

Agricultural Waste Management System (AWMS) Planning

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Bootcamp II

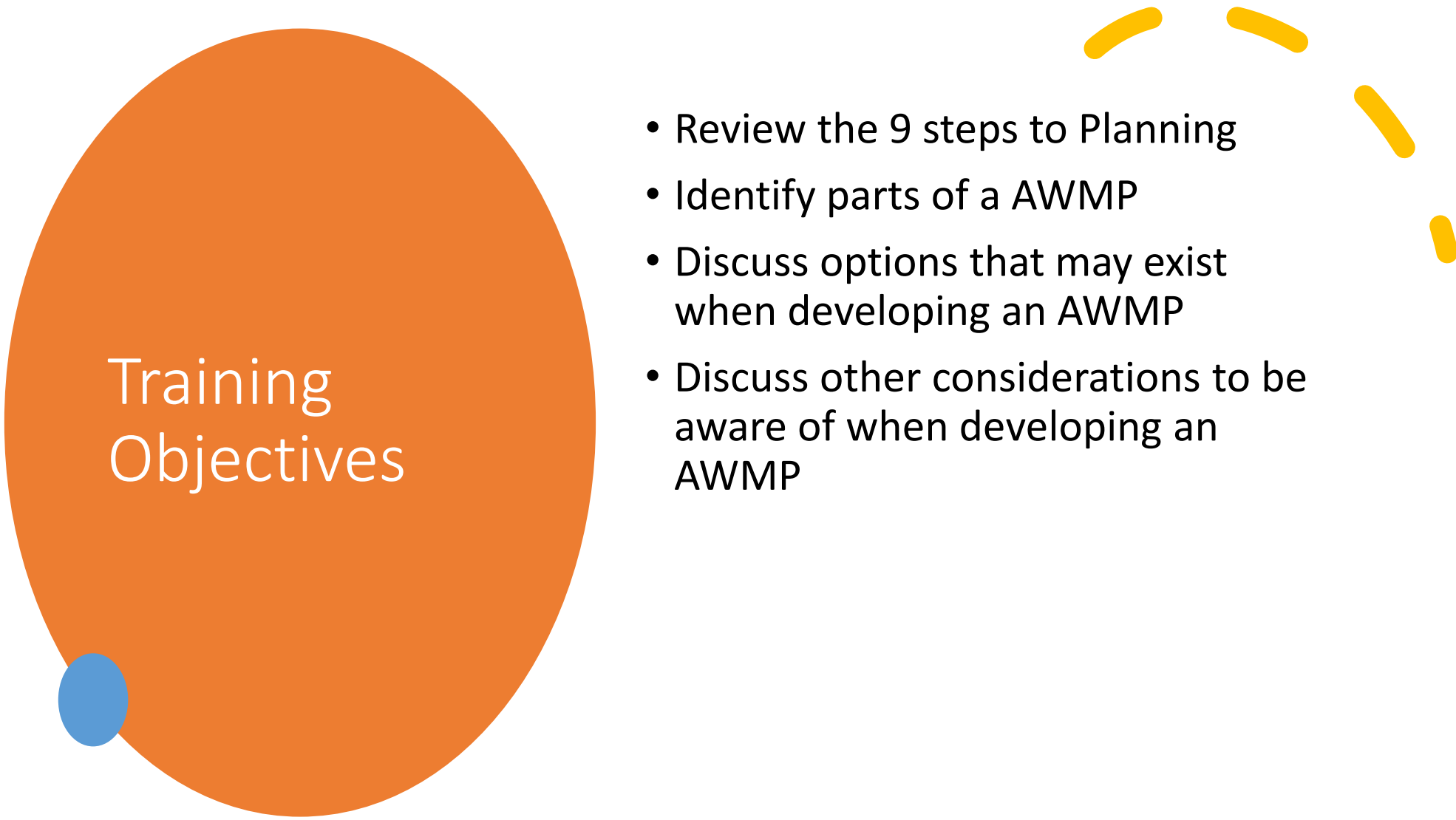
A large orange shape on the left side of the slide, consisting of a rectangle and a quarter-circle, with the text 'AWMS Planning' inside it.

AWMS Planning

- Team approach
 - Decision maker & Planner & Engineer or Tech
 - Can be complex
 - Part of a total Resource Management System -
AWMS is connected to the cropping system
and water management system
 - Planned action based on a resource concern
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- A series of four yellow curved lines in the bottom right corner, arranged in a diagonal pattern from bottom-left to top-right.

Planning to Protect Natural Resources

- Soil
- Water
- Air
- Plants
- Animals
- Social
- Cultural
- Economic

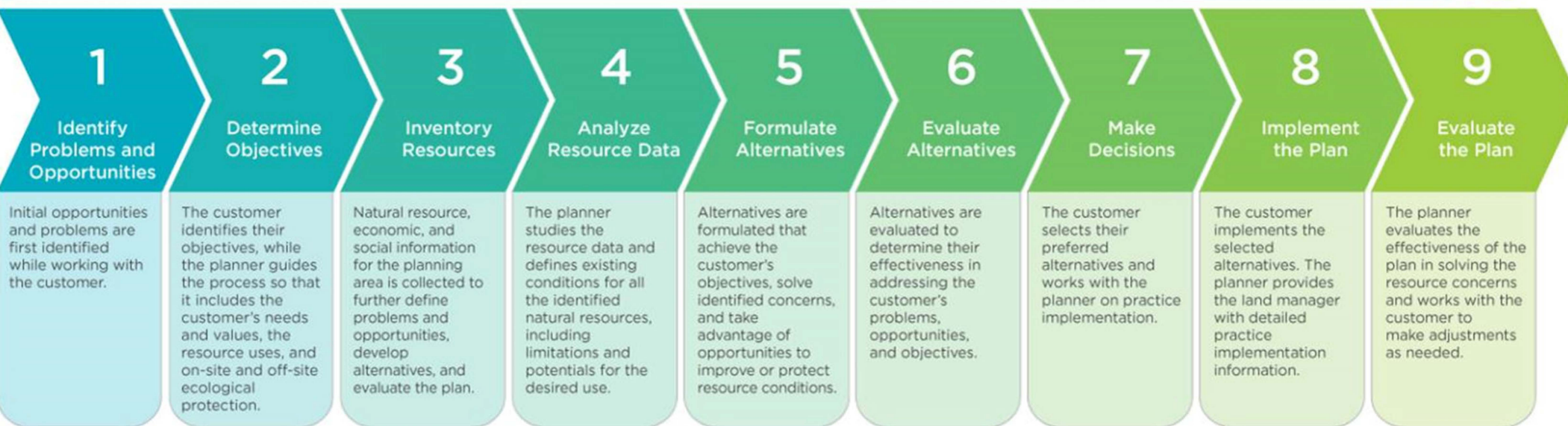


Training Objectives

- Review the 9 steps to Planning
- Identify parts of a AWMP
- Discuss options that may exist when developing an AWMP
- Discuss other considerations to be aware of when developing an AWMP

HOW CONSERVATION PLANNING WORKS

A NINE-STEP PROCESS



Planning Process – Steps 1 & 2

Identify the problem (Step 1)

- Decision maker
- Regulatory
- Program concerns

- Agency issues may differ from owner issues

Planning Process – Step 3

Inventory the resources (Step 3)

- Type of operation
- Size
- Site location
- Current Operation
- Land availability
- Soil
- Topography

Planning Process – Step 3 (cont.)

Inventory the resources (Step 3)

- Climate
- Geology
- Crops
- Labor availability
- Equipment
- Level of management

Planning Process – Step 3 (cont.)

Inventory the resources (Step 3)

- Adjacent land use
- Travel routes
- Laws and regulations
- Utilities
- Landscape resources
- Expansion of the enterprise
- Flexibility

Planning Process – Step 4

Analyze the resource data (Step 4)

- Production
- Collection
- Transfer
- Storage
- Treatment
- Utilization

Planning Process

Steps 5-9

- Formulate alternative solutions (Step 5)
- Evaluate alternative solutions (Step 6)
- Client determine a course of action (Step 7)
- Client implements the plan (Step 8)
- Evaluation of the results of the plan (Step 9)



AWMS Plan Details



Purpose of plan

Expectations

How this system should work



Contents

Description

Sequence and schedule of installation

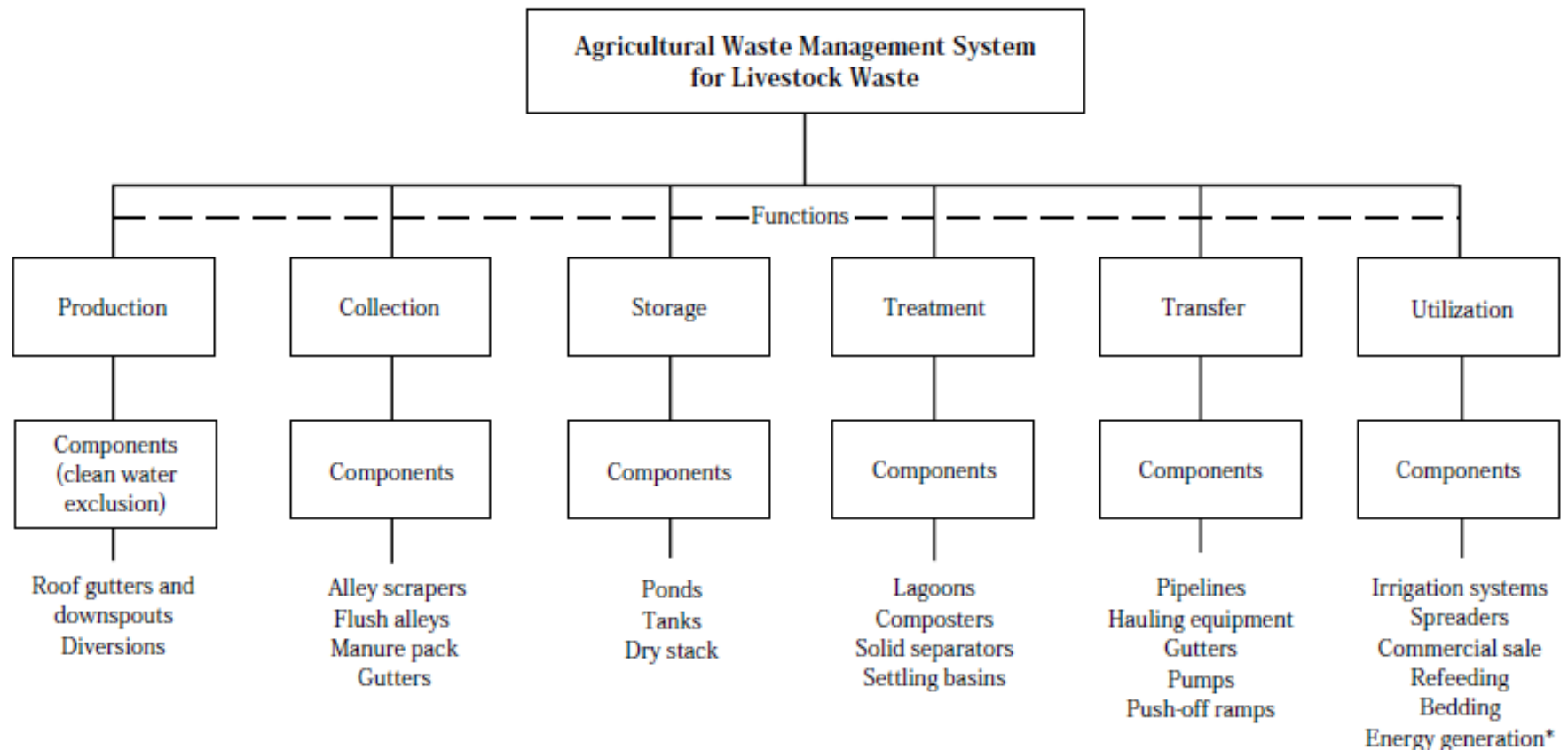
Operation and maintenance

Engineering details, drawings,
specifications

Nutrient Management Plan

Relationship to other management systems

AWMS key functions





Roof Gutters

Drop Box



Waste Collection Methods

- Direct scrape
- Alley scrape
- Chain & Flight, shuttle stroke
- Flush system, barn on 2-3% slope
- Slatted concrete gang slats for floor
- Gravity gutters
- Combination of the above





Mule powered manure pushing system used with tie-stall barn gutters



Tire scraper





Alley scraper





Tie stall barn with extra large gutters used to hold sand laden manure for several days and then cleaned out with chain and flight system

Roofed facility with
slatted floor above
storage tank





Tie-stall housing with
conventional gutter cleaner



Under floor Collection
for Duck wastes



Composting bedded pack for dairy cows



Virginia style, mono-slope
roofed heifer facility with
slatted floor above
concrete storage tank



They are here –
Robots!

Transfer Options

- Pumping
- Ram pump
- Pull plug
- 3 to 7 day holding tank with pump to transfer to storage
- Gravity hopper and pipe system
- Combination of the above





Heifer barn with Slatted
manure floor – Short term
storage



Long scrape
to push off





Conventional box type
manure spreader for
solid manure



Electric manure pump



PTO driven manure pump to
transfer manure from short-
term storage to long-term
storage

Manure chute/elevator



Sand scraper in cross alley

Piston transfer
Pump



Manure being pumped

Alley flush system with large towers



Treatment Options

- Removing Solids
 - Static or vibrating screens
 - Roller press
 - Inclined gravity gutters
 - Screw press
 - Flocculation

Methods of removing manure solids



Screw against screen



Paddle press against screen



Long term settling basin using weeping walls to dewater solids on a flush alley dairy



Manure Solids separation with Albers gravity screen system

Treatment Options

- Removing Sand
 - Gravity systems
 - Sand settling lanes
 - Settling Basin
 - Mechanical systems
 - Cyclones or other mechanical removal



Sand Settling lane looking upstream during flush discharge



Sand settling lane looking downstream at end of flush



Collection area for
separated manure solids

Processing area for
gravity separated sand
from an alley flush
systems





Mechanical Sand separation
Equipment

Advanced Treatment

- Solids drying systems
- Solids removal by flocculation
- Anaerobic Digesters
- Composting solids



Drum Composter to treat and dry manure solids



Various Digesters Systems

- Pull plug
- Fixed film
- Mixed





Removing manure solids by adding a “flocculent” to consolidate solids



Composting manure solids

Storage Systems

Two types

1. Aerobic

- Requires adding oxygen
- Mechanical aerator

2. **Anaerobic**

- No oxygen
- 99% of storage facilities in PA

Factors Affecting Storage Type

- Bedding material and manure consistency
 - Sand, recycled manure, sawdust, peanut hulls
- Geology- rock, water table, soils on-site
- Space limitations
- Current or future manure handling equipment
- Cost of installation
- Site constraints, existing building
- Owner's preference
- Program cost-share guidelines and finances

Manure Storage Options

- Earthen pit, lined with treated soil or membrane (HDPE)
- In ground concrete tank
- Above ground concrete or steel tank
- Temporary stacking area on lot
- Remote stacking/storage facility
- Roofed storage
- Upgrading existing sites





HDPE lined earthen storage with access ramp
and gravity fill pipe for manure and leachate



Concrete tank with Ramp





Interior view of slatted floor
storage facility showing post and
beam supports



Steel storage tanks



Roofed stacking facility





Short term storage
within facility



Barnyard Runoff Options

Direct transfer to
storage

Hold and pump to
storage

Direct transfer to
settling basin then to
tank to dose

Reduce runoff by
diverting water with
roof gutters, diversions,
and other systems

Slotted curbs - liquids
from small lots adjacent
to suitable filter areas

Roof all or part of site to
reduce liquids

Reduce the lot size or
eliminate site



Settling basin off
concrete barnyard



Runoff collection to basin
with riser

Barnyard (HUA) with
runoff collection



Pump tanks





Barnyard paving and runoff collection
with a perforated curb





Roofed barnyard



Milkhouse Waste Options

Transfer	Pump	Collect and haul
Transfer directly to storage	Pump or gravity flow to holding tank and dose or spray to vegetated filter area	Collect and haul daily

*Subsurface drainfills are NOT an option



Milkhouse waste pumped into storage



Collection tank with Flout to control discharge



Spreader pipe distribution system
above waste treatment strip

Upgrading Existing Facilities

- Existing may be undersized or have safety issues to address
- Must meet current standards
- May require new lining system
- May involve major expense with no assurance that storage will be manure tight
- May require state permits
- Requires PE approval





Relining existing earthen
storage with bentonite
and concrete



Concrete lined, earthen
manure storage



Silage Leachate Options

Collect low-flow, then

- gravity flow or pump to outside storage
- dilute by 50% and dose or pump to spreader pipe

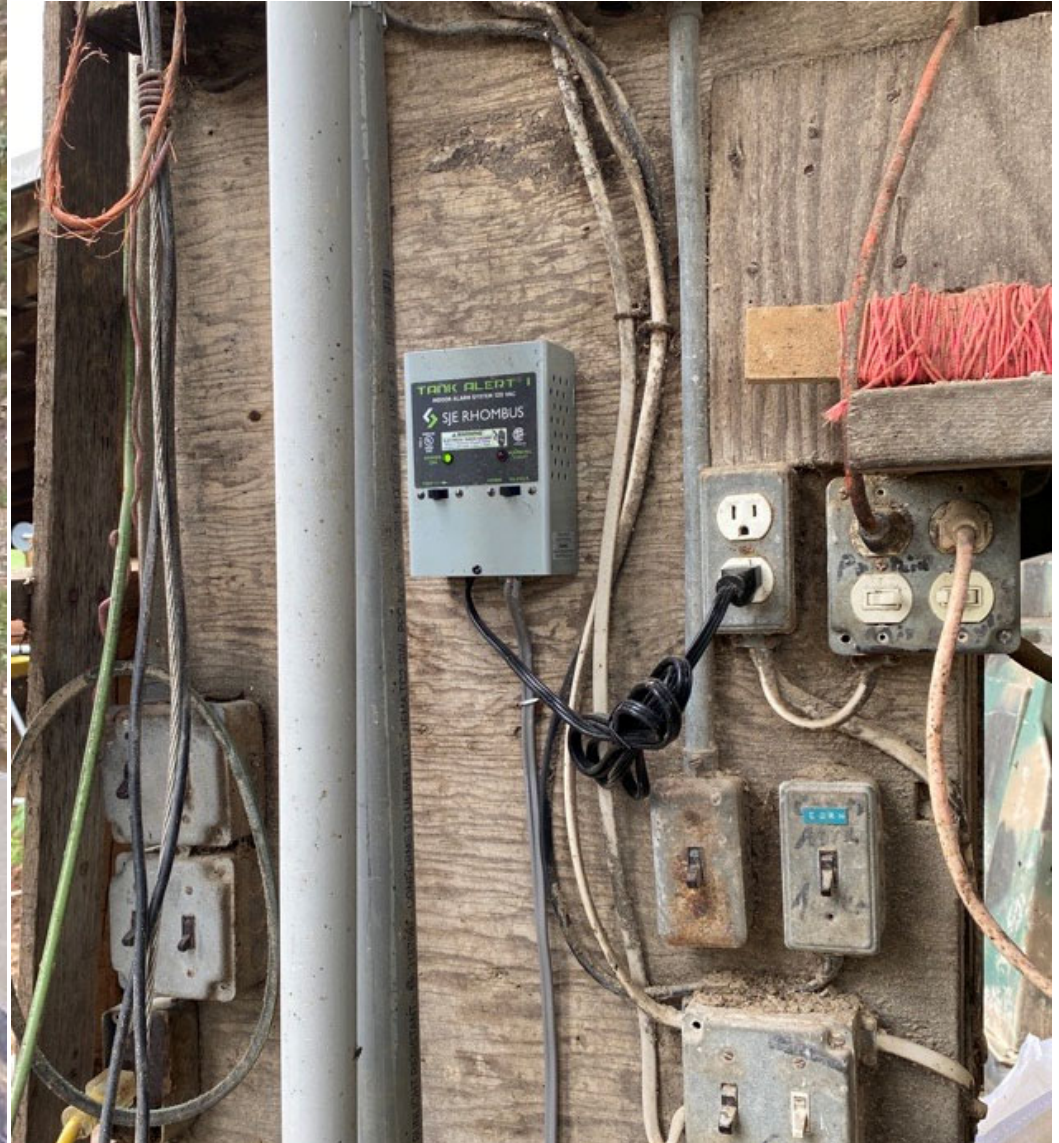
Add lime to neutralize before direct land application

Direct high flow to grassed area of equal area according to Design Guide #10

Leachate pump tank with
warning light



Warning light located at barn





Variations of low-flow
collection systems



Odor Reduction Considerations

- Site facilities downwind
- Consider adjacent landowners with longer setbacks
- Incorporate manure if allowed by conservation plan or use an injection system
- Digesters for operations over 200 cows
- Solids separation and aeration of second stage storage
- Refer to PA Odor Management Plan for more options

Laws and Regulations Considerations

- Does township require Lot Development Permits?
- CAO or CAFO regulations
- Other zoning ordinances?
- Act 38 protection or participation?
- Nutrient Management Planning- P based
- Need for a Conservation Plan
- Need for a NPDES Phase II, E&S plan
- Setbacks?

Expansion and Flexibility



Consider future
animal numbers

Space for barn expansion?

Space for feed storage?

Space for manure storage?



Routing of equipment,
animals, stormwater,
etc.



Other consultants may
be involved like the Ag
Extension Engineer,
builders, etc.

Alternatives

- Most sites have several alternatives
- Develop the alternatives and present to landowner to allow them to make a decision
- Consider all options and present as many as practical. Some can be eliminated during the discussion phase.
- Document why one option was selected over another

Developing Cost Estimates

- Owners need estimates to compare alternatives
- Use local cost data to develop estimate
- A draft layout provides better quantities to develop an estimate or get prices
- EQIP incentive rates are NOT cost tables

Wrap-up

Reviewed the steps in developing an AWMS

Discussed the options that may exist in an AWMS

Reviewed key elements of an AWMP

Next week you will use what you have learned by creating an AWMP

Resources

- Agricultural Waste Field Management Handbook- Ch. 2, 4, 11, 12
- Local office staff
- Technical office staff
- Landowners