meet **standards contained in the Pennsylvania Technical Guide**, except if these standards conflict with the Nutrient Management Act regulations, in which case the requirements in the regulations would take precedence. These conflicts mainly relate to setbacks, where the PA Technical Guide does not require specific setbacks, but the regulations do. **Setback standards** for manure storage facilities are established under this program for any storage constructed or expanded as part of an approved Act 38 nutrient management plan. These setback standards are explained in more detail under items "6" through "9" below.

a. The Natural Resources Conservation Service maintains the Pennsylvania Technical Guide on the Internet and can be found at http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/.

b. At least 2 weeks prior to installation or major repair of a liquid or semisolid manure storage facility, the responsible engineer shall submit a verification (including a quality assurance inspection plan for construction) to the Commission or delegated conservation district documenting that the design, meeting the requirements of this subsection including applicable setbacks has been completed.

c. Following completion of the installation or repair of a liquid or semisolid manure storage facility, the responsible engineer and contractor shall certify in writing to the Commission or delegated conservation district that the facility was constructed, expanded or repaired according to design/location, and meeting the requirements of this subsection. A sample format for the contractor/engineer certification document may be found in Supplement 14: New Waste Storage Facility Certification. The engineer's signature on the Chesapeake Bay Program (CBP-12) form or equal may also be used as this certification.

4. Manure storage repairs.
Manure storage repairs called for in the approved nutrient management plan shall be designed and constructed in accordance with the standards in the Pennsylvania Technical Guide. The location criteria required in the Act 38 regulations do **not** apply to manure storage facilities repaired under the program.

5. Contingency plans.
A written site specific contingency (emergency action) plan, developed in accordance with the standards contained in the Pennsylvania Technical Guide, addressing actions

to be taken in the event of a manure leak or spill from a manure storage facility installed, expanded, or repaired under the Act, shall be developed by the facility engineer by the time the storage is built, and kept on-site at the operation.

In the case of a leak or spill from a manure storage facility covered under the Act, the **operator is responsible for implementation** of the site-specific contingency plan developed for the storage facility. The contingency plan shall contain information necessary to meet the notification requirements contained in DEP's regulations (Section 101.2, relating to incidents causing or threatening pollution), for reporting leak or spill events that would result in pollution to surface water or groundwater. **These DEP regulations require operators** of manure storage facilities where a spill or leak has occurred, to immediately contact DEP as well as notify known downstream water users of the leak or spill. This DEP requirement needs to be included as part of the contingency plan so that the farmer understands this requirement. Supplement 13: Emergency Response Plan provides a model emergency response plan.

a. It is recommended that the operator provide a copy of the contingency plan to the local Emergency Management Agency and others (such as neighbors who will assist with equipment, the local fire department, etc.) that would assist during a leak or spill event.

b. Another resource for development of the contingency plan is DEP's Guidelines for the Development and Implementation of Environmental Emergency Response Plans.

6. General description, manure storage setback requirements for operations in existence ON OR BEFORE October 1, 1997:

There are two separate major categories of setback criteria established for the program based on when the farm operation went into existence. The first set of setback requirements described immediately below is for those operations that were producing livestock or poultry **on or before** *October 1, 1997*. The second set of setback requirements listed under items "8" and "9" below are for farms that came into existence **after** *October 1, 1997*. Please call state NMA program staff to assist you with making setback determinations in situations where you are not sure what the program setback requirements are.

a. The regulations refer to CAOs that were producing livestock or poultry on or before October 1, 1997. The wording *"producing livestock or poultry on or before October 1, 1997"* is meant to describe an active animal production operation at the time the regulations went into effect. It is understood that there is down time due to production cycles or market trends and therefore there may not be animals on the operation on October 1, 1997, but the operation would still be considered as "producing livestock or poultry on or before October 1, 1997" if it was temporarily without animals consistent with the normal production cycle for the operation.

   - If there is an **existing manure storage facility**, then, as part of the manure management portion of the plan, the storage would need to be visually

inspected by the planner and plan reviewer to assure that it is not leaking. An existing storage located within the setback distances does not have to be moved or reconstructed if it is not causing a problem. If the existing storage is determined to be leaking, then it will need to be repaired or replaced.

- If there is to be a **new manure storage facility** built on an existing operation, it would need to meet the standards and setback criteria explained in "7" below. These requirements recognize that where there is an existing barn housing the animals, the farmer may not have much of a choice of where to put the storage ("7" below allows for waivers of setbacks).

- If there is planned to be an **enlargement or a major alteration to an existing manure storage facility** on an existing operation, then the facility will again need to meet the setback requirements explained in "7" below.

- Where an existing CAO is building new animal confinement facilities (new barns) for an existing animal type, either due to the need to make facility renovations or as a part of an operation expansion, this shall generally be considered as an operation which was "producing livestock or poultry as of October 1, 1997" for purposes of determining setback criteria and shall be required to follow the setback criteria established in section "7" below.

- In contrast, where an existing CAO brings on a new animal enterprise (i.e. a dairy operation which is putting on a new broiler house), this portion of the farm would generally be considered to be an "agricultural operation coming into existence after October 1, 1997" for purposes of determining setback criteria and therefore the operator would be required to follow the setback distances for new CAOs covered in "8" and "9" below.

- Manure storage setback requirements are only relevant to those portions of the operation considered to be a manure storage facility. The definitions within the regulations define a manure storage facility. Setbacks relate to all types of manure storages built on participating farms including liquid, semi-solid, and solid storage facilities. These setbacks do not relate to animal confinement facilities (barns) that are not considered manure storage facilities.

7. For CAOs that were producing livestock or poultry ON OR BEFORE October 1, 1997, manure storage facilities, except reception pits and transfer pipes, may not be constructed:

a. Within **100 feet** of a perennial stream, intermittent stream, river, spring, lake, pond or reservoir.

- A **perennial stream is defined** as a body of water normally flowing year round, having defined bed and banks, and is capable, in the absence of manmade disturbances, of supporting bottom dwelling aquatic animals.

- An **intermittent stream is defined** as a body of water flowing only at times of surface water runoff or when the water table is high. This area may or may not have defined bed and banks, and is commonly not capable of supporting bottom dwelling aquatic animals year round.

- A **spring is defined** as a place where groundwater flows onto the land surface at least 183 days a year.

b. Within **100 feet** of a wetland that is identified on the National Wetlands Inventory maps, if the following apply:

   - The wetland is within the 100-year floodplain of an Exceptional Value stream segment.

   - Surface flow is toward the wetland.

c. Within **100 feet** of a private water well, or open sinkhole.

d. Within **100 feet** of an active public drinking water well, unless other State or Federal laws or regulations require a greater isolation distance.

   - A **public water supply is defined** as one that is used at least 60 days a year and either having at least 15 service connections or serving at least 25 individuals daily.

   - Please note that **no waivers** are available for the setbacks established for public wells.

e. Within **100 feet** of an active public drinking water source surface intake, unless other State or Federal laws or regulations require a greater isolation distance.

   - A **public water supply is defined** as one that is used at least 60 days a year and either having at least 15 service connections or serving at least 25 individuals daily.

   - Please note that **no waivers** are available for the setbacks established for public drinking water source surface intakes.

f. Within **100 feet** of a property line, unless the **landowners** within the 100 feet distance from the manure storage facility otherwise agree and execute a waiver in a form acceptable to the Commission.

   - A **road bisecting a property** is generally not considered a property line in relation to these setbacks. Operators are instructed to contact their local municipality to confirm this and to determine general township setbacks.

Please note that **township nutrient management ordinances** must be consistent with the Nutrient Management Act, but townships may have other setbacks that they establish such as for road siting distances, emergency fire lanes, etc.

- A **sample waiver form** is provided in Supplement 16: Sample Manure Storage Setback Waiver. Please note that a neighbor waiver is not transferable when the property is sold unless it is recorded with the deed or the subsequent landowner agrees in writing to accept the waiver. Also note that a neighbor waiver is only necessary for the *construction* of the manure storage facility. If a farmer obtained a waiver from his neighbor and the storage was subsequently built, and later on a new person buys the neighboring property after the storage is there, it is presumed that the new neighbor bought the property understanding that there is a manure storage located next to his property and that by buying the property, they are accepting its existence in that location.

g. Within **200 feet** of an intermittent, or perennial stream, river, spring, lake, pond, reservoir or any water well, or wetland if a facility (except permanent stacking and compost facilities) is located on slopes exceeding 8% or a facility has a capacity of 1.5 million gallons or greater.

- **To determine if a slope exceeds 8%** utilize topographic maps along with a field review. The area where the slope is to be measured is the area within the 200 feet from the water source.

- Note that the setback does not increase from the initial 100' setback distance for **manure stacking and composting facilities**.

h. Within 200 feet of a property line, if a facility (except permanent stacking and compost facilities) is located on slopes exceeding 8% and if the slope is toward the property line, or a facility has a capacity of 1.5 million gallons or greater, unless the landowners within the 200 foot distance from the facility otherwise agree and execute a waiver in a form acceptable to the Commission.

- **To determine if a slope exceeds 8%** utilize topographic maps along with a field review. The area where the slope is to be measured is the area within the 200 feet from the property line.

- A **road bisecting a property** is generally not considered a property line in relation to these setbacks. Operators are instructed to contact their local municipality to confirm this and to determine general township setbacks. Please note that **township nutrient management ordinances** must be consistent with the Nutrient Management Act, but townships may have other setbacks that they establish such as for road siting distances, emergency fire lanes, etc.

- A **sample waiver form** is provided in Supplement 16: Sample Manure Storage Setback Waiver. Please note that a neighbor waiver is not transferable when the property is sold unless it is recorded with the deed or the subsequent landowner agrees in writing to accept the waiver. Also note that a neighbor waiver is only necessary for the *construction* of the manure storage facility. If a farmer obtained a waiver from his neighbor and the storage was subsequently built, and later on a new person buys the neighboring property after the storage is there, it is presumed that the new neighbor bought the property understanding that there is a manure storage located next to his property and that by buying the property, they are accepting its existence in that location.

It should be noted that **waivers can be granted** for most of the manure storage facility setbacks listed above built on **existing farms.** Waivers are granted by the delegated conservation district or the Commission in accordance with the criteria listed in the program's administrative manual. **An operator must meet all of the criteria established in the Nutrient Management Program Administrative Manual (see item "10" below for a listing of waiver criteria) in order to be granted a waiver.**

It should also be noted that the district or Commission may only grant waivers for manure storage facilities built on existing farms, but the neighbor may provide a waiver from the property line setback for manure storage facilities built on existing **or new** operations. Again note that **no waivers are ever to be granted from the setbacks established for public water sources.**

8. General description, manure storage facility setback requirements for agricultural operations that come into existence AFTER October 1, 1997:

The regulations refer to CAOs on agricultural operations that *come into existence after October 1, 1997*. For farmers building a storage on these new operations, the operator is expected to follow the stricter setback criteria listed in "9" below. It is the intention of the program to require stricter standards of new operations because they have more of an opportunity to address barn placement, etc. as they design their general farm layout.

9. For CAOs on agricultural operations that come into existence AFTER October 1, 1997, manure storage facilities, except reception pits and transfer pipes, may not be constructed:

a. Within **100 feet** of a perennial stream or intermittent stream, river, spring, lake, pond or reservoir.

- A **perennial stream is defined** as a body of water normally flowing year round, having defined bed and banks, and is capable, in the absence of manmade disturbances, of supporting bottom dwelling aquatic animals.

- An **intermittent stream is defined** as a body of water flowing only at times of surface water runoff or when the water table is high. This area may or may not

have defined bed and banks, and is commonly not capable of supporting bottom dwelling aquatic animals year round.

- A **spring is defined** as a place where groundwater flows onto the land surface at least 183 days a year.

b. Within **100 feet** of a wetland that is identified on the National Wetlands Inventory maps, if the following apply:

- The wetland is within the 100-year floodplain of an Exceptional Value stream segment.

- Surface flow is toward the wetland.

c. Within **100 feet** of a private water well, or open sinkhole.

d. Within **100 feet** of an active public drinking water well, unless other State or Federal laws or regulations require a greater isolation distance.

- A **public water supply is defined** as one that is used at least 60 days a year and either having at least 15 service connections or serving at least 25 individuals daily.

e. Within **100 feet** of an active public drinking water source surface intake, unless other State or Federal laws or regulations require a greater isolation distance.

- A **public water supply is defined** as one that is used at least 60 days a year and either having at least 15 service connections or serving at least 25 individuals daily.

f. Within **200 feet** of a property line, unless the **landowners** within the 200-foot distance from the manure storage facility otherwise agree and execute a waiver in a form acceptable to the Commission.

- A **road bisecting a property** is generally not considered a property line in relation to these setbacks. Operators are instructed to contact their local municipality to confirm this and to determine general township setbacks. Please note that **township nutrient management ordinances** must be consistent with the Nutrient Management Act, but townships may have other setbacks that they establish such as for road siting distances, emergency fire lanes, etc.

- **A waiver may be granted by the neighboring landowner**. A sample waiver form is provided in Supplement 16: Sample Manure Storage Setback Waiver. Please note that a neighbor waiver is not transferable when the property is sold unless it is recorded with the deed or the subsequent landowner agrees in writing to accept the waiver. Also note that a neighbor waiver is only necessary

for the *construction* of the manure storage facility. If a farmer obtained a waiver from his neighbor and the storage was subsequently built, and later on a new person buys the neighboring property after the storage is there, it is presumed that the new neighbor bought the property understanding that there is a manure storage located next to his property and that by buying the property, they are accepting its existence in that location.

g. Within **200 feet** of an intermittent or perennial stream, river, spring, lake, pond, reservoir or any water well where these manure storage facilities (except permanent stacking and compost facilities) are located on slopes exceeding 8% or have a capacity of 1.5 million gallons or greater.

   - **To determine if a slope exceeds 8%** utilize topographic maps along with a field review. The area where the slope is to be measured is the area within the 200 feet from the water source.

h. Within **300 feet** of a property line, where these facilities (except permanent stacking and compost facilities) are located on slopes exceeding 8% where the slope is toward the property line, or have a capacity of 1.5 million gallons or greater, unless the **landowners** within the 300 foot distance from the facility otherwise agree and execute a waiver in a form acceptable to the Commission.

   - **To determine if a slope exceeds 8%** utilize topographic maps along with a field review. The area where the slope is to be measured is the area within the 200 feet from the property line.

   - A **road bisecting a property** is generally not considered a property line in relation to these setbacks. Operators are instructed to contact their local municipality to confirm this and to determine general township setbacks. Please note that **township nutrient management ordinances** must be consistent with the Nutrient Management Act, but townships may have other setbacks that they establish such as for road siting distances, emergency fire lanes, etc.

   - **A waiver may be granted by the neighboring landowner**. A sample waiver form is provided in Supplement 16: Sample Manure Storage Setback Waiver. Please note that a neighbor waiver is not transferable when the property is sold unless it is recorded with the deed or the subsequent landowner agrees in writing to accept the waiver. Also note that a neighbor waiver is only necessary for the *construction* of the manure storage facility. If a farmer obtained a waiver from his neighbor and the storage was subsequently built, and later on a new person buys the neighboring property after the storage is there, it is presumed that the new neighbor bought the property understanding that there is a manure storage located next to his property and that by buying the property, they are accepting its existence in that location.

It should be noted that **NO WAIVERS may be granted by the districts or the Commission** for any of the setbacks listed in "9" above **(**these are the setbacks for storages built on new farms**).** It should also be noted that the **NEIGHBOR may provide a waiver from the property line setback** for storages built on existing **or new** operations.

10. Loading areas adjacent to a poultry house.

The normal operation of these facilities involves removing the waste and litter several times a year. Some or all of the material may be removed prior to the next flock. The material can be pushed out the end of the facility and stockpiled for a short time period till it is loaded and hauled away. The other method is to load up and go out a side door to direct load into a truck or spreader.

These handling and loading areas are part of their waste transfer system and must meet the following:

- Must be built to the Waste Transfer (634) Standard found in the FOTG.
- Must have a concrete surface.
- Larger pads shall be sloped or bermed to direct on-site runoff to a grassed area.
- Offsite runoff shall be directed around area.
- Pile must covered if left on site for more than 14 days on CAFO operations.
- Wastes to be removed as soon as possible.
- If the wastes are to be left on-site for more than 28 days, the facility shall be converted to meet CPS Manure Storage Facilities (313).

11. What is the process to approve water feature waivers for manure storage facilities?

The Nutrient Management Act Administrative Manual lays out the criteria and process to be followed when the districts or the Commission receive a waiver request for a water feature (Please note property line setback waivers are handled differently). A sample waiver request form is included in Supplement 15: Waiver Request for Manure Storage Setback Requirements. The agency reviewing the waiver request (the district or the Commission), in conjunction with other relevant cooperating agency technical staff, shall perform an **on-site visit** to evaluate the site for which the waiver is proposed. An outline of the waiver criteria that must be met in order to obtain a waiver are as follows:

a. The placement of the manure storage facility outside of the setback area is found to be physically impractical or economically unreasonable (an increase in cost of 50% or $5,000 whichever is less).

b. The placement of the manure storage facility within the setback area has been determined to adequately protect the surrounding area from offsite migration of manure (by way of existing topography, proposed diversion or other conservation practices, or demonstrating that it is safer to have it within the area than it is to build a system to transport manure out of the setback area).

c. The facility design meets PA Technical Guide standards.

d. The operator agrees to allow for annual inspection of the manure storage facility when empty.

e. The loading/unloading area is designed to retain or divert 3,000 gallons of manure.

f. The manure storage facility shall **not** use a gravity unloading system.

g. The foundation, floor and walls of the manure storage facility will be protected against erosion and flotation from a 25-year flood event.

h. The **top** of the storage is above the 100-year flood elevation. The 100-year flood elevation will need to be determined by the engineer designing the manure storage.

i. An operation and maintenance plan (including a contingency plan) must be developed and reviewed with the appropriate individuals.

j. The loading/unloading equipment shall be outfitted with a secondary check valve (where appropriate).

Additional information concerning waivers is available in the program's administrative manual that may be viewed at the conservation district office. In addition to the sample waiver request form included as Supplement 15: Waiver Request for Manure Storage Setback Requirements, sample waiver approval/disapproval letters are included in the Nutrient Management Program Administrative Manual.

The program **allows neighbors to approve waivers from the property line setback**. Manure storage facilities do not need to meet the above criteria to get a waiver from the neighbor from the property line setback. The operator looking for the waiver needs only to get written agreement from the neighbor that the storage may be placed closer to the property line than the setbacks allow. A sample format for these neighbor waivers is provided in Supplement 16: Sample Manure Storage Setback Waiver.

12. The sides of facilities located in a floodplain shall be protected from erosion and scouring from a 25-year flood event.

This information relates to specific design criteria available from NRCS.

13. Chapter 105 regulations.

All manure storage facilities built under the act shall conform to the requirements in DEP's Chapter 105 Rules and Regulations. Chapter 105 requires operators to get a Dam Safety or Encroachment Permit for manure storage facilities built in certain areas next to streams, or for very large storages that are over 15 feet tall and hold more than 50 acre-feet of manure (50 acre-feet of manure is approximately 16 million gallons). Information related to these requirements can be obtained from the DEP regional offices or the conservation district office.

Section IV
Record Keeping and Informational Requirements

Unless otherwise specified, records required under this program are **not to be submitted** to the Commission or delegated conservation district, but shall be retained at the agricultural operation subject to the requirements of the act. Records are required to be **retained on the operation for at least 3 years**. Record keeping should begin as soon as the nutrient management plan is approved. Appendix 1: Nutrient Management Plan Agreement and Responsibilities in the NMP provides a summary of the required records that are to be kept by program participants. Also, you can access the "Record Keeping Packet" under Planning Resources of the Nutrient Management Program Website at: http://extension.psu.edu/plants/nutrient-management/planning-resources

1. Crop yield records.
Approximate **annual crop yield levels for each crop group shall be recorded**. These yields do not need to be determined using precision hand yield checks, these can be estimated by calculations based on estimated total amount harvested taken from a particular field (knowing the acres of the field).

Records of annual crop yields shall include: field or crop group identification, acres of crop harvested, and bushel or tons per acre.

2. Land application of nutrients.
The land application of nutrients on NMP operations shall be documented on an annual basis by **recording the following information** for each source of nutrients:

a. The location and number of acres of nutrient application by field number or field identification label

b. The dates of nutrient application

c. The rate of nutrient application for each crop management unit. The number of tons or gallons of manure applied per acre (if the application is less than 5 tons/acre, the rate shall be estimated to the nearest 10th of a ton)

d. The number of animals on pasture, the number of days on pasture and the average number of hours per day on pasture

e. Rate per acre (to the nearest 5-pound increment) and analysis of **commercial fertilizer** or other sources of nutrients applied.

3. Annual manure production records.
Annual manure production records should include the amount of manure produced on the operation determined by either:

a. Recording the actual amount of manure that was stored (knowing the storage capacity of the storage facility).

b. Applied to the operation (knowing the number of loads applied over the year and the amount of manure applied per load) over the year's time.

4. Soil testing requirements.
After the approval of the initial plan, soil tests are **required at least every 3 years** from the date of the last test. At a minimum, the most recent soil test for each field shall be kept on site. If the operator does annual soil testing for the fields on the operation, he/she will need to retain the last 3 years' worth of soil tests for the fields.

Records of soil tests should include: date of sampling; the testing facility that did the analysis; fields tested; crop and yield information; Phosphorous, Potassium, and pH levels, and the soil test recommendations for N, P_2O_5, and K_2O. All of this information must be entered in Appendix 4: Crop and Manure Management Information for each crop management unit.

5. Manure sampling records.
Records of manure testing results and testing of other nutrient sources shall be maintained consistent with the determination of available nutrients. The regulations require farmers that are taking manure tests to retain these records the same as any other item where records are required. Manure testing is required once every year for each manure group, except manure groups associated with less than five AEUs of livestock or poultry at the operation and manure groups representing grazing. For these small quantity manure groups and manure deposited on the pasture, nutrient content values are to be based on Penn State Agronomy Guide values and Phosphorus Source Coefficient (PSC) values are to be based on PSC values provided in Appendix 5: Phosphorus Index.

Manure analysis information for each animal group must be entered in Appendix 3: Manure Group Information. There are no manure sampling records required for manure deposited on pasture or manure groups with less than 5 AEUs.

For those operations with less than one-year storage capacity, which is open to receive rainfall, would have multiple manure groups requiring manure testing based on storage capacity and various degrees of dilution from rainfall. Multiple manure tests are not required when the storage does not receive rainfall.

During the implementation of the plan, operators of **NMP operations exporting manure are required to determine the nutrient content of the manure by using accepted manure sampling and chemical analysis methods** as outlined in the Penn State Agronomy Guide or the DEP Manure Management Manual.

Records of manure analysis shall include: date of sampling; the name of the testing facility; the type of manure analyzed; and the percent solids, amount of Total Nitrogen (as N), ammonium nitrogen (as NH4-N), Total Phosphate (as P_2O_5), and Total Potash (as K_2O) per ton or gallon (or 1000 gallons).

6. Informational requirements when exporting manure off of the operation.
The importer has the primary responsibility for the application of the manure imported to his/her site. When an importer receives the manure from the exporter, the manure is changing ownership and it therefore becomes the importer's manure. Therefore, it is the importer's responsibility to see that the manure is used correctly. The record keeping and informational requirements reflect this change of ownership, except in the case where the exporter is applying the manure. In this case, where the exporter applies the manure, the exporter retains some control of the application and therefore is required to record the field identification, the rate at which the manure was applied and the acres that the manure was applied to (See the Manure Export Sheet discussion below and Supplement 12: Manure Export Sheet).

When manure is exported **from a NMP operation for land application**, the program requires the NMP Operation (exporter) to provide the importer with various informational items to allow the importer to best manage the manure being imported. The 'Exported Manure Informational Packet' containing the following items required by the regulations must be provided by the exporter to the importer:

a. A completed **manure export sheet**,

   - A manure export sheet shall be used for **all** manure transfers from NMP operations. The **NMP operation is responsible for providing the export sheet to the importers**. 'Blank' export sheets should be given to the NMP operation at the time when the operator is informed of his plan approval. **Computer-generated manure export forms** may be used if they contain the same information as, and are reasonably similar in format to, the manure export sheets provided by the program.

   - The **exporter is responsible** for the completion of Section 1 of the Manure Export Sheet. When the exporter, or person working under the direction of the exporter (such as a commercial hauler, or a hired farm worker), applies the manure to the importing farm, the exporter is also responsible for completion of Section 2 of the Manure Export Sheet.

   - A sample copy of a manure export sheet is attached in Supplement 12: Manure Export Sheet.

b. The **Pennsylvania Manure Management for Environmental Protection** and the **Land Application of Manure: Manure Management Plan Guidance (October 29, 2011)** of the Pennsylvania Manure Management Manual.

   - The exporter is required to provide the importer with the relevant sections of the Pennsylvania Manure Management Manual at the time the manure is exported. If the exporter needs copies of the Pennsylvania Manure Management Manual to provide to the importer, copies may be obtained from the regional DEP office or from the delegated conservation district.

c. A concise **educational publication describing the key concepts of nutrient management**. The program has developed this publication as a fact sheet titled: 'Agronomy Facts 60' - Nutrient Management Planning, An Overview'. This publication can be obtained from the county Penn State Cooperative Extension office or from the delegated conservation district.

d. Nutrient Balance Sheets

The conservation district or the Commission will provide the Exported Manure Informational Packet to the NMP operation for distribution to the importer. The NMP operation exporter is only required to provide those items (a-c) that have been made available to the exporter by the conservation district or the Commission. The NMP operation exporter is responsible for providing the informational materials to the importer or broker only if the importer or broker does not already have a current copy of the informational materials. A new manure export sheet is required for each export transaction."

The detailed record keeping documentation described above is not needed for small quantity importers, specifically importers receiving less than the following amounts of manure per year:

- 5 tons of poultry manure
- 25 tons of non-poultry manure
- 10,000 gallons of liquid manure

Records for these exports can be documented on the sample quantity exports record keeping form included in Supplement 19: Small Quantity Manure Importer List. These records are required to be maintained for all small quantity exports to document who received the manure, how much and when.

7. Record keeping requirements when exporting manure off of the operation.
NMP operations exporting manure for agricultural land use by importers identified in the plan need not submit manure export records to the agency approving the plan, but shall retain these records on site for a minimum of three years for possible review by the appropriate agency personnel.

8. BMP designs and certification for new liquid and semi-solid manure storage facilities.
During the implementation of the approved plan, the operator is responsible for obtaining the necessary BMP designs and associated operation and maintenance plans to implement the BMPs listed in the approved plan. These BMP designs and associated operation and maintenance plans shall be kept on record at the operation as a supplement to the plan.

At least 2 weeks prior to installation of the facility or the repair, the registered engineer shall submit a verification (including a quality assurance inspection plan for construction) to the Commission or delegated conservation district documenting that the design, meeting the requirements including applicable setbacks, has been completed.

Following completion of the installation or repair, the responsible engineer and construction contractor shall certify to the Commission or delegated conservation district that construction of the manure storage facility was completed according to the design, construction and location standards.

Section V
Plan Review and Implementation

Plan Review and Approval

Plans or plan amendments are to be submitted to delegated conservation districts for review and approval (the Commission will assist in counties not delegated administrative authority). Nutrient management plans submitted as of January 1, 2011 must be developed using the NMP Spreadsheet. Electronic NMP submission will continue to be an option. Where a NMP is submitted electronically the Nutrient Management Plan Summary (including the maps), Appendix 1: Nutrient Management Plan Agreements and Responsibilities and Appendix 2: Operation Information must be submitted as a paper copy. This process is for the initial NMP submission and for changes needed during the review process. The nutrient management planner is responsible to submit a paper copy of the complete and final NMP for board action. The conservation district reviews the plan to assure accuracy and that it meets NMA program criteria. The conservation district assigns the plan review to their designated review specialist. This district plan review specialist must be a Certified Public Nutrient Management Specialist holding a valid, up to date certification in accordance with the Department of Agriculture's nutrient management specialist certification requirements.

The Commission or a delegated conservation district will, within 10 days from the date of receipt of the plan, perform an administrative completeness review of the plan and provide notice to the operator indicating whether all of the required plan elements have been received.

Section 83.361(c) of the Act 38 Rules and Regulations indicates "The Commission or a delegated conservation district will approve or disapprove a plan or plan amendment within 90 days of receipt of a complete plan or plan amendment". The reviewing agency has 10 days after the submission date to determine if the plan is administratively complete. If a determination is made that the plan received is administratively complete, the 90-day review period starts at the initial plan submission date. If the 10-day administrative completeness review indicates additional information is required, the 90-day review period begins when the additional information is received, and the plan is determined to be administratively complete.

In addition to determining that all required information is present in the plan, the 10-day administrative completeness review should determine that all the included information meets program criteria. Some dated information in the submitted plan may exceed the expiration date established by the regulations and must be identified during the administrative completeness review. One example would be soil test dates which are older than 3 years. The Commission is not concerned that the actual date of the new soil test never exceeds the 3-year date of the previous test, but that the tests be taken in the same season. For review purposes, soil test dates for plan submissions, plan updates, and plan amendments must be within three years of plan submission (taking manure application season into account). Another example would be manure analysis dates. The Commission would accept the manure samples be within one year of the date of plan submission (taking manure application season into account).

For example, A NMP is submitted for review on August 1, 2020 that includes a soil test taken on June 30, 2017. This soil test, even though it is slightly over 3 years old would be acceptable as it was taken in the same season 3 years ago. A NMP is submitted for review on May 10, 2020 and includes a manure test taken April 1, 2019. This manure test, even though it is slightly over 1 year old would be acceptable as it was taken in the same season 1 years ago.

An example of submitted information not meeting program criteria would be a single soil test sample that represents multiple fields totaling more than 20 acres. While a single field larger than 20 acres can be represented by one soil test, a combination of multiple fields greater than 20 acres may not.

Section 83.294(c) of the regulations indicates "Manure application rates and procedures must be consistent with the capabilities, including capacity and calibration range, of the available application equipment". For existing operations using their own application equipment, the plan must include a statement indicating that the existing equipment has been calibrated. If the plan does not include an adequate statement to allow you to confirm that the required manure spreader calibration was completed and the manure application rates in the plan are based on those calibration rates, the plan must be considered incomplete unless mitigating circumstances preclude the manure spreader calibration. What the scenarios above hope to convey is the impact those situations have on the 90-day review period when soil testing, manure testing, and manure spreader calibration, are required.

There should be more involved in your 10-day administrative completeness review than just making sure all the empty spaces in the submitted plan are filled in.

Listed are common issues the plan reviewer should look at during the administrative completeness review:

1. Are all the required sections of the plan submitted?
2. Are all the sections of the plan completed?
3. Were the required sections of the plan completed using the required version of the NMP Standard Format Spreadsheet?
4. Are all the submitted soil test results within the required date range and all the required information included?
5. Were the required manure test results utilized in Appendix 3: Manure Group Information?
6. Are the plan years within the required date range?
7. Is the manure spreader calibration statement included and adequate?

After you have completed the administrative review of the submitted plan you need to tell the farmer of your findings. Make sure to carbon-copy the plan writer in the letter informing the farmer of the result of your administrative evaluation.

If the plan is administratively complete:

1. Send an Administratively Complete letter
2. If this is a CAFO operation you can now submit the appropriate documentation to the DEP regional office where the animal operation resides to have the plan advertised in the PA Bulletin and also remind (via e-mail) the plan writer to submit a copy of the plan to the DEP regional office for their review.
3. If this is a CAO or a VAO, then proceed with the technical review of the plan. You have 90 days from the date of the plan submission to complete the review.

If the plan is NOT administratively complete:

Send an Administratively Incomplete Letter, along with the administratively incomplete NMP, listing the plan deficiencies to the farmer and carbon-copy the plan writer on the letter.

Technical Review:
NMP signatures (operator and planner) are required at the time of submission of the NMP to the District. First signature is required at the time of initial NMP submission and the second signature at the time of final submission if the plan has undergone significant changes during the plan review. If there is no farmer signature with the initial NMP submission the NMP is administratively incomplete.

The 90-day review process requires an on-site evaluation of the operation.

During the NMP review field visit, NMP reviewers will generally ask farmers if the plan writer has reviewed the NMP with them and if they understand and are able to implement the practices in the NMP. This represents a significant change in the approach Conservation District staff will take in NMP site visits. The main difference is the reviewer will not complete a detailed review of the NMP with the farmer. Instead the NMP review with the farmer will include general questions about whether or not the NMP was reviewed by the NMP developer and address any management questions resulting from the review process.

Listed are examples of questions the NMP reviewer should be asking the farmer.

1. Did the planner explain the manure application rates?
2. Was the manure spreader calibrated to meet the application rates in the plan?
3. Do you feel you are able to meet the manure application rates with your current equipment?
4. Did the planner explain any setbacks you may need to be aware of for manure application?
5. Did the planner explain any Best Management Practices (BMPs) needed in your plan and if yes, do you understand what the BMPs entail?
6. Did the planner explain any environmentally sensitive areas to be aware of for manure application?
7. Is there anything in your nutrient management plan that you do not understand?

If a review of the NMP with the farmer as outlined above has not been completed by the NMP planner, the PA Department of Agriculture Nutrient Management Certification Program should be notified in writing.

During the on-site evaluation, there are several items the plan reviewer should verify: 1) The plan reviewer must verify records which are required to be maintained on the operation but are not required to be submitted with the NMP, and 2) The plan reviewer must verify that a current Ag E&S Plan written for the operation meets the requirements of Chapter 102.4. Chapter 102.4(a) indicates "The E&S Plan shall be available for review and inspection at the agricultural operation. The Act 38 NMP can't be approved by a District Board unless a current Ag E&S Plan exists for the operation and has been verified by the plan reviewer during the on-site evaluation. The term "current" refers to the crop rotation and tillage practices currently employed on the operation.

Traditionally, Erosion and Sediment Control plans have been required for agricultural plowing and tilling activities that disturb 5,000 sq. ft. (1/10 acre) or more of land. No-till and manure injection is considered plowing and tillage under the Chapter 102 Regulations. Also, due to recent regulatory updates, these Ag E&S Plans must also cover certain animal activities which include Animal Concentration Areas (ACAs) and Animal Heavy Use Areas (AHUAs). The landowner, and any lessee, renter, tenant or other land occupier, conducting or planning to conduct agricultural plowing or tilling activities or erosion-causing animal activities are jointly and individually responsible for developing a written Erosion and Sediment Control Plan.

Ag E&S plan verification is required for all lands in the NMP. It is critically important that the Ag E&S plan and the proposed Act 38 NMP correlate and complement each other. Having two separate plans that do not relate only serves to confuse the operator and additionally make the operator out of compliance with either Act 38 or Chapter 102.

Ag E&S plans are required for operations that are conducting plowing and tilling activities and operations where earthen ACAs and/or AHUAs exist. However, the possibility does exist where certain operations are not required to have an Ag E&S Plan. One example would be a total grazing operation where no plowing or tilling activities occur and no earthen ACAs or AHUAs exist. All earthen ACAs and/ or AHUAs equal to or greater than 5,000 square feet in size must be mapped, described and BMPs identified to minimize erosion and sedimentation from those areas in the Ag E&S Plan

Portions of a traditional conservation plan, developed by NRCS, a Technical Service Provider (TSP) or the conservation district (CD), may meet these Ag E&S Plan requirements. It is recommended that operators contact NRCS, the TSP, or the CD to determine if their conservation plan meets DEP's Chapter 102.4(a) requirements. It is important to note that if a current Ag E&S Plan does not exist for the operation at the time of the plan review site visit and one cannot be obtained by the time the plan is ready for board action, the plan should be disapproved.

In addition to the Ag E&S Plan requirements discussed above, it is also important to note that any construction or earthmoving activities taking place on agricultural

operations must also meet DEP's traditional E&S Plan requirements under Chapter 102.4(b) or Chapter 102.4(c).

Plans shall be reviewed against the standard plan format and a technical review to assure that the information in the plan is correct. A comprehensive list of items which must be assessed during the on-site evaluation is included in the Nutrient Management Program Administrative Manual.

The delegated conservation district (or the Commission in unusual circumstances) shall approve, modify or disapprove the plan or plan amendment within **90 days** of receipt of a complete plan or plan amendment. The district's action on the plan requires a formal action of the board. An operation that submits a complete NMP or plan amendment is authorized to implement the plan if the conservation district fails to act within 90 days of submittal. When the conservation district fails to act within 90 days of plan submission and the district again fails to act within 90 days of the expiration of the initial 90-day review period, the plan shall be deemed approved.

If a NMP operation plan or plan amendment submission is disapproved, the NMP operation submitting the plan or plan amendment for the first time shall have 30 days after receipt of a written notice explaining specific reasons for the disapproval to resubmit a revised plan amendment.

Conservation district plan review and approval actions are explained in more detail in the Program's NMA Administrative Manual, provided to all of the delegated conservation districts.

Correspondence with Plan Writers and Owners/Operators

It is imperative that owner/operators and plan writers are equally aware of the status of the submitted NMP. The following should occur with each submitted plan.

1. Owner/Operator is to receive a copy of the administratively complete/incomplete letter per paragraph 83.361(b) of the Act 38 regulations. The planner should also receive a copy of this letter.
2. Owner/Operator and planner is to receive the second and all other "request for corrections" letters after informal efforts to make corrections with the planner has failed.
    a. Informal efforts could include e-mails and telephone calls before a formal review letter.
    b. Conservation Districts are allowed to send all correspondence by letter, if directed to do so by their district manager or Board of Directors.
    c. Conservation Districts are allowed to send the first correction letter (copy of the first technical review e-mail or notes from the first technical review telephone call), if directed to do so by their District Manager or Board of Directors. However, this is not required.
3. Owner/Operator is to receive a determination to disapprove a NMP along with the reasoning per paragraph 83.361(e) of the Act 38 regulations. The planner should also receive a copy of this communication.
4. Both the owner/operator and the planner are to receive a copy of the approval

letter.

Provisions for Withdrawing of a Plan Under Review

The following guidance is provided for CAO, CAFO and volunteer (VAO) plans undergoing review under the Act 38 program. It should be noted that CAOs and CAFOs have an obligation to maintain a valid nutrient management plan for the life of their operation. Therefore, if one of these mandated Act 38 participating farms withdraws a plan under review, they are required to resubmit a new plan submission within 30 days of withdrawal in order to demonstrate a desire to maintain compliance. In contrast, non-mandated Act 38 VAOs have no legal obligation to resubmit a plan which they withdrew unless they received BMP installation funding under Act 38 or AgriLink (but this resubmission obligation only lasts for the life span of the funded BMP), or if they wish to continue their efforts to participate as a VAO under the program.

Conservation districts have a finite timeframe in which to act on a nutrient management plan under review for the Act 38 program. Unless there is a plan review delay caused by the conservation district, action on the plan must take place within 90 days of receiving a complete plan. If the conservation district provides its full set of initial plan review comments to the planner, giving the planner at least 30 days to address the comments prior to the first 90-day deadline, the district is expected to act on the plan within 90 days. However, if the district is delayed in providing its complete initial plan comments to the extent that the planner does not have the aforementioned 30-day time period to make any required plan revisions, the district is required to submit a request to the SCC regional coordinator to roll the plan review over to the second 90-day timeframe.

Given the time restriction on the approval/disapproval of the submitted Act 38 NMPs, there will be times when the planner cannot adequately address the comments provided within the allotted timeframe. Farmers and planners may not want a NMP “disapproval” on public record with the district, so they may want to avoid that formal action. In these cases, the planner or operator submitting the plan may make a written request (via letter or e-mail) to the conservation district, requesting that the plan be withdrawn from the review process. The conservation district will send a letter to the planner or farmer (depending on who sent in the withdraw request) and copy the other party (such as copying in the farmer for a planner request, and copying in the planner for a farmer request), acknowledging the withdrawal request. This acknowledgement letter will also notify mandated Act 38 participating farms about the 30-day resubmission requirements.

In light of this process, when conservation districts provide their initial plan review comments they should alert the planner regarding the specific timelines mentioned above. For planes requiring extensive revisions, the planner may want to discuss with the conservation district the option to withdraw the initial submission and resubmit a revised version of the plan that would be expected to move through the revision and review process within the 90-day plan review timeframe.

Plan Implementation

A NMP operation shall fully implement the plan within 3 years of the date the plan is approved. It should be noted that this 3-year implementation time frame relates to implementing conservation practices called for in the plan. The proper manure handling and application rates called for in the plan shall be implemented immediately upon approval of the plan. For a plan that calls for converting an operation from solid manure daily haul to constructing a liquid manure storage, the plan shall address manure handling and application rates for the proposed liquid system and shall also include interim solid manure handling and application rates and procedures to be implemented until the liquid system is installed. The implementation schedule may be extended upon approval of the Commission or Delegated Conservation District.

Whatever adjustments to the operation are made during the implementation of the approved plan, nutrient application rates shall always be balanced to assure that **nitrogen is not over-applied** in relation to crop nitrogen needs. The owner, operator or specialist shall review the approved plan at least annually to ensure that this condition is met.

At least every 3 years the plan shall be reviewed by a Public, Commercial or Individual Certified Nutrient Management Specialist**. If the plan requires an update (year specific) or amendment, it shall be developed and certified by an Individual or Commercial Nutrient Management Specialist.** If the agricultural operation has changed from that described in the approved plan or the plan requires an update (year specific), reference Section VI: Plan Amendments and Transfers.

Limited Liability Protection

Section 13 of the Nutrient Management Act states: *"If a person is fully and properly implementing a nutrient management plan approved by a delegated county conservation district or the Commission and maintained under the act and this subchapter, the implementation shall be given appropriate consideration as a mitigating factor in any civil action for penalties or damages alleged to have been caused by the management or utilization of nutrients under the implementation."*

Limited liability protection is afforded to those operators properly implementing an approved plan under this subchapter.

- This protection is intended to only provide protection to the extent that the plan is implemented. Liability protection for a leaking manure storage facility planning to be repaired can't be granted until the storage is repaired. Nor would an operator get protection from a complaint of over-application of manure, if the operator were not implementing the proper manure application rates listed in the plan.
- The "appropriate consideration" phrase in the law is a matter of discretion, either for the judge in a civil action or for the state or local government enforcement agency.

If the Commission finds that nutrient pollution or the danger of nutrient pollution results from activities which are being or have been implemented in accordance with a plan approved under this act, the owner or operator of the agricultural operation shall be exempt from penalties under the Nutrient Management Act.

The implementation schedule should describe the timing, by year and season, of construction activities for the listed Best Management Practices (BMPs).

Working Together to Help Farmers Meet the Program Requirements
Implement your day-to-day activities in the program in such a way as to facilitate and build good working relations between planners, reviewers and the participating farmers. The more we can work together in a cooperative way, the better the farm community and the environment will be served. I have seen a number of ways that planners and reviewers have been working together that have been great in helping get the job done for the program. These include:

a. Planners inviting reviewers out to the farm with them as they are developing the plan. This is especially helpful with complex farm situations including those with a number of animal types and various Animal Concentration Area (ACA) situations. These meetings are most helpful when they are scheduled to take place prior to plan submission.

b. Planners hand delivering plan submissions (especially complex ones) to the district office and spending time going over the plan with the reviewer.

c. Reviewers inviting planners out to their site visits as part of their plan review process. This allows the planner and reviewer to discuss various issues in question in the plan. This again is especially helpful for complex plans. It is best for the reviewer to review the paperwork part of the plan prior to this visit so any issues that have come to light during the paperwork review, can be discussed with the planner on site.

d. Reviewers calling planners to discuss comments that arise during their review of the plan (backed up by an email message to the planner listing the issues identified during the review). This provides an opportunity to determine if the concerns raised during the review are valid given the particular farm situation, and also provides an opportunity for planners and reviewers to become better informed concerning the planning requirements.

e. District staff providing maps and assistance with soil testing, for farmers who want to import manure to their operation. This assistance helps the planners in getting the necessary background work from the farmer for developing Nutrient Balance Sheets (NBSs) for importing operations. This helps keep the cost of NBS development down for importing farms.

f. Reviewers providing their comments on a plan within 2 to 3 weeks of receipt of the plan, thus providing adequate time for the planner to address the comments found during their review.

g. District staff (with the farmer's approval) providing a copy of their status review comments/notes to the planners so that the planner can utilize these comments in their update of that farmer's nutrient management plan.

h. District staff accepting more minor emailed revisions to plan pages addressing the comments submitted during the district's review. Revisions requiring significant page changes and map changes may require the submission of a hard copy by the planner in order to ensure that the plan is complete and arranged in the way the planner would want.

i. Most important the farmer should be intimately involved in the process. The plan is written for the farmer not the planner or the plan reviewer. This should not be something that is developed independently from the farmer and presented to him when completed. He/she should be encouraged to provide input on all aspects of the plan before and during plan development. Try to find out what the farmer currently does or would like to do and if possible write the plan accordingly. The plan is more likely to be implemented if it reflects the farmer's management.

Plan Review Guidance

Planners

Planners should make sure they are including all the required nutrient management plan elements as outlined in the regulations and the Nutrient Management Program Technical Manual. This can be accomplished by completing all components of the standard formats of the nutrient management plan and nutrient balance sheet. At times this may be a daunting task, but in order to ensure all areas of the farm are properly addressed the required program elements are necessary in the plan. In addition, if a particular plan section does not apply to the operation that should be noted with "Not Applicable" or something similar. In this way, the plan reviewer will know that this was not missed and that it is not relevant to this farm.

Reviewers

Reviewers are strongly directed not to require additional items during the plan review, that **are not required** in the standard plan or the technical manual. For example, township designation, specific watershed codes (the watershed needs to be named in the plan but the code is to be determined by the conservation district when they fill out their DEP forms), a copy of the emergency response plan, soils data or descriptions for NBSs, winter spreading procedures when no winter application is planned, in-field manure stacking procedures when no manure stacking is planned (unless it is a CAFO), rainfall calculations when the storage is under the barn, signed agreements for farmers importing manure should not be required by reviewers. Also, rounded off numbers should be accepted (the exception is the AEUs/acre calculation which must be shown to the second decimal place). In addition, every gallon of manure doesn't need to be spread during an application period. Recognize that the figures we work with in these calculations are not exact and therefore we do not need to be overly exact in assessing these numbers during plan review.

When reviewing NBSs for importing farms, the NBSs and associated documentation such as maps, setbacks, etc. should be reviewed with the same scrutiny as you would utilize in the review of the NMP. For additional information on review of NBSs submitted by manure brokers, see the NM/MM Administrative Manual Chapter 2.

The planning process has become very involved in order to address the various nutrient issues that can arise on a farm. It is imperative that this not be made more complicated or burdensome than necessary. In addition, we need to be diligent to maintain consistency across the program statewide. Make sure the plans are complete, and we do not require any more plan components than we are authorized to require.

Planners are encouraged to involve reviewers as soon as possible in the planning process, especially when writing more complex plans. This will ensure a much quicker review and timely plan approval.

Section VI
Plan Amendments and Transfers

Significant Changes in Management Requiring a Plan Amendment
In order to assure the plan is valid; a plan amendment **is required** when the operator of an operation falling under the act expects to make significant changes in the management of nutrients from those activities listed in the approved plan (Section 83.371(1) – (10)). Significant changes in the management of the operation that would require a plan amendment are one of the following:

a. A net increase of greater than 10% in the AEUs/acre.

   - For example, if a farmer with 100 dairy cows (weighing 1300 lbs each) on 50 acres brings on another 12 cows (weighing 1300 lbs each). This operation would go from 2.6 AEUs/acre to 2.91 AEUs/acre, which is a 12% increase.

b. A change in crop management that results in a reduction of greater than 20% in nitrogen necessary for realistic expected crop yields or in the amount of nitrogen that the crops will use in the given crop year.

   - For example, if a farmer changes from all corn silage (21-ton yield) on 50 acres (which uses a total of 7,500 lbs of nitrogen), to all wheat (60 bu yield) on the 50 acres (which could use up to 4,500 lbs of nitrogen), this would be a 40% reduction in nitrogen used on the operation.
   - This 20% reduction is a "whole farm reduction" of the nitrogen necessary, not a single CMU (field) reduction.

c. A change in the method of excess manure utilization arrangements.

   - For example, where a CAO changes from providing exported manure to known neighboring landowners to providing exported manure to a manure broker.

d. Calculations in the approved plan are found to be in error, or figures used in the approved plan are inconsistent with the variables contained in the Penn State Agronomy Guide and adequate written justification for the inconsistency has not been given.

   - For example, where the planner projected that a 125 bushel corn yield will require 175 lbs of nitrogen (instead of 125 lbs as in the Agronomy Guide) and it was not found during the initial plan review.
   - If the plan was approved using the correct Agronomy Guide figures at the time of plan development, and the Agronomy Guide figures change after approval, the plan is not considered to be incorrect until after the 3 year review. During the 3 year update of the plan, the plan should be amended to reflect the revised variables listed in the most recent Agronomy Guide.

e. A different BMP than that called for in the approved plan is proposed to address a manure management or stormwater management concern.

   - For example, where the approved plan stated that a concreted barnyard and curbing will be used to address a barnyard problem, but when the barnyard improvement is being designed the farmer decides to instead use roof gutters and a buffer strip to address the problem.

f. After the first 3 years of implementation, the three-year average of the actual yields are less than 80% of the expected crop yields listed in the approved plan.

   - For example, if the approved plan estimated a crop yield of 150 bushels per acre but the crop yields over the first three years are 100 bu, 140 bu, and 110 bu per acre respectively. The average yield over the first three years would be 117 bushel. This average actual yield is only 78% of what the projected yield was for the operation. Therefore, the plan would have to be amended to more closely reflect these lower yields.
   - For instances where there is a documented severe drought or other natural catastrophe which drastically reduced crop yields, at the discretion of program staff, those years may be able to be disregarded for purposes of determining an average 3 year yield for the operation. Please call the state NMA program staff to get direction on when a farmer can disregard particular years' yield data due to a natural disaster.

g. If alternative organic nutrient sources will replace or augment nutrient sources described in the plan.

h. If additional lands are brought into the operation through purchase, lease or renting.

i. If there is a change in the manure management system that is expected to result in a different nutrient content that requires a change in manure application rates under Section 83.293 (relating to determination of nutrient application rates).

j. If a change in manure application is necessary based on the reevaluation of potential phosphorus loss as part of the triennial review under Section 83.362(c) (relating to plan implementation), or a change in manure application is necessary due to the end of the phase-in period under Section 83.293(c)(3).

k. When a BMP is not implemented within the 3 year time frame of the initial plan approval.

l. If the plan initially called for no winter application and it is being changed to allow for the winter application of manure

Plan Amendment Procedure

If an amendment is required, it shall be developed and certified by an Individual or

Commercial Nutrient Management Specialist and it shall require Conservation District Board approval, similar to the approval process for a new NMP submission.

A plan amendment is required if the operator expects to make significant changes in the management of nutrients from those contained in the approved NMP. A significant change in management is defined in the regulations in Section 83.371 (1) – (10) and is listed above in # 1. (Significant Changes in Management Requiring a Plan Amendment). If any of the listed changes pertain to the operation, a plan amendment is required.

Only plan amendments developed using the most current version of the standardized Act 38 Nutrient Management Plan Spreadsheet will be accepted for review and approval under the Act 38 program.

Note: When a NMP that contains NBSs for importers is amended, the NBSs are to be updated to the most recent planning version of the Nutrient Balance Sheet Spreadsheet.

For more information on submission of Plan Amendments see the NMP Submission section of this manual.

A plan amendment shall be submitted to the reviewing agency in accordance with Section 83.361(a) of the regulations. It is the obligation of the planner to submit a copy of the initial amendment submission to DEP if the operation is a CAFO. The Conservation District will send an approval letter for amended plans obtaining Conservation District Board approval to the operator and c.c. the planner (and DEP if the operation is a CAFO). The planner is responsible for sending a copy of the approved plan amendment to DEP for their CAFO file.

A plan amendment shall be submitted, for any plan updates (#3 below), to obtain approval of these plan update changes, when the plan is subject to the triennial review under Section 83.362(c) of the regulations.

A majority of approved NMPs will need to go through the formal Amendment process after every triennial review, if an amendment is not needed sooner according to 83.371(a) (1)-(10). It is possible to have a very old plan not needing any formal amendments, but only relevant to total export plans, using a manure broker. In these situations, plan updates are still required.

Plan Update Procedures

If a plan update is needed to address operational or computation changes other than those described in the regulations Section 83.371(a) (1) – (10) or listed in #1 above (Significant Changes in Management Requiring a Plan Amendment), the plan update shall be developed and certified by a Commercial or Individual Certified Nutrient Management Specialist.

a. The Commercial or Individual Certified Nutrient Management Specialist shall:
    - Make the necessary revisions,

- Update all dates and crop year dates, that are applicable, to reflect which crop years the plan update will cover. These dates are contained in the Cover Page; NMP Summary; Appendix 1; Appendix 3; Appendix 4
- Review the updates with the farmer for approval before submission, and
- Submit the revisions to the District for inclusion into the operation's file.

b. The District shall evaluate these plan updates and provide any necessary direction to the operator and/or planner relating to the revised practices proposed for the operation. **Plan updates do NOT require Conservation District Board approval.**

Once the update has been evaluated and determined to be complete, the District sends a plan update acceptance letter to the farmer, cc. to the planner (and to DEP if the update is a CAFO). The planner is responsible for sending accepted plan updates to the DEP and the farmer. The District and DEP files need to have the same plan and the plan has to be current such that it covers the current crop year and whatever future years the plan may address.

Amendments Due To Unforeseen Circumstances

In cases due to unforeseen circumstances where the operator is not able to implement the management practices outlined in the approved plan; a plan amendment shall also be required. This emergency amendment shall conform to program requirements explained in this section of the manual, be developed by a Certified Nutrient Management Specialist, and be submitted to the district within 30 days of implementation. These emergency amendments due to unforeseen circumstances will not require a formal approval of the conservation district, but shall temporarily become part of the plan until normal operations are resumed.

Unforeseen circumstances include the following:

a. Outbreak of a contagious disease. In these cases the program recognizes that manure may not be transported off-site due to the concern of spreading a contagious disease. The program allows the operator (only in this case) to over-apply manure nitrogen in order to provide for a disposal site for the manure. In cases where manure is over-applied due to this provision, the operator shall, where applicable, plant cover crops to take up excess nutrients and harvest the cover crops to remove the excess nutrients. These operators are required to take standard soil tests each year for fields where manure is over-applied; as well as take a soil nitrogen test for 1 year beyond the cessation of excess manure application.

b. Failures or malfunctions of equipment or storage that require a change in manure handling procedures.

c. Other unforeseen circumstances that may cause a significant change in the management of nutrients on the agricultural operation include:
   - unforeseen weather conditions which significantly impact plan implementation (i.e. hail, drought, etc.), or

- crop failure as from plant diseases or insects, or
- unanticipated loss of rented land or exporting sites that would create a reduction of greater than 20% in the nitrogen necessary for expected crop yields.
- Some form of emergency that would require winter manure application on an operation where no winter manure application is included in the approved plan. SCC Regional Nutrient Management Coordinators should be contacted for guidance when this situation arises.

Those instances where amended activities will be implemented over a long period of time (over 3 months) or done on a continuing basis will require the amendment to be reviewed and approved by the district.

Plan Transfers
An approved nutrient management plan may be transferred to a subsequent owner or operator of an agricultural operation by written notification of the transfer to the conservation district, unless the transfer results in operational changes requiring a plan amendment.

If the transfer of the plan results in operational changes requiring a plan amendment as described in item "1" above (Significant Changes in Management Requiring a Plan Amendment), the plan amendment shall be developed by a properly certified individual and submitted to the conservation district for approval.

Withdrawal of a Volunteer Plan from the Nutrient Management Act Program
If an approved Act 38 Nutrient Management Plan (NMP) on file at the Conservation District is expected to expire it is recommended that in the January/February time frame of the year when the plan expires, the Conservation District sends a letter informing the operator their Act 38 plan expires on September 30th of that year. Those letters mailed in January/February informs the operators that they should be contacting their nutrient management specialist to start the process of performing their triennial review. Since the letter will go out early in the year (January/February) the operators/planners should have sufficient time to gather the required soil and manure test results collected over the previous 3 years to write the new annual or three year NMP. No sample letter is provided as this is not a program requirement of the Conservation Districts but rather a preferred practice.

If the operator allows the volunteer plan to expire, the operator has one of two alternatives: 1) either submit a new annual or triennial plan for review and approval, or 2) withdrawal the plan from the Act 38 program. When withdrawing a volunteer nutrient management plan from the nutrient management act program the operator should send an appropriate withdrawal letter to the appropriate Conservation District. An example letter is attached and titled “Nutrient Management Act Program Withdrawal”.

The SCC has developed a sample “Nutrient Management Plan Date Expiration, 1st letter” which can be utilized to inform operators of their responsibility. The sample letter contains a copy of the “Nutrient Management Act Program Withdrawal” form which must

be returned to the Conservation District. Some Conservation Districts send a second letter, similar to the 1st letter, if no response to the first mailing, giving the operator an additional opportunity to comply and return the intent to withdraw the plan from the program form.

When all else fails, the farm operator is to receive the “Nutrient Management Plan Date Expiration, 2nd letter” from the County Conservation District indicating the plan on file at the District has now expired and no correspondence from the plan operator has been received at the District indicating the desire to have a new NMP approved or withdraw from the program and they have forfeited the limited liability eligibility as well as the ability to receive funding from the program.

When the “Nutrient Management Plan Date Expiration, 2nd letter” is sent, the NMP should be removed from the list of county NMPs and removed from the program on the counties next quarterly report.

Both sample letters from the conservation district indicating the expiration date of the plan and the form indicating the intent of withdrawing the volunteer plan from the Act 38 program are available on the nutrient management web-site under “SCC Program Information”.

Supplement 1
Agronomy Guide Tables

Table 1.2-5. Nitrogen recommendations for agronomic crops.

These are base recommendations and should be adjusted for previous crop, previous manure history, and planned manure applications (see "Manure Nutrient Management" section).

Crop	Recommendation (lbs N/unit of expected yield)	Comments
Corn grain (bu/A)	1	For better N efficiency, delay application of the nitrogen until the corn is between 10 and 20 inches tall. If the field has a history of manure and/or legumes, delay all of the N. If there is no history of manure and/or legumes, split the N, applying one-third near to planting and delaying the balance. Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 and 1.2-15). The PSNT or chlorophyll meter test can be used to refine N recommendations for corn, especially where manure is a major nutrient source.
Corn silage (ton/A)	7	For better N efficiency, delay application of the nitrogen until the corn is between 10 and 20 inches tall. If the field has a history of manure and/or legumes, delay all of the N. If there is no history of manure and/or legumes, split the N, applying one-third near to planting and delaying the balance. Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 and 1.2-15). The PSNT or chlorophyll meter test can be used to refine N recommendations for corn, especially where manure is a major nutrient source.
Grain sorghum (bu/A)	0.75	Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).
Forage sorghum (ton/A)	7	Adjust this recommendation for any previous legume in the rotation (see Table 1.2-7) and for residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).
Oats (bu/A)	0.8	Apply the N with any other fertilizer before planting. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).
Wheat/rye (bu/A)	1	If plants did not tiller well, apply N by mid-March; otherwise, apply any time up to growth stage 5. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).
Barley (bu/A)	0.8	If plants did not tiller well, apply N by mid-March; otherwise, apply any time up to growth stage 5. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).
Small grain silage (ton/A)	17	Apply at greenup in the spring.
Grass hay (ton/A dry hay equivalent)	50	Split the nitrogen recommendation and apply it based on the expected yield for each cutting. For grass-legume mixtures, if the legume is more than 50% of the stand, the field should be managed as a legume; thus, no nitrogen is recommended. Adjust this recommendation for any residual N from previous manure applications (see Tables 1.2-14 and 1.2-15).

Table 1.2-6. Residual nitrogen contributions from legumes to summer annual crops.

Previous crop[1]	Percent stand	High-productivity fields (Soil productivity group 1)[2]	Moderate-productivity fields (Soil productivity groups 2 & 3)[2]	Low-productivity fields (Soil productivity groups 4 & 5)[2]
	Nitrogen credit (lbs/A)			
First year after alfalfa	>50	120	110	80
	25–49	80	70	60
	<25	40	40	40
First year after clover or trefoil	>50	90	80	60
	25–49	60	60	50
	<25	40	40	40
First year after soybeans harvested for grain	1 lb N/bu soybeans			

1. When a previous legume crop is checked on the Penn State soil test information sheet, the residual nitrogen for the year following the legume is calculated and given on the report. This credit should be deducted from the N recommendation given on the soil test report.
2. See Agronomy Guide Table 1.1-1 in the basic soils section for information on soil productivity groups.

Table 1.2-7. Nitrogen removal by legumes.

Legume crop (no nitrogen application recommended)	Pounds of N removed/unit of yield	Comments
Alfalfa (ton/A)	50	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Clover (ton/A)	40	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Trefoil (ton/A)	50	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.
Soybeans (bu/A)	3.2	Although legumes will use N from manure and other sources, applying N may increase the competition from weeds and grasses. If you apply manure, limit it to an application rate that balances the crop's P requirement.

Table 1.2-8. Typical crop nutrient removal for phosphorus and potassium.

Crop (units)	Per unit of yield		Typical yield/A	Removal for given yield	
	P_20_5	K_20		P_20_5	K_20
Corn (bu)	0.4	0.3	150 (bu)	60	45
Corn silage (T)[1]	4.0	8.0	25 (T)	100	200
Grain sorghum (bu)	0.6	0.8	125 (bu)	75	100
Forage sorghum (T)[1]	3.0	10.0	15 (T)	45	150
Sorghum/sudangrass[1]	7.0	7.0	15 (T)	105	105
Alfalfa (T)[2,3]	15.0	50.0	5 (T)	75	250
Red Clover (T)[2,3]	15.0	40.0	3.5 (T)	55	140
Trefoil (T)[2,3]	15.0	40.0	3.5 (T)	55	140
Cool-season grass (T)[2,3]	15.0	50.0	4 (T)	60	200
Bluegrass (T)[2,3]	10.0	30.0	2.5 (T)	25	75
Wheat/rye (bu)[4]	1.0	1.8	60 (bu)	60	110
Oats (bu)[4]	0.9	1.5	80 (bu)	70	120
Barley (bu)[4]	0.6	1.5	75 (bu)	45	110
Soybeans (bu)	1.0	1.4	50 (bu)	50	70
Small grain silage (T)[1]	7.0	26.0	6 (T)	40	160

1. 65 percent moisture.
2. For legume-grass mixtures, use the predominant species in the mixture.
3. Dry hay equivalent, 10 percent moisture.
4. Includes straw.

Table 1.2-13. Typical Pennsylvania average daily production and total content of manure.

Animal type	Daily production	Manure % dry matter	Analysis units	N	P_2O_5	K_2O	Comments
Dairy cattle							
Lactating cow, liquid	13 gal/AU/day	<10	lb/1,000 gal	28	13	25	Production does not include dilution. Analysis includes dilution to approximately 7.5% solids.
Dry cow, liquid	6 gal/AU/day	<10	lb/1,000gal	28	13	25	
Lactating cow, solid	111 lb/AU/day	12	lb/ton	10	4	8	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by dairy cows, dairy dry cattle, and dairy young cattle.
Dry cow, solid	51 lb/AU/day		lb/ton	9	3	7	
Heifer	60 lb/AU/day		lb/ton	10	3	7	
Calf	80 lb/AU/day		lb/ton	10	3	4	
Veal	7 gal/AU/day	2	lb/1,000 gal	19	13	25	Production does not include dilution. Analysis includes dilution.
Beef							
Cow, solid	90 lb/AU/day	12	lb/ton	11	7	10	No bedding or dilution included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by a beef cow and calf, beef calves, and steers.
Cow, liquid	11 gal/AU/day		lb/1,000 gal	32	16	27	
Calf	106 lb/AU/day	12	lb/ton	11	7	10	
Finishing cattle, solid	49 lb/AU/day	8	lb/ton	14	5	8	
Finishing cattle, liquid	6 gal/AU/day		lb/1,000 gal	62	19	39	
Swine							
Farrow to wean (includes sows), liquid	11 gal/AU/day	2.5	lb/1,000 gal	18	18	11	Production includes a typical amount of in-barn dilution water but not rainfall for an outdoor storage, except for farrow to wean which also includes rainfall. Analysis includes dilution to approximately the % dry matter indicated.
Nursery, liquid	14 gal/AU/day	1.5	lb/1,000 gal	19	8	14	
Wean to finish, liquid	5.5 gal/AU/day	4	lb/1,000 gal	37	23	21	
Grow-finish, liquid	7 gal/AU/day	4	lb/1,000 gal	31	24	22	
Farrow to wean (includes sows), solid	47 lb/AU/day		lb/ton	19	13	15	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by swine.
Nursery, solid	75 lb/AU/day		lb/ton	20	7	13	
Wean to finish, solid	49 lb/AU/day		lb/ton	23	8	11	
Grow-finish, solid	49 lb/AU/day		lb/ton	23	8	11	

Animal type	Daily production	Manure % dry matter	Analysis units	N	P_2O_5	K_2O	Comments
Sheep/Goats	40 lb/AU/day	25	lb/ton	23	8	20	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by sheep and goats.
Horse	55 lb/AU/day	20	lb/ton	12	5	9	No bedding included in production or analysis figures. Use these analyses for estimating nutrients deposited on pastures by horses.
Poultry							
Layer (364 days)[1]	26.5 lb/AU/d	65*	lb/ton	61	58*	33*	
Layer breeders (364 days)	24 lb/AU/d	66	lb/ton	51	70	45	
Pullet (118 days)[1]	30 lb/AU/d	63*	lb/ton	71	58	39*	
Broiler (38-46 days)[1]	28 lb/AU/d	67	lb/ton	58	43	47*	Production and analysis figures include litter.
Broiler breeders (364 days)[1]	20 lb/AU/d	48	lb/ton	33	47	30	
Turkey tom (93-148 days)[1]	13 lb/AU/d	61	lb/ton	53	52	46	
Turkey hen (130-133 days)[1]	13 lb/AU/d	57	lb/ton	51	57	50	
Duck (dry)	110 lb/AU/day	27	lb/ton	21	26	15	No bedding included in production or analysis figures.
Duck (wet)	13 gal/AU/day	5	lb/1000 gal	33	23	16	Production does not include dilution. Analysis includes dilution to approximately 5% solids.

Note: When possible, have manure analyzed. Actual values may vary over 100 percent from averages in the table.

1. Typical production days.

* Significant differences exist between management styles.

Table 1.2-14. Manure nitrogen availability factors relative to fertilizer nitrogen for use in determining manure application rates based on planning conditions.

A. Current Year

To use this table find the ***planned manure application season*** in the left column, then move to the right in that row and select the target crop utilization. Continue to the right in that row to find the ***nitrogen availability factor*** for the ***planned manure application management***. The manure nitrogen availability factor is the fertilizer equivalence of the manure N or the lb of fertilizer N equivalent per pound of total manure N. For example, if the N Availability Factor = 0.50, effectively there is the equivalent of 0.50 lb of fertilizer N for every pound of total N in the manure.

Planned manure application season	Planned manure target crop utilization	Application management	Nitrogen availability factor[1]		
			Poultry manure	Swine manure	Other manure
Spring or summer	Spring utilization by small grains and grass or legume hay. Summer utilization by corn, other summer annuals, and grass or legume hay.	Incorporation the same day	0.75	0.70	0.50
		Incorporation within 1 day	0.50	0.60	0.40
		Incorporation within 2–4 days	0.45	0.40	0.35
		Incorporation within 5–7 days	0.30	0.30	0.30
		Incorporation after 7 days or no incorporation	0.15	0.20	0.20
Early fall[2]	Early spring utilization by small grains and grass or legume hay, including small grain silage and other winter crops in a double-crop system.[3]	Incorporated less than 2 days	0.50	0.45	0.40
		Incorporated 3-7 days	0.30	0.30	0.30
		Incorporated more than 7 days or no incorporation	0.15	0.20	0.20
	Summer utilization by corn, other summer annuals, and spring establishment of grass or legume hay with a cover crop not harvested and used as a green manure.	Incorporated less than 2 days	0.45	0.40	0.35
		Incorporated 3-7 days	0.25	0.25	0.25
		Incorporated more than 7 days or no incorporation	0.15	0.20	0.20
	Summer utilization by corn, other summer annuals, and spring establishment of grass or legume hay with no cover crop or grass or legume hay.	All methods of incorporation	0.15	0.20	0.20
Late fall or winter[4]	Early spring utilization by small grains and established grass or legume hay, including small grain silage and other winter crops in a double-crop system.[3]	All situations	0.50	0.45	0.40
	Summer utilization by corn, other summer annuals, and spring establishment of grass or legume hay in a single crop system.	No cover crop	0.15	0.20	0.20
		Cover crop harvested for silage	0.15	0.20	0.20
		Cover crop used as green manure	0.50	0.45	0.40

Planned manure application season	Planned manure target crop utilization	Application management	Nitrogen availability factor[1]		
			Poultry manure	Swine manure	Other manure
Early fall, late fall or winter for summer double crop (additional N available to the summer crop in a double-crop system.)[2,4,5]	Summer utilization by the second crop, corn or other summer annuals in a double-crop system.	All methods of incorporation	0.15	0.20	0.20
Grazing	Grazing anytime with nutrient uptake during growing season	Manure deposited more or less continuously by grazing cattle	0.15	0.20	0.20

1. This is the pounds of fertilizer equivalent N per pound of total manure N. Multiply this factor times the manure N content to estimate the manure N available for the planning conditions.
2. Early fall would be when it is still warm enough for plant growth and microbial activity to continue (soil temperature >50^{0}F at 2 inches).
3. When manure is applied in the early or late fall to the winter crop in a double-crop system, use these factors to determine the N available to the winter crop.
4. Late fall and winter is when it is so cold that there is no plant growth or microbial activity (soil temperature <50^{0}F at 2 inches).
5. Use these factors to determine the N available from the fall or winter applications in a double crop system to the summer crop. These factors would be applied to the same manure application that was used for the winter crop (See footnote 3 above).

B. Historical Frequency of Manure Application on the Field

To use this table, determine the frequency of manure application and move to the right in the row to determine the amount of residual N that is available from past manure applications. Deduct this amount of residual N from the basic N recommendation before determining any additional fertilizer or manure application rates.

	Pounds N available to a summer crop (corn, grass hay, oats, etc.)	Pounds N available to a winter crop (wheat, barley, rye, etc.)	Pounds N available to the winter crop in a double-crop system	Pounds N available to the summer crop in a double-crop system
Rarely received manure in the past (<2 out of 5 years) NOTE: If a field only received manure once out of 5 years, but this application was made the previous year, use the frequent credit for the following year.	**0**	**0**	**0**	**0**
Frequently received manure (2–3 out of 5 years)	**20**	**7**	**7**	**13**
Continuously received manure (4–5 out of 5 years)	**35**	**11**	**11**	**24**

Table 1.2-15. Factors for calculating manure nitrogen availability based on time of application, incorporation, field history, and manure analysis with ammonium and organic N fractions. Recommended for all manures, but required for atypical or treated manures.

The manure nitrogen availability factor is the fertilizer equivalence of the manure N or the lb of fertilizer N equivalent per pound of ammonium or organic manure N. For example, if the ammonium N Availability Factor = 0.80, effectively there is the equivalent of 0.80 lb of fertilizer N for every pound of ammonium N in the manure. Likewise, if the organic N Availability Factor = 0.35, effectively there is the equivalent of 0.35 lb of fertilizer N for every pound of organic N in the manure.

TOTAL MANURE N

AMMONIUM N ANALYSIS

Spring/summer			
For spring utilization by small grains and grass hay and summer utilization by corn, other summer annuals, and grass hay			
Days to incorp.[1]	Poultry[2]	Other[2]	Compost
Immediately	0.90	0.80	0.80
1	0.80	0.60	0.60
2-4	0.60	0.40	0.40
5-7	0.40	0.20	0.20
>7	0.20	0.10	0.10
Early fall[3]			
Days to incorp.[1]	Poultry[2]	Other[2]	Compost
For fall and spring use by grass hay, small grains, small grain silage			
0-2	0.80	0.60	0.40
3-7	0.50	0.30	0.20
>7	0.20	0.10	0
For following summer utilization by a summer crop following a non-harvested cover crop used as a green manure			
0-2	0.45	0.35	0.35
3-7	0.20	0.15	0.15
>7	0	0	0

ORGANIC N ANALYSIS (total N – ammonium N)

Organic N decomposed during year applied				
	Poultry	Swine	Other	Compost
Summer crop	0.60	0.50	0.35	0.10
Winter crop	0.40	0.30	0.25	0.10
Additional organic N available to the summer crop in a double-crop system from manure applied in the fall for the winter crop (above)				
Summer crop	0.30	0.25	0.20	0.10

Organic N decomposed from past applications		
Manure applied	Manure	Compost
1 yr ago	0.12	0.05
2 yrs ago	0.05	0.02
3 yrs ago	0.02	0.01
4 yrs ago	0.02	0.01
5 yrs ago	0.01	0.01

Early fall (cont.)

For following summer utilization by a summer crop following a harvested winter crop or no winter crop			
No ammonium-N credit			
Late fall/winter[4]			
For following summer utilization by a summer crop following a harvested winter crop or no winter crop			
No ammonium-N credit			
For spring use by grass hay or small grains, or summer use by corn or summer annuals *with green manure cover crop*			
	Poultry	Other	Compost
All situations	0.60	0.50	0.50

1. Mechanical incorporation or incorporation by 0.5 inch of rain.
2. Increase these factors by 0.2 after one day for very liquid manures (<5 percent solids) to account for soaking-in on application. For spring use by grass hay or small grains, or summer use by corn or summer annuals with green manure cover crop
3. Early fall would be when it is still warm enough for plant growth and microbial activity to continue (soil temperature >50^0F at 2 inches).
4. Late fall and winter is when it is so cold that there is no plant growth or microbial activity (soil temperature <50^0F at 2 inches).

Table 1.1-1. Selected properties and typical capabilities of major Pennsylvania soils.

Note: Ratings provide relative information for comparing soils and should not be used quantitatively.
Moisture contents: corn grain = 15.5%; corn silage = 65%; alfalfa and clover = dry matter; wheat, oats, and barley = 12%; sorghum/sudan = 65%; and soybeans = 13%

Soil series	*Depth class*[1]	*Drain class*[2]	*Leaching potential*[3]	*Crop prod. group*	*Corn grain (bu/A)*	*Corn silage (T/A)*	*Alfalfa (T/A)*	*Clover (T/A)*	*Wheat (bu/A)*	*Oats (bu/A)*	*Barley (bu/A)*	*Sorghum/sudan (T/A)*	*Soybeans (bu/A)*
Abbottstown	D[5]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Albrights	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Allegheny	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Allenwood	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Alton	D	WD[6]	3	3	160	21	5	4.5	60	80	75	4	40
Alvira	D[5]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Andover	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Armagh	D	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Atkins	D	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Barbour	D	WD	2[7]	1	200	30	7	5.5	70	100	100	5	60
Basher	D	MWD	2[7]	2	160	21	6	5	70	100	100	4	50
Bath	D[5]	WD	1[7]	2	160	21	6	5	70	100	100	4	50
Bedington	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Berks	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Birdsall	D	PD	1[7]	5	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Birdsboro	D	MWD	2[7]	1	200	30	7	5.5	70	100	100	5	60
Blairton	MD	MWD	1[7]	4	130	15	5	3.5	50[8]	80	50[8]	3	40
Bowmansville	D	SWPD	2[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Braceville	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Brecknock	D	WD	2	2	160	21	6	5	70	100	100	4	50
Brinkerton	D	PD	2	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Brooke	MD	WD	1	2	160	21	6	5	70	100	100	4	50
Buchanan	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Bucks	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Calvin	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Cambridge	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Canfield	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Cavode	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Chenango	D	WD[6]	3	2	160	21	6	5	70	100	100	4	50
Chester	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Chippewa	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Clarksburg	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Clymer	D	WD	2	2	160	21	6	5	70	100	100	4	50
Comly	D	SWPD	1[7]	3	160	21	5[8]	4.5	60	80	75	4	40
Conestoga	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Conotton	D	WD	2	2	160	21	6	5	70	100	100	4	50
Cookport	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Croton	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Culleoka	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
DeKalb	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Dormont	D	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Duffield	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Duncannon	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Edgemont	D	WD	2	2	160	21	6	5	70	100	100	4	50
Edom	D	WD	1	2	160	21	6	5	70	100	100	4	50
Elliber	D	WD[6]	3	2	160	21	6	5	70	100	100	4	50
Erie	D[4]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Ernest	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Fredon	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Frenchtown	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Gilpin	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Glenelg	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Glenville	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Guernsey	D	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Hagerstown	D	WD	1	1	200	30	7	5.5	70	100	100	5	60
Hanover	D[5]	WD	1[7]	2	160	21	6	5	70	100	100	4	50
Hartleton	D	WD	2	3	160	21	5	4.5	60	80	75	4	40
Hazleton	D	WD	2	2	160	21	6	5	70	100	100	4	50
Highfield	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Holly	D	PD	2[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40

(continued)

Table 1.1-1. Selected properties and typical capabilities of major Pennsylvania soils (continued).

Soil series	*Depth class*[1]	*Drain class*[2]	*Leaching potential*[3]	*Crop prod. group*	*Corn grain (bu/A)*	*Corn silage (T/A)*	*Alfalfa (T/A)*	*Clover (T/A)*	*Wheat (bu/A)*	*Oats (bu/A)*	*Barley (bu/A)*	*Sorghum/sudan (T/A)*	*Soybeans (bu/A)*
Hublersburg	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Huntington	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Klinesville	S	WD	2	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Kreamer	D	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Lackawanna	D[5]	WD	1[7]	2	160	21	6	5	70	100	100	4	50
Laidig	D[5]	WD	1[7]	2	160	21	6	5	70	100	100	4	50
Langford	D[5]	WD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Lansdale	D	WD	2	2	160	21	6	5	70	100	100	4	50
Leck Kill	D	WD	2	2	160	21	6	5	70	100	100	4	50
Lehigh	D	MWD	1[7]	4	130	15	5	3.5	50[8]	80	50[8]	3	40
Letort	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Lewisberry	D	WD	2	2	160	21	6	5	70	100	100	4	50
Lordstown	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Manor	D	WD	2	2	160	21	6	5	70	100	100	4	50
Mardin	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Meckesville	D[5]	WD	1[7]	2	160	21	6	5	70	100	100	4	50
Melvin	D	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Mertz	D	WD	1	2	160	21	6	5	70	100	100	4	50
Monongahela	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Morris	D[4]	SWPD	2	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Morrison	D	WD	2	2	160	21	6	5	70	100	100	4	50
Murrill	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Neshaminy	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Opequon	S	WD	2	4	130	15	5[8]	3.5	50	80	50	3	40
Oquaga	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Penn	MD	WD	2	3	160	21	5	4.5	60	80	75	4	40
Philo	D	MWD	2[7]	2	160	21	6	5	70	100	100	4	50
Platea	D[5]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Pope	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Rainsboro	D	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Ravenna	D[5]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Rayne	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Readington	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Reaville	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Red Hook	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Sheffield	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Shelmadine	D[5]	PD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Swartswood	D[5]	MWD	1[7]	2	160	21	6	5	70	100	100	4	50
Tunkhannock	D	WD[6]	3	2	160	21	6	5	70	100	100	4	50
Tyler	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Upshur	D	WD	1	2	160	21	6	5	70	100	100	4	50
Venango	D[5]	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Volusia	D	SWPD	1[7]	4	130	15	5[8]	3.5	50[8]	80	50[8]	3	40
Washington	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Watson	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Weikert	S	WD[6]	2	4	130	15	5[8]	3.5	50	80	50	3	40
Wellsboro	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Westmoreland	D	WD	2	2	160	21	6	5	70	100	100	4	50
Wharton	D	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Wheeling	D	WD	2	1	200	30	7	5.5	70	100	100	5	60
Wurtsboro	D[5]	MWD	1[7]	3	160	21	5	4.5	60	80	75	4	40
Wyoming	D	WD[6]	3	3	160	21	5	4.5	60	80	75	4	40

1. Depth classes: D = deep (> 0 inches); MD = moderately deep (20 to 0 inches); S = shallow (< 20 inches).
2. Drainage classes: WD = well drained; MWD = moderately well drained; SWPD = somewhat poorly drained; PD = poorly drained.
3. Leaching ratings—these are only a relative rating of leaching potential. The higher the number, the greater the relative leaching potential.
4. A fragipan is present at 10 to 16 inches (0.25 to 0 meters) below the surface of the soil.
5. A fragipan is present at 16 to 0 inches (0 to 1 meter) below the surface.
6. These soils are well drained to excessively well drained.
7. These soils have a seasonal high water table that is less than 6 feet from the surface. Leaching potential may be a consideration of water resource use and water table following pesticide application.
8. Crop is not well suited for this soil.

Typical Manure Only

This example illustrates calculating the maximum rate of manure required to meet the nitrogen needs of a crop and the net recommendation for the field based on total analysis for N, P_2O_5, and K_2O and can only be used for typical, nontreated dairy, swine, other livestock, and poultry manures.

Situation

- Recommendations for 150 bu/A corn crop from the soil test report were 150-50-100 pounds/A of N, P_2O_5 and K_2O, respectively.
- The liquid dairy manure analysis is 20 pounds total N, 11 pounds P_2O_5, and 21 pounds K_2O per 1,000 gallons.
- Manure is to be applied in the spring for this corn crop and incorporated the day after application.
- Similar manure has been applied to this field frequently in the past (two or three out of the last five years).
- The starter fertilizer program is 150 pounds per acre of 10-20-10.
- Last year, the crop in this field was soybeans, which yielded 50 bu/A.

Net Crop Nutrient Requirement

First, all sources of nutrients must be accounted for before a manure rate is calculated by starting with the soil test recommendations and then deducting any other sources of nutrients applied or already available in the field.

Net nutrients required = soil test recommendation – residual N from past manure – residual N from a previous legume crop in the rotation – starter nutrients

Residual N from Past Applications (Table 1.2-14, Part B)

Residual N = 20 lb N/A for a history of frequent manure applications

Residual N from a Previous Legume Crop in the Rotation (Table 1.2-8)

Soybeans @ 50 bu/A x 1 lb residual N/bu = 50 lb N/A from the soybeans the previous year

Starter Fertilizer Nutrients That Will Be Applied Regardless of the Planned Manure Application

150 lb/A of a 10-20-10 starter fertilizer will be used on this field. The N, P_2O_5, and K_2O applied in this fertilizer is calculated as follows:

150 lbs fertilizer/A x 10% N = 15 lb N/A

150 lbs fertilizer/A x 20% P_2O_5 = 30 lb P_2O_5/A

150 lbs fertilizer/A x 10% K_2O = 15 lb K_2O/A

Net nutrients required	*N*	*P_2O_5*	*K_2O*
		(lb/A)	
Soil test recommendation	150	50	100
–Residual manure N	20	—	—
–Residual legume N	50	—	—
–Starter nutrients	15	30	15
Net requirement (lbs/A)	65	20	85

N Balance Manure Application Rate

The N balanced manure application rate is determined by dividing the available N in the manure into the net crop N requirement calculated above.

Available N in the manure = total manure N x N availability factor (Table 1.2-14, Part A)

N availability factor = 0.4 from Table 1.2-14 (based on the time of application [spring], crop [corn], time until incorporation [1 day], and manure type [liquid dairy]):

Available N = 20 lb N/1,000 gal x 0.4 = 8 lb N/1,000 gal

Maximum rate per acre to meet N need = net N requirement ÷ available manure N

Rate per acre to meet N need = 65 lbs N/A ÷ 8 lbs N/1,000 gal = 8,125 gal/A

(Note: Any rate less than or equal to this rate is acceptable.)

Nutrients Applied at the Planned Rate

Based on this calculation, the farmer decided to apply 8,000 gal/A. At this application rate the following amounts of nutrients would be applied:

Nitrogen: 8,000 gal/A x 8 lb available N/1,000 gal = 64 lb available N/A

Phosphorus: 8,000 gal/A x 11 lb P_2O_5/1,000 gal = 88 lb P_2O_5/A

Potassium: 8,000 gal/A x 21 lb K_2O/1,000 gal = 168 lb K_2O/A

Final Nutrient Balance on the Field after Manure Application

The nutrient balance is simply the difference between the net crop nutrient requirement and the nutrients applied at the planned rate.

	N	*P_2O_5*	*K_2O*
		(lb/A)	
Net crop nutrient requirement	65	20	85
Nutrients applied at planned rate (8,000 gal/acre)	64	88	168
Balance after manure application	1 short	68 excess	83 excess

As discussed earlier, this excess P should be evaluated with the Phosphorus Index to see if it represents a potential risk to the environment. If the P Index indicates that the risk is high, manure management may have to be changed to address this concern. The excess K could result in high K levels in crops, which can, under certain circumstances, cause problems in animal feeding programs and animal health.

All Manure Including Atypical or Treated Manure

This example illustrates calculating the maximum rate of manure required to meet the nitrogen needs of a crop and the net recommendation for the field based on analysis for dry matter, total N, NH_4-N, total P_2O_5, and K_2O. This calculation can be used for all manure, but it is required for atypical and/or treated manures.

Situation

- Recommendations from the soil test report for 150 bu/A corn crop were 160-50-40 lbs of N, P_2O_5 and K_2O, respectively.
- Poultry manure was composted and has an analysis of 50 lbs total N; 10 lbs NH_4-N, 40 lbs P_2O_5, and 30 lbs K_2O/ton; and 40 percent moisture.
- Manure is to be incorporated three days after application.
- Manure with the same analysis has been applied to this field at the rate of 10 ton/A each of the last three years.
- The starter fertilizer program is 5 gal/A of 10-34-0 (Note: 10-34-0 weighs 11.68 lb/gal).

Net Crop Nutrient Requirement

First all sources of nutrients must be accounted for before a manure rate is calculated by starting with the soil test recommendations and then deducting any other sources of nutrients applied or already available in the field.

Net nutrients required = soil test recommendation – residual N from past manure – residual N from a previous legume crop in the rotation – starter nutrients

Residual N from Past Applications (Table 1.2-15)

Residual N from past manure applications is estimated as follows: For each year in the last five when manure was applied, multiply the rate applied x organic N analysis x the appropriate factor from the section of Table 1.2-15 labeled "Organic N decomposed from past applications." Note that if the organic N is not given on the manure analysis report it can be calculated by subtracting the ammonium N from the total N on the report.

In this example the manure is composted and has 50 lbs total N/ton and 10 lbs of NH_4+N /ton

Organic N = total N – ammonium N = 50 lbs/ton – 10 lbs/ton = 40 lbs/ton organic N

Residual N from last year: 10 tons/A x 40 lbs organic N/ton x 0.05 = 20 lbs N/A

Residual N from 2 years ago: 10 tons/A x 40 lbs organic N/ton x 0.02 = 8 lbs N/A

Residual N from 2 years ago: 10 tons/A x 40 lbs organic N/ton x 0.01 = 4 lbs N/A

Total residual N from past applications: 32 lbs N/A

Residual N from a Previous Legume Crop in the Rotation (Table 1.2-8)

None in this example.

Starter Fertilizer Nutrients That Will Be Applied Regardless of the Planned Manure Application

5 gal/A of a 10-34-0 starter fertilizer will be used on this field. First, since this is a liquid fertilizer the gal/A must be converted to lb/A. To do this multiply the number of gal/A x the weight/gal.

5 gal/A x 11.86 lbs/gal = 59.3 lbs/A

Then the N, P_2O_5, and K_2O applied in this fertilizer are calculated as follows:

59.3 lbs fertilizer/A x 10% N = 6 lbs N/A

59.3 lbs fertilizer/A x 34% P_2O_5 = 20 lbs P_2O_5/A

There is no K_2O in this fertilizer.

Net nutrients required	*N*	*P_2O_5 (lbs/A)*	*K_2O*
Soil test recommendation	160	50	40
–Residual manure N	32	—	—
–Residual legume N	0	—	—
–Starter nutrients	6	20	0
Net requirement (lbs/A)	**122**	**30**	**40**

N Balance Manure Application Rate

The N balanced manure application rate is determined by dividing the available N in the manure into the net crop N requirement calculated above. For treated manures the available N is the sum of the N available from both the ammonium and organic N.

Available NH_4-N in the manure = NH_4-N x NH_4-N availability factor (Table 1.2-15)

NH_4-N availability factor = 0.4 from Table 1.2-15 (based on the time of application [spring], crop [corn], time until incorporation [3 days], and manure type [composted poultry])):

NH_4-N x NH_4-N availability factor = 10 x 0.40 = 4 lbs N/ton

Available organic in the manure = organic N x organic N availability factor (Table 1.2-15)

In this example, the manure is composted and has 50 lbs total N/ton and 10 lbs NH_4-N /ton

Organic N = total N – ammonium N = 50 lbs/ton – 10 lb/ton = 40 lbs/ton organic N

Organic N availability factor = 0.1 from Table 1.2-15 (composted manure in this example):

Organic N x Organic N availability factor = 40 x 0.10 = 4 lbs N/ton

Total available N in the manure = available NH_4-N + available organic N

Total Available N = 4 lbs NH_4 -N/ton + 4 lbs organic N/ton = 8 lbs available N/ton

Maximum rate per acre to meet N need = net N requirement ÷ available manure N

Rate per acre to meet N need = 122 lbs N/A ÷ 8 lb N/ton = 15.25 ton/A
(Note: Any rate less than or equal to this rate is acceptable.)

(Note: This may seem to be a very high rate for poultry manure, but because it was composted, the N availability is very low compared to raw poultry manure; thus, a larger amount is required to supply adequate available N for this crop.)

Nutrients Applied at the Planned Rate

Based on this calculation, which determined that up to 15.25 tons/A could be applied, the farmer decided to apply 10 ton/A. At this application rate the following amounts of nutrients would be applied:

Nitrogen: 10 tons/A x 8 lbs available N/ton = 80 lbs available N/A

Phosphorus: 10 tons/A x 40 lbs P_2O_5/ton = 400 lbs P_2O_5/A

Potassium: 10 tons/A x 30 lbs K_2O/ton = 300 lbs K_2O/A

Final Nutrient Balance on the Field after Manure Application

The nutrient balance is simply the difference between the net crop nutrient requirement and the nutrients applied at the planned rate.

	N	*P_2O_5*	*K_2O*
		(lbs/A)	
Net crop nutrient requirement	122	30	40
Nutrients applied at planned rate	80	400	300
Balance after manure application	42 short	370 excess	260 excess

Note that one of the consequences of applying a low N availability material like compost at a rate that comes close to matching the N needs of the crop will usually apply a large excess of P and K. This is very clear in this example even though the rate the farm chose was much lower than the rate required to supply the available N needs.

Supplemental Fertilizer Needs

In this example the N applied at the farmers planned rate will not be adequate to meet the needs of the crop. Therefore, a supplemental N fertilizer application will be needed to supply the 42 lbs N/A that he is short.

Supplement 2
Sample Nutrient Management Plan

Supplement 2 provides a sample of a completed Nutrient Management Plan. The sample Nutrient Management Plan was developed using Nutrient Management Plan Standard Format: Version 7.0 – October 2019.

Nutrient Management Plan

For Crop Year(s)

2020

Prepared For

Operator's Name, Mailing Address, Telephone Number(s)

Creekside Dairy
Jesse L. Landis
1000 Penn Grant Road
Lancaster, PA 17602
717-626-9034

Operation's Location Address (if different than above)

Site Name (CAFOs)

Prepared By

Nutrient Management Specialist's Name, Address, Telephone Number(s)

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Lancaster, PA 17601
717-393-0208

Nutrient Management Specialist's Program Certification Number

1000

Administratively Complete Date

Plan Approval Date

Plan Update Submission Date(s)

(updates to the approved plan not requiring board action)

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Nutrient Management Plan Summary

Total acres reported in NMP Summary: 246.6 **Crop Year(s)** 2020

Whole Farm Note:

If manure runs out for any field, consult Appendix 4 of the plan for that field. The fertilizer required on any part of the field that does not receive manure can be determined from the 'Net Nutrients Required' for that field.

Fall manure applications require at least 25% cover unless the crop management unit is planted to a cover crop in time to allow for appropriate growth to control runoff until the next growing season, or the manure is injected or mechanically incorporated within 5 days using minimal soil disturbance techniques consistent with no-till farming practices.

Operation Acres:

Total Acres: 267 **Total Acres Available For Nutrient Application Under Operator's Control: Owned:** 246.6 **Rented:** _____

Animal Equivalent Units: 199.17 **Animal Equivalent Units Per Acre:** 0.81

								Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
A6	3.9	Established Pasture (without legume)	Dry Cows Fall - uncollected	Grazing	Grazing anytime with nutrient uptake during growing season	Grazing	See Notes	0	0	0	101	0	0	0	-14	-55
A20	2.9	Established Pasture (without legume)	Pre-Fresh Heifers - uncollected	Grazing	Grazing anytime with nutrient uptake during growing season	Grazing	See Notes	0	0	0	84	0	0	0	-46	-67
A5	4.7	Small Grain Silage				No Manure Applied		0	0	0	79	0	0	0	0	0
A5	4.7	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization- Incorporation within 2–4 days	10	tons/A	0	0	0	136	0	0	0	-61	-73
A7	9	Small Grain Silage				No Manure Applied		0	0	0	79	0	0	0	0	0
A7	9	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization- Incorporation within 2–4 days	10	tons/A	0	0	0	136	0	0	0	-61	-73

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
A16	2.4	Small Grain Silage				No Manure Applied		0	0	0	79	0	30	0	0	0
A16	2.4	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	10	tons/A	0	0	0	136	0	0	0	-61	-33
A19	4.4	Small Grain Silage				No Manure Applied		0	0	0	79	0	0	0	0	0
A19	4.4	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	10	tons/A	0	0	0	136	0	0	0	-61	-73
B8	12.5	Small Grain Silage				No Manure Applied		0	0	0	79	0	0	0	0	0
B8	12.5	Corn for Silage				No Manure Applied		0	0	0	176	0	0	0	0	0
A21	10.4	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	43	0	0	0	-67	-56
A21	10.4	Corn for Silage				No Manure Applied		0	0	0	152	0	0	0	-67	-36
B9	3.8	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	47	0	84	0	-67	0
B9	3.8	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	76	0	88	0	-142	0

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
B13	5.5	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	43	0	0	0	-67	-76
B13	5.5	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	100	0	0	0	-142	-208
A11	3.4	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	0	0	-82	-3
A11	3.4	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	92	0	55	0	-157	0
A13	8.3	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	47	0	-82	0
A13	8.3	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	92	0	138	0	-157	0
A17	18.2	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	35	0	0	0	-82	-83
A17	18.2	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	68	0	0	0	-157	-125

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
B3	5.3	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	0	0	-82	-23
B3	5.3	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	92	0	15	0	-157	0
A2	4	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	0	0	-82	-123
A2	4	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	92	0	0	0	-157	-235
A4	5.9	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	0	0	-82	-143
A4	5.9	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	92	0	0	0	-157	-275
A18	3.6	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	31	0	0	0	-82	-143
A18	3.6	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	18	tons/A	0	0	0	72	0	0	0	-192	-274

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
B1	4.8	Small Grain Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	35	0	0	0	-82	-113
B1	4.8	Corn for Silage	Cow Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	7850	gal/A	0	0	0	68	0	0	0	-157	-205
B5	5.6	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	18	tons/A	0	0	0	14	0	23	0	-121	0
B5	5.6	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	18	tons/A	0	0	0	60	0	89	0	-231	0
B12	2.3	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	47	0	94	0	-67	0
B12	2.3	Corn for Silage	Heifer Spring	Spring	Spring: Spring or summer utilization-Incorporation within 2–4 days	18	tons/A	0	0	0	56	0	99	0	-177	0
C1	10.7	Corn for Silage	Cow Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	7850	gal/A	0	0	0	72	0	87	0	-82	0
C2	13.4	Small Grain Silage				No Manure Applied		0	0	0	90	0	140	0	0	0

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
C2	13.4	Corn for Silage				No Manure Applied		0	0	0	200	0	190	0	0	0
C3	13.7	Small Grain Silage				No Manure Applied		0	0	0	79	0	170	0	0	0
C3	13.7	Corn for Silage				No Manure Applied		0	0	0	176	0	230	0	0	0
A8	3.2	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	43	0	4	0	-67	0
A8	3.2	Corn for Silage				No Manure Applied		0	0	0	152	0	110	0	-67	0
A9	4.8	Small Grain Silage	Heifer Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days	10	tons/A	0	0	0	43	0	14	0	-67	0
A9	4.8	Corn for Silage				No Manure Applied		0	0	0	152	0	130	0	-67	0
A1	6.6	Planting Alfalfa				No Manure Applied		0	0	0	0	0	210	0	0	0
A3	2.4	Established Alfalfa				No Manure Applied		0	0	0	0	0	270	0	0	0
A10	5.2	Established Alfalfa				No Manure Applied		0	0	0	0	0	270	0	0	0
A12	3.9	Established Alfalfa				No Manure Applied		0	0	0	0	0	200	0	0	0
A15	5.8	Established Alfalfa				No Manure Applied		0	0	0	0	0	30	0	0	0

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
								N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
B2	5.4	Planting Alfalfa				No Manure Applied		0	0	0	0	0	220	0	0	0
B4	5.5	Established Alfalfa				No Manure Applied		0	0	0	0	0	0	0	0	0
B7	5.5	Established Alfalfa				No Manure Applied		0	0	0	0	0	130	0	0	0
B11	6.6	Established Alfalfa				No Manure Applied		0	0	0	0	0	270	0	0	0
A14	10.8	Soybeans				No Manure Applied		0	0	0	0	0	80	0	0	0
A22	12.8	Soybeans				No Manure Applied		0	0	0	0	0	0	0	0	0
B6	5.4	Soybeans				No Manure Applied		0	0	0	0	0	120	0	0	0
B10	4	Soybeans				No Manure Applied		0	0	0	0	0	0	0	0	0

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

NMP Summary Notes

Crop Years 2020

CMU/Field ID	Notes
A6	Dry cow pasture grazing season is from April through October. Average number of 8 cows are fed and watered in the barn and have unlimited access to pasture during the grazing season. 35' manure (mechanical) application setback from stream.
A20	Heifer pasture grazing season is from April through October. Average number of 12 heifers are fed and watered in the barn and have unlimited access to pasture during the grazing season. 35' manure (mechanical) application setback from stream.
A5	
A5	
A7	100' manure application setback from stream.
A7	100' manure application setback from stream.
A16	
A16	
A19	100' manure application setback from stream.
A19	100' manure application setback from stream.
B8	100' manure application setback from stream.
B8	100' manure application setback from stream.
A21	100' manure application setback from stream.
A21	100' manure application setback from stream.
B9	100' manure application setback from stream.
B9	100' manure application setback from stream.
B13	100' manure application setback from stream.
B13	100' manure application setback from stream.
A11	
A11	
A13	
A13	
A17	100' manure application setback from wellhead.
A17	100' manure application setback from wellhead.
B3	
B3	
A2	
A2	
A4	
A4	
A18	100' manure application setback from stream.
A18	100' manure application setback from stream.
B1	
B1	
B5	100' manure application setback from stream.

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

CMU/Field ID	Notes
B5	100’ manure application setback from stream.
B12	
B12	
C1	
C2	
C2	
C3	100’ manure application setback from wellhead.
C3	100’ manure application setback from wellhead.
A8	
A8	
A9	
A9	
A1	
A3	
A10	
A12	100’ manure application setback from wellhead.
A15	
B2	
B4	100’ manure application setback from stream.
B7	100’ manure application setback from stream.
B11	
A14	100’ manure application setback from wellhead.
A22	100’ manure application setback from wellhead.
B6	100’ manure application setback from stream.
B10	

[1] See rate calibration table (Nutrient Management Plan Summary Notes).

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

Manure Spreader Calibration Notes

1

Crop Years 2020

Manure Application Rate	Manure Spreader Used	Spreader Settings	Tractor Used (if applicable)	Tractor Settings (speed, gear, rpm, pto, etc.)
7850 gallons/acre	Nuhn 6500		John Deere 8300	1.8 mph @ 1700 rpm
10 ton/acre	Knight 8018 Pro-Twin		John Deere 8300	4.5 mph @ 1700 rpm
18 ton/acre	Knight 8018 Pro-Twin		John Deere 8300	2.8 mph @ 1700 rpm

Additional Nutrient Management Plan Requirements

Manure Management and Stormwater BMP Implementation Summary

Best Management Practice	NRCS Practice Code [1]	BMP Location	Implementation Season & Year
Heavy Use Area Protection	561	Cow Facility	Summer 2020
Trails and Walkways	575	Cow Facility	Summer 2020
Trails and Walkways	575	Calf & Heifer Facility	Summer 2020

1 If applicable, enter USDA-NRCS Practice Code. For other non-technical BMPs, leave blank.

In-Field Manure Stacking Procedures

Manure must be applied to the field within 120 days of stacking or the stacks must be covered. Stacks must be implemented and maintained according to sound BMPs, addressing concerns such as soil type, soil slope, shape of the pile, setbacks, and rotation of piles.

There will be no regular in-field stacking of manure on the operation. An emergency in-field stacking area for the calf and heifer manure has been designated in field A15 (located on Farm 1 Operator Map).

Additional CAFO Requirements

In-field stacking criteria, winter storage requirements, and other issues identified by DEP's review of the nutrient management plan.

Not applicable.

Proposed Manure Storage Description

Type, dimensions, volume, freeboard and location on map.

Not applicable.

Description of Planned Alternative Manure Technology Practices

Type of practice, volume of manure addressed, and result of practice.

Not applicable.

Exported Manure Summary

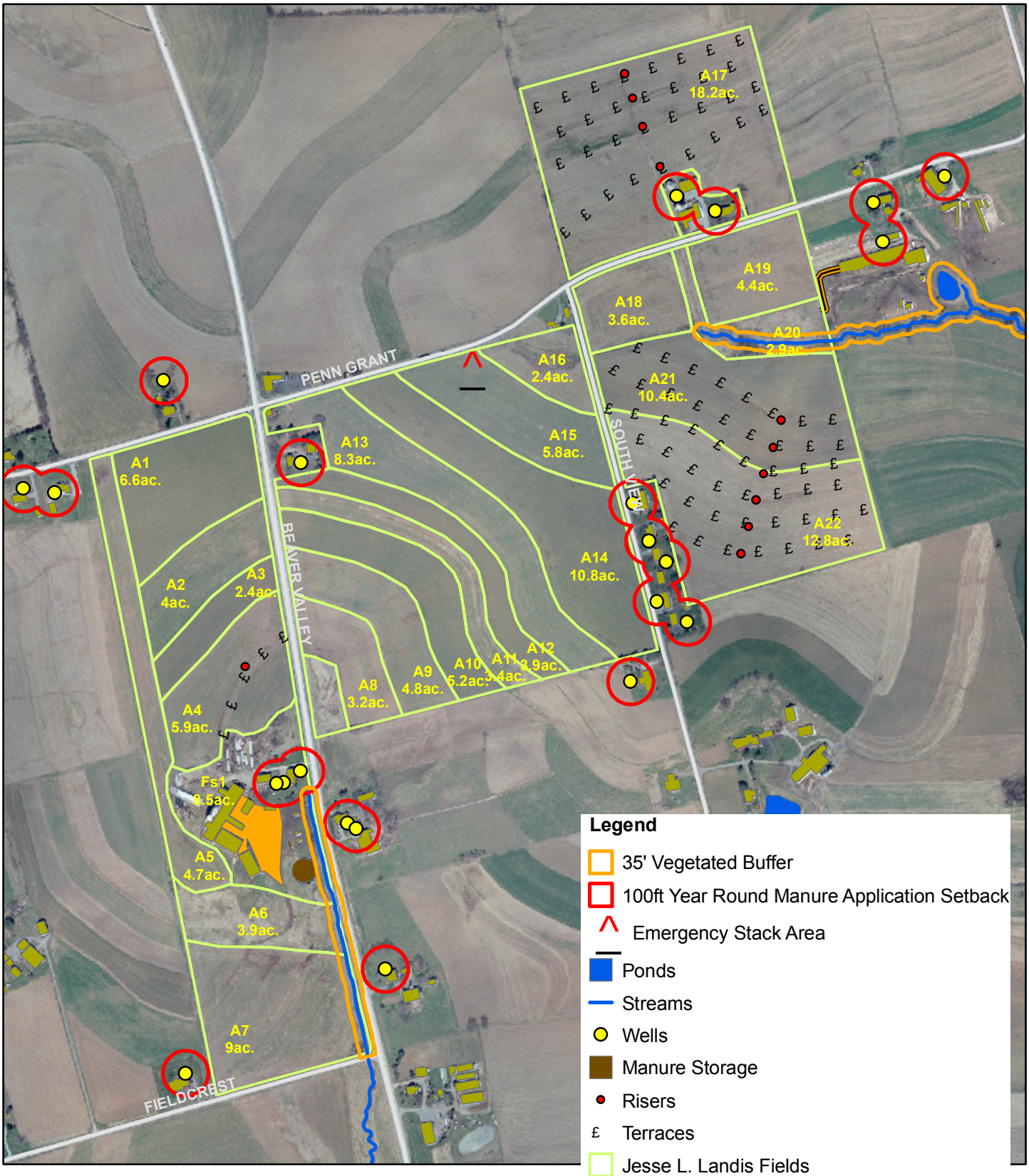
Summarize in a short paragraph the arrangements proposed for the manure to be exported from the operation. This information is described in more detail in Appendix 8 of this plan.

There is no exported manure.

Operator Management Map

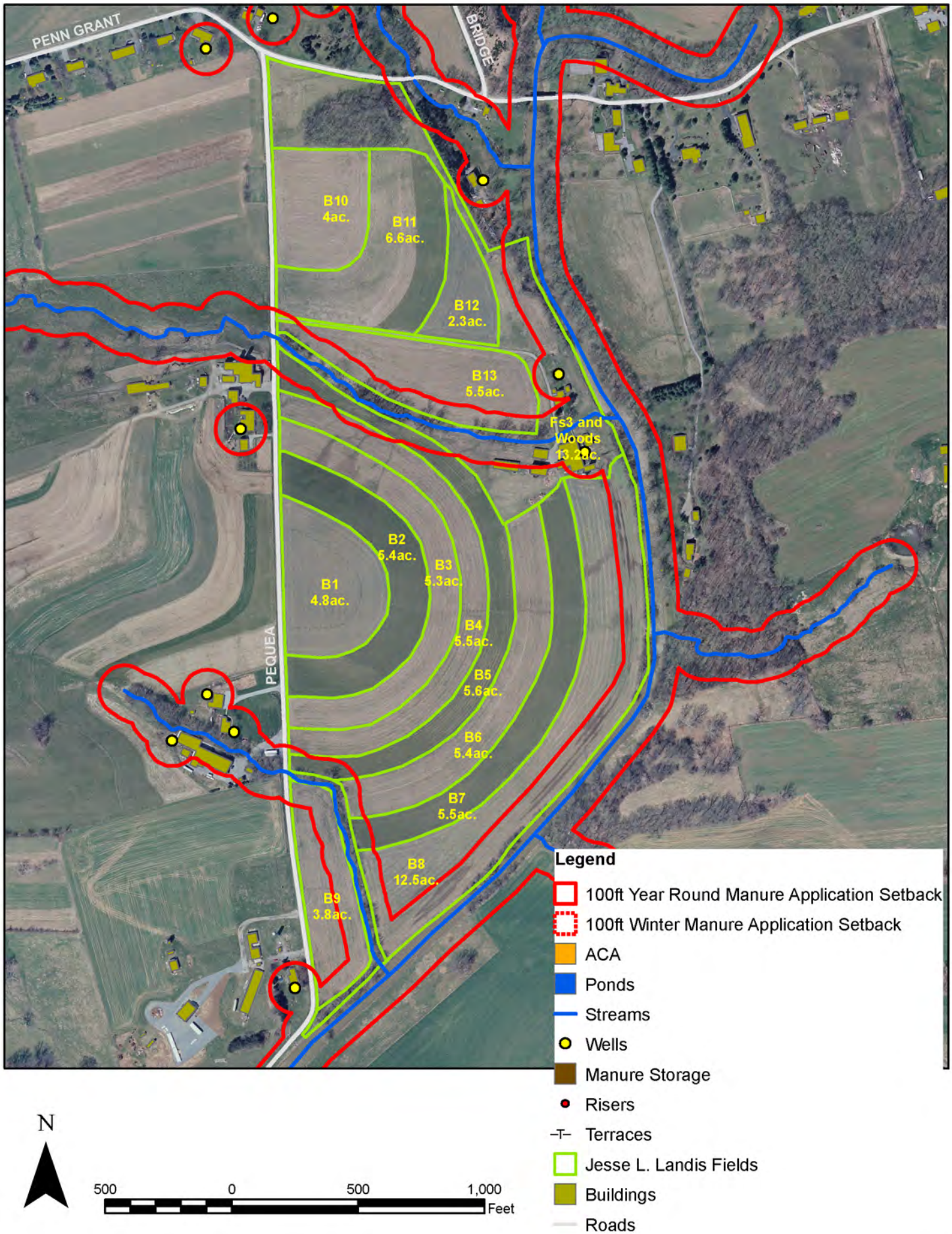
Three types of maps are required for an Act 38 Nutrient Management Plan: 1) Topographic Map, 2) Soils Map, and 3) Operator Management Map. The **Operator Management Map** is to be included here in the Nutrient Management Plan Summary and must include field identification, acreage and boundaries, manure application setback areas and buffers and associated landscape features (streams and other water bodies, sinkholes and active water wells), location of existing and proposed structural BMPs (including manure storage facilities), location of existing or proposed emergency manure stacking areas and in-field manure stacking areas, and road names adjacent to and within the operation. All features on the map must be clearly identified and include a legend for setback areas and other features. The Topographic Map and Soils Map must be included in Appendix 9.

CREEKSIDE DAIRY - FARM 1 OPERATOR MAP

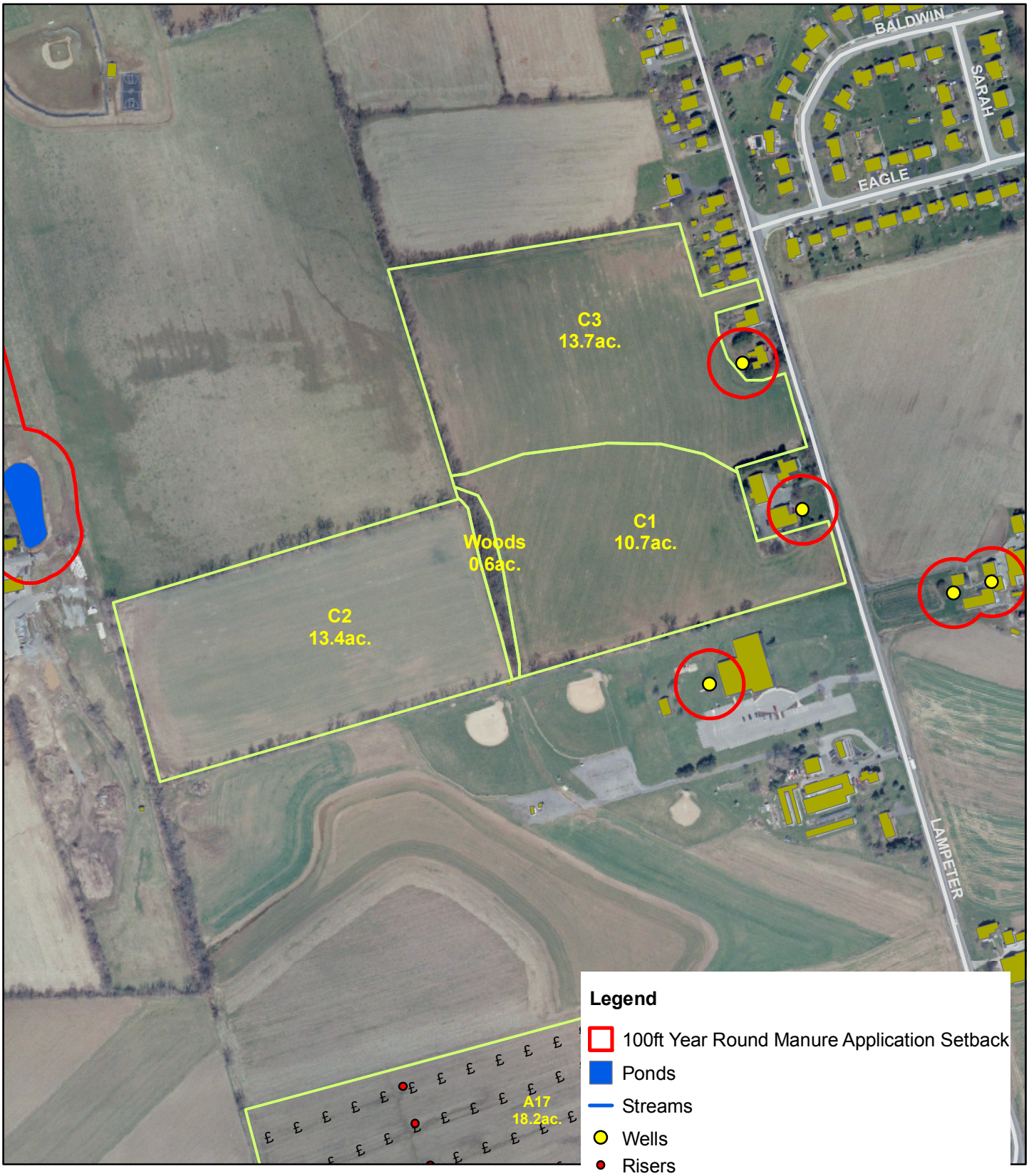


600 0 600 1,200 Feet

CREEKSIDE DAIRY - FARM 2 OPERATOR MAP



CREEKSIDE DAIRY - FARM 3 OPERATOR MAP



400 0 400 800 Feet

Appendix 1

Nutrient Management Plan Agreement & Responsibilities

Plan Implementation Requirements

This nutrient management plan has been developed to meet the requirements of the following programs:

X	Pennsylvania Act 38 of 2005		CAO	X VAO (check one)
	Pennsylvania CAFO (Concentrated Animal Feeding Operation) program			
	Other program:			

Plans developed under these programs are required to be implemented as approved in order to maintain compliance with the specific law or program. Implementation includes adherence to manure and fertilizer application rates, timing, setbacks and conditions; installation of listed BMPs within implementation timeframes; and record keeping obligations of the program.

The nutrient management plan has been developed as a: (check one)

X	1-Year Plan for Crop Year	2020 (annual updates will be completed)
	3-Year Plan for Crop Years	

Records required to be maintained include the following:

1) Annual crop yields
2) Manure and fertilizer application rates, locations and date of application
3) Manure production figures for the various manure groups listed in your plan
4) Soil test reports (testing required every 3 years per crop management unit)
5) Manure test reports (testing required once a year for each manure group)
6) Number of animals on pasture, number of days on pasture, and hours per day on pasture
7) For operations exporting manure, Manure Export Sheets
8) BMP designs and certification for new liquid and semi-solid manure storage facilities

The following has been confirmed:

X	Verification of Ag E&S Plan		No Ag E&S Plan Required
	Verification of Existing Site Specific Emergency Response Plan		

Verification that owners of rented/leased lands have been notified that a nutrient management plan has been developed which calls for manure to be applied to their lands and that they have no objections to the plan requirements.

	Owners Notified		No Rented/Leased Lands

Specialist Signature

I affirm that the information contained in this nutrient management plan is true, accurate and complete to the best of my knowledge and belief, based on information provided by the operator; that this plan has been developed in accordance with the criteria established for the program(s) indicated above; and that I have presented the final complete plan to the operator and discussed the content and implementation of this plan with the operator, subject to the penalties of 18 Pa.C.S.A. § 4904, relating to unsworn falsification to authorities.

Specialist Signature _____

Date July 25, 2019

Operator Signature

I understand and agree that I will implement the practices, procedures and record keeping obligations as outlined in this plan in order to protect water quality and address the nutrient needs of the crops associated with the operation. I agree that if I use a commercial hauler or broker for the application or export of manure, that only haulers or brokers that hold a valid certification issued by the Pa Department of Agriculture, under Act 49 of 2004, will be used. I affirm that all information provided in this nutrient management plan is true, accurate and complete to the best of my knowledge and belief, and reflects the current and planned activities of the operation; and that, if this plan was completed by a nutrient management specialist, I have reviewed the final completed plan and the specialist has discussed the content and implementation of this plan with me, subject to the penalties of 18 Pa.C.S.A. § 4904, relating to unsworn falsification to authorities.

Operator Signature	
Operator Title	Owner
Date	July 25, 2019

Appendix 2

Operation Information

Operation Description

Animal types and numbers; cropland, hayland and pastureland acreage; farmstead acreage; crop rotation (crops, sequence of crops, and number of years for each crop); manure group management (contributing animal groups, collection, storage and handling procedures); composting (including mortality) management.

This dairy operation is a purebred Holstein dairy with approximately 100 cows and 84 replacement heifers.

The cows are housed in a freestall barn. The manure from the cows, along with milkhouse wastewater and barnyard runoff is collected in a circular concrete storage. Dry cows are pastured on a 3.9 acre pasture from April to October and are fed and watered in the barn during the grazing season.

Replacement animals are housed and raised in a roofed calf and heifer facility from birth to freshening. Calves are raised in individual calf pens. After weaning they move through a series of seven group bedded pack pens until freshening. Manure from all the pens is scraped into a roofed manure storage that is part of the heifer facility. The oldest group of heifers (1100 – 1250 pounds) has access to a 2.9 acre pasture from April to October and are fed and watered in the barn.

Both storages are emptied in the spring and fall and the manure is land applied on the operation.

The operation consists of 246.6 crop acres and 20.4 farmstead acres. The crop rotation is Small Grain Silage/Corn Silage (4 years), Alfalfa (4 years), and Soybeans (1 year). Tillage is a chisel/disk.

County(s)

Lancaster

Name of Receiving Stream(s)/Watershed(s)

Pequea Creek

Notation of Special Protection Waters

None.

Operation Acres

Total Acres: 267

Total Acres Available for Nutrient Application Under Operator's Control

Owned: 246.6

Rented: 0

Names & Addresses of Owners of Rented or Leased Land and/or Facilities

Not applicable.

Existing Manure Storages & Capacity

Type of storage, dimensions, useable capacity, freeboard, top or bottom loaded, dimensions and description of contributing runoff area, description of wastewater additions, types and amounts of bedding. Briefly describe, for each manure group, manure storage management during removal (degree of agitation, method of manure removal, extent the storage is emptied, type of unremoved manure, etc.) and manure sampling procedures.

The manure storage for the cow facility is an 80' x 18' slurrystore. With a 1' freeboard the useable capacity is 638,852 gallons. Runoff from the proposed 50' x 100' concrete exercise lot along with the milkhouse wastewater will be directed to the storage and bottom loaded. Sawdust bedding is used at the rate of 8 cubic yards/week. The storage is thoroughly agitated and completely emptied during each application season. Manure analysis lab samples are obtained when the storage is emptied from subsamples taken from every fifth load and mixed together.

The manure storage for the calf and heifer facility is located between the calf and heifer barns. The 75' x 42' x 6' concrete stacking area is walled and roofed with a capacity of 520 tons. Manure from all pens is scraped and stored in this area. Straw bedding is used. The storage is completely emptied during each application season. Manure analysis lab samples are obtained when the storage is emptied from subsamples taken from every fifth load and mixed together.

Manure Application Equipment Capacity & Practical Application Rates

Description of application equipment, practical application rates based on calibration and calibration method used, the data recorded during equipment calibration is to be retained on the farm. If applicable, name and Act 49 certification number of custom applicator.

A Knight 8018 Pro-Twin spreader is used to apply the solid manure and was calibrated using the tarp method at rates of 10 and 18 tons per acre. A Nuhn 6500 spreader is used to apply the liquid manure and was calibrated using the swath area method at a rate of 7850 gallons per acre.

Appendix 3 Manure Group Information Crop Yrs. 2020	Cow Spring			Cow Fall			Heifer Spring			Heifer Fall		
Manure Report Date (note if averaging several reports)	March 26, 2019			October 3, 2018			March 19, 2019			October 10, 2018		
Laboratory Name	AASL			AASL			AASL			AASL		
Manure Type	Dairy			Dairy			Dairy			Dairy		
Manure Unit (lbs/ton or 1000 gal)	lb/1000 gal			lb/1000 gal			lb/ton			lb/ton		
Total Nitrogen (N) (lbs/ton or 1000 gal)	18.90			20.50			11.40			12.10		
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	7.40			8.30			2.50			2.80		
Total Organic N (lbs/ton or 1000 gal)	11.50		Go to NMP Index	12.20			8.90			9.30		
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	9.60		Go to Appendix 3 Input	10.40			6.10			6.70		
Total Potash (K_2O) (lbs/ton or 1000 gal)	16.80		Go to Manure Avg Input	18.20			7.30			7.60		
Percent Solids	5.70		Grazing Calculator	5.50			34.70			34.70		
PSC Value (analytical or book value)	0.80			0.80			0.80			0.80		
Percent Moisture	94.30			94.50			65.30			65.30		
Manure Group AEU's	71.51			71.51			28.08			28.08		
Description: Site & Season Applied	Slurrystore - Spring		Spring	Slurrystore - Early Fall		Fall	Heifer Barn Storage - Spring		Spring	Heifer Barn Storage - Early Fall		Fall
Inventory Method	Calculated			Calculated			Calculated			Calculated		
	Collected Calc.		Uncollected Calc.	Collected Calc.		Uncollected Calc.	Collected Calc.		Uncollected Calc.	Collected Calc.		Uncollected Calc.
Manure Group Identification	Cow Spring		Cow Spring - uncollected	Cow Fall		Cow Fall - uncollected	Heifer Spring		Heifer Spring - uncollected	Heifer Fall		Heifer Fall - uncollected
CALCULATED: Total Manure Collected Per Manure Group	471,212.0		4.4	491,589.0		26.6	413.2		6.3	381.5		38.1
Units	gallons		Tons	gallons		Tons	Tons		Tons	Tons		Tons
RECORDS: Total Manure Collected Per Manure Group												
Unit												
	Collected		Uncollected	Collected		Uncollected	Collected		Uncollected	Collected		Uncollected
Manure Used On-Farm	464,720.0		0.0	503,970.0		30.8	412.0		0.0	400.8		44.4
Units	Gallons		Tons	Gallons		Tons	Tons		Tons	Tons		Tons
Manure Exported	0.0			0.0			0.0			0.0		
Units												
Manure Allocation Balance	6,492.0		4.4	-12,381.0		-4.2	1.2		6.3	-19.3		-6.3
Units	Gallons		Tons	Gallons		Tons	Tons		Tons	Tons		Tons
Manure Balance as a Percent of Total Manure Collected	1.4%			-2.5%			0.3%			-5.1%		
Total Rainfall and Runoff	86,068			111,665			0			0		
	gallons			gallons			tons			tons		

Appendix 3 Manure Group Information Crop Yrs. 2020	Cow Spring		Cow Fall		Heifer Spring		Heifer Fall	
	Manure Generation per Animal Group	Uncollected Manure: Nutrient Analysis Book Values	Manure Generation per Animal Group	Uncollected Manure: Nutrient Analysis Book Values	Manure Generation per Animal Group	Uncollected Manure: Nutrient Analysis Book Values	Manure Generation per Animal Group	Uncollected Manure: Nutrient Analysis Book Values
Animal Group 1	Lactating Cows		Lactating Cows		Calves & Heifers		Calves & Heifers	
Animal Type	Holstein Lactating Cow		Holstein Lactating Cow		Calves & Heifers		Calves & Heifers	
Animal Number	92		92		72		72	
Animal Weight	1450 lbs		1450 lbs		595 lbs		595 lbs	
Animal Group AUs	133.40 AUs		133.40 AUs		42.84 AUs		42.84 AUs	
Animal Group AEUs	65.79 AEUs		65.79 AEUs		21.13 AEUs		21.13 AEUs	
Daily Manure Production per AU	13.0 gal		13.0 gal		80.0 lb		80.0 lb	
Total Days Manure Produced	180 days		180 days		180 days		180 days	
Total Manure Produced	312,156.00 gal		312,156.00 gal		308.45 tons		308.45 tons	
Days On Pasture	0 days		0 days		0 days		0 days	
Hours Per Day On Pasture	0 hrs		0 hrs		0 hrs		0 hrs	
Total Bedding	21,004.00 gal		21,004.00 gal		35.00 tons		35.00 tons	
Total Washwater	40,500.00 gal		40,500.00 gal		0.00 tons		0.00 tons	
CALCULATED - Total Uncollected Manure Per Animal Group								
CALCULATED-Total Manure Collected Per Animal Group	373,660.00 gal		373,660.00 gal		343.45 tons		343.45 tons	
Animal Group 2	Dry Cows Spring	Dry Cows Spring - uncollected	Dry Cows Fall	Dry Cows Fall - uncollected	Pre-Fresh Heifers	Pre-Fresh Heifers - uncollected	Pre-Fresh Heifers	Pre-Fresh Heifers - uncollected
Animal Type	Holstein Dry Cow	Total Nitrogen (N) lbs/ton	Holstein Dry Cow	Total Nitrogen (N) lbs/ton	Pre-Fresh Heifers	Total Nitrogen (N) lbs/ton	Pre-Fresh Heifers	Total Nitrogen (N) lbs/ton
Animal Number	8	9.00	8	9.00	12	10.00	12	10.00
Animal Weight	1450 lbs	Total Phosphate (P2O5) lbs/ton	1450 lbs	Total Phosphate (P2O5) lbs/ton	1175 lbs	Total Phosphate (P2O5) lbs/ton	1175 lbs	Total Phosphate (P2O5) lbs/ton
Animal Group AUs	11.60 AUs	3.00	11.60 AUs	3.00	14.10 AUs	3.00	14.10 AUs	3.00
Animal Group AEUs	5.72 AEUs	Total Potash (K2O) lbs/ton	5.72 AEUs	Total Potash (K2O) lbs/ton	6.95 AEUs	Total Potash (K2O) lbs/ton	6.95 AEUs	Total Potash (K2O) lbs/ton
Daily Manure Production per AU	6.0 gal	7.00	6.0 gal	7.00	60.0 lb	7.00	60.0 lb	7.00
Total Days Manure Produced	180 days	PSC Value	180 days	PSC Value	180 days	PSC Value	180 days	PSC Value
Total Manure Produced	12,528.00 gal	0.80	12,528.00 gal	0.80	76.14 tons	0.80	76.14 tons	0.80
Days On Pasture	30 days		180 days		30 days		180 days	
Hours Per Day On Pasture	12 hrs		12 hrs		12 hrs		12 hrs	
Total Bedding	0.00 gal		0.00 gal		0.00 tons		0.00 tons	
Total Washwater	0.00 gal		0.00 gal		0.00 tons		0.00 tons	
CALCULATED - Total Uncollected Manure Per Animal Group	1,044.00 gal	4.44 - Tons	6,264.00 gal	26.62 - Tons	6.35 tons	6.35 - Tons	38.07 tons	38.07 - Tons
CALCULATED-Total Manure Collected Per Animal Group	11,484.00 gal		6,264.00 gal		69.80 tons		38.07 tons	

App. 4: Crop Yrs. 2020	A6			A20			A5			A5			A7		
CMU/Field ID															
Acres	3.9			2.9			4.7			4.7			9.0		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	44	211	6.9	78	165	5.9	204	280	6.5	204	280	6.5	196	211	6.9
P Index Part A Evaluation	<150ft			<150ft			Soil Test P			Soil Test P			<150ft		
Part A Result	Part B			Part B			Part B			Part B			Part B		
Crop	Established Pasture (without legume)			Established Pasture (without legume)			Small Grain Silage			Corn for Silage			Small Grain Silage		
Planned Yield	3 ton/A			3 ton/A			6 ton/A			25 ton/A			6 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	150	10	0	150	0	40	90	0	0	200	0	0	90	0	0
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	0			0			[0]	Winter Double Crop		0	Summer Double Crop		[0]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop		35	Continuously - Summer Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	115	10	0	115	0	40	79	0	0	176	0	0	79	0	0
Manure Group	Dry Cows Fall - uncollected			Pre-Fresh Heifers - uncollected						Heifer Spring					
Application Season: Management (Incorporation, cover crops, etc.)	Grazing anytime with nutrient uptake during growing season			Grazing anytime with nutrient uptake during growing season						Spring: Spring or summer utilization-Incorporation within 2–4 days					
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.20			0.20						0.35					
P Index Application Method	April - Oct: No incorp or incorp > 1 wk.			April - Oct: No incorp or incorp > 1 wk.						Incorporated within 1 week					
N Balanced Manure Rate (ton; gal/A)	63.9 tons/A			57.5 tons/A						44.1 tons/A					
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	15 tons/A			15 tons/A						23.3 tons/A					
	Crop P Removal (lb/A) 45.0			Crop P Removal (lb/A) 45.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0		
P Index Value	19			34			46			46			64		
Planned Manure Rate (ton or gal/A)	**7.9 tons/A**			**15.3 tons/A**			**No Manure Applied**			**10 tons/A**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	14	24	55	31	46	107	0	0	0	40	61	73	0	0	0
Nutrient Balance after Manure	101	-14	-55	84	-46	-67	79	0	0	136	-61	-73	79	0	0
Supplemental Fertilizer (lb/A)	101	0	0	84	0	0	79	0	0	136	0	0	79	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-14**	**-55**	**0**	**-46**	**-67**	**0**	**0**	**0**	**0**	**-61**	**-73**	**0**	**0**	**0**
Multiple Application															
Manure Utilized on CMU	31 tons			44 tons			0			47 tons			0		

App. 4: Crop Yrs. 2020	A7			A16			A16			A19			A19		
CMU/Field ID															
Acres	9.0			2.4			2.4			4.4			4.4		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	196	211	6.9	218	173	6.8	218	173	6.8	189	245	6.1	189	245	6.1
P Index Part A Evaluation	<150ft			Soil Test P			Soil Test P			<150ft			<150ft		
Part A Result	Part B			Part B			Part B			Part B			Part B		
Crop	Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage		
Planned Yield	25 ton/A			6 ton/A			25 ton/A			6 ton/A			25 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	200	0	0	90	0	30	200	0	40	90	0	0	200	0	0
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	0	Summer Double Crop		[0]	Winter Double Crop		0	Summer Double Crop		[0]	Winter Double Crop		0	Summer Double Crop	
Manure History Description Residual Manure N (lb/A)	24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	176	0	0	79	0	30	176	0	40	79	0	0	176	0	0
Manure Group	Heifer Spring						Heifer Spring						Heifer Spring		
Application Season: Management (Incorporation, cover crops, etc.)	Spring: Spring or summer utilization-Incorporation within 2–4 days						Spring: Spring or summer utilization-Incorporation within 2–4 days						Spring: Spring or summer utilization-Incorporation within 2–4 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.35						0.35						0.35		
P Index Application Method	Incorporated within 1 week						Incorporated within 1 week						Incorporated within 1 week		
N Balanced Manure Rate (ton; gal/A)	44.1 tons/A						44.1 tons/A						44.1 tons/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	23.3 tons/A						23.3 tons/A						23.3 tons/A		
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0		
P Index Value	64			48			48			63			63		
Planned Manure Rate (ton or gal/A)	**10 tons/A**			**No Manure Applied**			**10 tons/A**			**No Manure Applied**			**10 tons/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	40	61	73	0	0	0	40	61	73	0	0	0	40	61	73
Nutrient Balance after Manure	136	-61	-73	79	0	30	136	-61	-33	79	0	0	136	-61	-73
Supplemental Fertilizer (lb/A)	136	0	0	79	0	30	136	0	0	79	0	0	136	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-61**	**-73**	**0**	**0**	**0**	**0**	**-61**	**-33**	**0**	**0**	**0**	**0**	**-61**	**-73**
Multiple Application															
Manure Utilized on CMU	90 tons			0			24 tons			0			44 tons		

App. 4: Crop Yrs. 2020	B8			B8			A21			A21			B9		
CMU/Field ID															
Acres	12.5			12.5			10.4			10.4			3.8		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	225	227	6.1	225	227	6.1	117	188	5.9	117	188	5.9	114	91	5.3
P Index Part A Evaluation	<150ft Soil Test P			<150ft Soil Test P			<150ft			<150ft			<150ft		
Part A Result	Part B			Part B			Part B			Part B			Part B		
Crop	Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage		
Planned Yield	6 ton/A			25 ton/A			6 ton/A			25 ton/A			6 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	90	0	0	200	0	0	90	0	20	200	0	20	90	0	160
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	[0]	Winter Double Crop		0	Summer Double Crop		[24]	Winter Double Crop		24	Summer Double Crop		[24]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		7	Frequently - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	79	0	0	176	0	0	79	0	20	152	-67	-36	83	0	160
Manure Group							Heifer Fall						Heifer Fall		
Application Season: Management (Incorporation, cover crops, etc.)							Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days						Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
							0.30						0.30		
P Index Application Method							Incorporated within 1 week						Incorporated within 1 week		
N Balanced Manure Rate (ton; gal/A)							21.8 tons/A						22.9 tons/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)							21.2 tons/A						21.2 tons/A		
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 142.0		
P Index Value	45			45			48			48			68		
Planned Manure Rate (ton or gal/A)	**No Manure Applied**			**No Manure Applied**			**10 tons/A**			**No Manure Applied**			**10 tons/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	0	0	0	0	0	0	36	67	76	0	0	0	36	67	76
Nutrient Balance after Manure	79	0	0	176	0	0	43	-67	-56	152	-67	-36	47	-67	84
Supplemental Fertilizer (lb/A)	79	0	0	176	0	0	43	0	0	152	0	0	47	0	84
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-67**	**-56**	**0**	**-67**	**-36**	**0**	**-67**	**0**
Multiple Application															
Manure Utilized on CMU	0			0			104 tons			0			38 tons		

App. 4: Crop Yrs. 2020	B9			B13			B13			A11			A11		
CMU/Field ID															
Acres	3.8			5.5			5.5			3.4			3.4		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	114	91	5.3	88	191	6.0	88	191	6.0	99	101	6.5	99	101	6.5
P Index Part A Evaluation	<150ft			<150ft			<150ft			No to All Part A			No to All Part A		
Part A Result	Part B			Part B			Part B			N Based			N Based		
Crop	Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage		
Planned Yield	25 ton/A			6 ton/A			25 ton/A			6 ton/A			25 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	200	0	220	90	0	0	200	0	0	90	0	140	200	0	190
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	24	Summer Double Crop		[24]	Winter Double Crop		24	Summer Double Crop		[32]	Winter Double Crop		32	Summer Double Crop	
Manure History Description Residual Manure N (lb/A)	13	Frequently - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop	
Legume History Description Residual Legume N (lb/A)	35	Soybeans, 35 bu/A		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	128	-67	220	79	0	0	152	-67	-76	79	0	140	144	-82	187
Manure Group	Cow Spring			Heifer Fall			Cow Spring			Cow Fall			Cow Spring		
Application Season: Management (Incorporation, cover crops, etc.)	Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.35			0.30			0.35			0.30			0.35		
P Index Application Method	Incorporated within 1 week			Incorporated within 1 week			Incorporated within 1 week								
N Balanced Manure Rate (ton; gal/A)	19335 gal/A			21.8 tons/A			22961 gal/A			12846 gal/A			21752 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	7813 gal/A			21.2 tons/A			7813 gal/A			13654 gal/A			6250 gal/A		
	Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0		
P Index Value	68			63			63								
Planned Manure Rate (ton or gal/A)	**7850 gal/A**			**10 tons/A**			**7850 gal/A**			**7850 gal/A**			**7850 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	52	75	132	36	67	76	52	75	132	48	82	143	52	75	132
Nutrient Balance after Manure	76	-142	88	43	-67	-76	100	-142	-208	31	-82	-3	92	-157	55
Supplemental Fertilizer (lb/A)	76	0	88	43	0	0	100	0	0	31	0	0	92	0	55
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-142**	**0**	**0**	**-67**	**-76**	**0**	**-142**	**-208**	**0**	**-82**	**-3**	**0**	**-157**	**0**
Multiple Application															
Manure Utilized on CMU	29,830 gallons			55 tons			43,175 gallons			26,690 gallons			26,690 gallons		

App. 4: Crop Yrs. 2020	A13			A13			A17			A17			B3		
CMU/Field ID															
Acres	8.3			8.3			18.2			18.2			5.3		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	73	59	5.8	73	59	5.8	73	160	6.7	73	160	6.7	87	118	5.4
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage		
Planned Yield	6 ton/A			25 ton/A			6 ton/A			25 ton/A			6 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	90	0	190	200	0	270	90	0	60	200	0	90	90	0	120
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	[32]	Winter Double Crop		32	Summer Double Crop		[32]	Winter Double Crop		32	Summer Double Crop		[32]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		7	Frequently - Winter Double Crop		13	Frequently - Summer Double Crop		11	Continuously - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		35	Soybeans, 35 bu/A		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	79	0	190	144	-82	270	83	0	60	120	-82	7	79	0	120
Manure Group	Cow Fall			Cow Spring			Cow Fall			Cow Spring			Cow Fall		
Application Season: Management (Incorporation, cover crops, etc.)	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.30			0.35			0.30			0.35			0.30		
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	12846 gal/A			21752 gal/A			13496 gal/A			18127 gal/A			12846 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	13654 gal/A			6250 gal/A			13654 gal/A			6250 gal/A			13654 gal/A		
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**7850 gal/A**			**7850 gal/A**			**7850 gal/A**			**7850 gal/A**			**7850 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	48	82	143	52	75	132	48	82	143	52	75	132	48	82	143
Nutrient Balance after Manure	31	-82	47	92	-157	138	35	-82	-83	68	-157	-125	31	-82	-23
Supplemental Fertilizer (lb/A)	31	0	47	92	0	138	35	0	0	68	0	0	31	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-82**	**0**	**0**	**-157**	**0**	**0**	**-82**	**-83**	**0**	**-157**	**-125**	**0**	**-82**	**-23**
Multiple Application															
Manure Utilized on CMU	65,155 gallons			65,155 gallons			142,870 gallons			142,870 gallons			41,605 gallons		

App. 4: Crop Yrs. 2020	B3			A2			A2			A4			A4		
CMU/Field ID															
Acres	5.3			4.0			4.0			5.9			5.9		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	87	118	5.4	135	187	6.8	135	187	6.8	146	193	6.7	146	193	6.7
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage		
Planned Yield	25 ton/A			6 ton/A			25 ton/A			6 ton/A			25 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	200	0	170	90	0	20	200	0	20	90	0	0	200	0	0
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	32	Summer Double Crop		[32]	Winter Double Crop		32	Summer Double Crop		[32]	Winter Double Crop		32	Summer Double Crop	
Manure History Description Residual Manure N (lb/A)	24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	144	-82	147	79	0	20	144	-82	-103	79	0	0	144	-82	-143
Manure Group	Cow Spring			Cow Fall			Cow Spring			Cow Fall			Cow Spring		
Application Season: Management (Incorporation, cover crops, etc.)	Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.35			0.30			0.35			0.30			0.35		
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	21752 gal/A			12846 gal/A			21752 gal/A			12846 gal/A			21752 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	6250 gal/A			13654 gal/A			6250 gal/A			13654 gal/A			6250 gal/A		
	Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**7850 gal/A**			**7850 gal/A**			**7850 gal/A**			**7850 gal/A**			**7850 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	52	75	132	48	82	143	52	75	132	48	82	143	52	75	132
Nutrient Balance after Manure	92	-157	15	31	-82	-123	92	-157	-235	31	-82	-143	92	-157	-275
Supplemental Fertilizer (lb/A)	92	0	15	31	0	0	92	0	0	31	0	0	92	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-157**	**0**	**0**	**-82**	**-123**	**0**	**-157**	**-235**	**0**	**-82**	**-143**	**0**	**-157**	**-275**
Multiple Application															
Manure Utilized on CMU	41,605 gallons			31,400 gallons			31,400 gallons			46,315 gallons			46,315 gallons		

App. 4: Crop Yrs. 2020	A18			A18			B1			B1			B5		
CMU/Field ID															
Acres	3.6			3.6			4.8			4.8			5.6		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	130	197	6.2	130	197	6.2	127	173	5.9	127	173	5.9	119	96	6.1
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage		
Planned Yield	6 ton/A			25 ton/A			6 ton/A			25 ton/A			6 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	90	0	0	200	0	0	90	0	30	200	0	40	90	0	160
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	[32]	Winter Double Crop		32	Summer Double Crop		[32]	Winter Double Crop		32	Summer Double Crop		[44]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		7	Frequently - Winter Double Crop		13	Frequently - Summer Double Crop		11	Continuously - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		35	Soybeans, 35 bu/A		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	79	0	0	144	-82	-143	83	0	30	120	-82	-73	79	0	160
Manure Group	Cow Fall			Heifer Spring			Cow Fall			Cow Spring			Heifer Fall		
Application Season: Management (Incorporation, cover crops, etc.)	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.30			0.35			0.30			0.35			0.30		
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	12846 gal/A			36.1 tons/A			13496 gal/A			18127 gal/A			21.8 tons/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	13654 gal/A			9.8 tons/A			13654 gal/A			6250 gal/A			21.2 tons/A		
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 142.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**7850 gal/A**			**18 tons/A**			**7850 gal/A**			**7850 gal/A**			**18 tons/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	48	82	143	72	110	131	48	82	143	52	75	132	65	121	137
Nutrient Balance after Manure	31	-82	-143	72	-192	-274	35	-82	-113	68	-157	-205	14	-121	23
Supplemental Fertilizer (lb/A)	31	0	0	72	0	0	35	0	0	68	0	0	14	0	23
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-82**	**-143**	**0**	**-192**	**-274**	**0**	**-82**	**-113**	**0**	**-157**	**-205**	**0**	**-121**	**0**
Multiple Application															
Manure Utilized on CMU	28,260 gallons			65 tons			37,680 gallons			37,680 gallons			101 tons		

App. 4: Crop Yrs. 2020	B5			B12			B12			C1			C2		
CMU/Field ID															
Acres	5.6			2.3			2.3			10.7			13.4		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	119	96	6.1	127	88	5.8	127	88	5.8	107	84	6.0	102	105	6.1
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Corn for Silage			Small Grain Silage			Corn for Silage			Corn for Silage			Small Grain Silage		
Planned Yield	25 ton/A			6 ton/A			25 ton/A			25 ton/A			6 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	200	0	220	90	0	170	200	0	230	200	0	230	90	0	140
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	44	Summer Double Crop		[24]	Winter Double Crop		24	Summer Double Crop		0			[0]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	24	Continuously - Summer Double Crop		7	Frequently - Winter Double Crop		13	Frequently - Summer Double Crop		0	Rarely - Summer Crop		0	Rarely - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		35	Soybeans, 35 bu/A		80	1st yr. after alfalfa 25-49% stand, High productivity soils		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	132	-121	220	83	0	170	128	-67	230	120	0	230	90	0	140
Manure Group	Heifer Spring			Heifer Fall			Heifer Spring			Cow Fall					
Application Season: Management (Incorporation, cover crops, etc.)	Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days			Spring: Spring or summer utilization-Incorporation within 2–4 days			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days					
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.35			0.30			0.35			0.30					
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	33.1 tons/A			22.9 tons/A			32.1 tons/A			19512 gal/A					
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	3.4 tons/A			21.2 tons/A			12.3 tons/A			9615 gal/A					
	Crop P Removal (lb/A) 21.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 100.0			Crop P Removal (lb/A) 142.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**18 tons/A**			**10 tons/A**			**18 tons/A**			**7850 gal/A**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	72	110	131	36	67	76	72	110	131	48	82	143	0	0	0
Nutrient Balance after Manure	60	-231	89	47	-67	94	56	-177	99	72	-82	87	90	0	140
Supplemental Fertilizer (lb/A)	60	0	89	47	0	94	56	0	99	72	0	87	90	0	140
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-231**	**0**	**0**	**-67**	**0**	**0**	**-177**	**0**	**0**	**-82**	**0**	**0**	**0**	**0**
Multiple Application															
Manure Utilized on CMU	101 tons			23 tons			41 tons			83,995 gallons			0		

App. 4: Crop Yrs. 2020	C2			C3			C3			A8			A8		
CMU/Field ID															
Acres	13.4			13.7			13.7			3.2			3.2		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	102	105	6.1	95	83	6.6	95	83	6.6	182	146	6.9	182	146	6.9
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Corn for Silage			Small Grain Silage			Corn for Silage			Small Grain Silage			Corn for Silage		
Planned Yield	25 ton/A			6 ton/A			25 ton/A			6 ton/A			25 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	200	0	190	90	0	170	200	0	230	90	0	80	200	0	110
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	0	Summer Double Crop		[0]	Winter Double Crop		0	Summer Double Crop		[24]	Winter Double Crop		24	Summer Double Crop	
Manure History Description Residual Manure N (lb/A)	0	Rarely - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	200	0	190	79	0	170	176	0	230	79	0	80	152	-67	110
Manure Group										Heifer Fall					
Application Season: Management (Incorporation, cover crops, etc.)										Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days					
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
										0.30					
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)										21.8 tons/A					
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)										21.2 tons/A					
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 75.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**10 tons/A**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	0	0	0	0	0	0	0	0	0	36	67	76	0	0	0
Nutrient Balance after Manure	200	0	190	79	0	170	176	0	230	43	-67	4	152	-67	110
Supplemental Fertilizer (lb/A)	200	0	190	79	0	170	176	0	230	43	0	4	152	0	110
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-67**	**0**	**0**	**-67**	**0**
Multiple Application															
Manure Utilized on CMU	0			0			0			32 tons			0		

App. 4: Crop Yrs. 2020	A9			A9			A1			A3			A10		
CMU/Field ID															
Acres	4.8			4.8			6.6			2.4			5.2		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	178	138	6.8	178	138	6.8	94	88	6.7	95	68	6.5	101	59	6.0
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Small Grain Silage			Corn for Silage			Planting Alfalfa			Established Alfalfa			Established Alfalfa		
Planned Yield	6 ton/A			25 ton/A			4 ton/A			5 ton/A			5 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	90	0	90	200	0	130	0	0	210	0	0	270	0	0	270
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	[24]	Winter Double Crop		24	Summer Double Crop		0			0			0		
Manure History Description Residual Manure N (lb/A)	11	Continuously - Winter Double Crop		24	Continuously - Summer Double Crop		35	Continuously - Summer Crop		35	Continuously - Summer Crop		20	Frequently - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	79	0	90	152	-67	130	0	0	210	0	0	270	0	0	270
Manure Group	Heifer Fall														
Application Season: Management (Incorporation, cover crops, etc.)	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated 3–7 days														
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.30														
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	21.8 tons/A														
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	21.2 tons/A														
	Crop P Removal (lb/A) 142.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 75.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**10 tons/A**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	36	67	76	0	0	0	0	0	0	0	0	0	0	0	0
Nutrient Balance after Manure	43	-67	14	152	-67	130	0	0	210	0	0	270	0	0	270
Supplemental Fertilizer (lb/A)	43	0	14	152	0	130	0	0	210	0	0	270	0	0	270
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**-67**	**0**	**0**	**-67**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multiple Application															
Manure Utilized on CMU	48 tons			0			0			0			0		

App. 4: Crop Yrs. 2020	A12			A15			B2			B4			B7		
CMU/Field ID															
Acres	3.9			5.8			5.4			5.5			5.5		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	121	117	5.8	168	189	6.8	57	54	5.8	172	221	6.2	113	147	6.8
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Established Alfalfa			Established Alfalfa			Planting Alfalfa			Established Alfalfa			Established Alfalfa		
Planned Yield	5 ton/A			5 ton/A			4 ton/A			5 ton/A			5 ton/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	0	0	200	0	0	30	0	0	220	0	0	0	0	0	130
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	0			0			0			0			0		
Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop		20	Frequently - Summer Crop		35	Continuously - Summer Crop		20	Frequently - Summer Crop		35	Continuously - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	0	0	200	0	0	30	0	0	220	0	0	0	0	0	130
Manure Group															
Application Season: Management (Incorporation, cover crops, etc.)															
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)															
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)															
	Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 60.0			Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 75.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nutrient Balance after Manure	0	0	200	0	0	30	0	0	220	0	0	0	0	0	130
Supplemental Fertilizer (lb/A)	0	0	200	0	0	30	0	0	220	0	0	0	0	0	130
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multiple Application															
Manure Utilized on CMU	0			0			0			0			0		

App. 4: Crop Yrs. 2020	B11			A14			A22			B6			B10		
CMU/Field ID															
Acres	6.6			10.8			12.8			5.4			4.0		
Soil Test Report Date	September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018			September 17, 2018		
Laboratory Name	AASL			AASL			AASL			AASL			AASL		
Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH	ppm P	ppm K	pH
(Show conversions to ppm in Appendix 10)	59	56	6.1	76	71	5.5	55	187	5.9	83	49	6.7	107	188	6.2
P Index Part A Evaluation	No to All Part A			No to All Part A			No to All Part A			No to All Part A			No to All Part A		
Part A Result	N Based			N Based			N Based			N Based			N Based		
Crop	Established Alfalfa			Soybeans			Soybeans			Soybeans			Soybeans		
Planned Yield	5 ton/A			35 bu/A			35 bu/A			35 bu/A			35 bu/A		
PSU Soil Test Recommendation (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	0	0	270	0	0	80	0	0	0	0	0	120	0	0	0
User Soil Test Recommendation (lb/A)															
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop CarryOver N (lb/A)	0			0			0			0			0		
Manure History Description Residual Manure N (lb/A)	20	Frequently - Summer Crop		20	Frequently - Summer Crop		20	Frequently - Summer Crop		20	Frequently - Summer Crop		20	Frequently - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume		0	No Previous Year Legume	
Net Nutrients Required (lb/A)	0	0	270	0	0	80	0	0	0	0	0	120	0	0	0
Manure Group															
Application Season: Management (Incorporation, cover crops, etc.)															
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)															
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)															
	Crop P Removal (lb/A) 75.0			Crop P Removal (lb/A) 35.0			Crop P Removal (lb/A) 35.0			Crop P Removal (lb/A) 35.0			Crop P Removal (lb/A) 35.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**			**No Manure Applied**		
Nutrients Applied at Planned Manure Rate (lb/A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nutrient Balance after Manure	0	0	270	0	0	80	0	0	0	0	0	120	0	0	0
Supplemental Fertilizer (lb/A)	0	0	270	0	0	80	0	0	0	0	0	120	0	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Multiple Application															
Manure Utilized on CMU	0			0			0			0			0		

Appendix 5 - P Index

[redacted]

Go to NMP Index

Crop Yrs. 2020

Pennsylvania P Index Version 2

Go to App 4 Input

PART A: SCREENING TOOL CMU/Field ID		PART A: SCREENING TOOL	CMU/Field ID	A6
Is the CMU in a Special Protection watershed?		Is the CMU in a Special Protection watershed?	If the answer is Yes to any of these questions, Part B must be used.	No
A significant farm management change as defined by Act 38?		Is there a significant farm management change as defined by Act 38?		No
Soil Test Mehlich 3 P greater than 200 ppm P?		Is the Soil Test Mehlich 3 P greater than 200 ppm P? (enter soil test value in ppm P)		44
Contributing Distance from CMU to receiving water <150 ft.?		Is the Contributing Distance from this CMU to receiving water less than 150 ft.?		Yes
Is winter manure application planned for this field ?		Is winter manure application planned for this field ?		No
Run P Index Part B voluntarily? (No to all Part A questions.)		Run P Index Part B voluntarily? (Answers are No to all Part A questions.)		No

PART B: SOURCE FACTORS: Mehlich 3 Soil Test P (ppm P)	Mehlich 3 Soil Test P (ppm P)					44
Soil Test Rating = 0.20* Mehlich 3 Soil Test P (ppm P)						9
FERTILIZER P APPLIED REGARDLESS OF MANURE (Starter or other)					Fertilizer P (lb P2O5/acre)	0
P INDEX APPLICATION METHOD OF FERTILIZER P APPLIED REGARGLESS OF MANURE[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	-
SUPPLEMENTAL P FERTILIZER					Fertilizer P (lb P2O5/acre)	0
P INDEX APPLICATION METHOD OF SUPPLEMENTAL P FERTILIZER[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	-
Fertilizer Rating = Fertilizer Rate x Fertilizer Application Method						0
MANURE P RATE					Manure P (lb P2O5/acre)	24
MANURE APPLICATION METHOD[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	0.6
P SOURCE COEFFICIENT[3]	Refer to: Test results for P Source Coefficient OR Book values from P Index Fact Sheet Table 1					0.8
Manure Rating = Manure Rate x Manure Application Method x P Source Coefficient						12
Source Factor Sum						21
PART B: TRANSPORT FACTORS EROSION	Soil Loss (ton/acre/yr)					1
RUNOFF POTENTIAL	0 *Drainage Class is* Excessively	2 *Drainage Class is* Somewhat Excessively	4 *Drainage Class is* Well/Moderately Well	6 *Drainage Class is* Somewhat Poorly	8 *Drainage Class is* Poorly/Very Poorly	4
SUBSURFACE DRAINAGE	0 None		1 Random		2 [1] Patterned	0
CONTRIBUTING DISTANCE	0 > 500 ft.	2 350 to 500 ft.	4 200 to 349 ft.	6 100 to 199 ft. OR < 100 ft. with 35 ft. buffer	9 [2] < 100 ft.	6
Transport Sum = Erosion + Runoff Potential + Subsurface Drainage + Contributing Distance						11
MODIFIED CONNECTIVITY	0.85 50 ft. Riparian Buffer APPLIES TO DIST < 100 FT		1.0 Grassed Waterway or None	1.1 Direct Connection APPLIES TO DIST > 100 FT		1.0
Transport Sum x Modified Connectivity / 24						0.46
P Index Value = 2 x Source x Transport						**19**

Low: 59 or less Nitrogen based management	Medium: 60 to 79 Nitrogen based management	High: 80 to 99 Phosphorus limited to crop removal	Very High: 100 or greater No Phosphorus applied

1 OR rapidly permeable soil near a stream
2 "9" factor does not apply to fields receiving manure with a 35 ft. buffer.
3 Error Note: if there is a manure or fertilizer rate and there is no corresponding method factor or PSC, it will display an "E".

Appendix 5 - P Index

Crop Yrs. 2020

PART A: SCREENING TOOL CMU/Field ID	A20	A5	A7	A16	A19	B8	A21
Is the CMU in a Special Protection watershed?	No	No	No	No	No	No	No
A significant farm management change as defined by Act 38?	No	No	No	No	No	No	No
Soil Test Mehlich 3 P greater than 200 ppm P?	78	204	196	218	189	225	117
Contributing Distance from CMU to receiving water <150 ft.?	Yes	No	Yes	No	Yes	Yes	Yes
Is winter manure application planned for this field ?	No	No	No	No	No	No	No
Run P Index Part B voluntarily? (No to all Part A questions.)	No	No	No	No	No	No	No
PART B: SOURCE FACTORS: Mehlich 3 Soil Test P (ppm P)	78	204	196	218	189	225	117
Soil Test Rating = 0.20* Mehlich 3 Soil Test P (ppm P)	16	41	39	44	38	45	23
FERTILIZER P APPLIED REGARDLESS OF MANURE (Starter or other)	0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
P INDEX APPLICATION METHOD OF FERTILIZER P APPLIED REGARGLESS OF MANURE[3]	-	-, -	-, -	-, -	-, -	-, -	-, -
SUPPLEMENTAL P FERTILIZER	0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
P INDEX APPLICATION METHOD OF SUPPLEMENTAL P FERTILIZER[3]	-	-, -	-, -	-, -	-, -	-, -	-, -
Fertilizer Rating = Fertilizer Rate x Fertilizer Application Me	0	0	0	0	0	0	0
MANURE P RATE	46	0, 61	0, 61	0, 61	0, 61	0, 0	67, 0
MANURE APPLICATION METHOD[3]	0.6	-, 0.4	-, 0.4	-, 0.4	-, 0.4	-, -	0.4, -
P SOURCE COEFFICIENT[3]	0.8	-, 0.8	-, 0.8	-, 0.8	-, 0.8	-, -	0.8, -
Manure Rating = Manure Rate x Manure Application Metho	22	20	20	20	20	0	21
Source Factor Sum	38	61	59	64	58	45	44
PART B: TRANSPORT FACTORS EROSION	1	3	3	3	3	2	3
RUNOFF POTENTIAL	4	4	4	6	4	4	4
SUBSURFACE DRAINAGE	0	0	0	0	0	0	0
CONTRIBUTING DISTANCE	6	2	6	0	6	6	6
Transport Sum = Erosion + Runoff Potential + Subsurface	11	9	13	9	13	12	13
MODIFIED CONNECTIVITY	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Transport Sum x Modified Connectivity / 24	0.46	0.38	0.54	0.38	0.54	0.50	0.54
P Index Value = 2 x Source x Transport	**34**	**46**	**64**	**48**	**63**	**45**	**48**

Low: 59 or less
Nitrogen based management

1 OR rapidly permeable soil near a stream
2 "9" factor does not apply to fields receiving manure with a 35 ft. buffer.
3 Error Note: if there is a manure or fertilizer rate and there is no correspondi

Appendix 5 - P Index

Crop Yrs. 2020

PART A: SCREENING TOOL CMU/Field ID	B9	B13
Is the CMU in a Special Protection watershed?	**No**	**No**
A significant farm management change as defined by Act 38?	**No**	**No**
Soil Test Mehlich 3 P greater than 200 ppm P?	**114**	**88**
Contributing Distance from CMU to receiving water <150 ft.?	**Yes**	**Yes**
Is winter manure application planned for this field ?	**No**	**No**
Run P Index Part B voluntarily? (No to all Part A questions.)	**No**	**No**
PART B: SOURCE FACTORS: Mehlich 3 Soil Test P (ppm P)	114	88
Soil Test Rating = 0.20* Mehlich 3 Soil Test P (ppm P)	23	18
FERTILIZER P APPLIED REGARDLESS OF MANURE (Starter or other)	0, 0	0, 0
P INDEX APPLICATION METHOD OF FERTILIZER P APPLIED REGARGLESS OF MANURE[3]	-, -	-, -
SUPPLEMENTAL P FERTILIZER	0, 0	0, 0
P INDEX APPLICATION METHOD OF SUPPLEMENTAL P FERTILIZER[3]	-, -	-, -
Fertilizer Rating = Fertilizer Rate x Fertilizer Application Me	0	0
MANURE P RATE	67, 75	67, 75
MANURE APPLICATION METHOD[3]	0.4, 0.4	0.4, 0.4
P SOURCE COEFFICIENT[3]	0.8, 0.8	0.8, 0.8
Manure Rating = Manure Rate x Manure Application Metho	45	45
Source Factor Sum	68	63
PART B: TRANSPORT FACTORS EROSION	2	2
RUNOFF POTENTIAL	4	4
SUBSURFACE DRAINAGE	0	0
CONTRIBUTING DISTANCE	6	6
Transport Sum = Erosion + Runoff Potential + Subsurface	12	12
MODIFIED CONNECTIVITY	1.0	1.0
Transport Sum x Modified Connectivity / 24	0.50	0.50
P Index Value = 2 x Source x Transport	**68**	**63**

Low: 59 or less
Nitrogen based management

1 OR rapidly permeable soil near a stream
2 "9" factor does not apply to fields receiving manure with a 35 ft. buffer.
3 Error Note: if there is a manure or fertilizer rate and there is no correspondi

Appendix 6

Manure Management

Date of Site Evaluation: May 15, 2019

Statement Documenting Areas Evaluated During Site Evaluation

List and clearly identify each of the specific area evaluated.

Evaluated the liquid manure storage, dry cow animal concentration area, heifer animal concentration area, and the feed storage area. All the pastures were evaluated for cogregation areas.

Identification of Inadequate Manure Management Practices and Conditions

List of each specific inadequate manure management practice or condition identified.

Dry Cow ACA – a large bare congregation area has developed between the barn and the pasture. Runoff from this areas discharges directly into the stream. Roof and upslope water controls related to this area are adequate.

Heifer ACA – a large bare congregation area has developed between the barn and the pasture. Runoff from this areas discharges directly into the stream. Roof water control is adequate but upslope water controls related to this area are not adequate.

BMPs to Address Manure Management Problem Areas

List of specific BMPs (including PA Technical Guide standard name and number) and management changes that will be implemented to address each of the inadequate practices listed above.

Dry Cow ACA – a 50’ x 100’ concrete exercise lot will be installed with an improved access lane from the exercise lot to the pasture. Runoff from the exercise lot will be directed to the manure storage.

Heifer ACA – the current congregation area will be eliminated by installing an improved access lane from the barn to the pasture. The bare area will be reseeded and maintained as lawn area around the calf and heifer facility. These practices will eliminate the need for upslope water controls.

Appendix 7

Stormwater Control

Date of Site Evaluation: May 15, 2019

Statement Documenting Areas Evaluated During Site Evaluation

List and clearly identify each of the specific areas evaluated.

All crop fields and pastures were evaluated. There is a current conservation plan for each farm in the operation. Conservation practices have been installed and maintained.

Identification of Critical Runoff Problem Areas

List of each specific critical runoff problem area identified.

None.

BMPs to Address Critical Runoff Problem Areas

List of specific BMPs (including PA Technical Guide standard name and number) and management changes that will be implemented to address each of the critical runoff problem areas listed above.

None.

Appendix 8

Importer/Broker Agreements & NBSs

Nutrient Balance Sheets are not required for importers that have an approved Nutrient Management Plan.

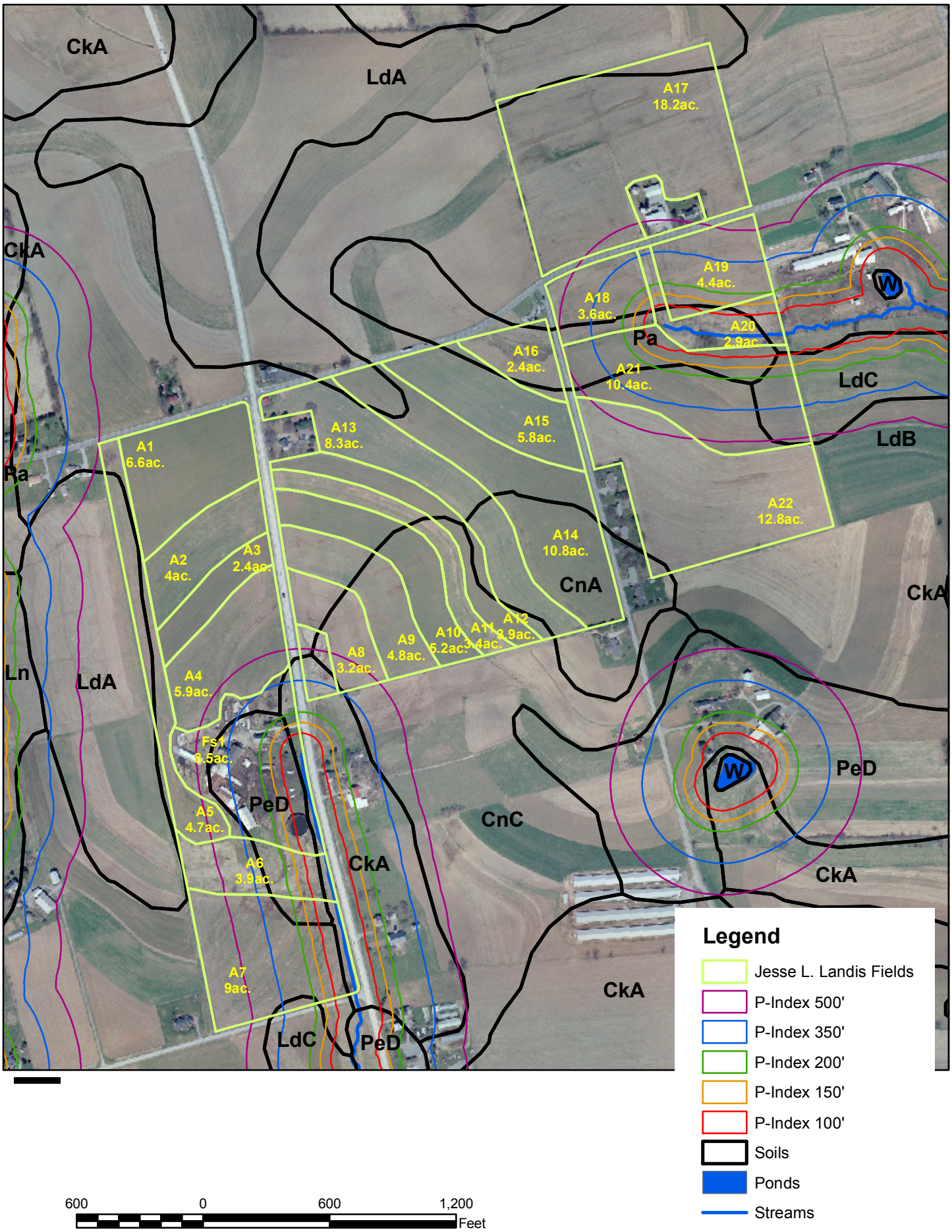
Not applicable.

Appendix 9

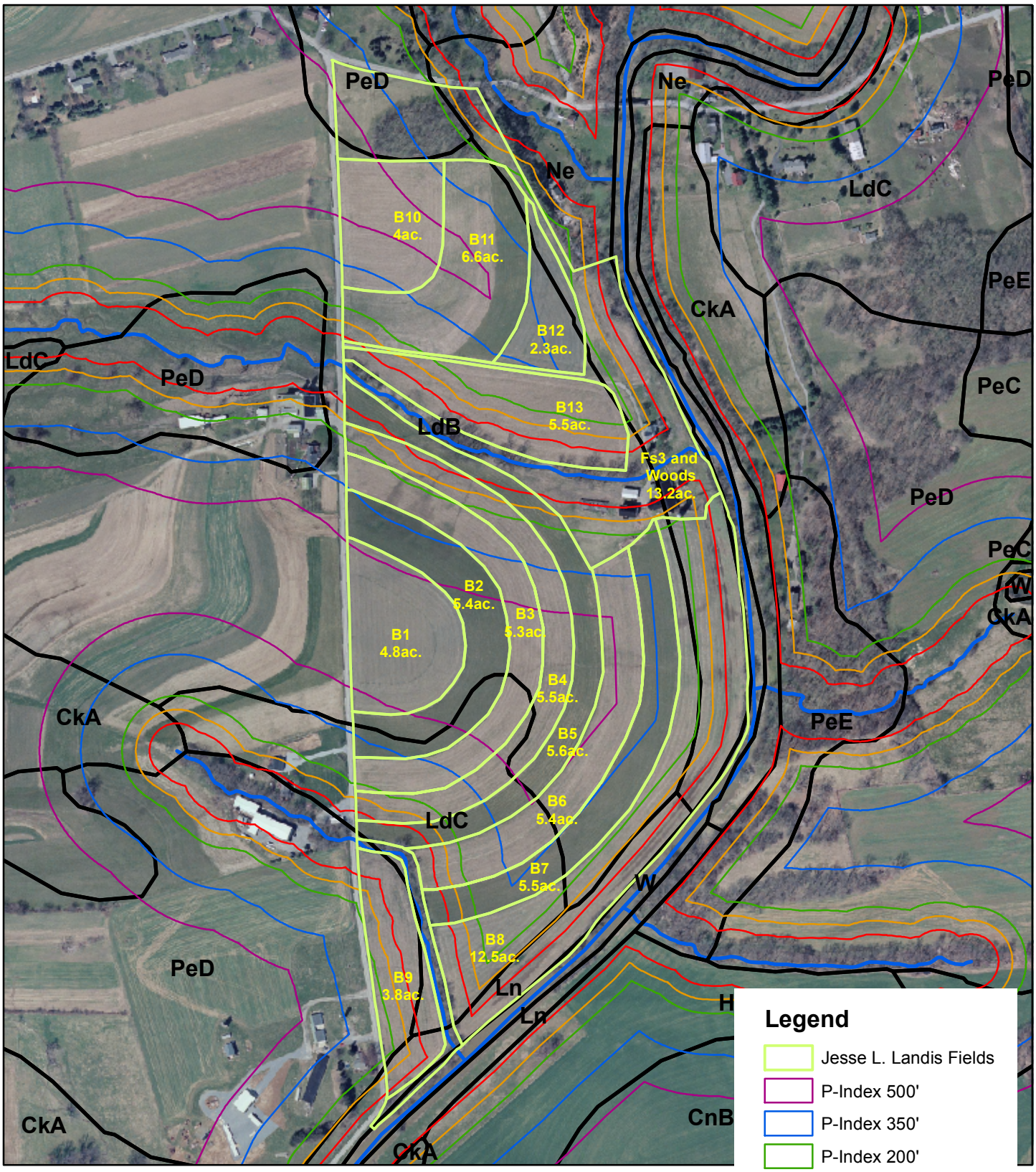
Operation Maps

Three types of maps are required for an Act 38 Nutrient Management Plan: 1) Topographic Map, 2) Soils Map, and 3) Operator Management Map. The **Topographic Map and Soils Map** must be included here. The Topographic map must be drawn to scale and identify the land included in the plan with operation boundaries. The Soils Map must include the field identification and boundaries, soil types and slopes with soil legend. Adding P Index lines can be helpful on the Topographic or Soils map but are not required. The Operator Management Map must be included in the Nutrient Management Plan Summary.

CREEKSIDE DAIRY - FARM 1 SOILS MAP



CREEKSIDE DAIRY - FARM 2 SOILS MAP

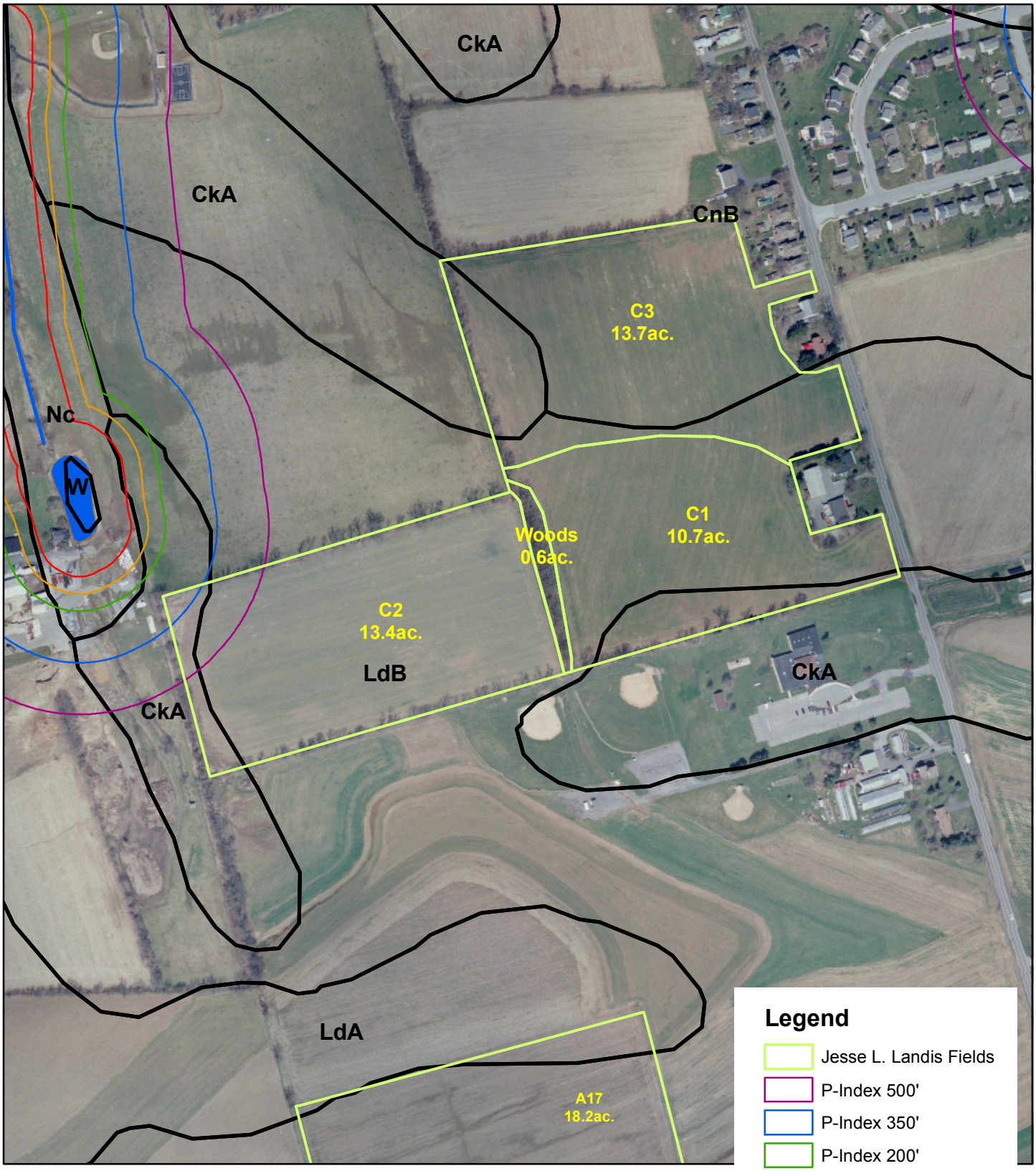


Legend

- Jesse L. Landis Fields
- P-Index 500'
- P-Index 350'
- P-Index 200'
- P-Index 150'
- P-Index 100'
- Soils
- Ponds
- Streams

500 0 500 1,000 Feet

CREEKSIDE DAIRY - FARM 3 SOILS MAP



Legend

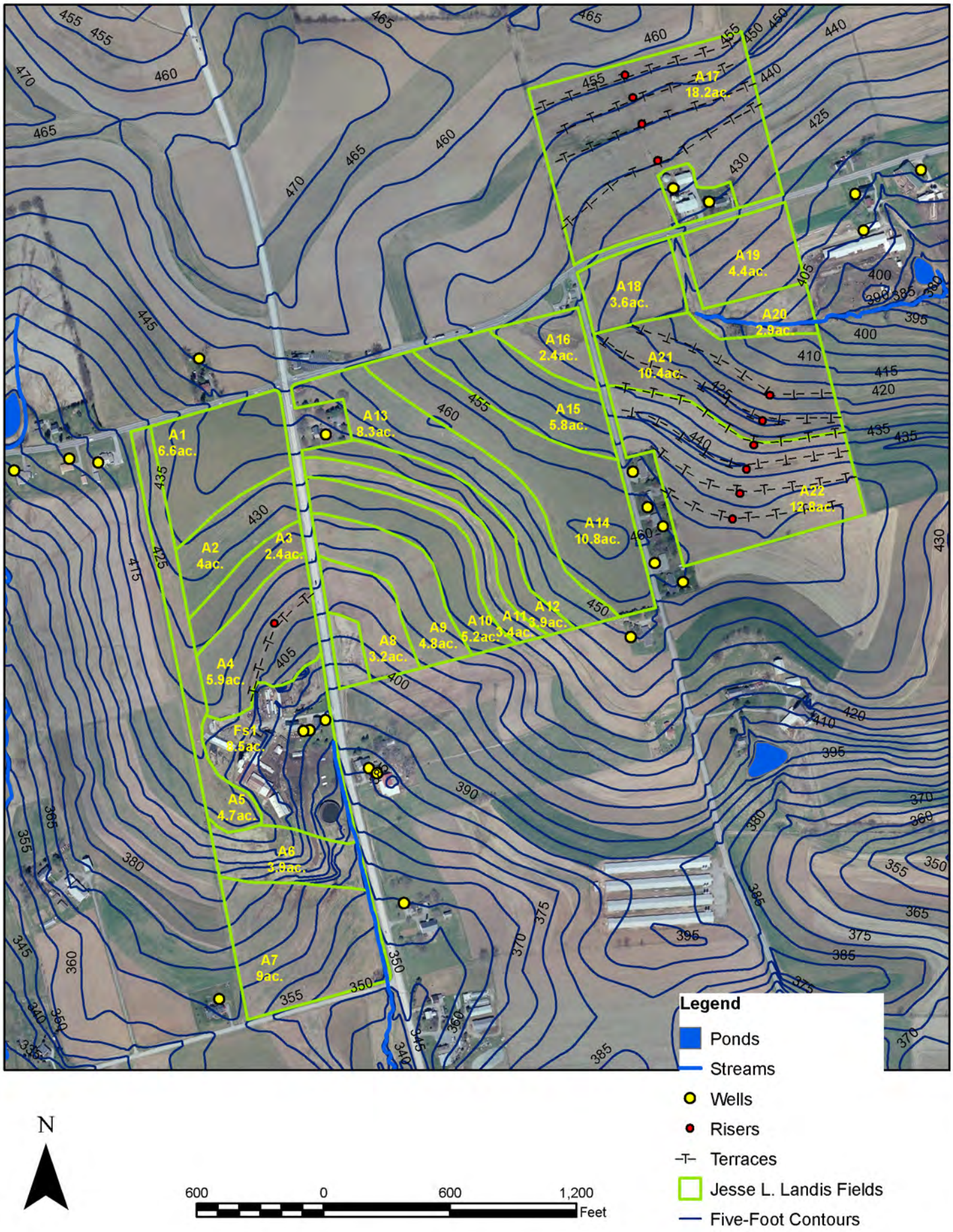
- Jesse L. Landis Fields
- P-Index 500'
- P-Index 350'
- P-Index 200'
- P-Index 150'
- P-Index 100'
- Soils
- Ponds
- Streams

400 0 400 800 Feet

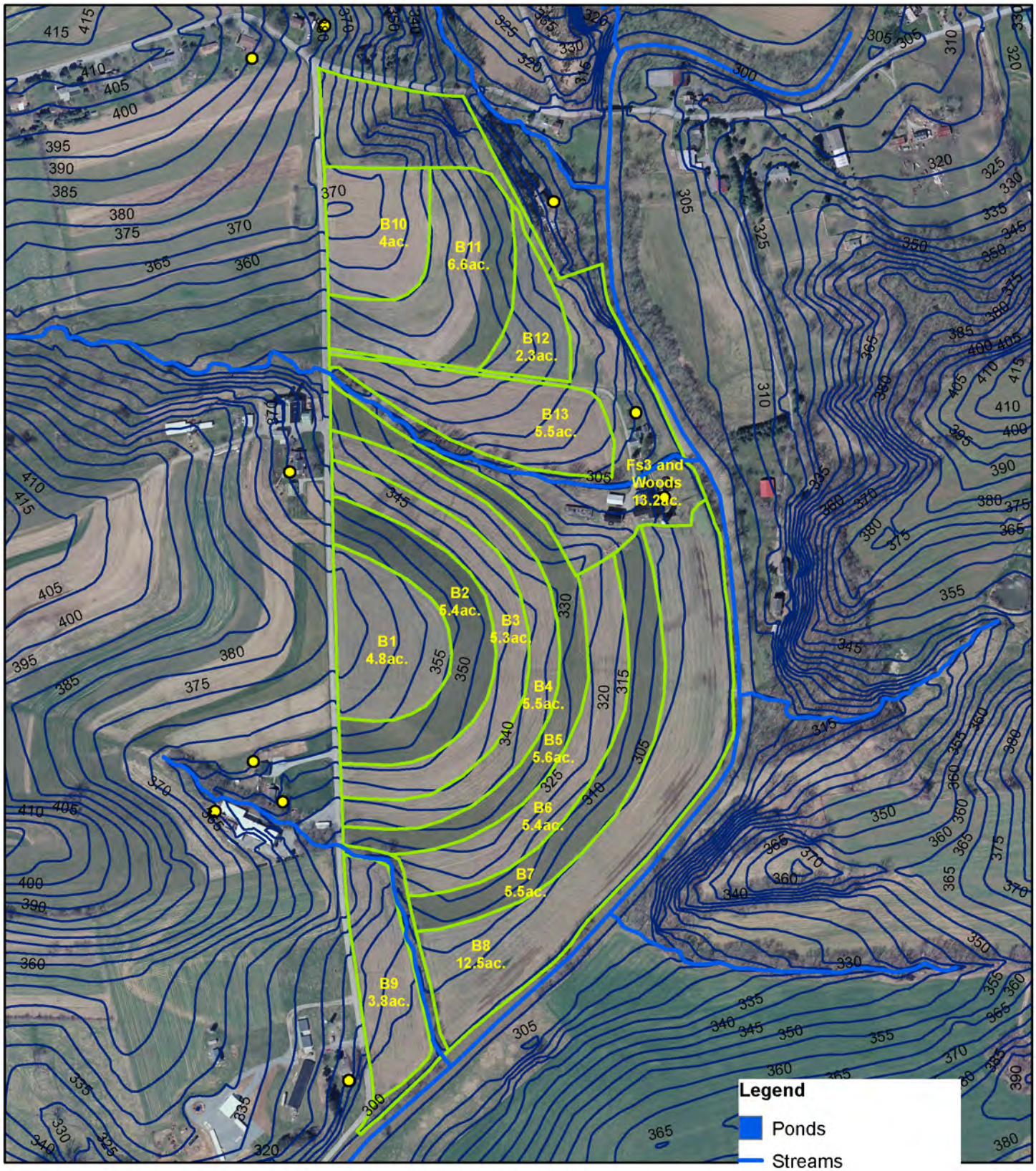
Soils Maps Farm 1, Farm 2 and Farm 3: Map Unit Legend

Map Unit	Soil Type	Slope
CkA	Clarksburg	0 to 5%
CnA	Conestoga	0 to 3%
CnB	Conestoga	3 to 8%
CnC	Conestoga	8 to 15%
LdA	Letort	0 to 3%
LdB	Letort	3 to 8%
LdC	Letort	8 to 15%
Ln	Linside	N/A
Ne	Nolin	N/A
Pa	Penlaw	N/A
PeD	Pequea	15 to 25%

CREEKSIDE DAIRY - FARM 1 TOPOGRAPHIC MAP



CREEKSIDE DAIRY - FARM 2 TOPOGRAPHIC MAP



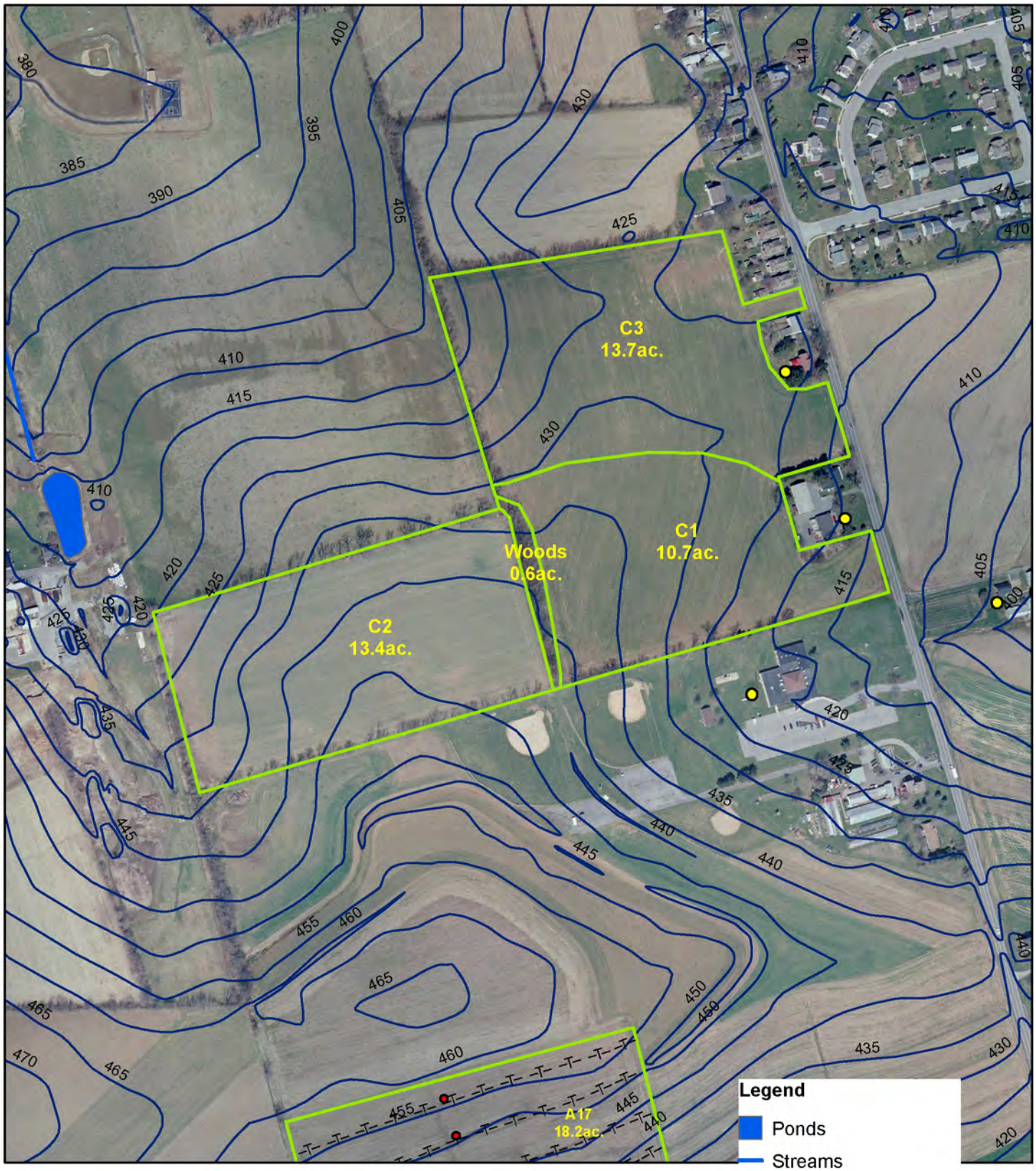
Legend

- Ponds
- Streams
- Wells
- Risers
- Terraces
- Jesse L. Landis Fields
- Five-Foot Contours

N

500 0 500 1,000 Feet

CREEKSIDE DAIRY - FARM 3 TOPOGRAPHIC MAP



Supporting Information & Documentation

Includes if applicable the Rainfall Additions Worksheet, Winter Application Matrix, Residual N Calculation Worksheet and other supplemental worksheets included in the NMP Spreadsheet. Attach information and documentation necessary to support plan content not included elsewhere in the NMP Spreadsheet or appendices. Examples include, but are not limited to, documentation of animal weights if Agronomy Facts 54 is not used, bedding calculations, or calculations for irrigation rates.

Liquid Bedding Calculations

• 8 yds3 x 26 weeks per manure group x 27 ft3/yds3 x 7.48 gal/ft3 ÷ 2 =
21,004 gallons per manure group

Milkhouse Wastewater Calculations

• 225 gallons/day x 180 days per manure group = 40,500 gallons per manure group

Liquid Storage Capacity

• 80’ x 18’ (1’ freeboard)
• 17’ x (3.14 x 40 x 40) x 7.48 gal/ft3 = 638,852 gallons

Heifer Bedded Pack Storage Capacity

• 75’ x 42’ x 6’
• 75’ x 42’ x 6’ = 18,900 ft3
• 18,900 ft3 x 55 lb/ft3 ÷ 2000 lb/ton = 520 tons

Manure Analysis 5 Year Running Average

Manure Average for Crop Years. 2020	Cow Spring					
	Average	1 year ago	2 years ago	3 years ago	4 years ago	5 years ago
Manure Report Date	**Mar 26 2019**	Mar 26 2019				
Laboratory Name	**AASL**	AASL				
Manure Type	**Dairy**	Dairy				
Manure Unit (lbs/ton or 1000 gal)	**lb/1000 gal**	lb/1000 gal				
Total Nitrogen (N) (lbs/ton or 1000 gal)	**18.90**	18.90				
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	**7.40**	7.40				
Total Organic N (lbs/ton or 1000 gal)	**11.50**	11.50				
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	**9.60**	9.60				
Total Potash (K_2O) (lbs/ton or 1000 gal)	**16.80**	16.80				
Percent Solids	**5.70**	5.70				
PSC Value (Enter analytical or book value)	**0.80**	0.80				

Manure Average for Crop Years. 2020	Cow Fall					
	Average	1 year ago	2 years ago	3 years ago	4 years ago	5 years ago
Manure Report Date	**Oct 03 2018**	Oct 03 2018				
Laboratory Name	**AASL**	AASL				
Manure Type	**Dairy**	Dairy				
Manure Unit (lbs/ton or 1000 gal)	**lb/1000 gal**	lb/1000 gal				
Total Nitrogen (N) (lbs/ton or 1000 gal)	**20.50**	20.50				
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	**8.30**	8.30				
Total Organic N (lbs/ton or 1000 gal)	**12.20**	**12.20**				
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	**10.40**	10.40				
Total Potash (K_2O) (lbs/ton or 1000 gal)	**18.20**	18.20				
Percent Solids	**5.50**	5.50				
PSC Value (Enter analytical or book value)	**0.80**	0.80				

Manure Average for Crop Years. 2020	Heifer Spring					
	Average	1 year ago	2 years ago	3 years ago	4 years ago	5 years ago
Manure Report Date	**Mar 19 2019**	Mar 19 2019				
Laboratory Name	**AASL**	AASL				
Manure Type	**Dairy**	Dairy				
Manure Unit (lbs/ton or 1000 gal)	**lb/ton**	lb/ton				
Total Nitrogen (N) (lbs/ton or 1000 gal)	**11.40**	11.40				
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	**2.50**	2.50				
Total Organic N (lbs/ton or 1000 gal)	**8.90**	**8.90**				
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	**6.10**	6.10				
Total Potash (K_2O) (lbs/ton or 1000 gal)	**7.30**	7.30				
Percent Solids	**34.70**	34.70				
PSC Value (Enter analytical or book value)	**0.80**	0.80				

Manure Analysis 5 Year Running Average

Manure Average for Crop Years. 2020	Heifer Fall					
	Average	1 year ago	2 years ago	3 years ago	4 years ago	5 years ago
Manure Report Date	**Oct 10 2018**	Oct 10 2018				
Laboratory Name	**AASL**	AASL				
Manure Type	**Dairy**	Dairy				
Manure Unit (lbs/ton or 1000 gal)	**lb/ton**	lb/ton				
Total Nitrogen (N) (lbs/ton or 1000 gal)	**12.10**	12.10				
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	**2.80**	2.80				
Total Organic N (lbs/ton or 1000 gal)	**9.30**	**9.30**				
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	**6.70**	6.70				
Total Potash (K_2O) (lbs/ton or 1000 gal)	**7.60**	7.60				
Percent Solids	**34.70**	34.70				
PSC Value (Enter analytical or book value)	**0.80**	0.80				

Rainfall Worksheet

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Crop Years 2020

County	Lancaster		
Evaporation or no Evaporation	No Evaporation - Directly on Storage		
Paved or Unpaved	Paved - Directed to Storage		
Manure Group	Cow Spring	86,068	gallons of rain water added to this manure group
Beginning Month (1-12)	10		
Ending Month (1-12)	3	Gallons of water for this manure group	
Storage Surface Area (Sq. ft.)	5024	55,712	gallons directly on storage
Runoff Surface Area (Sq. ft.)	5000	30,356	gallons directed to storage

County	Lancaster		
Evaporation or no Evaporation	No Evaporation - Directly on Storage		
Paved or Unpaved	Paved - Directed to Storage		
Manure Group	Cow Fall	111,665	gallons of rain water added to this manure group
Beginning Month (1-12)	4		
Ending Month (1-12)	9	Gallons of water for this manure group	
Storage Surface Area (Sq. ft.)	5024	70,587	gallons directly on storage
Runoff Surface Area (Sq. ft.)	5000	41,078	gallons directed to storage

Supplement 3
Sample Nutrient Balance Sheet (Excel)

Act 38 provides two formats to develop Act 38 nutrient balance sheets for exported manure: Microsoft Excel and Microsoft Word.

Supplement 4 provides a sample of a completed Nutrient Balance Sheet using Microsoft Excel. This sample Nutrient Balance Sheet was developed using Nutrient Balance Sheet Standard Format: Version 5.0 – October 2019.

Nutrient Balance Sheet

Prepared for

Importing Operator Name	Gary L. Brown
Importing Operator Address	934 Pine Hill Road, Lititz, PA 17543
Importing Operator Phone Number	717-626-6032
County of Application	Lancaster

Prepared by

NM Specialist or Broker 2 Name	Jesse A. Landis
NM Specialist Broker 2 Certification No.	462-NMC
NM Specialist or Broker 2 Address	273 Centerville Road, Lancaster, PA 17604
NM Specialist Broker 2 Phone Number	717-299-5691

Nutrient Management Specialist or Broker 2 Signature

Date of Development July 20, 2019

This nutrient balance sheet has been developed for manure exported for agricultural land application under the following Act 38 export option:

- [x] Exported to a known operation (included in Exporter NMP)
- [ ] Exported through a broker (include Broker information below if not prepared by a broker)

Broker Information

Broker Name	
Broker Certification Number	
Broker Address	
Broker Phone Number(s)	

Exporter Information

Exporting Operator Name	Dennis Siegrist
Exporting Operator Address	23 Orchard Road, Lititz, PA 17543
County of Origin	Lancaster, PA

Nutrient Balance Sheet Summary

Importing Farm:

Whole Farm Note:

Fall manure applications require at least 25% cover unless the crop management unit is planted to a cover crop in time to allow for appropriate growth to control runoff until the next growing season, or the manure is injected or mechanically incorporated within 5 days using minimal soil disturbance techniques consistent with no-till farming practices.

									Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A)[2]		
Crop Group	Fields	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate[1]		N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Pasture	1	9	Established Pasture (without legume)	Sheep Uncollected	Grazing	Grazing anytime with nutrient uptake during growing season	Grazing	See Notes	0	0	0						
Pasture	1	9	Established Pasture (without legume)	Siegrist Fall	Late Fall	Late Fall: Early Spring Utilization. Small grains and established grass or legume hay	6250	Gal/A	0	0	0	17	0	0	0	-160	-117
Grass Hay	9	16	Established Mixed Grasses	Siegrist Spring	Spring	Spring: Spring or summer utilization-Incorporation after 7 days or none	6250	Gal/A	0	0	0						
Grass Hay	9	16	Established Mixed Grasses	Siegrist Spring	Summer	Summer: Summer utilization-Incorporation after 7 days or none	6250	Gal/A	0	0	0	48	0	0	0	-254	-218
Barley-Soybeans	2-8	90	Winter Barley	Siegrist Fall	Early Fall	Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated after 7 days or none	6250	Gal/A	0	0	0	10	0	0	0	-138	-101
Barley-Soybeans	2-8	90	Soybeans with Manure	Siegrist Spring	Summer	Summer: Summer utilization-Incorporation after 7 days or none	6250	Gal/A	0	0	0	0	0	0	0	-265	-210
Corn After Corn	2-8	90	Corn for Grain	Siegrist Spring	Spring	Spring: Spring or summer utilization-Incorporation after 7 days or none	6250	Gal/A	15	30	30	59	0	0	0	-157	-139
Corn After Soybeans	2-8	90	Corn for Grain	Siegrist Spring	Spring	Spring: Spring or summer utilization-Incorporation after 7 days or none	6250	Gal/A	15	30	30	9	0	0	0	-157	-139
Corn After Alfalfa	11	12	Corn for Grain	Siegrist Spring	Spring	Spring: Spring or summer utilization-Incorporation after 7 days or none	3370	Gal/A	0	0	0	93			0	2	-6.5
Corn AfterAlfalfa P Index	10	12	Corn for Grain	Siegrist Spring	Spring	Spring: Spring or summer utilization-Incorporation after 7 days or none	6250	Gal/A	0	0	0	89	0	0	0	-127	-109

[1] See Nutrient Management Plan Summary Notes

[2] Positive numbers = nutrient deficit; Negative numbers = nutrient excess

NBS Summary Notes

Importing Farm:

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Crop Group	Fields	Crop	Manure Group	Nutrient Balance Notes	Notes
Pasture	1	Established Pasture (without legume)	Sheep Uncollected	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	25 ewes and 2 rams are on pasture from March through November for 18 hours per day.
Pasture	1	Established Pasture (without legume)	Siegrist Fall	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	
Grass Hay	9	Established Mixed Grasses	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	This application is applied in the spring at green-up. Field 9 has a 100' manure application setback from a well and a 150' manure application setback from the stream.
Grass Hay	9	Established Mixed Grasses	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	This application is applied after first cutting. Field 9 has a 100' manure application setback from a well and a 150' manure application setback from the stream.
Barley-Soybeans	2-8	Winter Barley	Siegrist Fall	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	Fields 4-8 have a 150' manure application setback from the stream.
Barley-Soybeans	2-8	Soybeans with Manure	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	Fields 4-8 have a 150' manure application setback from the stream.
Corn After Corn	2-8	Corn for Grain	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	Fields 4-8 have a 150' manure application setback from the stream.
Corn After Soybeans	2-8	Corn for Grain	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	Fields 4-8 have a 150' manure application setback from the stream.
Corn After Alfalfa	11	Corn for Grain	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Crop Removal and SHOULD NOT be used to determine additional fertilizer needs	Field 11 has a 100' manure application setback from a sinkhole.
Corn AfterAlfalfa P Index	10	Corn for Grain	Siegrist Spring	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs	

Manure Group Information

Appendix 3 Manure Group Information	Sheep Uncollected	Siegrist Spring	Siegrist Fall
Manure Report Date (note if averaging several reports)	Book Values	June 14, 2019	October 23, 2018
Laboratory Name	PSU Agronomy Guide	AASL	AASL
Manure Type	Other	Swine	Swine
Manure Unit (lbs/ton or 1000 gal)	lb/ton	lb/1000 gal	lb/1000 gal
Total Nitrogen (N) (lbs/ton or 1000 gal)	23.00	32.70	30.40
Ammonium N (NH_4-N) (lbs/ton or 1000 gal)	0.00	19.60	18.30
Total Organic N (lbs/ton or 1000 gal)	23.00	13.10	12.10
Total Phosphate (P_2O_5) (lbs/ton or 1000 gal)	8.00	20.30	22.10
Total Potash (K_2O) (lbs/ton or 1000 gal)	20.00	17.40	16.10
Percent Solids	20.00	4.20	4.10
PSC Value (analytical or book value)	0.80	1.00	1.00

Option 1 P Removal Option 2 Nitrogen Based Nutrient Balance Sheets															
Crop Group Identification	Pasture			Pasture			Grass Hay			Grass Hay			Barley-Soybeans		
Fields	1			1			9			9			2-8		
Acres	9			9			16			16			90		
NBS Option	Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement		
P Banking															
Mehlich 3 Soil Test P	ppm P			ppm P			ppm P			ppm P			ppm P		
For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	81			81			93			93			154		
P Index Part A Evaluation															
Part A Result															
Crop	Established Pasture (without legume)			Established Pasture (without legume)			Established Mixed Grasses			Established Mixed Grasses			Winter Barley		
Planned Yield	3 ton/A			3 ton/A			3 ton/A			3 ton/A			60 bu/A		
Crop Removal Recommendations (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	150	45	120	150	45	120	150	45	150	150	45	150	48	36	90
Soil Test Recommendation (lb/A)	150	0	40	150	0	40	150	0	0	150	0	0	55	0	0
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P Index Application Method															
Double Crop Carry Over N (lb/A)	0			0			0			0			[38]	Winter Double Crop	
Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop		0	Continuously - Summer Crop		20	Frequently - Summer Crop		0	Frequently - Summer Crop		7	Frequently - Winter Double Crop	
Legume History Description Residual Legume N (lb/A)	0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop		0	Legume N credit does not apply to this crop	
Net Nutrients Required (lb/A)	115	0	40	102	-22	-16	130	0	0	89	-127	-109	48	0	0
Manure Group	Sheep Uncollected			Siegrist Fall			Siegrist Spring			Siegrist Spring			Siegrist Fall		
Units	lb/ton			lb/1000 gal			lb/1000 gal			lb/1000 gal			lb/1000 gal		
Manure Nutrient Content	**N**	**P2O5**	**K20**	**N**	P2O5	**K20**	**N**	P2O5	**K20**	**N**	P2O5	**K20**	**N**	P2O5	**K20**
(lbs/ton or 1000 gal)	23.00	8.00	20.00	30.40	22.10	16.10	32.70	20.30	17.40	32.70	20.30	17.40	30.40	22.10	16.10
Application Season: Management (Incorporation, cover crops, etc.)	Grazing anytime with nutrient uptake during growing season			Late Fall: Early Spring Utilization. Small grains and established grass or legume hay			Spring: Spring or summer utilization-Incorporation after 7 days or none			Summer: Summer utilization-Incorporation after 7 days or none			Early Fall: Early spring utilization incl. winter crop in double crop system: Incorporated after 7 days or none		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.20			0.45			0.20			0.20			0.20		
P Index Application Method															
N Balanced Manure Rate (ton; gal/A)	25 tons/A			7,456 gal/A			19,878 gal/A			13,609 gal/A			7,895 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	6 tons/A			1,041 gal/A			2,217 gal/A			0 gal/A			3,891 gal/A		
	Crop P Removal (lb/A) 45.0			Crop P Removal (lb/A) 23.0			Crop P Removal (lb/A) 45.0			Crop P Removal (lb/A) 0.0			Crop P Removal (lb/A) 86.0		
P Index Value															
Planned Manure Rate (ton or gal/A)	**2.8 tons/A**			**6250 gal/A**			**6250 gal/A**			**6250 gal/A**			**6250 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	13	22	56	86	138	101	41	127	109	41	127	109	38	138	101
Nutrient Balance after Manure	102	-22	-16	17	-160	-117	89	-127	-109	48	-254	-218	10	-138	-101
Supplemental Fertilizer (lb/A)	0	0	0	17	0	0	0	0	0	48	0	0	10	0	0
P Index Application Method															
Final Nutrient Balance (lb/A)				**0**	**-160**	**-117**				**0**	**-254**	**-218**	**0**	**-138**	**-101**
Multiple Application	Multiple Initial			Multiple Final			Multiple Initial			Multiple Final					
Soil test or Crop Removal	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs		

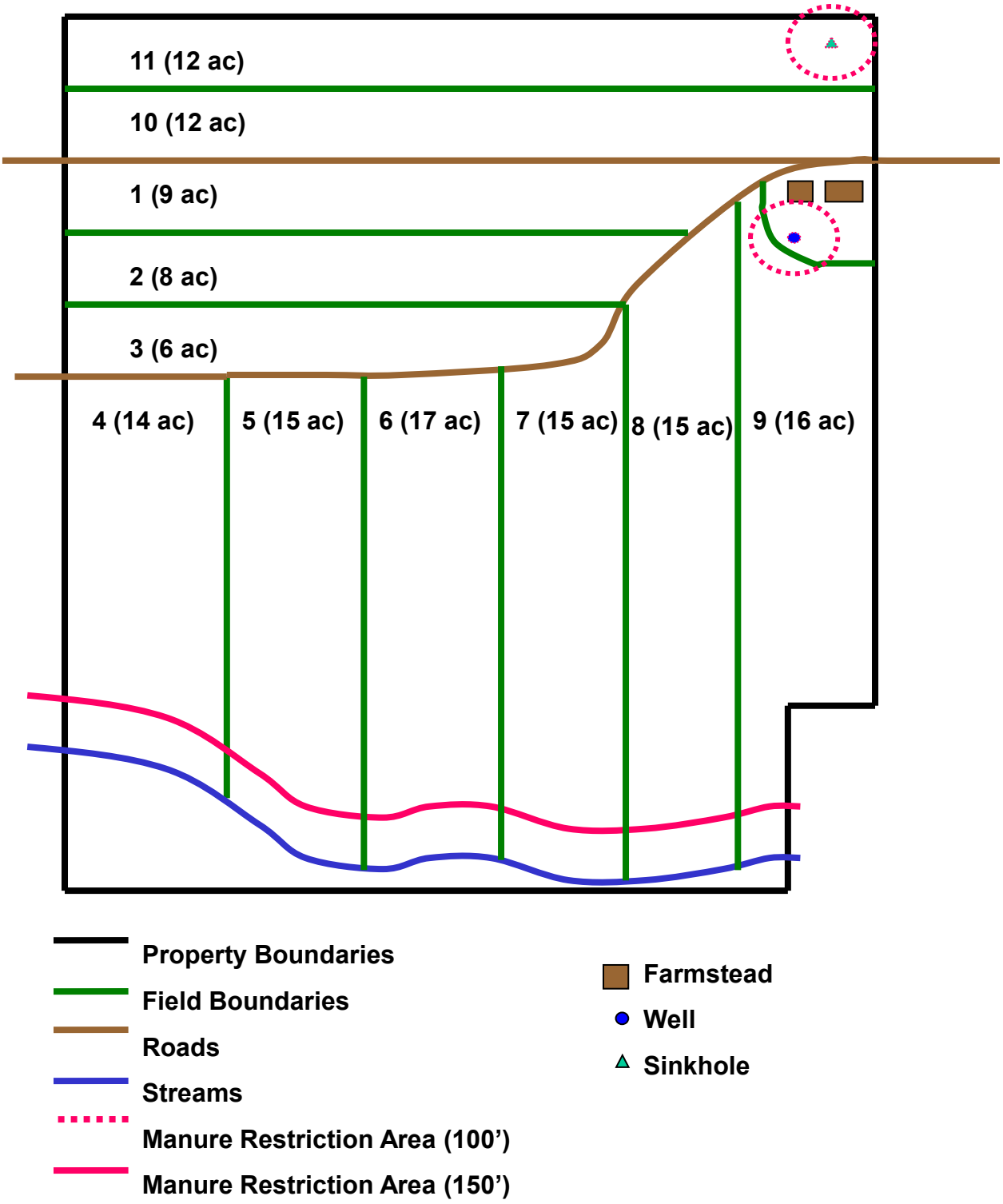
Option 1 P Removal **Option 2 Nitrogen Based** **Nutrient Balance Sheets**	Barley-Soybeans			Corn After Corn			Corn After Soybeans			Corn After Alfalfa		
Crop Group Identification												
Fields	2-8			2-8			2-8			11		
Acres	90			90			90			12		
NBS Option	Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement			Option 2 Nitrogen Requirement			Option 1 P Removal		
P Banking												
Mehlich 3 Soil Test P	ppm P			ppm P			ppm P			ppm P		
For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	154			154			154					
P Index Part A Evaluation												
Part A Result												
Crop	Soybeans with Manure			Corn for Grain			Corn for Grain			Corn for Grain		
Planned Yield	50 bu/A			150 bu/A			150 bu/A			175 bu/A		
Crop Removal Recommendations (lb/A)	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**	**N**	**P2O5**	**K2O**
	160	50	70	150	60	45	150	60	45	175	70	53
Soil Test Recommendation (lb/A)	160	0	0	150	0	0	150	0	0			
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0	15	30	30	15	30	30	0	0	0
P Index Application Method												
Double Crop Carry Over N (lb/A)	38	Summer Double Crop		0			0			0		
Manure History Description Residual Manure N (lb/A)	13	Frequently - Summer Double Crop		35	Continuously - Summer Crop		35	Continuously - Summer Crop		20	Frequently - Summer Crop	
Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume		0	No Previous Year Legume		50	Soybeans, 50 bu/A		40	1st yr. after alfalfa <25% stand	
Net Nutrients Required (lb/A)	109	-138	-101	100	-30	-30	50	-30	-30	115	70	53
Manure Group	Siegrist Spring			Siegrist Spring			Siegrist Spring			Siegrist Spring		
Units	lb/1000 gal			lb/1000 gal			lb/1000 gal			lb/1000 gal		
Manure Nutrient Content	**N**	P2O5	**K20**	**N**	P2O5	**K20**	**N**	P2O5	**K20**	**N**	P2O5	**K20**
(lbs/ton or 1000 gal)	32.70	20.30	17.40	32.70	20.30	17.40	32.70	20.30	17.40	32.70	20.30	17.40
Application Season: Management (Incorporation, cover crops, etc.)	Summer: Summer utilization-Incorporation after 7 days or none			Spring: Spring or summer utilization-Incorporation after 7 days or none			Spring: Spring or summer utilization-Incorporation after 7 days or none			Spring: Spring or summer utilization-Incorporation after 7 days or none		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**	**Total N**	**NH4-N**	**Org. N**
	0.20			0.20			0.20			0.20		
P Index Application Method												
N Balanced Manure Rate (ton; gal/A)	16,667 gal/A			15,291 gal/A			7,645 gal/A			17,584 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	0 gal/A			1,478 gal/A			1,478 gal/A			3,448 gal/A		
	Crop P Removal (lb/A) 0.0			Crop P Removal (lb/A) 30.0			Crop P Removal (lb/A) 30.0			Crop P Removal (lb/A) 70.0		
P Index Value												
Planned Manure Rate (ton or gal/A)	**6250 gal/A**			**6250 gal/A**			**6250 gal/A**			**3370 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	41	127	109	41	127	109	41	127	109	22	68	59
Nutrient Balance after Manure	0	-265	-210	59	-157	-139	9	-157	-139	93	2	-7
Supplemental Fertilizer (lb/A)	0	0	0	59	0	0	9	0	0	93	0	0
P Index Application Method												
Final Nutrient Balance (lb/A)	**0**	**-265**	**-210**	**0**	**-157**	**-139**	**0**	**-157**	**-139**	**0**	**2**	**-7**
Multiple Application												
Soil test or Crop Removal	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs			Nutrient Balances for P2O5 and K2O are based on Crop Removal and SHOULD NOT be used to determine additional fertilizer needs		

Option 3 P Index Nutrient Balance Sheets	10		
Field Identification			
Crop Group	Corn AfterAlfalfa P Index		
Acres	12.0		
NBS Option	Option 3 P Index		
Field Id -Crop Group	10 - Corn AfterAlfalfa P Index		
Mehlich 3 Soil Test P For Option 2 enter maximum Soil Test For Option 3 enter soil test for PI	ppm P 315		
P Index Part A Evaluation	Soil Test P		
Part A Result	Part B		
Crop	Corn for Grain		
Planned Yield	175 bu/A		
Crop Removal Recommendations (LB/A)	**N**	**P2O5**	**K2O**
	175	70	53
Soil Test Recommendation (lb/A)	190	0	0
Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0
P Index Application Method			
Double Crop Carry Over N (lb/A)	0		
Manure History Description Residual Manure N (lb/A)	20	Frequently - Summer Crop	
Legume History Description Residual Legume N (lb/A)	40	1st yr. after alfalfa <25% stand	
Net Nutrients Required (lb/A)	130	0	0
Manure Group	Siegrist Spring		
Units	lb/1000 gal		
Manure Nutrient Content	**N**	**P2O5**	**K20**
(lbs/ton or 1000 gal)	32.70	20.30	17.40
Application Season: Management (Incorporation, cover crops, etc.)	Spring: Spring or summer utilization-Incorporation after 7 days or none		
Availability Factors (Total N or NH4-N & Organic N)	**Total N**	**NH4-N**	**Org. N**
	0.20		
P Index Application Method	April - Oct: No incorp or incorp > 1 wk.		
N Balanced Manure Rate (ton; gal/A)	19,878 gal/A		
P Removal Balance Manure Rate (ton or gal/A; If required by P Index)	3,448 gal/A		
	Crop P Removal (lb/A) 70.0		
P Index Value	70		
Planned Manure Rate (ton or gal/A)	**6,250 gal/A**		
Nutrients Applied at Planned Manure Rate (lb/A)	41	127	109
Nutrient Balance after Manure	89	-127	-109
Supplemental Fertilizer (lb/A)	89	0	0
P Index Application Method			
Final Nutrient Balance (lb/A)	**0**	**-127**	**-109**
Multiple Application			
Soil test or Crop Removal	Nutrient Balances for P2O5 and K2O are based on Soil Test recommendations and SHOULD be used to determine additional fertilizer needs		

Appendix 1

Operation Maps

Maps (or aerial photographs) required in Nutrient Balance Sheets must identify: road and road names adjacent to and within the operation; field identification, boundaries and acreage; manure application setback areas and vegetated buffers and associated landscape features (streams and other water bodies, sinkholes, and active water wells or springs); and location of in-field manure stacking areas (including each site in stacking area rotation).


11 (12 ac)
10 (12 ac)
1 (9 ac)
2 (8 ac)
3 (6 ac)
4 (14 ac)
5 (15 ac)
6 (17 ac)
7 (15 ac)
8 (15 ac)
9 (16 ac)
Property Boundaries
Field Boundaries
Roads
Streams
Manure Restriction Area (100')
Manure Restriction Area (150')
Farmstead
Well
Sinkhole

Phosphorus Index
Populated from NBS Input P Index sheet

Go to NBS P Index Input Go to NBS Index

Pennsylvania P Index Version 2

PART A: SCREENING TOOL CMU/Field ID		PART A: SCREENING TOOL	CMU/Field ID	10 - Corn AfterAlfalfa P Index
Is the CMU in a Special Protection watershed?		Is the CMU in a Special Protection watershed?	If the answer is Yes to any of these questions, Part B must be used.	**No**
A significant farm management change as defined by Act 38?		Is there a significant farm management change as defined by Act 38?		**No**
Soil Test Mehlich 3 P greater than 200 ppm P?		Is the Soil Test Mehlich 3 P greater than 200 ppm P? (enter soil test value in ppm P)		**315**
Contributing Distance from CMU to receiving water <150 ft.?		Is the Contributing Distance from this CMU to receiving water less than 150 ft.?		**No**
Is winter manure application planned for this field ?		Is winter manure application planned for this field ?		**No**
Run P Index Part B voluntarily? (No to all Part A questions.)		Run P Index Part B voluntarily? (Answers are No to all Part A questions.)		**No**

PART B: SOURCE FACTORS: Mehlich 3 Soil Test P (ppm P)	Mehlich 3 Soil Test P (ppm P)					315
Soil Test Rating = 0.20* Mehlich 3 Soil Test P (ppm P)						63
FERTILIZER P APPLIED REGARDLESS OF MANURE (Starter or other)					Fertilizer P (lb P2O5/acre)	0
P INDEX APPLICATION METHOD OF FERTILIZER P APPLIED REGARGLESS OF MANURE[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	-
SUPPLEMENTAL P FERTILIZER					Fertilizer P (lb P2O5/acre)	0
P INDEX APPLICATION METHOD OF SUPPLEMENTAL P FERTILIZER[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	-
Fertilizer Rating = Fertilizer Rate x Fertilizer Application Method						0
MANURE P RATE					Manure P (lb P2O5/acre)	127
MANURE APPLICATION METHOD[3]	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	0.6
P SOURCE COEFFICIENT[3]	Refer to: Test results for P Source Coefficient OR Book values from P Index Fact Sheet Table 1					1
Manure Rating = Manure Rate x Manure Application Method x P Source Coefficient						76
Source Factor Sum						139
PART B: TRANSPORT FACTORS EROSION	Soil Loss (ton/acre/yr)					2
RUNOFF POTENTIAL	0 *Drainage Class is* Excessively	2 *Drainage Class is* Somewhat Excessively	4 *Drainage Class is* Well/Moderately Well	6 *Drainage Class is* Somewhat Poorly	8 *Drainage Class is* Poorly/Very Poorly	4
SUBSURFACE DRAINAGE	0 None		1 Random		2 [1] Patterned	0
CONTRIBUTING DISTANCE	0 > 500 ft.	2 350 to 500 ft.	4 200 to 349 ft.	6 100 to 199 ft. OR < 100 ft. with 35 ft. buffer	9 [2] < 100 ft.	0
Transport Sum = Erosion + Runoff Potential + Subsurface Drainage + Contributing Distance						6
MODIFIED CONNECTIVITY	0.85 50 ft. Riparian Buffer APPLIES TO DIST < 100 FT		1.0 Grassed Waterway or None	1.1 Direct Connection APPLIES TO DIST > 100 FT		1.0
Transport Sum x Modified Connectivity / 24						0.25
P Index Value = 2 x Source x Transport						**70**

Low: 59 or less
Nitrogen based management

Medium: 60 to 79
Nitrogen based management

High: 80 to 99
Phosphorus limited to crop removal

Very High: 100 or greater
No Phosphorus applied

1 OR rapidly permeable soil near a stream
2 "9" factor does not apply to fields receiving manure with a 35 ft. buffer.
3 Error Note: if there is a manure or fertilizer rate and there is no corresponding method factor or PSC, it will display an "E".

Supplement 4
Sample Nutrient Balance Sheet (Word)

Act 38 provides two formats to develop Act 38 nutrient balance sheets for exported manure: Microsoft Excel and Microsoft Word.

Supplement 4 provides a sample of a completed Nutrient Balance Sheet using the Microsoft Word. This sample Nutrient Balance Sheet was developed using Nutrient Balance Sheet Standard Format: Version 5.0 – October 2019.

Nutrient Balance Sheet

Prepared For

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934 Pine Hill Road, Lititz, PA 17543
717-626-6032
Lancaster County

Prepared By

Jesse A. Landis
462-NMC
273 Centerville Road, Lancaster, PA 17603
717-299-5691

Jesse A. Landis
Nutrient Management Specialist or Broker 2 Signature

July 30, 2019
Date of Development

This nutrient balanced sheet has been developed for manure exported for agricultural land application under the following Act 38 export option:
__x__ Exported to a known operation (included in Exporter NMP)
____ Exported through a broker (include Broker information below if not prepared by broker)

Broker Information

Broker Name

Broker Certification Number

Broker Address

Broker Phone Number(s)

Exporter Information

Dennis Siegrist
23 Orchard Road
Lititz, PA 17543
Lancaster County

Nutrient Balance Sheet Summary

	Crop Group	CMU/Field ID	Manure Group	Application Season	Application Management	Planned Manure Rate	Starter/Other Fertilizer (lb/A)			Nutrient Balance @ Planned Rate (lb/A) [1]			Notes (check)
							N	P_2O_5	K_2O	N	P_2O_5	K_2O	
1	Pasture	1	Siegrist Fall	Late Fall	No Incorporation	6250	0	0	0	16	(160)	(117)	
2	Corn After Corn	2-8	Siegrist Spring	Spring	No Incorporation	6250	15	30	30	59	(157)	(139)	✓
3	Corn After Soybeans	2-8	Siegrist Spring	Spring	No Incorporation	6250	15	30	30	9	(157)	(139)	✓
4	Barley (Winter)	2-8	Siegrist Fall	Early Fall	No Incorporation	6250	0	0	0	10	(138)	(101)	✓
5	Soybeans (Summer)	2-8	Siegrist Spring	Summer	No Incorporation	6250	0	0	0	0	(265)	(210)	✓
6	Grass Hay (1st)	9	Siegrist Spring	Spring	No Incorporation	6250	0	0	0				✓
7	Grass Hay (2nd)	9	Siegrist Spring	Summer	No Incorporation	6250	0	0	0	48	(254)	(218)	✓
8	Corn After Alfalfa	10	Siegrist Spring	Spring	No Incorporation	6250	0	0	0	89	(127)	(109)	
9	Corn After Alfalfa	11	Siegrist Spring	Spring	No Incorporation	3370	0	0	0	93	2	(6)	✓
10													
11													
12													
13													
14													
15													

[1] Positive numbers = nutrient deficit; negative numbers = nutrient excess

Nutrient Balance Sheet Summary Notes

Fall manure applications require at least 25% cover unless the crop management unit is planted to a cover crop in time to allow for appropriate growth to control runoff until the next growing season, or the manure is injected or mechanically incorporated within 5 days using minimal soil disturbance techniques consistent with no-till farming practices.

	Crop Group	CMU/Field ID	Manure Group	Notes [1]
1	Corn After Corn	2-8	Siegrist Spring	Fields 4 – 8 have a 150' manure application setback from the stream.
2	Corn After Soybeans	2-8	Siegrist Spring	Fields 4 – 8 have a 150' manure application setback from the stream.
3	Barley (Winter)	2-8	Siegrist Fall	Fields 4 – 8 have a 150' manure application setback from the stream.
4	Soybeans (Summer)	2-8	Siegrist Spring	Fields 4 – 8 have a 150' manure application setback from the stream.
5	Grass Hay (1st)	9	Siegrist Spring	This application is applied in the spring at green-up. Field 9 has a 100' manure application setback from a well and 150' manure application setback along the stream.
6	Grass Hay (2nd)	9	Siegrist Spring	This application is applied after first cutting. Field 9 has a 100' manure application setback from a well and 150' manure application setback along the stream.
7	Corn After Alfalfa	11	Siegrist Spring	Nutrient balances for P_2O_5 and K_2O are based on crop removal and should not be used to determine additional fertilizer needs. Field 11 has a 100' manure application setback from a sinkhole.
8	Pasture	1	Sheep Uncollected	25 ewes and 2 rams on pasture from March through November for 18 hours per day.
9				
10				
11				
12				
13				

[1] If crop removal values were used in Row A for P_2O_5 and K_2O, planners should use the following standard note: Nutrient balances for P_2O_5 and K_2O are based on crop removal and should not be used to determine additional fertilizer needs.

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Pasture	**3 T/A**	**1**	**9**

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			81			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Fall	**30.4**	**22.1**	**16.1**	**Late Fall**	**No Incorporation**

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]	Recommendation Basis
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	**150**	**0**	**40**	X Soil Tests Crop Removal
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	**0**	**0**	**0**	**Application Record & Notes** Record when the planned manure and fertilizer rates were applied or note changes.
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	**13**	**22**	**56**	
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	**35**			Other Organic Source – Uncollected Sheep Manure
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	**0**			
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	**102**	**(22)**	**(16)**	
G) Manure Nutrient Content (lb/ton or lb/1000gal)	**30.4**	**22.1**	**16.1**	
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	**.45**			
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	**13.68**			
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	**7456**			
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	**6250**			
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	**86**	**138**	**101**	**Note:** Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	**16**	**(160)**	**(117)**	

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

Version 5.0 – October 2019

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Grass Hay (1st)	3 T/A	9	16

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			93			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Spring	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	150	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	0	0	0
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	20		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	0		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	130	0	0
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	19,878		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	89	(127)	(109)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

Version 5.0 – October 2019

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Grass Hay (2nd)	3 T/A	9	16

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			93			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Summer	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)			
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)			
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)			
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)			
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report			
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	89	(127)	(109)
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	13,609		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	48	(254)	(218)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

Version 5.0 – October 2019

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Barley (Winter)	60 Bu/A	2-8	90

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			154, 154, 125, 137, 118, 142, 133			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Fall	30.4	22.1	16.1	Early Fall	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	55	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	0	0	0
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	7		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	0		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	48	0	0
G) Manure Nutrient Content (lb/ton or lb/1000gal)	30.4	22.1	16.1
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.08		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	7895		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	38	138	101
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	10	(138)	(101)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

Version 5.0 – October 2019

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Soybeans (Summer)	50 Bu/A	2-8	90

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			154, 154, 125, 137, 118, 142, 133			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Summer	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	160	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	0	0	0
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	38	138	101
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	13		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	0		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	109	(138)	(101)
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	16,667		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	0	(265)	(210)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

Version 5.0 – October 2019

Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Corn After Corn	150 Bu/A	2-8	90

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			154, 154, 125, 137, 118, 142, 133			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Spring	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	150	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	15	30	30
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	35		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	0		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	100	(30)	(30)
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	15,291		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	59	(157)	(139)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

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Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Corn After Soybeans	150 Bu/A	2-8	90

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement	X	OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			154, 154, 125, 137, 118, 142, 133			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Spring	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	150	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	15	30	30
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	35		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	50		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	50	(30)	(30)
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	7645		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	9	(157)	(139)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

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Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Corn After Alfalfa	175 Bu/A	10	12

Manure Plan Basis (check planning option)	OPTION 1 P Removal		OPTION 2 N Requirement		OPTION 3 P Index	X
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
			315			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Spring	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	190	0	0
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	0	0	0
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	20		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	40		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	130	0	0
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)	19,878		
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	6250		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	41	127	109
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	89	(127)	(109)

Recommendation Basis	
X	Soil Tests
	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

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Nutrient Balance Worksheet

Crop Group	Yield	CMU/Field Identification (Each field must be clearly identified on a map)	Acres
Corn After Alfalfa	175 Bu/A	11	12

Manure Plan Basis (check planning option)	OPTION 1 P Removal	X	OPTION 2 N Requirement		OPTION 3 P Index	
	• P removal rates • 150' application setback from streams, lakes or ponds • No winter application		• N requirement rates • 150' application setback from streams, lakes or ponds • Soil test < 200 ppm Mehlich 3 P • No winter application		• P Index evaluation of fields • P Index and Winter Matrix required for winter application	
			Soil Test Mehlich 3 P (ppm)			
	(Use the P_2O_5 column to determine acceptable rate)		(Use the N column to determine acceptable rate)		(Use appropriate column based on the P Index to determine acceptable rate)	

Manure Group	Manure Analysis (lb/ton or 1000 gal) Total N	P_2O_5	K_2O	Application Season	Application Management
Siegrist Spring	32.7	20.3	17.4	Spring	No Incorporation

Notes	

	N [1]	P_2O_5 [1]	K_2O [1]
A) Recommendation or Removal (lb/A) N – Soil Test or Tables 1 & 2 (AG Table 1.2-5;1.2-7) P_2O_5 & K_2O – Soil Test or Table 3 (AG Table 1.2-8)	175	70	53
B) Fertilizer Applied (lb/A) (Regardless of Manure e.g. Starter)	0	0	0
C) Other Organic Sources Applied (lb/A) (e.g. Biosolids, Other Manure)	0	0	0
D) Residual Manure N (lb/A) Table 4 (AG Table 1.2-14B)	20		
E) Previous Legume N (lb/A) Table 5 (AG Table 1.2-6) or Soil Test Report	40		
F) Net Nutrient Requirement (lb/A) (A – B – C – D – E)	115	70	53
G) Manure Nutrient Content (lb/ton or lb/1000gal)	32.7	20.3	17.4
H) Nitrogen Availability Factor Table 6 (AG Table 1.2-14A)	.2		
I) Available Nitrogen (lb/ton or lb/1000gal) (G x H)	6.54		
J) Balanced Manure Rate (tons/A or gallons/A) For N: (F ÷ I) For P: (F ÷ G)		3448	
K) Planned Manure Rate (tons/A or gallons/A) Must be less than or equal to the appropriate Balanced Rate based on the plan basis being used	3370		
L) Nutrients Applied at Planned Rate (lb/A) For N: (K x I) For P & K: (K x G)	22	68	59
M) Nutrient Balance at Planned Rate (lb/A) (F - L) (Indicate short or excess)	93	2	(6)

Recommendation Basis	
	Soil Tests
X	Crop Removal

Application Record & Notes
Record when the planned manure and fertilizer rates were applied or note changes.

Note: Nutrient balances for P_2O_5 and K_2O based on crop removal (Row A) should not be used to determine additional fertilizer needs. Only recommendations based on soil tests should be used for this purpose.

[1] Completion of N column required for all options; P_2O_5 column is optional for N based rates; K_2O is optional for all rates.

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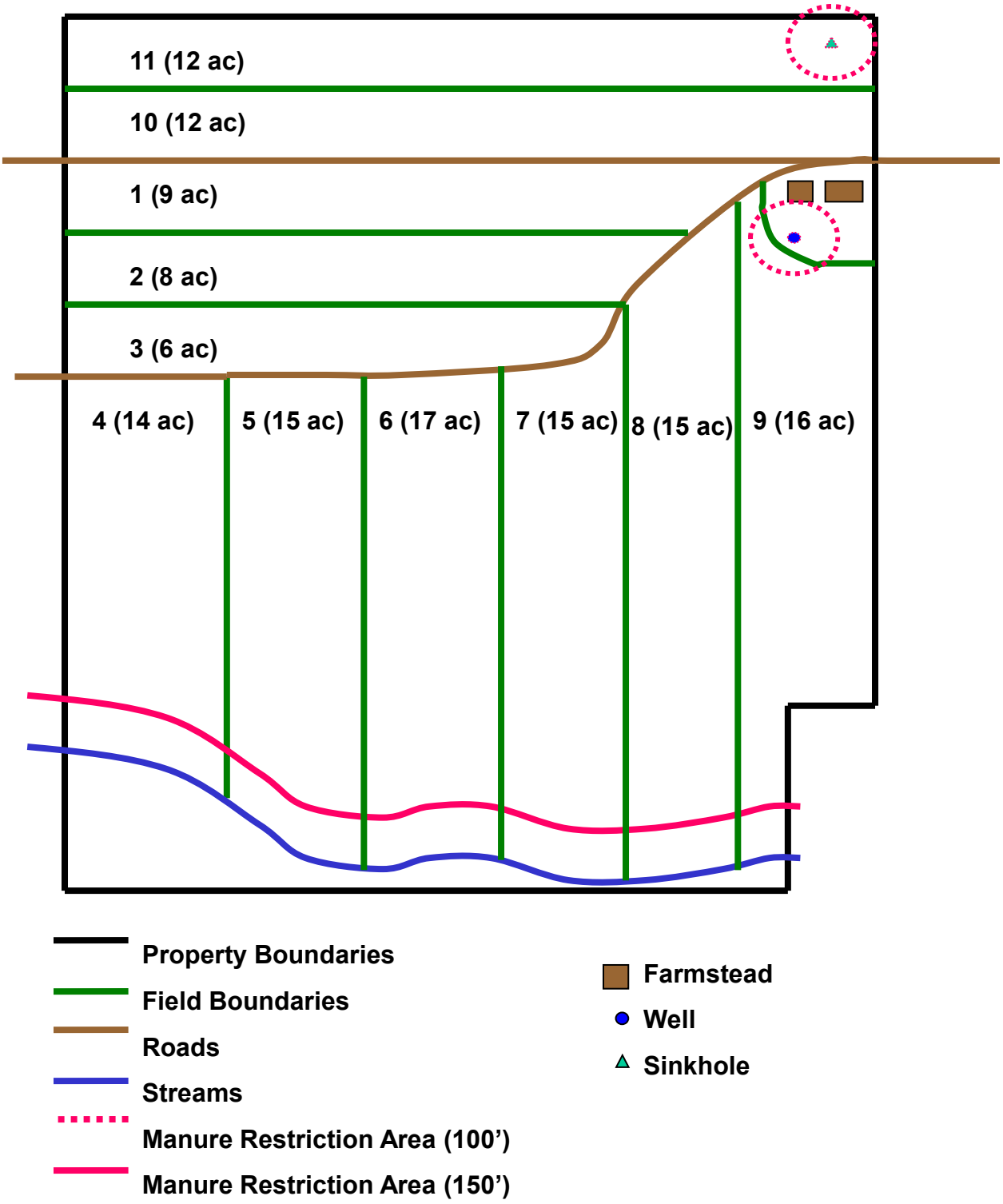
Appendix 1

Operation Maps

Maps (or aerial photographs) required in Nutrient Balance Sheets must identify: road and road names adjacent to and within the operation; field identification, boundaries and acreage; manure application setback areas and vegetated buffers and associated landscape features (streams and other water bodies, sinkholes, and active water wells or springs); and location of in-field manure stacking areas (including each site in stacking area rotation).


11 (12 ac)
10 (12 ac)
1 (9 ac)
2 (8 ac)
3 (6 ac)
4 (14 ac)
5 (15 ac)
6 (17 ac)
7 (15 ac)
8 (15 ac)
9 (16 ac)
Property Boundaries
Field Boundaries
Roads
Streams
Manure Restriction Area (100')
Manure Restriction Area (150')
Farmstead
Well
Sinkhole

Appendix 2

Option 3 Evaluations

Include the current Pennsylvania Phosphorus Index Spreadsheet or paper worksheet for each field that required Part B of the P Index when using Manure Plan Basis Option 3. Include the Winter Matrix evaluation of fields that will receive winter manure applications.

	A	B	C	D	E	F	G
1	**Pennsylvania P Index Version 2** (October 2009; Penn State, Dept. Crop & Soil Sciences & USDA-ARS, Pasture Systems & Watershed Mgmt. Research Unit)						
2							
3	**FARM IDENTIFICATION**		**PART A: SCREENING TOOL**			**CMU/Field ID**	**10**
4	Gary L. Brown Farm		Is the CMU in a Special Protection watershed?			If the answer is Yes to any of these questions, Part B must be used.	**No**
5			Is there a significant farm management change as defined by Act 38? (see below				**No**
6			Is the Soil Test Mehlich 3 P greater than 200 ppm P? (enter soil test value in ppm				315
7			Is the Contributing Distance from this CMU to receiving water less than 150 ft.?				**No**
8			The following Act 38 criteria determine when there is a significant farm management change:				Part B
9			1. net increase of greater than 10% in AEUs per acre				
10			2. a change in crop management that results in a farmwide reduction of greater than 20% in nitrogen necessary for realistic				
11			3. alternative organic sources will replace all or some of the nutrient sources listed in the plan				
12			4. additional lands are brought into the operation (purchased or rented)				
13	**PART B: SOURCE FACTORS**					**CMU/Field ID**	**10**
14	SOIL TEST	Mehlich 3 Soil Test P (ppm P)					315
15						**Soil Test Rating = 0.20* Mehlich 3 Soil Test P (ppm P)**	63
16	FERTILIZER P RATE	Fertilizer P (lb P_2O_5/acre)					0
17		P Applied from multiple fertilizer applications, if any (From Multiple Applications Calculator)					0
18	FERTILIZER APPLICATION METHOD	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	
19						**Fertilizer Rating = Fertilizer Rate x Fertilizer Application Method**	0
20	MANURE P RATE	Manure P (lb P_2O_5/acre)					127
21		P Applied from multiple manure applications, if any (From Multiple Applications Calculator)					0
22	MANURE APPLICATION METHOD	0.2 Placed or injected 2" or more deep	0.4 Incorporated <1 week following application	0.6 Incorporated > 1 week or not incorporated following application in April - October	0.8 Incorporated >1 week or not incorporated following application in Nov. - March	1.0 Surface applied to frozen or snow covered soil	0.6
23	P SOURCE COEFFICIENT	Refer to: Test results for P Source Coefficient OR Book values from P Index Fact Sheet Table 1					1
24						**Manure Rating = Manure Rate x Manure Application Method x P Source Coefficient**	76
25						**Source Factor Sum**	139
26	**PART B: TRANSPORT FACTORS**					**CMU/Field ID**	**10**
27	EROSION	Soil Loss (ton/acre/yr)					2
28	RUNOFF POTENTIAL	0 *Drainage Class is* Excessively	2 *Drainage Class is* Somewhat Excessively	4 *Drainage Class is* Well/Moderately Well	6 *Drainage Class is* Somewhat Poorly	8 *Drainage Class is* Poorly/Very Poorly	4
29	SUBSURFACE DRAINAGE	0 None or No direct outlet to receiving water		1 Random Drainage - Outlets directly to receiving water		2 * Patterned drainage - Outlets directly to receiving water	0
30	CONTRIBUTING DISTANCE	0 > 500 ft.	2 350 to 500 ft.	4 200 to 349 ft.	6 100 to 199 ft. OR < 100 ft. with 35 ft. buffer	9 ‡ < 100 ft.	0
31						**Transport Sum = Erosion + Runoff Potential + Subsurface Drainage + Contributing Distance**	6
32	MODIFIED CONNECTIVITY	0.85 50 ft. Riparian Buffer APPLIES TO DIST < 100 FT		1.0 Grassed Waterway or None		1.1 Direct Connection APPLIES TO DIST > 100 FT	1.0
33	* OR rapidly permeable soil near a stream					**Transport Sum x Modified Connectivity / 24**	0.25
34	‡ "9" factor does not apply to fields with a 35 ft. buffer receiving manure.					**P Index Value = 2 x Source x Transport**	**70**
35	**MANAGEMENT GUIDANCE**			**Optional Calculators**			
36	P Index Rating: Values	Nutrient Application Guidance		**User Inputs** 1. Manure Units (gal/A or T/A)			
37	Low: 59 or less	Nitrogen based management		2. N plan manure rate (units above)			
38	Medium: 60 to 79	Nitrogen based management		3. Manure P analysis (units above lb P_2O_5)			
39	High: 80 to 99	Phosphorus limited to crop removal		P Applied at N Rate listed above in (2) (lb P_2O_5/A)			0
40	Very High: 100 or greater	No Phosphorus applied					

Supplement 5
Standard Animal Weights

Agronomy Facts 54 - Table 1. Standard animal weights used to calculate animal equivalent units to identify concentrated animal operations.

Type of Animal	Standard Weight (lbs) during Production (range)
Dairy Holstein/Brown Swiss	
Cow	1450
Heifer: 1-2 yr.	1000 (750 – 1250)
Calf: 0-1 yr.	420 (90 – 750)
Bull	1700
Dairy Guernsey/Ayrshire	
Cow	1200
Heifer: 1-2 yr.	865 (630 – 1100)
Calf: 0-1 yr.	350 (70 – 630)
Bull	1600
Dairy Jersey	
Cow	1000
Heifer: 1-2 yr.	675 (500 – 850)
Calf: 0-1 yr.	275 (50 – 500)
Bull	1200
Beef	
Calf: 0-8 mo.	300 (100 – 500)
Backgrounding Cattle	500 (300 – 700)
Finishing: 8-24 mo.	950 (500 – 1400)
Replacement Heifer: 8 mo.-1 yr.	500 (300 – 700)
Replacement Heifer: 1-2 yr.	875 (700 – 1050)
Cow	1400
Bull	1500
Veal	
Calf: 0-20 wk.	280 (95 – 465)
Swine	
Nursery pig	35 (13 – 57)
Wean to finish	143 (13 – 273)
Grow finish	165 (57 – 273)
Gestating sow	450
Sow and litter	470
Boar	450

Type of Animal	Standard Weight (lbs) during Production (range)
Poultry Layer	
White egg: 18-75 wk.	3.13 (2.82 – 3.44)
White egg: 18-90 wk.	3.14 (2.82 – 3.46)
Brown egg: 18-75 wk.	3.85 (3.35 – 4.34)
Brown egg: 18-90 wk.	3.85 (3.35 – 4.34)
Pullet, white egg: 0-16 wk.	1.38 (0.08 – 2.67)
Pullet, brown egg: 0-16 wk.	1.54 (0.08 – 3.0)
Breeder hen, white egg: 17-70 wk.	3.25 (2.7 – 3.8)
Breeder rooster, white egg: 17-70 wk.	4.37 (3.67 – 5.06)
Breeder hen, brown egg: 17-70 wk.	3.55 (2.9 – 4.2)
Breeder rooster, brown egg: 17-70 wk.	4.78 (4.5 – 5.06)
Poultry Broiler	
Large: 0-53 days	3.55 (0.09 – 7.0)
Medium: 0-35 days	2.55 (0.09 – 5.0)
Roaster male: 0-7 wk.	4.70 (0.09 – 9.3)
Roaster female: 0-9 wk.	4.95 (0.09 – 9.8)
Breeder pullet: 0-20 wk.	2.55 (0.09 – 5.0)
Breeder cockerel: 0-20 wk.	3.55 (0.09 – 7.0)
Breeder hen: 20-65 wk.	6.75 (5.0 – 8.5)
Breeder rooster: 20-65 wk.	8.75 (7.0 – 10.5)
Poultry Turkey	
Tom brooder: 0-6 wk.	3.36 (0.22 – 6.5)
Hen brooder: 0-6 wk.	2.74 (0.22 – 5.25)
Tom: 6-18 wk.	25.25 (6.5 – 44)
Hen regular: 6-12 wk.	11.13 (5.25 – 17)
Hen heavy: 6-16 wk.	14.63 (5.25 – 24)
Poultry Duck	
Starter: 0-17 days	1.36 (0.22 – 2.5)
Finisher: 17-38 days	4.88 (2.5 – 7.25)
Developer: 0-196 days	3.21 (0.22 – 6.2)
Layer	6.85 (6.2 – 7.5)
Poultry Game Birds	
Guinea, growing: 0-14 wk.	1.91 (0.06 – 3.75)
Guinea, mature	3.75
Pheasant, growing: 0-13 wk.	1.53 (0.05 – 3.0)
Pheasant, mature	3.0
Chukar, growing: 0-13 wk.	0.52 (0.04 – 1.0)
Chukar, mature	1.0
Quail, growing: 0-13 wk.	0.26 (0.02 – 0.5)
Quail, mature	0.5

Type of Animal	Standard Weight (lbs) during Production (range)
Larger Breed Sheep	
Lamb: 0-1 yr.	95 (10 – 180)
Ewe	225
Ram	300
Medium Breed Sheep	
Lamb: 0-1 yr.	80 (10 – 150)
Ewe	175
Ram	225
Smaller Breed Sheep	
Lamb: 0-1 yr.	45 (10 – 80)
Ewe	100
Ram	125
Meat Goats	
Kid: 0-1 yr.	65 (5 – 125)
Doe	150
Buck	200
Dairy Goats	
Kid: 0-1 yr.	45 (5 – 85)
Doe	125
Buck	170
Miniature Horses & Miniature Donkeys	
Foal: 0-6 mo.	35 (25 – 45)
Weanling: 6-12 mo.	60 (45 – 75)
Yearling: 12-24 mo.	100 (75 – 125)
Two Year Old: 24-36 mo.	150 (125 – 175)
Mature	200
Ponies & Donkeys	
Foal: 0-6 mo.	65 (30 – 100)
Weanling: 6-12 mo.	150 (100 – 200)
Yearling: 12-24 mo.	300 (200 – 400)
Two Year Old: 24-36 mo.	400 (300 – 500)
Mature	600
Light Horses & Mules	
Foal: 0-6 mo.	190 (80 – 300)
Weanling: 6-12 mo.	450 (300 – 600)
Yearling: 12-24 mo.	700 (600 – 800)
Two Year Old: 24-36 mo.	900 (800 – 1000)
Mature	1100

Type of Animal	Standard Weight (lbs) during Production (range)
Draft Horses	
Foal: 0-6 mo.	360 (120 – 600)
Weanling: 6-12 mo.	800 (600 – 1000)
Yearling: 12-24 mo.	1150 (1000 – 1300)
Two Year Old: 24-36 mo.	1450 (1300 – 1600)
Mature	1800
Bison	
Calf: 0-1 yr.	275 (50 – 500)
Yearling: 1-2 yr.	650 (500 – 800)
Cow	1000
Bull	1600
Deer	
Fawn: 0-6 mo.	36 (7 – 65)
Yearling Doe: 6-18 mo.	95 (65 – 125)
Yearling Buck: 6-18 mo.	110 (65 – 155)
Mature Doe	145
Mature Buck	200
Alpaca	
Young	80 (15 – 145)
Mature Female	145
Mature Male	170
Llama	
Cria: 0-1 yr.	75 (25 – 125)
Yearling: 1-2 yr.	213 (125 – 300)
Mature	350

Supplement 6
Density of Bedding Materials

The values in the Density of Bedding Materials table are used to calculate the gallons of bedding added to liquid manure by converting pounds of bedding to gallons of bedding. The following formula is used to make this conversion:

- Pounds of Bedding ÷ Density (lbs/ft^3) = Cubic Feet of Bedding
- Cubic Feet of Bedding ÷ 2 (bedding volume is reduced by one-half during use) x 7.48 gallons/ft^3 = Gallons of Bedding

To simplify this process use the bedding volume (gallons/lb) values which were derived from the formula outlined above. Simply multiply the volume factor times the pounds of bedding to obtain the gallons of bedding.

Density of Bedding Materials

Loose Bedding		
Material	**Density (lbs/ft^3)**	**Volume (gallons/lb)**
Straw	2.5	1.5
Wood Shavings	9	0.42
Sawdust	12	0.31
Sand	105	0.04
Non-legume Hay	4	0.94
Alfalfa	4	0.94
Baled Bedding		
Material	**Density (lbs per cu ft)**	**Volume (gallons/lb)**
Straw	5	0.75
Wood Shavings	20	0.19
Non-legume Hay	7	0.53
Alfalfa	8	0.47
Chopped Bedding		
Material	**Density (lbs per cu ft)**	**Volume (gallons/lb)**
Straw	7	0.53
Newspapers	14	0.27
Non-legume Hay	6	0.62
Alfalfa	6	0.62

Table 11. Density of Bedding Materials, Manure Characteristics: Manure Management Systems Series MWPS-18, Section 1, 2nd Edition

For Act 38 nutrient management plans the gallons of bedding should be rounded to nearest hundred gallons. Calculations for bedding used are to be shown in Appendix 10: Supporting Information and Documentation of the Nutrient Management Plan.

Supplement 7
Rainfall, Runoff and Evaporation Data

Rainfall, Runoff and Evaporation Data for Pennsylvania Counties

Prepared by TJM, May 2000, Revised October 2007 by WHL

Use the factors in the following table to determine the contribution of rainfall to total manure production on the farm for any given manure collection period.

Rainfall Directly on the Storage

To estimate rainfall contributions directly on the storage the effects of evaporation must be accounted for in some situations. Follow the guidance below to determine whether to adjust for evaporation or not. Answer the three questions that follow to decide if evaporation should be included in your calculations for cattle manure. Hog manure almost always stays liquid on the surface, so evaporation can always be used. Poultry manure is usually not stored as a liquid, so this is not usually an issue.

1. Does the storage facility contain fibrous organic bedding (Straw bedding or a lot of waste hay)?
   NO – Account for evaporation.
   YES – Go to 2.

2. Is the manure loaded through a pipe near the bottom of the storage facility?
   NO – Go to 3.
   YES – Do NOT account for evaporation.

3. Is milking parlor (more than a pipeline milking system) wastewater added at or near the top of the storage facility?
   NO – Do NOT account for evaporation.
   YES - Account for evaporation.

Rainfall Directed to the Storage

To estimate rainfall contributions directed to the storage from barnyards, loafing areas, barn roofs, etc., the nature of the runoff surface must be accounted for. Runoff to a storage will differ depending on whether the surface where runoff is occurring is paved or not. Use the paved data for all hard compacted surfaces (A simple guide is if an animal does not leave a hoof print when the surface is walked on dry, consider it paved). Also, a roof would be considered a paved surface in this calculation.

Rainfall, Runoff and Evaporation for Pennsylvania Counties

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Adams	Directly on Storage - No Evaporation	2.98	2.72	3.22	3.42	3.73	3.53	2.96	3.30	3.60	2.97	3.23	3.15	38.81
	Directly on Storage - With Evaporation	1.99	1.73	1.57	1.11	0.43	0.00	0.00	0.00	0.00	0.00	1.25	2.16	10.24
	Directed to Storage - Paved	1.52	1.44	1.71	1.78	1.94	2.01	1.69	2.08	2.27	1.66	1.81	1.61	21.51
	Directed to Storage - Unpaved	0.60	0.60	0.71	0.72	0.78	0.92	0.77	1.06	1.15	0.74	0.81	0.63	9.48
Allegheny	Directly on Storage - No Evaporation	2.51	2.40	3.26	3.18	3.91	3.78	3.88	3.22	3.03	2.52	3.05	2.94	37.65
	Directly on Storage - With Evaporation	1.64	1.53	1.81	1.15	1.01	0.00	0.00	0.00	0.00	0.00	1.31	2.07	10.52
	Directed to Storage - Paved	1.03	1.08	1.47	1.49	1.84	2.00	2.05	1.74	1.64	1.21	1.46	1.21	18.21
	Directed to Storage - Unpaved	0.25	0.34	0.46	0.51	0.63	0.83	0.85	0.74	0.70	0.43	0.52	0.29	6.54
Armstrong	Directly on Storage - No Evaporation	2.68	2.61	3.47	3.36	4.11	4.36	4.32	4.09	3.70	2.98	3.34	3.14	42.13
	Directly on Storage - With Evaporation	1.84	1.77	2.07	1.40	1.31	0.72	0.12	0.17	0.34	0.46	1.66	2.30	14.13
	Directed to Storage - Paved	1.10	1.17	1.56	1.58	1.93	2.31	2.29	2.21	2.00	1.43	1.60	1.29	20.46
	Directed to Storage - Unpaved	0.27	0.36	0.49	0.54	0.66	0.96	0.95	0.94	0.85	0.51	0.57	0.31	7.40
Beaver	Directly on Storage - No Evaporation	2.32	2.12	3.25	3.16	3.92	3.48	4.08	3.15	3.07	2.37	2.93	2.94	36.79
	Directly on Storage - With Evaporation	1.45	1.25	1.80	1.13	1.02	0.00	0.00	0.00	0.00	0.00	1.19	2.07	9.91
	Directed to Storage - Paved	0.90	0.93	1.43	1.45	1.80	1.81	2.12	1.67	1.63	1.11	1.38	1.15	17.39
	Directed to Storage - Unpaved	0.19	0.28	0.42	0.47	0.59	0.73	0.86	0.69	0.68	0.38	0.47	0.24	5.98
Bedford	Directly on Storage - No Evaporation	2.23	2.45	2.96	3.26	3.50	3.52	3.70	2.85	2.97	2.89	2.91	2.66	35.87
	Directly on Storage - With Evaporation	1.39	1.61	1.56	1.30	0.70	0.00	0.00	0.00	0.00	0.37	1.23	1.82	9.97
	Directed to Storage - Paved	1.05	1.20	1.45	1.63	1.75	1.94	2.03	1.65	1.72	1.50	1.51	1.25	18.68
	Directed to Storage - Unpaved	0.36	0.44	0.53	0.62	0.66	0.84	0.89	0.77	0.80	0.61	0.61	0.43	7.56
Berks	Directly on Storage - No Evaporation	3.11	2.63	3.10	3.62	4.36	3.75	4.34	3.93	3.91	2.89	3.71	3.32	42.67
	Directly on Storage - With Evaporation	2.09	1.61	1.40	1.24	0.96	0.00	0.00	0.00	0.00	0.00	1.67	2.30	11.27
	Directed to Storage - Paved	1.62	1.42	1.68	1.92	2.31	2.18	2.52	2.52	2.50	1.65	2.11	1.72	24.14
	Directed to Storage - Unpaved	0.65	0.60	0.71	0.80	0.96	1.01	1.17	1.30	1.29	0.75	0.96	0.70	10.91

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Blair	Directly on Storage - No Evaporation	2.60	2.43	3.27	3.59	4.63	4.43	4.25	3.67	4.00	3.65	3.61	3.16	43.29
	Directly on Storage - With Evaporation	1.80	1.63	1.87	1.59	1.83	0.83	0.05	0.00	0.70	1.15	1.91	2.36	15.72
	Directed to Storage - Paved	1.20	1.17	1.57	1.76	2.27	2.39	2.30	2.06	2.24	1.86	1.84	1.45	22.10
	Directed to Storage - Unpaved	0.39	0.41	0.56	0.65	0.83	1.02	0.98	0.92	1.00	0.73	0.72	0.47	8.68
Bradford	Directly on Storage - No Evaporation	1.94	2.19	2.40	2.90	3.48	3.52	3.02	2.91	3.14	2.58	3.04	2.40	33.52
	Directly on Storage - With Evaporation	1.14	1.39	1.00	0.90	0.68	0.00	0.00	0.00	0.00	0.08	1.34	1.60	8.13
	Directed to Storage - Paved	0.87	1.03	1.13	1.39	1.67	1.87	1.60	1.60	1.73	1.32	1.55	1.08	16.83
	Directed to Storage - Unpaved	0.27	0.35	0.38	0.49	0.59	0.77	0.66	0.70	0.75	0.52	0.61	0.34	6.44
Bucks	Directly on Storage - No Evaporation	3.43	3.08	3.89	4.02	4.51	4.11	5.59	4.66	4.41	3.20	3.92	3.79	48.61
	Directly on Storage - With Evaporation	2.41	2.06	2.19	1.64	1.11	0.00	0.49	0.00	0.33	0.14	1.88	2.77	15.02
	Directed to Storage - Paved	1.82	1.69	2.14	2.21	2.48	2.47	3.35	3.03	2.87	1.92	2.35	2.01	28.34
	Directed to Storage - Unpaved	0.75	0.74	0.93	0.96	1.08	1.19	1.62	1.58	1.50	0.93	1.14	0.83	13.27
Butler	Directly on Storage - No Evaporation	2.55	2.32	3.30	3.39	4.14	4.47	4.37	3.90	3.71	2.98	3.40	3.22	41.72
	Directly on Storage - With Evaporation	1.71	1.48	1.90	1.43	1.34	0.83	0.17	0.00	0.35	0.46	1.72	2.38	13.74
	Directed to Storage - Paved	1.02	1.02	1.45	1.56	1.90	2.32	2.27	1.95	1.85	1.43	1.63	1.29	19.69
	Directed to Storage - Unpaved	0.23	0.30	0.43	0.51	0.62	0.94	0.92	0.74	0.70	0.51	0.58	0.29	6.76
Cambria	Directly on Storage - No Evaporation	3.74	3.45	4.14	3.98	4.60	4.50	5.03	4.08	3.97	3.31	3.87	3.68	48.31
	Directly on Storage - With Evaporation	2.90	2.61	2.74	2.02	1.80	0.86	0.83	0.16	0.61	0.79	2.19	2.84	20.31
	Directed to Storage - Paved	1.68	1.62	1.94	1.91	2.21	2.43	2.72	2.28	2.22	1.65	1.93	1.65	24.25
	Directed to Storage - Unpaved	0.52	0.55	0.66	0.68	0.78	1.03	1.16	1.02	0.99	0.63	0.73	0.51	9.27
Cameron	Directly on Storage - No Evaporation	2.26	2.52	3.10	2.99	4.12	5.22	4.28	3.86	3.83	3.37	3.51	3.16	42.20
	Directly on Storage - With Evaporation	1.42	1.68	1.70	1.03	1.32	1.58	0.08	0.00	0.47	0.85	1.83	2.32	14.26
	Directed to Storage - Paved	0.90	1.13	1.40	1.37	1.89	2.71	2.23	1.93	1.91	1.58	1.65	1.26	19.98
	Directed to Storage - Unpaved	0.20	0.35	0.43	0.45	0.62	1.10	0.90	0.73	0.73	0.54	0.56	0.28	6.89

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Carbon	Directly on Storage - No Evaporation	2.63	2.33	3.04	3.18	4.01	3.75	3.96	3.48	3.55	2.73	2.92	2.81	38.37
	Directly on Storage - With Evaporation	1.63	1.33	1.44	0.98	0.81	0.00	0.00	0.00	0.00	0.00	1.02	1.81	9.01
	Directed to Storage - Paved	1.32	1.17	1.52	1.59	2.00	2.06	2.18	2.09	2.13	1.50	1.61	1.41	20.55
	Directed to Storage - Unpaved	0.50	0.44	0.58	0.60	0.76	0.90	0.95	1.01	1.03	0.65	0.70	0.53	8.66
Centre	Directly on Storage - No Evaporation	2.31	2.54	3.05	2.92	3.73	4.24	3.83	3.33	3.48	2.93	3.27	2.56	38.17
	Directly on Storage - With Evaporation	1.51	1.74	1.65	0.92	0.93	0.64	0.00	0.00	0.18	0.43	1.57	1.76	11.31
	Directed to Storage - Paved	1.06	1.22	1.46	1.43	1.83	2.29	2.07	1.86	1.95	1.49	1.67	1.18	19.51
	Directed to Storage - Unpaved	0.35	0.43	0.52	0.53	0.67	0.98	0.88	0.83	0.87	0.59	0.65	0.38	7.67
Chester	Directly on Storage - No Evaporation	3.35	2.96	3.52	3.77	4.01	3.94	4.47	3.58	4.09	2.99	3.79	3.62	44.09
	Directly on Storage - With Evaporation	2.30	1.91	1.77	1.32	0.51	0.00	0.00	0.00	0.00	0.00	1.69	2.57	12.06
	Directed to Storage - Paved	1.78	1.66	1.97	2.03	2.17	2.36	2.68	2.36	2.70	1.77	2.24	1.92	25.63
	Directed to Storage - Unpaved	0.74	0.74	0.88	0.87	0.92	1.14	1.30	1.25	1.43	0.84	1.06	0.80	11.97
Clarion	Directly on Storage - No Evaporation	2.77	2.46	3.30	3.67	4.09	5.06	4.55	4.29	4.29	3.31	3.80	3.27	44.86
	Directly on Storage - With Evaporation	1.93	1.62	1.90	1.71	1.29	1.42	0.35	0.37	0.93	0.79	2.12	2.43	16.86
	Directed to Storage - Paved	1.11	1.11	1.49	1.69	1.88	2.63	2.37	2.15	2.15	1.56	1.79	1.31	21.21
	Directed to Storage - Unpaved	0.25	0.34	0.46	0.55	0.61	1.06	0.96	0.82	0.82	0.53	0.61	0.29	7.30
Clearfield	Directly on Storage - No Evaporation	1.80	2.09	2.91	3.12	3.95	4.48	4.37	3.79	3.46	2.63	2.74	2.11	37.45
	Directly on Storage - With Evaporation	0.96	1.25	1.51	1.16	1.15	0.84	0.17	0.00	0.10	0.11	1.06	1.27	9.58
	Directed to Storage - Paved	0.77	0.96	1.34	1.50	1.90	2.37	2.32	2.05	1.87	1.29	1.34	0.91	18.61
	Directed to Storage - Unpaved	0.22	0.31	0.44	0.53	0.67	0.99	0.96	0.87	0.80	0.47	0.49	0.25	7.00
Clinton	Directly on Storage - No Evaporation	1.82	2.53	2.95	3.17	3.66	4.04	3.47	3.34	2.99	2.72	3.41	2.47	36.57
	Directly on Storage - With Evaporation	0.82	1.53	1.25	0.87	0.36	0.00	0.00	0.00	0.00	0.00	1.41	1.47	7.71
	Directed to Storage - Paved	0.82	1.19	1.39	1.52	1.76	2.14	1.84	1.84	1.64	1.36	1.71	1.11	18.31
	Directed to Storage - Unpaved	0.25	0.40	0.47	0.54	0.62	0.89	0.76	0.80	0.72	0.52	0.31	0.35	6.63

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Columbia	Directly on Storage - No Evaporation	2.52	2.42	2.97	3.27	4.03	4.56	3.87	3.51	3.69	3.17	3.40	3.00	40.41
	Directly on Storage - With Evaporation	1.62	1.52	1.47	1.17	1.03	0.66	0.00	0.00	0.09	0.47	1.60	2.10	11.73
	Directed to Storage - Paved	1.21	1.21	1.49	1.67	2.06	2.46	2.09	2.04	2.14	1.68	1.80	1.44	21.28
	Directed to Storage - Unpaved	0.43	0.46	0.56	0.65	0.81	1.05	0.89	0.95	1.00	0.70	0.75	0.51	8.75
Crawford	Directly on Storage - No Evaporation	2.19	2.29	2.87	3.21	4.04	4.62	4.24	4.19	4.16	3.46	3.86	3.26	42.36
	Directly on Storage - With Evaporation	1.35	1.45	1.47	1.25	1.24	0.98	0.04	0.27	0.80	0.94	2.18	2.42	14.36
	Directed to Storage - Paved	0.79	0.94	1.18	1.44	1.82	2.35	2.16	1.97	1.95	1.59	1.77	1.17	19.14
	Directed to Storage - Unpaved	0.11	0.23	0.29	0.45	0.57	0.92	0.85	0.67	0.66	0.52	0.58	0.16	6.01
Cumberland	Directly on Storage - No Evaporation	2.75	2.62	3.14	3.25	3.79	3.80	3.55	3.01	3.57	3.08	3.22	2.92	38.66
	Directly on Storage - With Evaporation	1.85	1.72	1.54	1.05	0.59	0.00	0.00	0.00	0.00	0.28	1.32	2.02	10.34
	Directed to Storage - Paved	1.37	1.36	1.63	1.66	1.93	2.13	1.99	1.83	2.17	1.69	1.77	1.46	20.99
	Directed to Storage - Unpaved	0.52	0.55	0.66	0.65	0.76	0.95	0.89	0.90	1.07	0.74	0.77	0.55	9.01
Dauphin	Directly on Storage - No Evaporation	2.84	2.93	3.28	3.24	4.26	3.85	3.59	3.31	3.51	2.93	3.53	3.24	40.51
	Directly on Storage - With Evaporation	1.88	1.97	1.68	1.00	1.06	0.00	0.00	0.00	0.00	0.05	1.61	2.28	11.53
	Directed to Storage - Paved	1.45	1.52	1.71	1.68	2.22	2.16	2.01	2.05	2.18	1.61	1.94	1.65	22.18
	Directed to Storage - Unpaved	0.57	0.62	0.69	0.68	0.89	0.96	0.90	1.03	1.09	0.70	0.85	0.65	9.62
Delaware	Directly on Storage - No Evaporation	2.88	3.03	3.81	3.63	4.13	3.73	4.14	3.71	3.88	2.86	3.64	3.40	42.84
	Directly on Storage - With Evaporation	1.83	1.98	2.06	1.18	0.63	0.00	0.00	0.00	0.00	0.00	1.54	2.35	11.57
	Directed to Storage - Paved	1.53	1.70	2.13	2.00	2.27	2.28	2.53	2.45	2.56	1.72	2.18	1.80	25.14
	Directed to Storage - Unpaved	0.63	0.76	0.95	0.87	0.99	1.12	1.24	1.30	1.36	0.83	1.06	0.75	11.86
Elk	Directly on Storage - No Evaporation	2.43	2.39	3.30	3.43	4.39	4.69	4.60	3.85	3.63	3.09	3.55	3.05	42.40
	Directly on Storage - With Evaporation	1.59	1.55	1.90	1.47	1.59	1.05	0.40	0.00	0.27	0.57	1.87	2.21	14.47
	Directed to Storage - Paved	1.00	1.05	1.45	1.61	2.06	2.44	2.39	2.00	1.89	1.48	1.70	1.25	20.33
	Directed to Storage - Unpaved	0.24	0.31	0.43	0.55	0.70	0.98	0.97	0.81	0.76	0.53	0.60	0.31	7.19

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Erie	Directly on Storage - No Evaporation	2.68	2.51	3.25	3.45	3.63	4.36	4.05	4.26	4.33	3.82	4.22	3.99	44.53
	Directly on Storage - With Evaporation	1.85	1.68	1.87	1.52	0.88	0.78	0.00	0.41	1.03	1.34	2.57	3.16	17.07
	Directed to Storage - Paved	0.94	1.00	1.30	1.52	1.60	2.18	2.03	1.91	1.95	1.76	1.94	1.40	19.51
	Directed to Storage - Unpaved	0.11	0.23	0.29	0.45	0.47	0.83	0.77	0.60	0.61	0.57	0.63	0.16	5.71
Fayette	Directly on Storage - No Evaporation	2.71	2.58	3.68	3.81	4.25	4.02	4.61	3.76	3.43	2.81	3.37	3.12	42.15
	Directly on Storage - With Evaporation	1.87	1.74	2.28	1.85	1.45	0.38	0.41	0.00	0.07	0.29	1.69	2.28	14.31
	Directed to Storage - Paved	1.22	1.21	1.73	1.83	2.04	2.17	2.49	2.07	1.89	1.41	1.69	1.40	21.14
	Directed to Storage - Unpaved	0.38	0.41	0.59	0.65	0.72	0.92	1.06	0.90	0.82	0.53	0.64	0.44	8.07
Forest	Directly on Storage - No Evaporation	2.49	2.22	3.27	3.51	3.87	4.56	4.52	4.05	3.94	3.33	3.54	3.18	42.48
	Directly on Storage - With Evaporation	1.65	1.38	1.87	1.55	1.07	0.92	0.32	0.13	0.58	0.81	1.86	2.34	14.48
	Directed to Storage - Paved	0.92	0.95	1.41	1.61	1.78	2.33	2.31	1.94	1.89	1.57	1.66	1.18	19.55
	Directed to Storage - Unpaved	0.15	0.27	0.39	0.53	0.58	0.91	0.90	0.69	0.67	0.53	0.57	0.19	6.38
Franklin	Directly on Storage - No Evaporation	2.66	2.71	3.56	3.50	3.91	3.95	3.55	3.46	3.29	3.19	3.39	3.12	40.26
	Directly on Storage - With Evaporation	1.73	1.78	2.01	1.33	0.81	0.00	0.00	0.00	0.00	0.40	1.53	2.19	11.77
	Directed to Storage - Paved	1.33	1.38	1.82	1.82	2.03	2.21	1.99	2.07	1.97	1.75	1.86	1.56	21.79
	Directed to Storage - Unpaved	0.51	0.54	0.71	0.74	0.82	0.99	0.89	1.00	0.95	0.76	0.81	0.59	9.31
Fulton	Directly on Storage - No Evaporation	2.27	2.53	3.15	3.44	3.81	3.72	3.49	3.30	3.32	3.22	3.19	2.83	38.24
	Directly on Storage - With Evaporation	1.37	1.63	1.65	1.34	0.81	0.00	0.00	0.00	0.00	0.52	1.39	1.93	10.62
	Directed to Storage - Paved	1.11	1.27	1.58	1.75	1.94	2.04	1.92	1.94	1.96	1.70	1.69	1.38	20.29
	Directed to Storage - Unpaved	0.41	0.48	0.60	0.69	0.76	0.89	0.84	0.92	0.93	0.71	0.70	0.51	8.43
Greene	Directly on Storage - No Evaporation	2.47	2.23	3.41	3.32	4.00	3.80	4.14	3.62	3.08	2.47	3.13	2.78	38.45
	Directly on Storage - With Evaporation	1.57	1.33	1.91	1.22	1.00	0.00	0.00	0.00	0.00	0.00	1.33	1.88	10.24
	Directed to Storage - Paved	1.06	1.05	1.60	1.59	1.92	2.01	2.19	1.99	1.69	1.21	1.53	1.20	19.06
	Directed to Storage - Unpaved	0.30	0.36	0.55	0.56	0.68	0.84	0.91	0.87	0.74	0.44	0.56	0.33	7.14

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Huntingdon	Directly on Storage - No Evaporation	2.39	2.42	3.13	3.27	4.37	4.17	4.17	3.42	3.64	3.32	3.41	2.98	40.67
	Directly on Storage - With Evaporation	1.59	1.62	1.73	1.27	1.57	0.57	0.00	0.00	0.34	0.82	1.71	2.18	13.38
	Directed to Storage - Paved	1.12	1.19	1.53	1.64	2.18	2.25	2.25	1.98	2.11	1.72	1.77	1.40	21.15
	Directed to Storage - Unpaved	0.38	0.44	0.56	0.62	0.83	0.96	0.96	0.92	0.98	0.70	0.72	0.48	8.54
Indiana	Directly on Storage - No Evaporation	3.22	3.09	4.02	3.88	4.44	4.70	4.91	4.08	4.08	3.08	3.82	3.54	46.83
	Directly on Storage - With Evaporation	2.38	2.25	2.62	1.92	1.64	1.06	0.71	0.16	0.72	0.56	2.14	2.70	18.83
	Directed to Storage - Paved	1.38	1.42	1.85	1.86	2.13	2.49	2.60	2.24	2.24	1.51	1.87	1.52	23.12
	Directed to Storage - Unpaved	0.39	0.46	0.60	0.66	0.75	1.03	1.08	0.98	0.98	0.55	0.69	0.42	8.60
Jefferson	Directly on Storage - No Evaporation	2.73	2.58	3.48	3.31	4.21	4.87	4.28	4.08	3.81	3.03	3.43	3.48	43.25
	Directly on Storage - With Evaporation	1.89	1.74	2.08	1.35	1.41	1.23	0.08	0.16	0.45	0.51	1.75	2.64	15.25
	Directed to Storage - Paved	1.12	1.13	1.53	1.55	1.98	2.53	2.23	2.12	1.98	1.45	1.65	1.42	20.69
	Directed to Storage - Unpaved	0.27	0.33	0.45	0.53	0.67	1.02	0.90	0.86	0.80	0.51	0.58	0.35	7.28
Juniata	Directly on Storage - No Evaporation	2.35	2.53	3.10	3.10	4.12	3.82	3.84	3.35	3.54	3.15	3.37	2.98	39.23
	Directly on Storage - With Evaporation	1.51	1.69	1.70	1.14	1.32	0.18	0.00	0.00	0.18	0.63	1.69	2.14	12.16
	Directed to Storage - Paved	1.13	1.27	1.55	1.55	2.06	2.10	2.11	1.94	2.05	1.67	1.79	1.43	20.64
	Directed to Storage - Unpaved	0.40	0.48	0.59	0.59	0.78	0.92	0.92	0.90	0.96	0.69	0.74	0.51	8.48
Lackawanna	Directly on Storage - No Evaporation	2.58	2.52	2.98	3.57	4.24	4.45	3.91	3.82	3.81	3.36	3.63	3.13	41.99
	Directly on Storage - With Evaporation	1.68	1.62	1.48	1.47	1.24	0.65	0.00	0.00	0.31	0.66	1.83	2.23	13.17
	Directed to Storage - Paved	1.26	1.29	1.52	1.82	2.16	2.45	2.15	2.29	2.29	1.81	1.96	1.53	22.53
	Directed to Storage - Unpaved	0.46	0.50	0.60	0.71	0.85	1.07	0.94	1.11	1.10	0.77	0.83	0.56	9.51
Lancaster	Directly on Storage - No Evaporation	2.79	2.43	2.92	3.66	3.72	4.10	4.20	3.51	3.35	3.14	3.34	3.17	40.32
	Directly on Storage - With Evaporation	1.74	1.38	1.17	1.21	0.22	0.00	0.00	0.00	0.00	0.00	1.24	2.12	9.08
	Directed to Storage - Paved	1.48	1.31	1.58	1.94	1.97	2.38	2.43	2.28	2.18	1.79	1.90	1.68	22.92
	Directed to Storage - Unpaved	0.61	0.56	0.67	0.80	0.82	1.11	1.13	1.19	1.14	0.82	0.87	0.70	10.42

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lawrence	Directly on Storage - No Evaporation	2.16	2.14	3.08	3.03	3.50	4.08	3.96	3.38	3.40	2.70	3.08	2.80	37.31
	Directly on Storage - With Evaporation	1.32	1.30	1.68	1.07	0.70	0.44	0.00	0.00	0.04	0.18	1.40	1.96	10.09
	Directed to Storage - Paved	0.82	0.92	1.32	1.39	1.61	2.08	2.02	1.69	1.70	1.27	1.45	1.06	17.34
	Directed to Storage - Unpaved	0.15	0.26	0.37	0.45	0.53	0.82	0.79	0.64	0.65	0.43	0.49	0.20	5.77
Lebanon	Directly on Storage - No Evaporation	3.10	2.42	3.01	3.67	4.86	4.23	4.74	3.62	4.13	3.02	3.66	3.34	43.80
	Directly on Storage - With Evaporation	2.11	1.43	1.36	1.36	1.56	0.00	0.00	0.00	0.17	0.05	1.68	2.35	12.07
	Directed to Storage - Paved	1.58	1.28	1.60	1.91	2.53	2.37	2.65	2.28	2.60	1.69	2.05	1.70	24.24
	Directed to Storage - Unpaved	0.62	0.53	0.66	0.77	1.02	1.06	1.19	1.16	1.32	0.76	0.92	0.67	10.67
Lehigh	Directly on Storage - No Evaporation	3.16	2.95	3.28	3.52	4.20	3.75	4.14	4.28	3.93	2.94	3.88	3.49	43.52
	Directly on Storage - With Evaporation	2.14	1.93	1.58	1.14	0.80	0.00	0.00	0.00	0.00	0.00	1.84	2.47	11.90
	Directed to Storage - Paved	1.64	1.59	1.77	1.87	2.23	2.14	2.36	2.74	2.52	1.68	2.21	1.81	24.55
	Directed to Storage - Unpaved	0.66	0.68	0.75	0.77	0.92	0.98	1.08	1.41	1.30	0.76	1.01	0.73	11.06
Luzerne	Directly on Storage - No Evaporation	2.37	2.49	2.79	3.51	4.16	4.46	4.24	4.00	3.95	3.23	3.57	2.91	41.69
	Directly on Storage - With Evaporation	1.47	1.59	1.29	1.41	1.16	0.56	0.00	0.00	0.35	0.53	1.77	2.01	12.15
	Directed to Storage - Paved	1.16	1.27	1.42	1.79	2.12	2.45	2.33	2.40	2.37	1.75	1.93	1.42	22.43
	Directed to Storage - Unpaved	0.43	0.50	0.56	0.70	0.83	1.07	1.02	1.16	1.15	0.74	0.82	0.52	9.50
Lycoming	Directly on Storage - No Evaporation	2.53	2.81	3.28	3.16	3.78	4.30	3.78	3.13	3.33	3.14	3.59	2.96	39.76
	Directly on Storage - With Evaporation	1.73	2.01	1.88	1.16	0.98	0.70	0.00	0.00	0.00	0.64	1.89	2.16	13.13
	Directed to Storage - Paved	1.14	1.35	1.57	1.55	1.85	2.28	2.00	1.75	1.86	1.60	1.83	1.33	20.11
	Directed to Storage - Unpaved	0.35	0.48	0.56	0.57	0.68	0.94	0.83	0.78	0.83	0.63	0.72	0.41	7.79
Mc Kean	Directly on Storage - No Evaporation	2.81	2.62	3.39	3.44	3.99	5.15	4.27	4.11	4.22	3.45	3.87	3.73	45.06
	Directly on Storage - With Evaporation	1.97	1.78	1.99	1.48	1.19	1.51	0.07	0.19	0.86	0.93	2.19	2.89	17.06
	Directed to Storage - Paved	1.04	1.10	1.42	1.55	1.80	2.62	2.18	1.97	2.03	1.62	1.82	1.38	20.53
	Directed to Storage - Unpaved	0.17	0.29	0.37	0.48	0.56	1.03	0.85	0.70	0.72	0.55	0.62	0.22	6.57

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mercer	Directly on Storage - No Evaporation	2.26	2.28	3.20	3.33	3.77	4.47	3.96	3.64	3.87	2.91	3.68	3.03	40.37
	Directly on Storage - With Evaporation	1.42	1.44	1.80	1.37	0.97	0.83	0.00	0.00	0.51	0.39	2.00	2.19	12.90
	Directed to Storage - Paved	0.84	0.96	1.34	1.50	1.69	2.28	2.02	1.74	1.86	1.37	1.73	1.12	18.44
	Directed to Storage - Unpaved	0.14	0.25	0.35	0.47	0.53	0.89	0.79	0.62	0.66	0.47	0.59	0.18	5.93
Mifflin	Directly on Storage - No Evaporation	2.17	2.41	2.99	2.95	4.10	3.91	4.09	3.17	3.28	2.98	3.20	2.80	38.05
	Directly on Storage - With Evaporation	1.37	1.61	1.59	0.95	1.30	0.31	0.00	0.00	0.00	0.48	1.50	2.00	11.11
	Directed to Storage - Paved	1.02	1.18	1.47	1.48	2.05	2.11	2.21	1.71	1.90	1.73	1.66	1.32	19.83
	Directed to Storage - Unpaved	0.35	0.43	0.54	0.56	0.78	0.90	0.94	0.73	0.89	0.80	0.67	0.45	8.04
Monroe	Directly on Storage - No Evaporation	3.41	3.21	3.66	4.03	4.65	4.16	4.24	4.18	4.22	3.60	4.37	3.81	47.51
	Directly on Storage - With Evaporation	2.41	2.21	2.06	1.83	1.45	0.00	0.00	0.00	0.42	0.70	2.47	2.81	16.34
	Directed to Storage - Paved	1.74	1.70	1.94	2.10	2.42	2.33	2.37	2.59	2.61	2.01	2.44	1.94	26.20
	Directed to Storage - Unpaved	0.68	0.71	0.81	0.85	0.98	1.04	1.06	1.30	1.31	0.90	1.09	0.76	11.47
Montgomery	Directly on Storage - No Evaporation	3.20	2.79	3.33	3.72	4.00	3.32	4.28	3.94	3.90	2.79	3.87	3.36	42.46
	Directly on Storage - With Evaporation	2.18	1.77	1.63	1.34	0.60	0.00	0.00	0.00	0.00	0.00	1.83	2.34	11.66
	Directed to Storage - Paved	1.69	1.56	1.86	2.01	2.16	1.99	2.57	2.60	2.57	1.65	2.28	1.78	24.71
	Directed to Storage - Unpaved	0.70	0.70	0.83	0.85	0.92	0.96	1.24	1.38	1.37	0.78	1.08	0.74	11.55
Montour	Directly on Storage - No Evaporation	2.52	2.42	2.97	3.27	4.03	4.56	3.87	3.51	3.69	3.17	3.40	3.00	40.41
	Directly on Storage - With Evaporation	1.62	1.52	1.47	1.17	1.03	0.66	0.00	0.00	0.09	0.47	1.60	2.10	11.73
	Directed to Storage - Paved	1.21	1.21	1.49	1.64	2.02	2.51	2.13	2.04	2.14	1.68	1.80	1.44	21.29
	Directed to Storage - Unpaved	0.43	0.46	0.56	0.62	0.77	1.09	0.93	0.95	1.00	0.70	0.75	0.51	8.76
Northampton	Directly on Storage - No Evaporation	3.42	3.08	3.69	3.94	4.77	4.21	4.23	4.27	4.28	3.48	4.23	3.95	47.55
	Directly on Storage - With Evaporation	2.43	2.09	2.04	1.63	1.47	0.00	0.00	0.00	0.32	0.51	2.25	2.96	15.70
	Directed to Storage - Paved	1.78	1.66	1.99	2.09	2.53	2.40	2.41	2.73	2.74	1.98	2.41	2.05	26.78
	Directed to Storage - Unpaved	0.72	0.71	0.85	0.87	1.05	1.09	1.10	1.41	1.41	0.90	1.10	0.83	12.04

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Northumberland	Directly on Storage - No Evaporation	2.50	2.45	2.83	3.53	4.20	4.26	4.03	3.84	3.39	3.64	3.68	2.81	41.16
	Directly on Storage - With Evaporation	1.60	1.55	1.33	1.43	1.20	0.36	0.00	0.00	0.00	0.94	1.88	1.91	12.20
	Directed to Storage - Paved	1.20	1.23	1.42	1.77	2.10	2.34	2.22	2.23	1.97	1.93	1.95	1.35	21.69
	Directed to Storage - Unpaved	0.43	0.47	0.54	0.67	0.80	1.02	0.97	1.04	0.92	0.80	0.81	0.48	8.93
Perry	Directly on Storage - No Evaporation	2.53	2.65	3.20	3.24	4.13	3.73	3.59	3.52	3.80	3.31	3.54	3.16	40.40
	Directly on Storage - With Evaporation	1.63	1.75	1.70	1.14	1.13	0.00	0.00	0.00	0.20	0.61	1.74	2.26	12.16
	Directed to Storage - Paved	1.24	1.35	1.63	1.65	2.11	2.05	1.97	2.11	2.28	1.79	1.91	1.55	21.65
	Directed to Storage - Unpaved	0.46	0.53	0.64	0.65	0.83	0.90	0.86	1.02	1.10	0.76	0.81	0.57	9.12
Philadelphia	Directly on Storage - No Evaporation	3.21	2.79	3.46	3.62	3.75	3.74	4.28	3.80	3.42	2.62	3.34	3.38	41.41
	Directly on Storage - With Evaporation	2.16	1.74	1.71	1.17	0.25	0.00	0.00	0.00	0.00	0.00	1.24	2.33	10.60
	Directed to Storage - Paved	1.70	1.56	1.94	1.99	2.06	2.28	2.61	2.51	2.26	1.57	2.00	1.79	24.28
	Directed to Storage - Unpaved	0.71	0.70	0.87	0.87	0.90	1.12	1.28	1.33	1.20	0.76	0.97	0.74	11.44
Pike	Directly on Storage - No Evaporation	3.12	2.90	3.42	3.69	4.30	3.80	4.30	3.70	3.87	3.08	3.88	3.35	43.41
	Directly on Storage - With Evaporation	2.22	2.00	1.82	1.49	1.20	0.00	0.00	0.00	0.17	0.28	1.98	2.45	13.61
	Directed to Storage - Paved	1.59	1.51	1.78	1.92	2.24	2.09	2.37	2.26	2.36	1.72	2.17	1.71	23.71
	Directed to Storage - Unpaved	0.62	0.61	0.72	0.77	0.90	0.91	1.03	1.11	1.16	0.77	0.97	0.67	10.25
Potter	Directly on Storage - No Evaporation	2.38	2.40	2.91	3.20	3.69	5.29	3.92	3.69	3.78	3.19	3.79	2.97	41.21
	Directly on Storage - With Evaporation	1.54	1.56	1.51	1.24	0.89	1.65	0.00	0.00	0.42	0.67	2.11	2.13	13.72
	Directed to Storage - Paved	1.00	1.08	1.31	1.50	1.73	2.75	2.04	1.88	1.78	1.50	1.78	1.25	19.60
	Directed to Storage - Unpaved	0.26	0.34	0.41	0.51	0.59	1.11	0.82	0.74	0.60	0.51	0.61	0.33	6.83
Schuylkill	Directly on Storage - No Evaporation	2.71	2.52	2.95	3.61	4.43	4.24	4.43	4.07	4.10	3.20	3.79	3.17	43.23
	Directly on Storage - With Evaporation	1.71	1.52	1.35	1.41	1.23	0.04	0.00	0.00	0.30	0.30	1.89	2.17	11.93
	Directed to Storage - Paved	1.38	1.31	1.53	1.88	2.31	2.38	2.48	2.52	2.54	1.79	2.12	1.62	23.86
	Directed to Storage - Unpaved	0.54	0.53	0.62	0.76	0.93	1.06	1.11	1.26	1.27	0.80	0.95	0.63	10.46

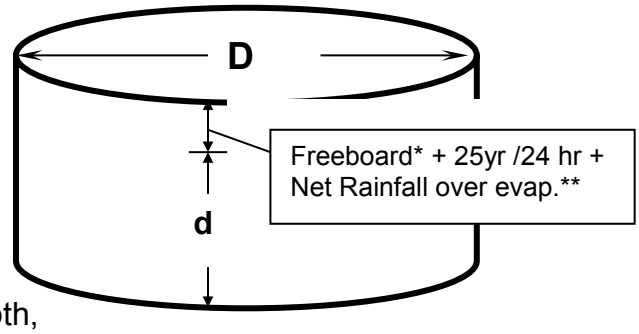
County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Snyder	Directly on Storage - No Evaporation	2.50	2.45	2.83	3.53	4.20	4.26	4.03	3.84	3.39	3.64	3.68	2.81	41.16
	Directly on Storage - With Evaporation	1.60	1.55	1.33	1.43	1.20	0.36	0.00	0.00	0.00	0.94	1.88	1.91	12.20
	Directed to Storage - Paved	1.20	1.23	1.42	1.77	2.10	2.34	2.22	2.27	2.00	1.93	1.95	1.35	21.76
	Directed to Storage - Unpaved	0.43	0.47	0.54	0.67	0.80	1.02	0.97	1.08	0.95	0.80	0.81	0.48	9.00
Somerset	Directly on Storage - No Evaporation	3.07	2.72	3.80	3.93	4.30	4.00	5.00	3.67	3.71	3.07	3.46	3.53	44.26
	Directly on Storage - With Evaporation	2.23	1.88	2.40	1.97	1.50	0.36	0.80	0.00	0.35	0.55	1.78	2.69	16.51
	Directed to Storage - Paved	1.41	1.31	1.82	1.93	2.11	2.16	2.70	2.09	2.11	1.57	1.76	1.62	22.60
	Directed to Storage - Unpaved	0.46	0.46	0.65	0.71	0.77	0.92	1.15	0.95	0.96	0.61	0.69	0.53	8.87
Sullivan	Directly on Storage - No Evaporation	2.81	2.85	2.54	3.88	3.71	4.83	4.25	3.67	3.53	3.62	4.22	3.12	43.03
	Directly on Storage - With Evaporation	2.01	2.05	1.14	1.88	0.91	1.23	0.05	0.00	0.13	1.12	2.52	2.32	15.36
	Directed to Storage - Paved	1.32	1.37	1.22	1.90	1.82	2.61	2.30	2.09	2.01	1.88	2.19	1.47	22.18
	Directed to Storage - Unpaved	0.45	0.48	0.43	0.70	0.67	1.11	0.98	0.95	0.92	0.76	0.89	0.50	8.84
Susquehanna	Directly on Storage - No Evaporation	2.90	2.84	3.23	3.62	4.00	4.22	3.88	3.81	3.60	3.41	3.84	3.31	42.66
	Directly on Storage - With Evaporation	2.00	1.94	1.83	1.62	1.10	0.52	0.00	0.00	0.20	0.81	2.14	2.41	14.57
	Directed to Storage - Paved	1.36	1.36	1.55	1.77	1.96	2.24	2.06	2.17	2.05	1.77	2.00	1.56	21.85
	Directed to Storage - Unpaved	0.46	0.48	0.55	0.65	0.72	0.93	0.85	0.99	0.94	0.72	0.81	0.53	8.63
Tioga	Directly on Storage - No Evaporation	1.68	1.78	2.14	2.35	3.33	4.09	3.36	2.82	3.14	2.64	2.62	2.19	32.14
	Directly on Storage - With Evaporation	0.88	0.98	0.74	0.39	0.53	0.45	0.00	0.00	0.00	0.12	0.94	1.35	6.38
	Directed to Storage - Paved	0.72	0.82	0.98	1.13	1.60	2.17	1.78	1.55	1.73	1.32	1.31	0.94	16.05
	Directed to Storage - Unpaved	0.20	0.27	0.32	0.40	0.57	0.90	0.74	0.68	0.75	0.50	0.50	0.26	6.09
Union	Directly on Storage - No Evaporation	2.58	2.88	3.34	3.21	4.39	4.54	4.29	3.41	4.27	3.66	3.82	3.17	43.56
	Directly on Storage - With Evaporation	1.68	1.98	1.84	1.21	1.49	0.74	0.00	0.00	0.77	1.06	2.12	2.27	15.16
	Directed to Storage - Paved	1.21	1.41	1.64	1.61	2.20	2.45	2.32	1.98	2.48	1.90	1.99	1.49	22.66
	Directed to Storage - Unpaved	0.41	0.52	0.60	0.61	0.83	1.04	0.99	0.92	1.15	0.77	0.80	0.51	9.16

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Venango	Directly on Storage - No Evaporation	2.46	2.39	3.25	3.53	3.79	4.69	4.79	4.08	3.88	3.16	3.77	3.25	43.04
	Directly on Storage - With Evaporation	1.62	1.55	1.85	1.57	0.99	1.05	0.59	0.16	0.52	0.64	2.09	2.41	15.04
	Directed to Storage - Paved	0.91	1.03	1.40	1.62	1.74	2.44	2.49	2.04	1.94	1.86	1.77	1.20	28.70
	Directed to Storage - Unpaved	0.15	0.29	0.39	0.53	0.57	0.98	1.01	0.78	0.74	0.51	0.60	0.20	6.73
Warren	Directly on Storage - No Evaporation	2.67	2.40	3.19	3.53	3.97	4.88	4.13	4.26	4.12	3.44	3.92	3.70	44.21
	Directly on Storage - With Evaporation	1.83	1.56	1.79	1.57	1.17	1.24	0.00	0.34	0.76	0.92	2.24	2.86	16.28
	Directed to Storage - Paved	0.99	1.03	1.37	1.62	1.83	2.49	2.11	2.04	1.98	1.62	1.84	1.37	20.29
	Directed to Storage - Unpaved	0.16	0.29	0.38	0.42	0.60	0.98	0.83	0.72	0.70	0.55	0.63	0.22	6.48
Washington	Directly on Storage - No Evaporation	2.37	2.26	3.33	3.24	3.83	3.65	3.87	3.64	3.08	2.63	3.00	2.70	37.58
	Directly on Storage - With Evaporation	1.47	1.36	1.83	1.14	0.83	0.00	0.00	0.00	0.00	0.00	1.20	1.80	9.61
	Directed to Storage - Paved	1.00	1.01	1.50	1.52	1.80	1.93	2.05	1.97	1.66	1.26	1.44	1.13	18.27
	Directed to Storage - Unpaved	0.26	0.32	0.47	0.52	0.61	0.80	0.85	0.84	0.71	0.45	0.51	0.30	6.62
Wayne	Directly on Storage - No Evaporation	2.87	2.77	3.13	3.71	4.33	4.28	3.73	3.95	3.81	3.40	3.85	3.39	43.19
	Directly on Storage - With Evaporation	1.97	1.87	1.63	1.71	1.43	0.48	0.00	0.00	0.31	0.80	2.15	2.49	14.82
	Directed to Storage - Paved	1.38	1.39	1.56	1.86	2.16	2.31	2.01	2.29	2.21	1.84	2.08	1.63	22.70
	Directed to Storage - Unpaved	0.49	0.53	0.59	0.70	0.82	0.98	0.86	1.07	1.03	0.78	0.89	0.58	9.31
Westmoreland	Directly on Storage - No Evaporation	2.81	2.78	3.66	3.96	4.32	4.63	4.65	4.03	3.88	3.03	3.64	3.27	44.66
	Directly on Storage - With Evaporation	1.97	1.94	2.26	2.00	1.52	0.99	0.45	0.11	0.52	0.51	1.96	2.43	16.66
	Directed to Storage - Paved	1.21	1.31	1.72	1.90	2.07	2.45	2.46	2.22	2.13	1.48	1.79	1.40	22.15
	Directed to Storage - Unpaved	0.34	0.45	0.59	0.67	0.73	1.02	1.02	0.97	0.93	0.54	0.66	0.39	8.31
Wyoming	Directly on Storage - No Evaporation	2.28	2.39	2.51	3.28	3.67	4.16	3.69	3.30	3.38	3.01	3.42	2.69	37.78
	Directly on Storage - With Evaporation	1.38	1.49	1.01	1.28	0.77	0.36	0.00	0.00	0.00	0.41	1.72	1.79	10.22
	Directed to Storage - Paved	1.10	1.17	1.23	1.64	1.83	2.25	1.99	1.91	1.96	1.60	1.81	1.29	19.78
	Directed to Storage - Unpaved	0.39	0.43	0.45	0.62	0.70	0.96	0.85	0.89	0.91	0.66	0.75	0.46	8.07

County		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
York	Directly on Storage - No Evaporation	2.90	2.80	3.21	3.42	3.91	3.88	3.39	3.33	3.48	2.98	3.40	3.20	39.91
	Directly on Storage - With Evaporation	1.91	1.81	1.56	1.11	0.61	0.00	0.00	0.00	0.00	0.01	1.42	2.21	10.64
	Directed to Storage - Paved	1.51	1.48	1.70	1.81	2.07	2.25	1.97	2.13	2.23	1.70	1.94	1.67	22.46
	Directed to Storage - Unpaved	0.61	0.62	0.71	0.75	0.86	1.05	0.92	1.10	1.15	0.77	0.88	0.67	10.09

Supplement 8
Manure Storage Volume Calculations

1. **To determine the useable volume (V) in a circular storage facility, use the following equation:**



V (ft^3) = **d** x (3.14 x (**D**^{2}/4))

D = tank diameter (ft)

d = useable depth of tank for liquid storage requires deducting freeboard, the 25-year 24-hour storm depth, and net rainfall over evap.** (Assumes sump or ramp for total cleanout)

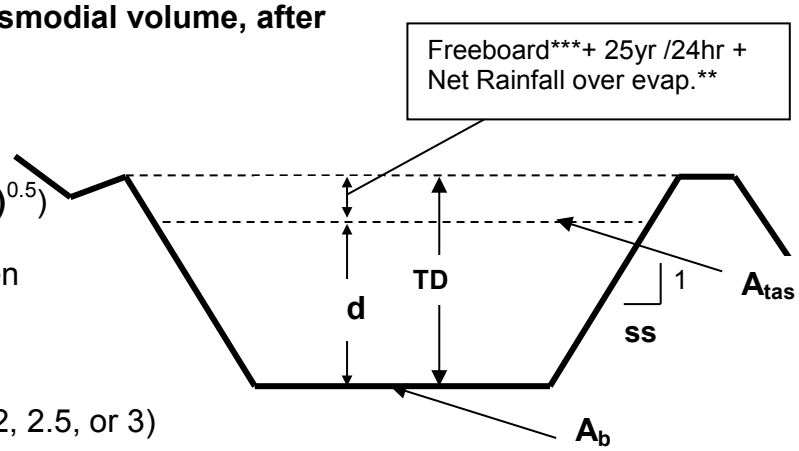
V = Volume in ft^3 of available storage (convert to gallons by multiplying by 7.48)

* Freeboard for all exposed vertical walled facilities is 6" except CAFO's >1,000 AEUs that are new or expanded after January 29, 2000, those would need 24" of freeboard.
** This value may be zero if included in Appendix 3, volume needed.

a. **Example determination of available storage:**
   - A storage tank is 92 feet in diameter and 12 feet of total deep. It is located in Fulton County where the 25-year 24-hour rainfall is 5.1" or 0.43'. (Supplement 9).
   - Storage period is from December 1 to May 31. Net rainfall over evaporation is 1.93 + 1.37 + 1.63 + 1.65 + 1.34 + 0.81 = 8.73" or 0.73'. (Supplement 7).
   - Freeboard requirement for a vertical walled facility is 6" or 0.5'.
   - The useable depth (**d**) = total depth – freeboard – 25-year 24-hour depth – net rainfall = 12'- 0.5'- 0.43' – 0.73' = 10.3'.
   - Substitute into the above formula and solve for the available storage in ft^3

V = 10.3' x (3.14 x (92^2 / 4)) = 68,436 ft^3

2. **To determine the usable volume (V) of a sloping sided storage facility with known sideslope ratio (ss), total depth (TD) and bottom or top dimensions use the following equation for a prismodial volume, after calculating useable depth (d).**



$$V = (d/3) \times (A_{tas} + A_b + (A_{tas} \times A_b)^{0.5})$$

Where **d** = useable depth between A_{tas} and A_b.

ss = side slope ratio. (typically 2, 2.5, or 3)

A_{tas} = area at top of available storage depth (**d**) in ft^2

A_b = area at bottom of available storage depth (**d**) in ft^2

*** Freeboard for all exposed, sloped waste storages is 1', including CAFO's < 1,000 AEU and 2' for CAFO's > 1,000 AEU's built or expanded after January 29, 2000.

Use the following formulas for sites when the bottom dimension, sideslope ratio (ss), and total depth (D) are known:

A_b = (bottom length (ft.)) $_X$ (bottom width(ft.))

*Now determine the useable depth (**d**)*

d (depth) = total depth(**TD**) – freeboard – 25-year 24-hour depth – net rainfall

Then substitute to find A_{tas}

A_{tas} = (bottom length + (2 x **ss** x **d**)) $_x$ (bottom width + (2 x **ss** x **d**))

Use the following formulas for sites when the top dimensions, sideslopes (ss), and total depth (D) are known:

*Determine the useable depth (**d**)*

d (depth) = total depth – freeboard - 25yr /24hr depth – Net Rainfall

Determine bottom length, bottom width and then A_b

Bottom length = (top length - (2 $_x$ **ss** $_x$ **D**)

Bottom width = (top width - (2 $_x$ **ss** $_x$ **D**)

A_b = Bottom length $_x$ Bottom width

Then substitute to find A_{tas}

$\mathbf{A_{tas}}$ = ((bottom length+(2 x **ss** x **d**)) x ((bottom width+(2 x **ss** x **d**))

*Finish by substituting into the formula for **V**, as shown above.*

a. Example determination of available storage volume (V) on a sloped storage with known bottom dimensions, sideslope (ss), and total depth (D):

- A non-CAFO storage pond located in Centre County has a total depth of 10' from top of embankment to bottom.
- The bottom dimensions are 60' x 80'.
- Storage period of 6 months from December 1 through May 31.
- The side slopes are 2.5:1.
- The 25-year 24-hour rainfall depth for this site is 5.5"or 0.46' (Supplement 9).
- Net rainfall over evaporation 1.76 + 1.51 + 1.74 + 1.65 + .92 + .93 = 8.51" or 0.71' (Supplement 7).
- This assumes that this volume not included in Appendix 3. By rule the freeboard is 1' for non-CAFO site.

d = 10'-1.0'-0.46'- 0.71'= 7.8'.

$\mathbf{A_{tas}}$, $\mathbf{A_b}$, and **V** by substitution into formulas from above.

$\mathbf{A_b}$ = 60 x 80 = 4800 ft^2

$\mathbf{A_{tas}}$ = (60 + (2 x 2.5 x 7.8)) x (80 + (2 x 2.5 x 7.8)) = 99 x 119 = 11,781 ft^2

V = (7.8 / 3) x (11,781 + 4,800 + (11,781 x 4,800)$^{0.5}$)

V = 2.6 x (11,781 + 4,800 + 7,520)

V = 62,663 ft^3 or 468,719 gallons (62,663 ft^3 * 7.48 gal/ft^3)

b. Example determination of available storage on a sloped storage with known top dimensions, sideslope, and total depth :

- A CAFO storage pond has a total depth **(TD)** of 12'.
- The top dimensions are 120' x 130'. The side slopes ratio (**ss**) of 2.5.
- Location and storage period the same as previous example, however it has > 1,000 CAOs and was built in 2002.
- The 25-year 24 hour rainfall depth for this site is 5.5" (0.46').
- Net rainfall over evaporation = 1.76 + 1.51 + 1.74 + 1.65 +. 92 + .93 = 8.51" or 0.71' (Supplement 7).
- This assumes that this volume not included in Appendix 3. By rule the freeboard requirement for a CAFO site is 2'.

d = 12'- 2.0'- 0.46'- 0.71'= 8.8'.

Determine $\mathbf{A_b}$, $\mathbf{A_{tas}}$, and **V** by substitution into formulas from above.

Bottom length = (120' - (2 x **2.5** x **12'**) = 60'

Bottom width = (130' - (2 x **2.5** x **12'**) = 70'

$\mathbf{A_b}$ = 60' x70' = 4,200 ft^2

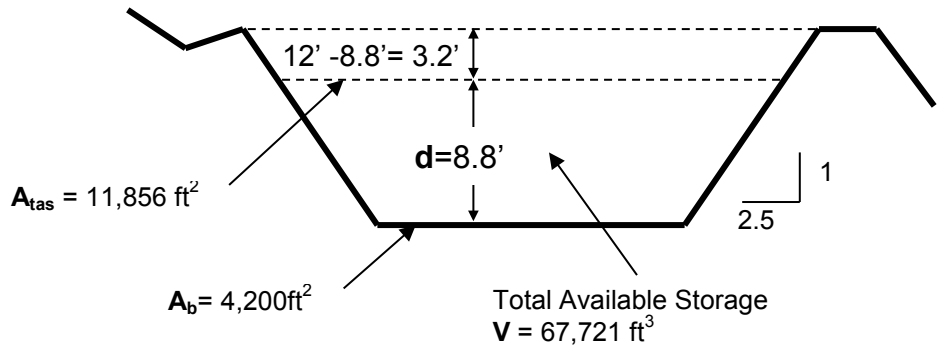
$\mathbf{A_{tas}}$ = (60 + (2 x 2.5 x 8.8')) x (70 + (2 x 2.5 x 8.8)) = 11,856 ft^2

V = (8.8 / 3) x (11,856 + 4,200 + $(11{,}856 \times 4{,}200)^{0.5}$)

V = 2.93 x (11,856 + 4,200 +7,057)

V = 67,721 ft^3 or 506,553 gallons (67,721 ft^3 * 7.48 gal/ft^3)

Solution:



3. To determine adequate storage.

After determining **V** (total storage available) compare against the required storage Volume, $\mathbf{V_r}$. The required storage volume is an output of Appendix 3: Manure Group Information. It includes all manure, washwater, bedding, net rainfall volume over the storage, and offsite runoff (includes net rainfall and the 25-year 24-hour for that area). It does not include the required freeboard or 25-year 24-hour volume over the actual storage area. Note in some cases, the net rainfall over the storage is not included and would be subtracted out during the **V** computation as shown in the examples.

- If **V** >= **Vr, storage is adequate**
- **If V < Vr, additional storage is needed and/or the plan must identify alternate storage or available land for application at times when capacity would be reached.**

P. Vanderstappen & W.H. Latshaw

Supplement 9
Pennsylvania 25-Year 24-Hour Storm Rainfall Data

Pennsylvania 24-Hour Storm Rainfalls in Inches*

County	25-Yr	County	25-Yr
Adams	6.0	Lackawanna	5.8
Allegheny	4.0	Lancaster	6.0
Armstrong	4.2	Lawrence	4.0
Beaver	4.0	Lebanon	5.7
Bedford	4.8	Lehigh	6.0
Berks	6.0	Luzerne	6.2
Blair	4.8	Lycoming	5.4
Bradford	4.3	McKean	4.3
Bucks	6.2	Mercer	4.1
Butler	4.1	Mifflin	5.3
Cambria	4.8	Monroe	6.0
Cameron	4.4	Montgomery	6.1
Carbon	6.3	Montour	5.1
Centre	5.5	Northampton	5.9
Chester	6.0	Northumberland	5.5
Clarion	4.2	Perry	5.3
Clearfield	4.4	Philadelphia	6.1
Clinton	5.4	Pike	5.7
Columbia	5.7	Potter	4.5
Crawford	4.3	Schuylkill	6.3
Cumberland	5.9	Snyder	5.7
Dauphin	5.6	Somerset	4.7
Delaware	6.0	Sullivan	5.5
Elk	4.4	Susquehanna	5.3
Erie	4.5	Tioga	4.4
Fayette	4.3	Union	5.5
Forest	4.1	Venango	4.1
Franklin	6.0	Warren	4.3
Fulton	5.1	Washington	4.0
Greene	4.1	Wayne	5.7
Huntingdon	4.9	Westmoreland	4.6
Indiana	4.5	Wyoming	5.2
Jefferson	4.3	York	6.1
Juniata	5.6		

* From NOAA14. Site specific rainfall depths for all rainfall frequencies including the 100 yr- 24hr can be obtained by going to the following http://hdsc.nws.noaa.gov/hdsc/pfds/ site. Print out results for documentation.

Supplement 10
Winter Manure Application Matrix

A nutrient management plan including planned winter manure application must include, with Appendix 10: Supporting Information and Documentation, a completed Winter Manure Application Matrix. When using the Nutrient Management Plan Excel spreadsheet for plan development, the Winter Manure Application Matrix is included and can be printed with the nutrient management plan.

A printout of the Winter Manure Application Matrix and user guidance is provided in this supplement. A standalone Excel version of the Winter Manure Application Matrix is available at: http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms.

Additional information relating to the winter manure application requirements under Act 38 can be found in the Nutrient Management Plan Summary and Appendix 10: Supporting Information and Documentation.

Supplement 10: Winter Manure Application Matrix (October 2009)

User Notes for the Winter Manure Application Matrix

1. Under Act 38, any one of the following conditions meets the "winter" definition .
   - December 15 to February 28
   - Frozen ground (4 inch depth)
   - Snow-covered ground
2. All Act 38 setbacks including those specific to winter manure application must be followed.

   Year-round:
   - 100 feet from streams (intermittent and perennial), lakes, ponds, and open existing sinkholes; unless less there is a permanent vegetative buffer at least 35 feet in width next to the stream, in which case there will be a 35 foot manure application setback.
   - 100 feet from active private water wells
   - 100 feet from active public water wells unless other state or federal programs require a larger setback

   Winter:
   - No winter manure application within 100 ft. of an above ground agricultural drainage inlet where surface flow is toward the inlet.
   - No winter manure application within 100 ft. of a wetland (identified on National Wetland Inventory Maps) within the 100 year floodplain of an Exceptional Value stream segment if surface flow is toward the wetland.
3. Fields receiving winter manure applications must have 25% cover or an established cover crop.

To begin for each CMU/Field ID, 1. Enter the CMU/Field ID and 2. Verify the CMU/Field meets the required cover conditions described in User Note 3.

CMU ID		
Does the CMU/Field have 25% cover or an established cover crop?		

To continue for each CMU/Field, 1. Choose the appropriate Evaluation Criteria Description and 2. Enter the corresponding Ranking Value.

	Evaluation Criteria Descriptions and Ranking Values					
	4	3	2[b]	1[c]		
Field Slope	< 4 %	4 - 8%	9 - 15%	> 15%		
Distance from Water Bodies[a]	> 350 ft.	350 - 200 ft	199 - 100 ft	<100 ft		
Drainage Class Determined using Phosphorus Index Drainage Class Determination	Somewhat Excessively OR Excessively	Well OR Moderately Well	Somewhat Poorly	Poorly OR Very Poorly		
Runoff Control	Recommended conservation practices are in place. **Very low potential for concentrated flow.**	Some conservation practices are in place. **Low potential for concentrated flow.**	Some conservation practices are in place. **Moderate potential for concentrated flow.**	No conservation practices are in place. **High potential for concentrated flow.**		

[a] Includes Perennial and Intermittent streams with defined bed and bank, Lakes, Ponds, Open sinkholes, and Active private and public water sources.

[b] With the exception of "Drainage Class", a field receiving a rating of "2" in any two categories is not recommended for winter application.

[c] With the exception of "Drainage Class", a field receiving a rating of "1" in any one category is not recommended for winter application.

Recommended Winter Manure Application Prioritization

Ranking Value	*Ranking Category*	*Recommendation for Winter Manure Spreading Prioritization*
Greater than 12	Good	These fields should receive first priority for winter manure application.
8 to 12	Fair	These fields should receive second priority for winter manure application.
Less than 8	Poor	These fields are not recommended for winter manure application.

Guidance for the Use of the Winter Application Matrix

When to Evaluate a Field/CMU Using the Winter Manure Application Matrix

All fields planned for winter manure application (mechanically) must be assessed using the most recent version of the Winter Manure Application Matrix. Also, these fields need to be evaluated for winter application in the Phosphorus Index (P Index) (see Appendix 5 for additional information). Uncollected manure deposited by grazing animals during winter doesn't need to be assessed in the Winter Manure Application Matrix.

1. Winter is defined as any time any one of the following conditions exists:
   - the date is on or between December 15 and February 28
   - the ground is frozen at least 4 inches
   - or the ground is snow covered

2. All Act 38 setbacks including those specific to winter manure application must be followed.

   Year-round:
   - 100 feet from streams (intermittent and perennial), lakes, ponds, and open existing sinkholes; unless less there is a permanent vegetative buffer at least 35 feet in width next to the stream, in which case there will be a 35-foot manure application setback
   - 100 feet from active private water wells
   - 100 feet from active public water wells unless other state or federal programs require a larger setback

   Winter:
   - No winter manure application within 100 ft. of an above ground agricultural drainage inlet where surface flow is toward the inlet.
   - No winter manure application within 100 ft. of a wetland (identified on National Wetland Inventory Maps) within the 100-year floodplain of an Exceptional Value stream segment if surface flow is toward the wetland.

3. Fields receiving winter manure applications must have 25% cover or an established cover crop.

Using the Winter Manure Application Matrix Results

(For additional information see the NMP Summary section)

The Winter Manure Application Matrix is a guidance tool developed to evaluate the field characteristics that are most relevant for assessing the potential for manure runoff during the winter season. The results provided by the Winter Manure Application Matrix are recommendations to assist nutrient management planners in selecting and prioritizing fields for winter manure application. If based upon specific historic understanding of a particular farm site, the planner or plan reviewer questions the Winter Manure Application Matrix evaluation recommendations, the results should be discussed

with SCC staff to determine how the fields should be considered for winter manure application.

For farms proposing to apply manure in the winter, the Winter Manure Application Matrix inputs and associated recommendations are to be submitted with Appendix 10 of the nutrient management plan. If using the Nutrient Management Plan spreadsheet, the Winter Manure Application Matrix is to be selected to be included with the nutrient management plan report.

Using the Winter Manure Application Matrix to Evaluate a Field/CMU

The following describes the process for evaluating a field/CMU with the Winter Manure Application Matrix.

All yellow shaded areas require information input. All un-shaded areas include information calculated by the spreadsheet.

1. Enter the field/CMU planned to receive the winter manure application. When using the Nutrient Management Plan spreadsheet when "Winter" is selected for the Season of Application the field/CMU ID will automatically be entered into the Winter Application Matrix.

2. Indicate whether or not the field/CMU has 25% cover or a cover crop. This is a "Yes" or "No" answer and is completed by selecting from a drop-down menu. If "No" is selected the inputs for the Winter Manure Application Matrix will be shaded gray and the recommendation will read "Not Allowed". See item 3 of "When to Evaluate a field/CMU using the Winter Manure Application Matrix" above for additional information.

3. Enter the weighting factor 1, 2, 3 or 4 for the category that best represents the field slope (%).

4. Enter the weighting factor 1, 2, 3 or 4 for the category that best represents the field distance from water bodies. Water bodies include Perennial and Intermittent streams with defined bed and bank, Lakes, Ponds, Open sinkholes, and Active private and public water sources.

5. Enter the weighting factor 1, 2, 3 or 4 for the category that best represents the field drainage class. This is the same Drainage Class determination used for the P Index. Therefore, the P Index County Runoff Potential Tables can be used in determining the appropriate Drainage Class.

6. Enter the weighting factor 1, 2, 3 or 4 for Runoff Control category that best represents the field's conservation practices.

The Winter Manure Application Matrix Ranking Value and Ranking Category

When all Winter Manure Application Matrix inputs have been entered (Steps 1 to 6 above), a Ranking Value will be calculated for the field/CMU. The Ranking Value will correspond to a Ranking Category of either Good, Fair or Poor. See the "Recommended Winter Manure Application Prioritization Table" at the bottom of the Winter Manure Application Matrix. The Ranking Value and Ranking Category provide recommendations for selecting and prioritizing fields/CMUs for winter application. See "Using the Winter Manure Application Matrix Results" section above for additional information on using the results as part of the nutrient management planning process.

In assessing which fields are appropriate to use for winter manure application, the following general guidance can be used, along with specific historic and additional on-farm knowledge of the assessed CMUs:

1. Fields receiving a ranking of “Poor” should not be used for winter manure application.

2. Fields receiving a ranking of “Fair’ should only be proposed for winter manure application if significant additional protective measures are incorporated into the plan for these fields to minimize the potential for manure runoff during these winter conditions. These additional measures could include actions such as only applying solid, heavily bedded manure, no application during snow or ice covered conditions, applying very low rates of manure, etc.

3. Fields receiving a ranking of “Good” are the fields most relevant to consider for winter manure application. These fields still need to have further assessment based on historic and farm specific characteristics to ensure that runoff from these fields is unlikely. Receiving a “Good” ranking for a field does not ensure that the field will not create runoff problems, but only indicates that these fields are most appropriate for consideration for winter manure application.

It is important to note that a field/CMU receiving a:

1. With the exception of Drainage Class, a "1" weighting factor for any one evaluation category will automatically receive a Ranking Category of "Poor". The Winter Manure Application Matrix will display "Poor" for both the Ranking Value and the Ranking Category. These CMU’s should not be used for winter manure application.

1. With the exception of Drainage Class, a "2" weighting factor for any two evaluation categories will automatically receive a Ranking Category of "Poor". The Winter Manure Application Matrix will display "Poor" for both the Ranking Value and the Ranking Category. These CMU’s should not be used for winter manure application.

Supplement 11

Exporter Agreements

Supplement 11 provides the following agreements for operations exporting manure:

1. Exporter/Importer Agreement - Manure Used for Agricultural Land Application
2. Exporter/Importer Agreement - Manure Used for Other Than Agricultural Land Application
3. Exporter/Importer Agreement - Manure Exported Out of Pennsylvania
4. Exporter/Broker Agreement
5. Exporter/Broker Agreement: Manure Exporter to Broker Outside of Pennsylvania
6. Act 49 Broker/Importer Agreement: Manure Used For Agricultural Land Application
7. Act 49 Broker/Importer Agreement: Manure Used For Other Than Agricultural Land Application
8. Act 49 Broker/Importer Agreement: Manure Exported Outside of Pennsylvania

These Exporter Agreements are also available and posted as Word documents with the Supplement 11 materials on the PA Nutrient Management Program web site: https://extension.psu.edu/programs/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the Exporter Agreements see Appendix 8: Importer/Broker Agreements and NBSs.

Exporter/Importer Agreement

Manure Used For Agricultural Land Application

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "exporter") who will supply manure, and _____ (the "importer"), who will receive the manure from the exporter.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the exporter to the importer.

3) The exporter is located at (county, twp, and address): _____
_____

4) The exporter will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows (maps indicating the location of importing fields must be attached to the supporting Nutrient Balance Sheets if manure is to be land applied at the importing site):

   a) **Phone number**: _____
   b) **County(s)**: _____
   c) **Address:** _____
   d) **Township(s)**: _____
   d) **Owner(s) of the property receiving manure**: _____
   e) **Total cropland acres managed by the importer**: _____
   f) **Number and type of animals raised by the importer**: _____
   _____
   g) **Number of acres available for this imported manure**: _____
   h) **Other manures (type, amount) imported to the site AND/OR utilized on the site**: (Note- this would include manure that is generated on the site by the importers animals, etc.) _____
      - **If other manure is generated, imported and/or utilized, is it applied to the same acres as indicated in item "g" above (relating to "acres available")**: Yes or No

- **If other manure is generated, imported and/or utilized, is it applied during the same season as the imported manure:** Yes or No

6) The exporter will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the exporter in accordance with the following requirements of the Nutrient and Odor Management Act regulations:
   a) A Manure Export Sheet shall be used to document all manure exports for their records
      - A copy of the Manure Export Sheet shall be provided to the importer
      - A copy of the Manure Export Sheet shall be retained on site by the exporter

   b) When the exporter (or someone working for, or contracted by the exporter) applies the exported manure, the exporter shall maintain the following exported manure records:
      - Application dates, areas, rates and methods

   c) Records shall be maintained by the exporter for a minimum of 3 years

   d) A manure export informational packet (as supplied by the conservation district or State Conservation Commission) shall be provided to the importer by the time of the manure export. This information only needs to be provided once to the importer.
      The manure export informational packet must include the following:
      i. Exported Manure Informational Packet Guidance Sheet
      ii. Nutrient Management Planning an Overview (Agronomy Facts 60)
      iii. Manure Management for Environmental Protection
      iv. Land Application of Manure- A supplement to the Manure Management Manual Plan Guidance
      v. Manure Export Sheet
      vi. Manure Transfer Summary Sheets
      vii. Manure Field Stacking Requirements Fact Sheet

8) Where applicable, the importer shall properly store manure received from the exporter in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for > 120 days unless covered or otherwise protected .

9) Manure received by the importer shall be applied to the land at the rate(s) and method(s) provided in the attached "Nutrient Balance Sheet(s)", or in accordance with a Nutrient Management Plan approved for the importing operation. If the importer wishes to change the lands used for imported manure, the nutrient balance sheet must be revised to reflect the changes and be submitted to the conservation district or State Conservation Commission (and DEP if the exporter is a CAFO) prior to implementing the changes.

10) The importer shall comply with applicable manure application setbacks for the imported manure, as outlined in the Nutrient Balance Sheet map(s).

11) For any lands not owned by the importer where the manure will be applied (i.e., rented lands), the importer hereby confirms that the importer has the authority to apply manure on those lands.

12) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the exporter shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Exporter Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Exporter/Importer Agreement

Manure Used For Other Than Agricultural Land Application

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "exporter") who will supply manure, and _____ (the "importer"), who will receive the manure from the exporter.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the exporter to the importer.

3) The exporter is located at (county, twp, and address): _____
_____

4) The exporter will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

Tons of _____ *(species)* manure, per season:
Spring _____ Summer _____ Fall _____ Winter _____

Gallons of _____ *(species)* manure, per season:
Spring _____ Summer _____ Fall _____ Winter _____

Total planned manure exported: (supply of manure may be less than what is planned)
Tons of _____ *(species)* manure: _____
Gallons of _____ *(species)* manure: _____

If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows:

a) **Phone number**: _____
b) **County(s)**: _____
c) **Address**: _____
d) **Owner of the property receiving manure**: _____
e) **Proposed usage of the imported manure**: _____
_____

6) The exporter will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the exporter in accordance with the following requirements of the Nutrient and Odor Management Act regulations:

a) A Manure Export Sheet shall be used to document all manure exports for their records
   - A copy of the Manure Export Sheet shall be provided to the importer
   - A copy of the Manure Export Sheet shall be retained on site by the exporter

b) Records shall be maintained by the exporter for a minimum of 3 years

8) Where applicable, the importer shall properly store manure received from the exporter in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for greater than 120 days unless covered or otherwise protected.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the exporter shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Exporter Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Exporter/Importer Agreement

Manure Exported Outside of Pennsylvania

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "exporter") who will supply manure, and _____ (the "importer"), who will receive the manure from the exporter.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the exporter to the importer.

3) The exporter is located at (state, county, twp, and address): _____
_____

4) The exporter will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows:

   a) **Phone number**: _____
   b) **County(s)**: _____
   c) **Address**: _____
   d) **Proposed usage of the imported manure (include acres where relevant)**: _____
   _____

6) The exporter will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the exporter in accordance with the following requirements of the Nutrient and Odor Management Act regulations:
   a) A Manure Export Sheet shall be used to document all manure exports for their records

- A copy of the Manure Export Sheet shall be provided to the importer
- A copy of the Manure Export Sheet shall be retained on site by the exporter

b) Records shall be maintained by the exporter for a minimum of 3 years

8) The importer agrees to store, handle and apply the manure in accordance with appropriate state, federal and local requirements relevant to the importing operation. Where applicable, the importer shall properly store manure received from the exporter in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for >120 days unless covered or otherwise protected; unless regulations exist that would supersede these requirements.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the exporter shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Exporter Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Exporter/Broker Agreement

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "exporter") who will supply manure, and _____ (the "broker") who will receive the manure from the exporter.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the exporter to the broker.

3) The exporter is located at (county, twp, and address): _____
_____

4) The exporter will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(Species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(Species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(Species)* manure: _____
   Gallons of _____ *(Species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The broker's contact information is as follows:

   a) **Name**: _____
   b) **Address**: _____
   _____
   c) **Telephone number**: _____
   d) **PDA Manure Broker Certification number**: _____

6) The Broker agrees to maintain their status as a certified Commercial Manure Broker as provided under Pa's Commercial Manure Hauler and Broker Certification Program (7 Pa Code Chapter 130e).

7) The Broker agrees to comply with all requirements established by section 5 of the Commercial Manure Hauler and Broker Certification Act regarding the development and distribution of nutrient balance sheets to importing operations and conservation districts when handling manure from a CAO, CAFO or volunteer operation. Specifically, where a broker under this agreement, makes arrangements for land application of the manure on an importing agricultural operation, the broker must:
   a. Provide a NBS to all importing operations receiving manure for land application, no later than the time of manure transfer

b. Provide copies of the NBS, no later than the time of manure transfer, to the county conservation district where the manure originated (exporting operation county)
c. Provide copies of the NBS, no later than the time of manure transfer, to the county conservation district where the manure is being applied (importing operation county)

Where a broker under this agreement, arranges for the use of manure for purposes other than land application, the broker is not required to supply a NBS to the importing operation

8) The exporter will use a Manure Export Sheet to record all manure exported to the broker. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the exporter shall notify the county conservation district office that approved their nutrient management plan, of the termination.

10) By signing this agreement, the broker accepts full responsibility for the manure received from the exporter as long as the manure is under the broker's control, including handling, storage and land application.

Exporter Signature, Name and Date	**Broker Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Exporter/Broker Agreement

Manure Exported to a Broker Outside of Pennsylvania

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "exporter") who will supply manure, and _____ (the "broker") who will receive the manure from the exporter.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the broker to the importer.

3) The exporter is located at (Address, State): _____

4) The broker will, as the supply of manure allows, accept responsibility for the following amounts of manure (from the listed exporter) during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The out of state broker's location and other relevant information as it relates to this manure export, is as follows:

   a. **State:** _____
   b. **Phone number**: _____
   c. **County(s)**: _____
   d. **Addresses**: _____
   _____
   e. **Proposed usage of the brokered / imported manure (include acres where relevant)**:
   _____
   _____

6) The exporter will use a Manure Export Sheet to record all manure exported to the broker. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the exporter in accordance with the following requirements of the Nutrient and Odor Management Act regulations:
   a. A Manure Export Sheet shall be used to document all manure exports for their records
      i. A copy of the Manure Export Sheet shall be provided to the broker
      ii. A copy of the Manure Export Sheet shall be retained on site by the exporter
   b. Records shall be maintained by the exporter and broker for a minimum of 3 years

8) The broker agrees to store, handle and apply the manure in accordance with their appropriate state, federal and local requirements relevant to the broker's clients. Where applicable, the brokershall properly store manure received from the exporter, and shall not cause contamination ofsurface or ground water.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days priorwritten notice to the other party. If this agreement is terminated, the exporter shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Broker Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Act 49 Broker/Importer Agreement

Manure Used For Agricultural Land Application

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "broker") who will supply manure, and _____ (the "importer"), who will receive the manure from the broker.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the broker to the importer.

3) The broker is located at (county, twp, and address): _____
_____

4) The broker will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows (maps indicating the location of importing fields must be attached to the supporting Nutrient Balance Sheets if manure is to be land applied at the importing site):

   a) **Phone number**: _____
   b) **County(s)**: _____
   c) **Address:** _____
   d) **Township(s)**: _____
   d) **Owner(s) of the property receiving manure**: _____
   e) **Total cropland acres managed by the importer**: _____
   f) **Number and type of animals raised by the importer**: _____
   _____
   g) **Number of acres available for this imported manure**: _____
   h) **Other manures (type, amount) imported to the site AND/OR utilized on the site**: (Note- this would include manure that is generated on the site by the importers animals, etc.) _____
      - **If other manure is generated, imported and/or utilized, is it applied to the same acres as indicated in item "g" above (relating to "acres available")**: Yes or No

- **If other manure is generated, imported and/or utilized, is it applied during the same season as the imported manure:** Yes or No

6) The broker will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the broker in accordance with the following requirements of the Nutrient and Odor Management Act regulations:
   a) A Manure Export Sheet shall be used to document all manure exports for their records
      - A copy of the Manure Export Sheet shall be provided to the importer
      - A copy of the Manure Export Sheet shall be retained on site by the broker

   b) When the broker (or someone working for, or contracted by the broker) applies the exported manure, the broker shall maintain the following exported manure records:
      - Application dates, areas, rates and methods

   c) Records shall be maintained by the broker for a minimum of 3 years

   d) A manure export informational packet (as supplied by the conservation district or State Conservation Commission) shall be provided to the importer by the time of the manure export. This information only needs to be provided once to the importer.
      The manure export informational packet must include the following:
      i. Exported Manure Informational Packet Guidance Sheet
      ii. Nutrient Management Planning an Overview (Agronomy Facts 60)
      iii. Manure Management for Environmental Protection
      iv. Land Application of Manure- A supplement to the Manure Management Manual Plan Guidance
      v. Manure Export Sheet
      vi. Manure Transfer Summary Sheets
      vii. Manure Field Stacking Requirements Fact Sheet

8) Where applicable, the importer shall properly store manure received from the broker in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for > 120 days unless covered or otherwise protected .

9) Manure received by the importer shall be applied to the land at the rate(s) and method(s) provided in the attached "Nutrient Balance Sheet(s)", or in accordance with a Nutrient Management Plan approved for the importing operation. If the importer wishes to change the lands used for imported manure, the nutrient balance sheet must be revised to reflect the changes and be submitted to the conservation district or State Conservation Commission (and DEP if the exporter is a CAFO) prior to implementing the changes.

10) The importer shall comply with applicable manure application setbacks for the imported manure, as outlined in the Nutrient Balance Sheet map(s).

11) For any lands not owned by the importer where the manure will be applied (i.e., rented lands), the importer hereby confirms that the importer has the authority to apply manure on those lands.

12) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the broker shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Broker Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Act 49 Broker/Importer Agreement

Manure Used For Other Than Agricultural Land Application

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "broker") who will supply manure, and _____ (the "importer"), who will receive the manure from the broker.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the broker to the importer.

3) The broker is located at (county, twp, and address): _____
_____

4) The broker will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows:

   a) **Phone number**: _____
   b) **County(s)**: _____
   c) **Address**: _____
   d) **Owner of the property receiving manure**: _____
   e) **Proposed usage of the imported manure**: _____
   _____

6) The broker will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the broker in accordance with the following requirements of the Nutrient and Odor Management Act regulations:

a) A Manure Export Sheet shall be used to document all manure exports for their records
   - A copy of the Manure Export Sheet shall be provided to the importer
   - A copy of the Manure Export Sheet shall be retained on site by the broker

b) Records shall be maintained by the broker for a minimum of 3 years

8) Where applicable, the importer shall properly store manure received from the broker in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for greater than 120 days unless covered or otherwise protected.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the broker shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Broker Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Act 49 Broker/Importer Agreement

Manure Exported Outside of Pennsylvania

Developed consistent with the PA Nutrient and Odor Management Act Program

1) This agreement is entered into on _____, by _____ (the "broker") who will supply manure, and _____ (the "importer"), who will receive the manure from the broker.

2) The purpose of this agreement is to set forth the mutual responsibilities and understanding of the parties with respect to the export of manure from the broker to the importer.

3) The broker is located at (state, county, twp, and address): _____
_____

4) The broker will, as the supply of manure allows, provide the following amounts of manure during the seasons outlined below:

   Tons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Gallons of _____ *(species)* manure, per season:
   Spring _____ Summer _____ Fall _____ Winter _____

   Total planned manure exported: (supply of manure may be less than what is planned)
   Tons of _____ *(species)* manure: _____
   Gallons of _____ *(species)* manure: _____

   If multi-species are planned, please add additional lines:

5) The importer's location and other relevant information as it relates to this manure export, is as follows:

   a) **Phone number**: _____
   b) **County(s)**: _____
   c) **Address**: _____
   d) **Proposed usage of the imported manure (include acres where relevant)**: _____
   _____

6) The broker will use a Manure Export Sheet to record all manure exported to the importer. These Manure Export Sheets are available from the county conservation district or the State Conservation Commission. Computer generated forms other than the manure export sheet may be used if they contain the same information as, and are reasonably similar in format to, the forms available from the State Conservation Commission or the conservation district.

7) Records relating to the export of manure shall be prepared by the broker in accordance with the following requirements of the Nutrient and Odor Management Act regulations:
   a) A Manure Export Sheet shall be used to document all manure exports for their records

- A copy of the Manure Export Sheet shall be provided to the importer
- A copy of the Manure Export Sheet shall be retained on site by the broker

b) Records shall be maintained by the broker for a minimum of 3 years

8) The importer agrees to store, handle and apply the manure in accordance with appropriate state, federal and local requirements relevant to the importing operation. Where applicable, the importer shall properly store manure received from the broker in accordance with the provisions of the Manure Management Manual and the Pa Technical Guide and shall not cause contamination of surface or ground water. This shall include manure stacked in application fields which may not be retained in fields for >120 days unless covered or otherwise protected; unless regulations exist that would supersede these requirements.

9) This agreement shall remain in full effect unless terminated by either party upon thirty days prior written notice to the other party. If this agreement is terminated, the broker shall notify the county conservation district office that approved their nutrient management plan, of the termination.

Broker Signature, Name and Date	**Importer Signature, Name and Date**
_____ (signature)	_____ (signature)
_____ (name)	_____ (name)
_____ (date)	_____ (date)

Supplement 12
Manure Export Sheet

Supplement 12 provides the Manure Export Sheet. The Manure Export Sheet is also available and posted as a Word document on the PA Nutrient Management Program web site: http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the exporter requirements see Section IV: Record Keeping and Informational Requirements.

Manure Export Sheet

Section 1

Name of Operation Exporting Manure _____

Name of Manure Importer/Broker _____

Address of Importer/Broker _____

_____

County _____ Township _____

Importer/Broker Certification # _____

Type of Manure Transferred _____(animal type)

Check here if manure will not be land applied ☐

Analysis of Manure N: _____ P_20_5: _____ K_2O: _____

(Units: lbs./ton ☐ lbs./100 gal ☐ lbs./1,000 gal ☐ other _____)

	Planned	**Actual**	
Total Amount of Manure Transferred	_____	_____	(tons or gal)

Date(s) Manure was Transferred _____

Check here if Importer has received manure informational packet ☐

Section 2

(To be completed when the exporter, or a person working under the direction of the exporter, applies the manure.)

Applied to:	_____	_____	_____	(field or crop group)
Number of Acres	_____	_____	_____	
Rate of Application	_____	_____	_____	

Notes:

1. Use a separate Manure Export Sheet for each separate manure type
2. All manure applications within Pennsylvania shall be in accordance with the accepted practices described in the Pennsylvania Department of Environmental Protection Manure Management Manual. When manure application practices do not conform to those described in the Manual, DEP approval is required.

Supplement 13
Emergency Response Plan

Any operation submitting an Act 38 plan for approval must have an Emergency Response Plan (ERP), acceptable to the Act 38 program guidelines, at the farm site. This ERP does not need to be submitted with the plan, but must be on the farm site at all times. In addition to the Commission's standardized Emergency Response Plan format, the program accepts PPC plans called for by DEP for CAFO operations.

The Commission's standardized ERP format is provided in this Supplement.

Additional information relating to the ERP requirement under Act 38 can be found in Appendix 1: Nutrient Management Plan Agreement and Responsibilities.

Emergency Response Plan

Developed for _____ Farm

If an emergency manure spill or leak should occur you need to take the following actions:

1) Ensure you and other people are safe, if the spill or leak involves a public road:
   a. Contact police for traffic control
      _____ **Police Department @**_____
   b. Use flares, safety cones, etc. to warn approaching motorists

2) Stop the leak or spill
   a. If the leak or spill happens while emptying the storage:
      - Stop pumps, close valves, and/or stop siphoning of manure
      - Park on top of flexible piping to pinch it closed
      - If necessary, direct manure to another storage structure
      - Plug holes in the impoundment, build dams to capture the leak and either pump the manure back into storage or spread it on fields
   b. If the leak or spill happens while on the road:
      - Pull off the side of the road
      - Plug the leak or otherwise stop the flow of manure from the tank
      - Build a berm or dike to keep manure from flowing into streams, ditch, etc.
      - Call the police to direct traffic
      _____ **Police Department @**_____

3) Contain and control the leak or spill:
   a. Build containment dam to capture the manure. Use soil, gravel, hay bales, etc. Provide an area for the impounded manure to run into and be temporarily stored. Limit the area in contact with the manure. Use a contractor if necessary. Some local contractors or others with equipment in the area are:
      Contractor _____**@**_____
      Contractor _____**@**_____
   b. Prevent manure from running into streams, ditches, etc.
   c. Use absorbent material to soak up the manure, such as straw, hay, sawdust, animal feed, or soil to limit or stop the flow
   d. Check for contaminated subsurface tile lines and divert flow from tile inlets

4) Notify the proper authorities:
   Pa DEP, Emergency Response number @ _____ **or**
   http://www.portal.state.pa.us/portal/server.pt/community/report_an_incident/6010
   _____ **County Conservation District@**_____
   PA Fish and Boat Commission @_____
   Your nutrient management planner @_____
   a. Make a record of details of the spill and actions you took. Take pictures of the extent of the spill and your containment and cleanup practices.
   b. If a spill enters a sinkhole or otherwise has the potential to enter groundwater, notify adjacent landowners who use private wells for their water supply.

5) Clean up the leak or spill:
   a. This may be directed by the authorities listed above.
   b. Pick up absorbent material you used and properly dispose of the material
   c. Restore the damaged area if necessary

Supplement 14
New Waste Storage Facility Certification

Supplement 14 provides the New Waste Storage Facility Certification. The New Waste Storage Facility Certification is also available and posted as a Word document with on the PA Nutrient Management Program web site:
http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the Waste Storage Facility Certification see Section III: Minimum Standards for Manure Storage Facilities.

New Waste Storage Facility (WSF) Certification

State Conservation Commission
Nutrient Management Program

Farm Name: _____ **County**: _____

Operator Name: _____

Address: _____

_____

Operator's Signature: _____ **Date:** _____

This WSF Certification Sheet covers the following practice(s):

WSF and Components	PATG Code	Farm Field	Inst. Date

I, the undersigned Professional Engineer, certify that the above WSF has been designed in accordance with the appropriate PA Technical Guide standards.

Engineering Firm/Agency: _____

Name/Title: _____ **License No: PE**_____

Signature: _____ **Date:** _____

We, the undersigned Contractor of Record and Engineer of Record, certify that the above WSF has been installed in accordance with the appropriate design and construction standards outlined in the PA Technical Guide, and as specified in the site-specific project design.

Contracting Firm: _____

Name/Title: _____

Signature: _____ **Date:** _____

Engineering Firm/Agency: _____

Name/Title: _____ **License No: PE**_____

Signature: _____ **Date:** _____

Supplement 15
Waiver Request for Manure Storage Setback Requirements

Supplement 15 provides the Waiver Request for Manure Storage Setback Requirements. The Waiver Request for Manure Storage Setback Requirements is also available and posted as a Word document on the PA Nutrient Management Program web site: http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the Waiver Request for Manure Storage Setback Requirements see Section III: Minimum Standards for Manure Storage Facilities.

Waiver Request for Manure Storage Setback Requirements

Date: _____

Name: _____

Address: _____

City, State, ZIP: _____

County: _____**Township:** _____

Directions to Farm: _____

_____

I hereby request the setback of 100 feet from a perennial stream, river, spring, private well, lake, pond or reservoir required by the Nutrient Management Act be waived for the construction of a manure storage facility on the above farm. I have included a sketch of the operation showing the proposed location of the manure storage facility, farm buildings and the body of water in question.

I understand that a delegated conservation district or the State Conservation Commission can grant a waiver only for agricultural operations that existed prior to October 1, 1997. I further understand that the following criteria will be used by the reviewing agency in consideration of the requested waiver:

- ☐ The placement of the manure storage facility outside the setback area is found to be physically impractical or economically unreasonable. (Increase cost $5,000 or 50%, whichever is less)
- ☐ The placement of the manure storage facility within the setback area has been determined to adequately protect the surrounding area from off-site migration of manure, or, the placement of the facility outside the setback area would increase the probability of off-site migration of manure.
- ☐ The design and construction of the facility shall meet PA Technical Guide standards and be certified by the contractor and the Engineer of Record.
- ☐ The operator shall allow for annual inspection of the manure storage facility when empty
- ☐ Where applicable, the loading/unloading area shall be designed to retain, or divert from off-site migration, 3,000 gallons of manure. If required, the retention area shall be designed for recollection of the manure for field application.
- ☐ The manure storage facility shall not utilize a gravity unloading system.
- ☐ The foundation, floor and walls of the manure storage facility shall be protected against erosion and flotation from the 25-year flood event.
- ☐ The top of the manure storage facility shall be above the 100-year flood elevation.
- ☐ A written Operation & Maintenance plan, to include a site-specific contingency plan, shall be developed, reviewed and implemented for the facility.
- ☐ Where appropriate, a secondary check valve shall be installed in loading/unloading equipment, to assure that manure cannot freely flow out of the storage if there is a primary valve or equipment failure.
- ☐ If applicable, the private water well construction meets the criteria that the Commission, in consultation with NRCS, deems necessary to protect water quality.

Operator's Signature: _____

Supplement 16
Sample Manure Storage Setback Waiver
(From Neighboring Landowner)

Supplement 16 provides a Sample Manure Storage Setback Waiver (From Neighboring Landowner). This Sample Manure Storage Setback Waiver (From Neighboring Landowner) is also available and posted as a Word document on the PA Nutrient Management Program web site: http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the Sample Manure Storage Setback Waiver (From Neighboring Landowner) see Section III: Minimum Standards for Manure Storage Facilities.

Manure Storage Setback Waiver
(From Neighboring Landowner)

To Whom It May Concern:

I hereby consent to waive the required setback distance of _____feet from my property line for the proposed manure storage facility to be built on the parcel of property with tax #_____ currently owned by _____.

My property is identified by parcel #_____.

I understand that this manure storage facility will be closer to my property line than required setbacks provided under §83.351(a)(2)(vi)(H) of the regulations developed to implement Act 38 of 2005. This manure storage facility has my consent to be no closer than _____ feet from my adjoining property line. I understand that such a waiver is acceptable to the Pennsylvania State Conservation Commission under §83.351(a)(2)(vi)(H) of the aforementioned regulations.

_____	_____
Landowner Name (print)	
	_____
_____	_____
Landowner Signature	Landowner Address
_____	_____
Date	Telephone Number

State of _____
County of _____

On this, the _____ day of _____, 20____, before me, the undersigned notary public, personally appeared _____, known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument, and acknowledged that he/she executed the same for the purposes therein contained.

In witness whereof, I hereunto set my hand and official seal.

_____
Notary Public

Supplement 17
Manure Stacking Requirements

This guidance applies to non-emergency related manure stacks that will remain in a field for an extended period of time. This guidance applies to farms planning under Act 38, as well as the farms that import manure from these planned farms (i.e. the Act-38 requirements stay with the manure independent of the final user's animal density classification).

The regulations call for the implementation of BMPs relating to in-field manure stacking. Guidance on how to meet that requirement is as follows:

1. The regulation states that the land application of the stacked manure shall occur within 120 days of stacking or by the next growing season, whichever is less.
   - For situations where stacks will be placed in fields with the expectation that it will be there for longer than 120 days, the stack shall be covered with an impermeable cover within 3 weeks of placing the stack in the field. Covering of manure stacks with an impermeable cover will eliminate the need to apply the manure within the 120 day, or by the next growing season, limitation.

2. The regulation also states that the location of in-field manure stacking sites must be identified on the nutrient management plan and nutrient balance sheet maps.

3. The stacks should be rotated so that stacking will only occur once every 4 years on a specific manure stacking pile footprint.

4. Stacked piles should be stacked in a cone or windrow shape so as to shed rainwater. This shape limitation would not be necessary if, upon stacking, the stack will be covered with an impermeable cover.

5. Stacks should be setback 100 feet from streams (intermittent and perennial), lakes, ponds, open existing sinkholes, and active water wells.

6. Stacks should not be located in water concentration areas, such as a swale, ditch, or waterway.

7. Stacks should not be located on areas that have excessively drained soils. This limitation would not be necessary if, upon stacking, the stack will be covered with an impermeable cover.

8. Stacks should not be located within 3 feet of the seasonal high water table.

9. Stacks should not be located above subsurface drain tiles. This limitation would not be necessary if, upon stacking, the stack will be covered with an impermeable cover.

10. Stacking sites should not have a slope of greater than 8%.

11. Stacking sites with slopes between 3 and 8% should not be located further than 100 feet from the top of the slope unless a diversion is constructed of soil above the stack.

12. The manure must be dry enough to allow for stacking at least 4 feet in height. When stacking on the application field, the volume needs to be limited to the amount that can be spread on the fields nearby to the stack.

The above criteria only address situations where manure is stacked in a field in order to facilitate manure application to those fields where the manure is being stacked (as allowed for in §83.294(h)). This guidance does not pertain to areas used for the composting of manure or dead animals.

Supplement 18
Nutrient Management Education Program Resource List

The Pennsylvania Nutrient Management Education Program provides a wide array of resources to nutrient management specialists. These resources serve two purposes:

- **Education.** These factsheets and publications are selected to supplement the material presented in the certification trainings and to cover aspects of nutrient management and related issues not fully addressed in the trainings.
- **Planning.** These references and tools are used consistently in the development and review of nutrient management plans.

Pennsylvania's Nutrient Management Program Website
The program website (https://extension.psu.edu/programs/nutrient-management) provides the most up-to-date and comprehensive source of information about Pennsylvania's Nutrient Management Act (Act 38, 2005) Program. **It is also the most complete source of key planning references, planning tools, and educational factsheets and publications.** Included is regulatory, technical, educational and financial assistance information. It also provides limited information concerning related programs and links to manure and nutrient management information from other states. Many of the publications are downloadable and printable.

In addition to the Pennsylvania's Nutrient Management Act **Program Technical Manual**, each specialist should secure the current versions of the following planning tools or become familiar with their use online.

Nutrient Management Rules and Regulations (25 PA. CODE CH. 83 Subchapter D 83.201)
This document contains the regulations to be followed for implementation of Pennsylvania's Nutrient Management Act (Act 38, 2005).

Penn State Agronomy Guide
The Agronomy Guide is the standard agronomic reference for Pennsylvania. The current edition is the official reference for Pennsylvania's Nutrient Management Program. The Soil Fertility Management section provides essential background information for nutrient management planning in Pennsylvania. Topics addressed include soil testing, fertilizer recommendations, and nutrient requirements for agronomic crops, fertilizer materials, manure nutrient management, and manure spreader calibration.

Act 38 Standard Format Planning Tools
The Act 38 Nutrient Management Program has produced standard planning tools for the development of Nutrient Management Plans and Nutrient Balance Sheets. All nutrient management plans and nutrient balance sheets must be developed using the current versions of the following tools.

- **Nutrient Management Plan Excel and Word Components**
- **Nutrient Balance Sheet Excel, Word and PDF Versions**

- **PA Phosphorus Index** – The PA Phosphorus Index is incorporated into the Excel versions of the Nutrient Management Plan and Nutrient Balance Sheet. In addition, it is available as a standalone spreadsheet.

Soil Test Recommendations Handbook: For Agronomic Crops
The Soil Test Recommendations Handbook for Agronomic Crops (https://agsci.psu.edu/aasl/soil-testing/soil-fertility-testing/handbooks/agronomic) is the standard reference for determining crop nutrient recommendations for Pennsylvania's Nutrient Management Program. Recommendation handbooks are also available for commercial vegetables, small fruits, tree fruits and turf.

PA NRCS Field Office Technical Guide (FOTG)
The PA NRCS Field Office Technical Guide (https://extension.psu.edu/programs/nutrient-management/planning-resources/pa-technical-guide) is the primary scientific reference for the Pennsylvania Natural Resources Conservation Service (NRCS). It consists of five sections. Section IV contains NRCS standards and specifications for each conservation practice for Pennsylvania.

County Soil Survey
The Soil Survey for each county in Pennsylvania contains descriptions of soil types, their characteristics, potentials, limitations, the impact of selected land uses, and recommended improvements to overcome limitations. Included are soil information tables and maps showing soil types and land features. (Available from county NRCS or Conservation District offices)

Soil Survey information is also available on the web through the NRCS Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm).

On-line Mapping and Soils Information
PAOneStop: Farm Mapping and E&S Planning System (https://www.paonestop.org/) provides online tools to help farmers meet regulatory requirements for Conservation and Nutrient Management Planning. The PAOneStop mapping module enables farmers and planners to generate high quality maps that are required for completion of Nutrient Management Plans and Nutrient Balance Sheets.

Supplement 19
Small Quantity Manure Importer List

Supplement 19 provides a recordkeeping sheet for listing Small Quantity Manure Importers. The Small Quantity Manure Importers recordkeeping sheet is also available and posted as a Word document with the Supplement 19 materials on the PA Nutrient Management Program web site: http://extension.psu.edu/plants/nutrient-management/planning-resources/alternative-tech-manual/spreadsheets-and-forms

For additional information about the Small Quantity Manure Importers recordkeeping sheet see Appendix 8: Importer/Broker Agreements and NBSs.

Small Quantity Manure Importer List

Name of operator exporting manure: _____

Time frame for this list: From _____to_____

Export Date	Name of Importer	Type of Manure*	Amount Exported (Tons)

* i.e. dairy, beef, broiler, swine, horse, etc.

Supplement 20

Common Best Management Practices

Basic Operation and Maintenance Guidelines

The purpose of this document is to provide basic operation and maintenance guidelines for common Best Management Practices (BMPs) that may be used in Act 38 Nutrient Management Plans (NMPs) to provide adequate manure and stormwater management to prevent pollution of surface and groundwater. For the purpose of this guidance document, the term "BMPs" is understood broadly to encompass the following:

- Required BMPs – Practices that are listed in the NMP that must be implemented to address identified Manure Management and Critical Runoff Problem Areas.
- Existing BMPs – Practices implemented to PA Technical Guide standards prior to securing an Act 38 NMP.
- Adequate "BMPs" – This includes sites, conditions, or practices that adequately address manure and stormwater management but have not been designed or implemented to PA Technical Guide standards.

Some operations obtaining NMPs, such as horse operations, are often not familiar with common agricultural BMPs and the required operation and maintenance associated with them. Nutrient Management Specialists writing and reviewing NMPs can provide these basic operation and maintenance guidance lists to these operators for the existing or planned BMPs on their operation.

It is understood that design packages and existing operation and maintenance guidelines provided for BMPs by the PA Natural Resources Conservation Service (NRCS) or a Professional Engineer supersede the general operation and maintenance bullets listed below. Likewise, when issues arise, the Act 38 program only recognizes the PA Technical Guide as the official source of information and guidelines for BMPs.

Access Road (560)

Maintain the existing access roads used for vehicles and farm equipment. Follow these basic operation and maintenance guidelines:

- Inspect the access road and associated culverts, water bars, and outlets after each major storm event, and make necessary repairs.
- Mow vegetated areas along the access road annually between August 1 and August 15 to control weedy vegetation or more frequently if needed.
- Maintain width of the access road and resurface as needed.

Animal Mortality Facility (316)

Maintain the existing facility for the treatment or disposal of animal carcasses for routine animal mortalities. Catastrophic mortality should be done with guidance from the state veterinarian, USDA APHIS, or other appropriate authority. For normal, non-catastrophic events follow these basic operation and maintenance guidelines:

- Maintain practices to divert upslope surface water runoff around/away from site.

- Maintain the site surface to provide positive drainage. Fill and compact surface using appropriate surface material as needed to avoid ponding.
- Maintain dense vegetation downslope of the site.
- Use sufficient bulking material to prevent leachate.
- Stack in single pile or windrow, up and down hill, to shed water and avoid ponding.
- Turn piles at least one time and re-compost prior to application or exporting.
- Maintain roof or cover on small, bin-style mortality composting facilities.

Composting Facility (317)
Maintain the existing composting facility. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify repair and maintenance needs.
- Re-grade, reshape and/or resurface earthen or improved surface as needed to maintain positive drainage.
- Maintain structures to divert upslope surface water runoff around/away from the area, if applicable.
- Build piles in windrows, up and down the hill, to avoid ponding water.
- Properly remove and land apply unsuitable materials.
- Maintain a Vegetated Treatment Area to handle liquid runoff unless collected and stored in a Waste Storage Facility.
- Follow your approved NMP for the handling and application of finished compost.
- Maintain appropriate local, state and federal permits, as applicable.

Contour Farming (330)
Maintain established contour farming areas throughout the cropping system. Follow these basic operation and maintenance guidelines:

- Maintain established contour lines.
- Preform all tillage and planting operations parallel to contour lines, minimizing headrows as much as possible.
- Evaluate annually for signs of erosion or deviation from contour. Re-establish or devise alternate plan to meet erosion control.
- Maintain sod turn strips on sharp ridge points or other odd areas were contour row curvature is too sharp for machinery alignment.

Cover Crop (340)
Plant a cover crop on row crop fields where manure application is planned or needed to meet Act 38 fall and winter application requirements or Ag E&S Ch. 102 sediment control regulations. Follow these basic operation and maintenance guidelines:

- Seed in time to ensure adequate establishment to meet nutrient management plan or Ag E&S plan requirements.
- Record rates and timing of nutrient application consistent with your NMP requirements.
- Completely terminate the cover crop to prevent crop competition.
- Evaluate the cover crop to determine if the cover crop is meeting the planned purposes(s). If not change species, use shorter season row-crops, or choose a different technology.

Critical Area Planting (342)
Maintain re-vegetated areas that were previously devoid of vegetation due to high rates of erosion by surface water runoff, lack of topsoil, and/or high access by animals. These areas are typically steep, devoid of topsoil and require extra preparation for establishment of vegetation. Areas within 100' of a stream and some others will require additional best management practices such as erosion control blankets, mulching, silt fence, etc. Follow a plan approved by the local conservation district or DEP for these unique situations. Species, seeding rates, fertility rates and timing, mulching requirements, and establishment methods can be found in the current Penn State Agronomy Guide and/or the Critical Area Planting Practice Guide. Follow these basic operation and maintenance guidelines:

- Maintain additional best management practices until vegetation established.
- Monitor initial plantings for water stress. If seeding fails, reseed. Best results can be obtained by seeding in early spring through the end of April or late summer from August through late September.
- Control undesirable plants by means of mowing and/or spot spraying herbicides if their presence threatens the establishment or persistence of the stand. This includes invasive species.
- Limit animal access when vegetation is drought stressed and to avoid having stand heights under 3". Allow no access during initial establishment.
- Continue to keep animals out of sites that can't withstand any animal activity.
- Inspect weekly during initial establishment, followed by semi-annual inspections to identify bare spots or eroded areas that will need reestablished.
- Inspect periodically to identify insect and diseases that could threaten stand survival and control as appropriate.

Diversion (362)
Maintain a diversion or grassed channel constructed across the slope. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify and repair maintenance needs.
- Maintain existing width and cross-sectional shape.
- Mow at least annually between August 1 and August 15 to control weedy vegetation.
- Re-grade, reshape and/or resurface earthen channel surface as needed to maintain positive drainage.
- Reseed and mulch or protect with erosion control blanket during early spring or early fall if erosion occurs.
- Significant gullies may require professional assistance to repair.
- Inspect frequently for burrowing animals. Eradicate burrowing animals and close burrows as soon as practical.

Fence (382)
Maintain existing fence associated with **pastures, streams and stream crossings**. Follow these basic operation and maintenance guidelines:

- Inspect fence, particularly those located adjacent to streams or in flood zones, after each major storm event to identify and make necessary repairs.
- Maintain gates in working condition.
- Maintenance and repair must be performed in a timely manner to maintain the desired control.
- Maintain fence free of vegetation, annually clearing of weeds and brush under and near the fence.

Fence (382)
Maintain existing fence around **waste storage facilities or concrete heavy use areas**. Follow these basic operation and maintenance guidelines:

- Maintain gates and associated safety devices in working condition. Replace as needed.
- Maintain fence free of weeds and woody vegetation.
- Maintenance and repair must be performed in a timely manner to maintain the desired control or safety benefits they provide.
- Inspect safety fence on waste storages bi-annually.
- Maintain safety signs and replace when signs are missing or no longer legible.

Filter Strip (393)
Maintain a strip of permanent herbaceous vegetation in the location where installed. Follow these basic operation and maintenance guidelines:

- All overland flow reaching the filter strip must be sheet flow. Concentrated flow must be dispersed prior to reaching the filter strip and any adjacent rills or gullies must be addressed upslope of the filter strip.
- Annually mow between the dates of August 1 and August 15 to control undesired weed species and all state-listed noxious weeds.
- Regularly inspect following all major storm events when located along a stream corridor.
- Repair immediately when gullies or uneven sedimentation occur in filter strip.
- Major gullies require addressing the source of concentrated flow.

Forage and Biomass Planting (512)
Maintain re-vegetated areas that were previously devoid of vegetation due to overgrazing and/or high animal usage or traffic in all or part of a designated pasture area. Species, seeding rates, fertility rates and timing, mulching requirements, and establishment methods can be found in the current Penn State Agronomy Guide or in the associated practice standard. Severely disturbed areas will need extra seed bed preparation. Areas within 100’ of streams will need a cover crop and/or mulching. Follow these basic operation and maintenance guidelines:

- Monitor initial plantings for water stress. If seeding fails, reseed. Best results can be obtained by seeding in early spring through the end of April or late summer from August through late September.
- Control undesirable plants by means of mowing and/or spot spraying of herbicides if their presence threatens the establishment or persistence of the stand. This includes invasive species.

- Limit animal access when vegetation is drought stresses and to avoid having stand heights under 3”. Allow no access during initial establishment.
- Inspect annually or more frequently to identify bare spots or eroded areas that will need reestablished.
- Inspect periodically to identify insect and diseases that could threaten stand survival and control as appropriate.

Grade Stabilization Structure (410)
Maintain the grade stabilization structure used to reduce grade in waterways or watercourses. Follow these basic operation and maintenance guidelines:
- Inspect structure annually and repair or replace as needed.
- Inspect after all significant storm events to identify and repair maintenance needs.
- Significant issues may require professional design assistance.

Grassed Waterway (412)
Maintain existing grassed waterway or plow skip waterways. Follow these basic operation and maintenance guidelines:
- Maintain the original width and profile.
- Inspect after all significant storm events to identify and repair maintenance needs.
- Mow annually between August 1 and August 15 to control weedy vegetation.
- If minor repairs are needed, reseed and mulch or protect with erosion control blanket during early spring or early fall.
- Significant gullies or sedimentation issues may require professional assistance to resolve.
- Gullies must be repaired and vegetation must be re-established and maintained to provide erosion control. Vegetative repairs should be done during early spring or fall.
- Turn off sprayers before crossing waterway to ensure that herbicides are not applied to vegetation in the waterway.

Heavy Use Area Protection (561)
Maintain existing heavy use area. Follow these basic operation and maintenance guidelines:
- Remove solids, typically daily for dairy cows and horses and weekly for beef or more frequently as needed for slotted curb or screen box liquid control systems. Solids on stoned equine pads should be collected weekly.
- Scrape or remove solids prior to predicted rainfall to reduce maintenance issues.
- Provide extra bedding or waste forage if solids to be stacked.
- Frozen manure and/or snow should not be scraped into a reception pit. If possible, safely load directly into a storage, stockpile on the lot, or stockpile in areas suitable for temporary in-field stacking as located on the NMP maps.
- Maintain and repair any damage to concrete floor and openings in curbing.
- Gravel pads associated with equine will need regular maintenance. Fill in low areas, replace working surface material, and regrade as needed.
- Maintain associated practices that keep off-site/upslope water out of area.

- Maintain and clean devices used to screen solids from liquid run-off after all rainfall events. Can include slotted curb, screen box, etc.
- Maintain any safety fence and signs.
- Animal access to pastures should follow guidance found under Prescribed Grazing (528).
- Animal movement from this area to the pasture should follow guidance under Trails and Walkways (575).
- Maintain vegetation below equine gravel pads.

Lined Waterway or Outlet (468)
Maintain rock lined (or turf reinforced mat) outlet at end of waterway or transition into diversion. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify and repair maintenance needs.
- Minor rock movement may be resolved by moving rock back and resetting.
- Major rock movement and washouts may indicate undersized materials or lack of capacity. It is recommended that professional assistance be obtained to resolve these issues.

Prescribed Grazing (528)
Maintain pastures included in the grazing system. Follow these basic operation and maintenance guidelines:

- Pastures must be managed to minimize bare spots and to maintain dense vegetation at average height of at least 3 inches throughout the growing season.
- Animals need to be restricted from the pasture during the winter, as well as when soil conditions are too wet or muddy to support hooved animals without causing damage to the soil structure or pasture vegetation. Grazing animals will be removed from the pasture when heat or drought conditions cause pastures to dry up and forage regrowth shuts down. During these conditions use either a temporary earthen sacrifice area or permanent concrete heavy use area.
- If a permanent heavy use area (concrete or stoned) is not available to move animals off pasture, use a temporary sacrifice area that is located away from surface water, wetlands, poorly drained soil, exposed bedrock and areas subject to flooding. Temporary fencing may be needed to isolate the area. Follow additional guidance for “Temporary Earthen Livestock Heavy Use Areas” in this standard.
- Renovate or reseed any areas that lack vegetation, have an undesirable stand, or are unable to meet system’s needs.
- Areas within pastures associated with feed bunks, waterers, and shade should follow the guidelines outlined in the Heavy Use Area Protection (561) guidance.
- Mow, at least annually, to control weeds and promote even forage production.
- Maintain other associated practices such as Fencing (382), Trails and Walkways (575) and Watering Systems (614).

Pumping Plant (533)
The pump or pumps associated with manure transfer, water supply, or irrigation. Follow these basic operation and maintenance guidelines:

- Regular inspection and testing of all components.

- Routine maintenance of all mechanical components in accordance with manufacturer's recommendations.
- Operate all valves at least one time per year.
- Perform regular checks, and as needed, remove debris or sediment.
- Maintain safety shields and periodically inspect of all safety features and repair and replace as needed.

Residue and Tillage Management Reduce Till (345)
Maintain residue and tillage management on fields as detailed in the Ag E&S or Conservation Plan. Follow these basic operation and maintenance guidelines:

- No moldboard plowing and heavy one-way disk plow usage is allowed.
- Crop residue cannot be burned.
- Maintain minimum amount residue as prescribed in the AG E&S or Conservation Plan. If residue levels are not achieved, adjust management accordingly by planning a new residue amount; adjusting the planting, tillage, or harvesting equipment; decreasing secondary tillage passes; or not removing crop residue / fodder.
- In areas of heavy residue, uniformly spread the residue prior to planting.

Riparian Forest Buffer (391)
Maintain existing riparian forested buffer. Follow these basic operation and maintenance guidelines:

- All livestock will be permanently excluded from this area.
- Spot apply herbicide, following all herbicide label recommendations, or mow as necessary to control noxious weeds, to prevent the invasion of undesirable vegetation, and to provide habitat for a variety of wildlife species.
- Vehicular traffic is limited to only what is necessary to perform required operation and maintenance.
- Replace dead trees or shrubs and control competing vegetation until the buffer is fully functional.

Roof Runoff Structure (558)
Maintain existing structures, typically roof gutters and downspouts, drip line drains, etc. Follow these basic operation and maintenance guidelines:

- Keep roof runoff structures clean and free of obstructions that reduce flow.
- Inspect the roof regularly and after all significant storm events, to identify repair and maintenance needs and make needed repairs.
- Maintain devices to protect downspouts from livestock and equipment damage, and outlets from small animal access.

Roofs and Covers (367)
Maintain the existing roof or cover over associated facility such as waste stacking facility, heavy use area, mortality facility, etc. Follow these basic operation and maintenance guidelines:

- Inspect roof after high wind or significant storm events and make needed repairs.

- Do not add additional loads to members (including adding sides to enclose the structure) without professional review.
- Consider snow load removal if loads exceed structural limits.
- Inspect for mechanical damage and replace or reinforce as needed.
- Inspect all structural connections (bolts, gusset plates, etc.) and repair or replace as needed.
- Inspect fabric covers and replace or repair damaged covers.
- Significant structural issues or questions should be referred to a building professional or PA registered engineer.

Short Term Storage of Animal Waste and Byproducts (318)
Maintain short term storage areas or in-field stacking areas at location(s) shown on plan maps. **The location of these sites must meet the Act 38 nutrient management plan and DEP manure management plan requirements.** Follow these basic operation and maintenance guidelines:

- Apply stacked manure within 120 days or cover.
- Add additional bedding if manure does not stack at least 4 feet.
- Rotate site location and re-vegetate area.
- Stack in single pile or windrow, up and down hill, to shed water and avoid ponding.
- Divert offsite/upslope water.
- Certain manure types more subject to runoff should be located above vegetated areas.

Sprinkler System (442)
Maintain the existing system (stationary, overhead, pulse jet, traveling gun, etc.) used to land apply liquid wastes. Follow these basic operation and maintenance guidelines:

- Maximum one time application must not exceed 9,000 gallons/acre. Verify that proper settings are used to avoid over-application.
- Rates above 9,000 gallons/acre need to be approved by the SCC and must not exceed infiltration rate and water holding capacity.
- No application within 100’ of stream unless permanent vegetated buffer of at least 35 feet.
- Total application during the winter period must not exceed 5,000 gallons per acre provided soils are not frozen.
- Observe and verify that fixed sprinkler nozzles are properly rotating when applying liquid wastes and repair as needed.
- Empty solids from the settling tank annually, or more frequently, as needed.

Stormwater Runoff Control (570)
Maintain practices associated with stormwater runoff. These could include, but are not limited to inlets, piping, stormwater basins, infiltration areas, etc. Follow these basic operation and maintenance guidelines:

- Maintain practices, unless impervious structures are converted back to prior conditions.
- Inspect after all significant storm events to identify repair and maintenance needs.

- Remove sediment, trash and other accumulated debris from settling basins and trash guards as needed.
- Inspect all practices on an annual basis.
- Mow vegetated areas annually between August 1 and August 15 to control weedy vegetation or more frequently as desired.
- Inspect frequently for burrowing animals for practices with earthen embankments. Eradicate burrowing animals and close burrows as soon as practical.

Stream Crossing (578)
Maintain existing stream crossing(s). Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify and repair maintenance needs.
- Replace damaged or lost materials with similar products.
- Maintain associated practices such as gates, fencing, stabilized trails etc.
- Relocation or significant changes will typically require obtaining local, state, and federal permits.
- Maintain up-slope surface water diversion devices such as waterbars and belt deflectors. Reshape and repair as needed.
- Continuous repairs may signal a need for professional assistance in resolving issues.

Stripcropping (585)
Maintain stripcropping in designated fields. Follow these basic operation and maintenance guidelines:

- Follow conservation plan crop rotation as outlined in the Ag E&S or Conservation Plan, and the associated maximum allowed tillage.
- Maintain required width and alignment.
- Adjacent strips may be similar if both are close growing, sediment trapping, erosion-resistant crops like hay or small grains.
- Establish a cover crop with rotations having corn silage and requiring manure application.
- Strips done within 100’ of a stream with tillage require additional practices to maintain Act 38 compliance, such as no-till or cover crops, to maintain a minimum of 25% crop residue.

Structure for Water Control (587)
Maintain existing screen box(s), level lip spreader(s), waterbar(s), grated channel, dropbox(s), etc. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify and repair maintenance needs.
- Clean and remove debris, built up manure, etc. as needed on screens, grates, inlet holes, etc.
- Re-grade, reshape, and /or resurface area around the structure as needed to maintain grade and flow of surface water into structure.
- All practices should be checked at least twice a year.

Subsurface Drain (606)
Maintain existing drainage systems. Follow these basic operation and maintenance guidelines:

- Inspect outlet annually to verify outlet clear of obstructions and animal guard in place.
- Repair areas with blowouts or washed out outlets.
- Discharges with manure odor or organic material require collection and redirection. Report to appropriate agencies if discharging into a stream.

Terrace (600)
Maintain the existing terrace or terrace system. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify and repair maintenance needs.
- Keep inlet for piped terraces free of debris. Replace if damaged.
- Keep manure application at least 100' away from inlet.
- Remove accumulated sediment when needed.
- Inspect associated underground piping for blowouts.
- Inspect outlet annually. Verify free of debris and outlet stable for both pipe outlet and gradient terraces.
- Mow vegetated areas at least annually between August 1 and August 15 to control weedy vegetation or more frequently as desired.
- Inspect frequently for burrowing animals in sections with earthen embankments. Eradicate burrowing animals and close burrows as soon as practical.

Trails and Walkways (575)
Maintain the existing animal walkways. Follow these basic operation and maintenance guidelines:

- Livestock should not be confined, fed or watered in these areas.
- Inspect after all significant storm events to identify repair and maintenance needs.
- Re-grade, reshape and/or resurface walkways as needed to maintain grade, dimensions, and desired walking surface.
- Divert runoff away from walkway and maintain waterbars to deflect water off walkway. Reshape and repair as needed.
- Manage manure accumulation by cleaning heavily used sites yearly or more frequently.
- Maintain all supporting practices, such as fence, gates, crossings, subsurface drainage, waterbars, and geotextile as originally installed.

Underground Outlet (620)
Maintain existing outlets associated with other practices such as roof runoff, waste storage facilities, structure for water control, etc. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify repair and maintenance needs.
- Keep all inlets and outlets free of trash and debris. Maintain animal guards.
- Repair damage caused by construction or farm equipment or loss of cover due to erosion.

- Maintain adequate backfill over all pipes.
- Maintain all supporting practices, such as riser pipes, drop boxes, downspouts, water and sediment control basins and rock-lined outlets as originally installed.

Vegetated Treatment Area (635)
Maintain the existing area of vegetation to treat runoff. Follow these basic operation and maintenance guidelines:

- Maintain distribution system to avoid concentrated flow. Verify that flow is spread uniformly across the design flow width. Regrade and redirect as needed to re-establish.
- Spreader pipe systems need to be flushed annually and discharge holes cleaned as needed.
- Observe and verify that fixed sprinkler system nozzles are properly rotating when applying liquid wastes and fix and replace as needed.
- Maintain practice used to divert off-site surface water from the treatment area.
- Any visible erosion must be filled with topsoil and reseeded as soon as possible.
- Dense, uniform vegetation is needed for optimum performance.
- Harvest/remove treatment area vegetation as appropriate to encourage dense growth. Do not harvest too short (not less than 4 inches) or too late in the growing season to prevent sufficient regrowth for practice function.
- Flash grazing shall only be done when surface is able to support hooved animals without damaging the soil structure or destroying vegetation. Grazing must be managed to avoid overgrazing.
- Maintain 4 to 12 inches of vegetation at all times.
- Control weed species, especially state-listed noxious weeds.
- Inspect and repair treatment strips after storm events to fill in gullies, remove flow disrupting sediment accumulation, reseed disturbed areas, maintain distribution system, and take other measures to prevent concentrated flow.

Waste Separation Facility (632)
Maintain the existing waste separation facility. Follow these basic operation and maintenance guidelines:

- Follow instruction manuals for mechanical separation equipment such as manure or sand separation equipment.
- Inspect facilities annually and repair as needed.
- Maintain inlet and outlet structures.
- Remove sediment and wastes as needed.
- Maintain any associated safety fencing, warning signs, and gates.

Waste Storage Facility (313)
Maintain the existing waste storage facility or facilities. Follow these basic operation and maintenance guidelines:

- All facilities must be inspected on an annual basis. Outside and open top facilities should be inspected when empty. Interiors of enclosed or covered facilities should be inspected if there are indications of leakage and only after proper ventilation and use of SCBA equipment before accessing the facility.

- Maintain any associated safety fencing, warning signs, and gates, keeping the gates locked when not in use.
- Facilities using gypsum products require additional safety precautions during agitation of both covered and open storage facilities. Deadly gases can develop around the agitation area.
- Inspect perimeter drain outlets or check observation wells to verify no leakage. Manure odors or colored liquids require additional investigation. Discharges to a watercourse or stream require collection and storage. Report to appropriate local or state authorities.
- Structural repairs, leakage areas, and rehabilitation plans require assistant from a professional engineer.
- Facilities storing manure with sand will require additional agitation and extra effort to remove to maintain storage capacity at each cleanout.
- Maintain required freeboard plus 25 year-24 hour storm event. Typically 6 inches for vertical walled storages or 12 inches for sloped storages plus 6 inches. Additional depth is needed for CAFO facilities.
- When loading or unloading storage collect and clean up all spillage of manure around the facility.
- Divert all stormwater from entering manure storage facilities, including dry stacking facilities.
- Filter and treat all stormwater that is comes off a manure stacking facility.
- Restrict and/or limit animal access to manure storage and stacking facility.
- New storages or expansion of existing semi-solid of liquid storages require a design and certification from a PA registered professional engineer.

Waste Transfer (634)

Maintain all components associated with the movement of manure, both liquid and solid fraction from the point of origin to short or long term storage or final land application. Items include cross channels, scrape alleys, pushoff, milkhouse collection and transfer, reception pit, etc. Follow these basic operation and maintenance guidelines:

- All facilities must be inspected on an annual basis.
- Repair concrete floors and curbs and any other materials used to control or direct manure.
- Maintain any associated safety fencing, warning signs, and gates, keeping the gates locked when not in use.
- Structural repairs and rehabilitation plans require assistant from a PA professional engineer.
- Conversion of gravity flow collection channels to storage will require certification for water tightness by a PA professional engineer.

Water and Sediment Control Basin (638)

Maintain the existing water and sediment control basin. Follow these basic operation and maintenance guidelines:

- Inspect after all significant storm events to identify repair and maintenance needs.
- Keep all inlets and outlets free of trash and debris.
- Repair concrete walls and floors as needed.

- Repair earthen fill.
- Repair stabilized overflow channels. Replace rock or other materials as needed.
- Mow vegetated areas annually between August 1 and August 15 to control weedy vegetation or more frequently as desired.
- Inspect frequently for burrowing animals. Eradicate burrowing animals and close burrows as soon as practical.

Watering Facility (614)

Maintain the existing watering facility that consists of a system for collection of water, tanks, and outlets. Follow these basic operation and maintenance guidelines:

- Check entire system regularly for leaks and repair as necessary.
- Monitor to ensure regular inflow and outflow.
- Ensure that areas adjacent to the watering facility are stable.
- Regularly clean the facility, removing any algae or iron sludge accumulation.
- Seasonal systems must have waterlines and troughs drained to prevent damage from freezing.

Supplement 21

Food Processing Waste & Sewage Sludge

Act 38 Nutrient Management Plan Guidance

This supplement is intended to provide guidance for operators that utilize food processing waste, otherwise known as food processing residuals (FPRs), and/or sewage sludge as a nutrient source or soil amendment for agronomic purposes. It discusses the statutory and regulatory requirements[1] for the land application of these materials when used alone and when mixed with manure. These requirements include coverage under general permits for municipal and residual waste. Finally, it describes the setback distances from environmentally sensitive areas and property lines.

I. FOOD PROCESSING AND AGRICULTURAL WASTE

The Solid Waste Management Act, 35 P.S. § § 6018 et seq. and the residual waste regulations, 25 Pa. Code, Chapter 287 set forth the requirements to beneficially use food processing waste and agricultural waste. Food processing waste and agricultural waste are categories of residual waste[2] because they result from industrial[3] or agricultural operations.

"Food processing waste" is defined as:

> Residual materials in liquid and solid form generated in the slaughtering of poultry and livestock, or in processing and converting fish, seafood, milk, meat and eggs to food products. The term includes residual materials generated in the processing, converting or manufacturing of fruits, vegetables, crops and other commodities into marketable food items. The term also includes vegetative residuals from food processing activities that are usually recognizable as part of a plant or vegetable, including cabbage leaves, bean snips, onion skins, apple pomace and grape pomace.

<u>35 P.S. § 6018.103; 25 Pa. Code Section 287.1</u>

"Agricultural waste" is defined as:

> Poultry and livestock manure, or residual materials in liquid or solid form generated in the production and marketing of poultry, livestock, fur bearing animals and their products, if the agricultural waste is not hazardous. The term includes the residual materials generated in producing, harvesting and marketing of agronomic, horticultural, aquacultural and silvicultural crops or commodities grown on what are

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[1] For specific questions related to the Solid Waste Management Act, Residual Waste Regulations or Municipal Waste Regulations, the Department of Environmental Protection should be consulted.

[2] Residual waste is defined, in relevant part, as any garbage, refuse, other discarded material or other waste, resulting from industrial and agricultural operations, including sludge from a wastewater treatment facility. 35 P.S. § 6018.103; 25 Pa. Code § 287.1.

[3] Industrial establishment is defined to include an establishment engaged in manufacturing or processing, and includes factories, foundries, mills, processing plants, and slaughterhouses. 35 P.S. § 6018.103; 25 Pa. Code § 287.1.

usually recognized and accepted as farms, forests or other agricultural lands. The term also includes materials in liquid or solid form generated in the production and marketing of fish or fish hatcheries.

35 P.S. § 6018.103; 25 Pa. Code Section 287.1

A permit under the Solid Waste Management Act and residual waste regulations is not necessary for the use of food processing wastes or agricultural wastes in the course of normal farming operations. 35 P.S. § 6018.501; 25 Pa. Code § 287.101(b)(1) and (2). A normal farming operation is defined as:

> The customary and generally accepted activities, practices and procedures that farms adopt, use or engage in year after year in the production and preparation for market of poultry, livestock and their products; and in the production, harvesting and preparation for market of agricultural, agronomic, horticultural, silvicultural and aquacultural crops and commodities, if the operations are conducted in compliance with applicable laws, and ***if the use or disposal of these materials will not pollute the air, water or other natural resources of this Commonwealth***. The term includes the storage and utilization of agricultural and food processing wastes, screenings and sludges for animal feed, and the agricultural utilization of septic tank cleanings and sewage sludges which are generated offsite. ***The term includes*** the management, collection, storage, transportation, use or disposal of manure, other agricultural waste ***and food processing waste, screenings and sludges on land where the materials will improve the condition of the soil, the growth of crops or in the restoration of the land for the same purposes.***

35 P.S. § 6018.103; 25 Pa. Code Section 287.1 (Emphasis added.)

To aid in ensuring that food processing waste is being properly managed and its use is not polluting the air, water, or other natural resources of the Commonwealth, persons managing this waste shall implement best management practices (BMPs). 25 Pa. Code § 287.101(b)(2). **The Department of Environmental Protection (DEP) has developed a technical guidance document, *The Food Processing Residual Management Manual,* No. 254-5400-100 that describes BMPs for persons managing food processing wastes.** If a person fails to implement BMPs, the DEP may require compliance with the land application, composting and storage operating requirements of Chapters 291, 295 and 299 of the residual waste regulations. 25 Pa. Code, Chapters 291.295 and 299, and 287.101(b)(2).

Additionally, the DEP may require an individual or general permit or take other appropriate action, when the person managing the food processing waste or agricultural waste is conducting an activity that harms or presents a threat of harm to the health, safety or welfare of the people or the environment of this Commonwealth. 25 Pa. Code § 287.101(c).

II. SEWAGE SLUDGE AND BIOSOLIDS

The Solid Waste Management Act, 35 P.S. § § 6018 et seq. and the municipal waste regulations, 25 Pa. Code, Chapter 271 set forth the requirements to beneficially use sewage sludge, including residential septage, by land application. To determine whether a material qualifies for beneficial use, it must fall within the definition of sewage sludge or residential septage. These terms are defined Title 25 Pa. Code § 287.1 as follows:

"Sewage sludge" is defined as:

> Liquid or solid sludges and other residues from a municipal sewage collection and treatment system; and liquid or solid sludges and other residues from septic and holding tank pumpings from commercial, institutional or residential establishments. The term includes materials derived from sewage sludge. The term does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator, grit and screenings generated during preliminary treatment of sewage sludge at a municipal sewage collection and treatment system, or grit, screenings and nonorganic objects from septic and holding tank pumpings.

"Residential septage" is defined as:

> Liquid or solid material removed from a septic tank, cesspool or similar treatment works that receives only waste or wastewater from humans or household operations. The term includes processed residential septage from a residential septage treatment facility. The term does not include liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

"Land application" is defined as:

> Agricultural utilization or land reclamation of solid waste. The term does not include the disposal of solid waste in a landfill or disposal impoundment.

Certain types of sewage sludge are also known as biosolids to emphasize the beneficial nature of this biological resource. (*See*, "A Plain English Guide to the EPA Part 503 Biosolids Rule," United States Environmental Protection Agency Publication, EPA/832/R-93/003, September 1994). The land application of biosolids is authorized by the DEP through a general permit or an individual permit. DEP has developed three general permits that contain standards to ensure a certain quality of the material and its proper end use through land application. Two of the permits, PAG-07 and PAG-08, authorize the land application of biosolids; while the third permit, PAG-09 authorizes the land application of residential septage. These permits are described as follows:

A. **PAG-07 - Exceptional Quality Biosolids (EQ biosolids).** This permit authorizes the land application of sewage sludge that meets specific treatment standards

related to pollutant concentrations, pathogen reduction, and vector attraction reduction to produce a high-quality material. These materials are typically generated at sewage treatment plants and are processed by commercial operators. Due to the exceptional quality of these materials, the land application is subject to only a few restrictions, and is exempt from isolation distances. The quality of the material is regulated through strict sampling and analysis requirements, and continued monitoring. The general permit also contains limited requirements for distribution; land application, including rates; blending; storage; training; recordkeeping and reporting. The distribution requirements include a label or information sheet that notifies the person receiving the material of any restrictions or limitations on its use, along with a description of its nutrient value. These biosolids may be licensed by the Pennsylvania Department of Agriculture (PDA) as a fertilizer or soil amendment.

B. **PAG-08 - Non-exceptional Quality Biosolids.** This permit authorizes the land application of sewage sludge that meets specific treatment standards related to pollutant concentrations, pathogen reduction, and vector attraction reduction. However, these treatment standards are not as stringent as those required under PAG-07 since this permit includes more use restrictions. Notice requirements include operator notification to adjacent landowners and notice of first land application under the permit to the county conservation district and DEP at least thirty (30) days prior to the first land application. The site is reviewed by DEP for suitability and notice of site suitability is sent to the municipality in which the site is located and published in the *Pennsylvania Bulletin*. Land application may commence at the end of the 30 day-period even if DEP has not made its site suitability determination. This permit also contains requirements for sampling and analysis; continued monitoring; land application, including rates; blending; storage; training; recordkeeping and reporting. Finally, the permit only allows food processing waste to be mixed with biosolids if approved by DEP.

C. **PAG-09- Residential Septage.** This permit authorizes the land application of residential septage that meets specific treatment standards related to pollutant concentrations, pathogen reduction, and vector attraction reduction. Non-organic objects must be removed prior to land application and disposed of a permitted disposal facility. The use restrictions are similar to those included in PAG-08. Finally, food processing waste may be mixed with residential septage only if approved by DEP.

III. LAND APPLICATION OF FOOD PROCESSING WASTE AND BIOSOLIDS

Food processing waste and biosolids can be applied individually. Additionally, food processing waste can be comingled with manure and used as a soil amendment or a crop nutrient source. The mixture may also be placed in a manure digester to enhance methane gas production, and the digested material can be land applied for agronomic purposes. Digester material (effluent) containing manure should be considered Act 38 manure. However, it is important to note that biosolids may not be comingled with manure, either as a soil amendment or for inclusion in a digester. The following

information provides additional guidance, and also highlights specific regulatory and permitting requirements for the land application of these materials.

A. Planning Considerations.

1. Application Setbacks
   a. For FPRs that are comingled with manure from a concentrated animal feeding operation (CAFO) or concentrated animal operation (CAO) ("Act 38 Manure"), the more stringent setbacks for either the FPRs or manure apply when the material(s) is applied as a soil amendment.
   b. Digester material (effluent) containing FPRs and manure should be considered Act 38 manure for the purposes of determining setback requirements.
   c. In some cases, permits for land application of waste may be required by DEP. Applications for DEP permits can be accessed on bureau websites or through DEP regional offices.
   d. The land application of all biosolids must comply with the conditions of General Permits PAG-08 and PAG-09, including the setbacks and 30-day notice of first land application, and/or the individual permit to land apply biosolids or residential septage. (In appendix 10 of the NMP, please provide a copy of the issued biosolids General Permit, 30-day first land application notice and/or the issued individual permit for the land application of biosolids/residential septage).
   e. FPRs applied individually should follow setbacks contained in the FPR manual.
2. Stacking Requirements
   a. FPR comingled with Act 38 manure should be stacked in accordance with the following: (1). The DEP's guidance: *The Food Processing Residual Management Manual,* No. 254-5400-100, (2) Act 38 Nutrient Management Program Technical Manual, (3) Chapter 92 Concentrated Animal Feeding Operation (CAFO) permit, or (4) manure management manual, whichever is more stringent.
   b. Biosolids should be stacked in accordance with the conditions of the DEP PAG-08/09 General Permit or individual permit for the land application of biosolids or residential septage.
   c. If no specific setbacks are required for FPRs, biosolids or residential septage, the applicable Act 38 manure setbacks requirements should be followed.

B. Applying Food Processing Residuals and/or Biosolids separately, not comingled with manure.

1. FPRs must be applied in accordance with DEP's guidance: *The Food Processing Residual Management Manual,* No. 254-5400-100, including preparation of a Land Application System Plan.
2. Representative samples of the FPRs (product) and/or biosolids should be taken to determine nutrient content.
3. Representative samples of the FPRs should be taken to assure the material does not contain potentially harmful contaminants.

4. The land application of biosolids under PAG-07 must be in accordance with the User Fact sheet provided by the generator or the general / individual permit and may not exceed agronomic rates for the crop intended.
5. The conditions in PAG-08/09 must be followed, including the 30-day notice of first land application and/or individual permit requirements.

C. When Food Processing Residual are comingled with manure and will be land applied.

1. Representative samples of the comingled product must be taken to determine nutrient content.
2. Representative samples of digester material (effluent) must be taken to determine nutrient content.
3. Representative samples of the Food Processing Residuals should be taken to assure the product does not contain potentially harmful contaminants.
4. The conditions in PAG-08/09 must be followed, including the 30-day notice of first land application and/or individual permit requirements.

IV. ADDITIONAL INFORMATION

A. FPRs may contain metal or glass that may cause injury or damage to equipment.
B. FPRs may contain heavy metals, like cadmium, that may build up in the soil, be picked up by crops, and reach hazardous levels in the plant tissue.
C. FPRs may contain high levels of salt or other compounds, disinfectants, cleaning materials, and/or chlorides that may restrict vegetation growth.
D. Applications of biosolids to crops grown specifically for human consumption (vegetables) may be restricted due to potential bacteria or heavy metal contamination. Application of biosolids must be in accordance with conditions in the PAG-08/09 general permit or individual permit.

V. ACT 38 NUTRIENT MANAGEMENT PLANNING REQUIREMENTS

A. NMP Plan Summary
   1. Comingled FPRs with manure, excluding digester material (effluent), would be detailed as a separate *manure group* in Appendix 3 and allocated to specific CMUs/Field ID in Appendix 4.
   2. Digester material (effluent) containing FPRs and manure would be detailed as a separate manure group in Appendix 3 and allocated to specific CMUs/Field ID in Appendix 4.
   3. Non-comingled FPR, EQ biosolids and Biosolids would be detailed in Appendix 4 and shown as other nutrient source used.

B. Plan Summary Notes
   1. List the specific setbacks for FPRs comingled with manure, excluding digester material (effluent), following whichever setback requirement is more stringent.
   2. For non-comingled FPR, list the FPR setback requirements.
   3. Biosolids must follow the setbacks in the PAG-08/09 general permit and 30-day farm land application notice or individual permit.

C. Appendix 2

1. The Operation Description should include the source and estimated volume of the FPRs.
2. Manure Application Equipment - Spreader calibration should be performed for the FPRs comingled with manure, excluding digester material (effluent).
3. Manure Application Equipment - Spreader calibration should be performed for the FPRs not comingled with manure.
4. Manure Application Equipment- spreader calibration should be performed for EQ biosolids either being used alone or comingled with manure.
5. Biosolids must be applied by a land applier or DEP certified hauler.

D. Appendix 3
   1. Comingled products, excluding digester material (effluent), will be listed as a separate manure group(s) and analysis required for nutrient content.

E. Appendix 4
   1. FPRs comingled with manure, excluding digester material (effluent), planned for CMU/field specific applications.
   2. FPRs not comingled with manure planned for CMU/field specific applications. These should be shown as other nutrient source used.
   3. Biosolids must be planned for CMU/field specific applications. EQ Biosolids should be shown as other nutrient sources used.

F. Appendix 5
   1. Phosphorous Index utilizing the same criteria as manure including the P Coefficient must be applied for comingled products.

G. Appendix 6
   1. Stacking FPRs comingled with manure should be evaluated utilizing the more restrictive requirements, including property line setbacks.
   2. Stacking FPRs not comingled with manure should be evaluated utilizing the FPRs manual.

H. Appendix 7
   1. Stormwater evaluation must take into account specific regulatory requirements for land application of comingled and non-comingled manure and FPRs, excluding digester material (effluent), including but not limited to, the requirement for incorporation after application, which could potentially increase runoff and erosion.

I. Appendix 8
   1. Importer/Broker Agreements & NBS must be completed for exporting manure comingled with FPRs.

J. Appendix 10
   1. Winter matrix, when applicable, must follow the more stringent requirements for the comingled manure and FPR.
   2. The specific FPR that is utilized must be detailed.

3. The specific FPR, quantity, and frequency the FPR added to the manure digester or manure storage, as applicable, must be detailed.
4. For EQ Biosolids, a copy of the label or user fact sheet must be prepared by the generator.
5. Any permits required by DEP for use of FPRs or biosolids must be issued and effective.
6. A FPR Analysis must be completed.