Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

VEGETATED TREATMENT AREA

CODE 635

(ac)

BROAD REVIEW DRAFT
COMMENTS AND RESPONSES

Drafted technical standard text is in black font.

Comments are in red, preceded by comment number (**C#**).
To find a specific comment number, search for that number using "Ctrl + F" (Windows) or "Command + F" (Mac).

*Responses to comments are in green italics, preceded by **RESPONSE**.*

Suggested minor changes to standard text are in tracked changes and highlighted.

General Comments

C44: It's good to see an attempt being made to solve some resource concerns for smaller operations that don't break the bank. I appreciate that.

***RESPONSE**: Thank you. The team tried to improve the standard!*

C103: The standard is definitely less cumbersome.

***RESPONSE**: Thank you.*

C124: I appreciate the effort on the re-write, it is a great attempt to revitalize the VTA standard and is quite thorough. Having said that, the reason why we were no longer using VTAs was because of a lot of shortcomings and research that showed their ineffectiveness.

***RESPONSE**: Size restrictions on contributory areas were intended to limit potential impacts.*

C28: Overall this standard is too wordy and descriptive where it doesn't need to be. Could be condensed to possibly 5 pages if unnecessary descriptions were to be removed. This standard is written more like a construction specification than a standard. I hope this standard proves to be useful as roofed barnyards are proving to be overkill and costly for small farms where this could be applicable.

***RESPONSE**: The team attempted to be more streamlined than the previous standard, while still including criteria for successful implementation.*

C102: I see that the requirement for excluding runoff from the VTA until vegetation was established was removed. That requirement was added in a previous 635 revision because of vegetation establishment

failures. I'm not sure I agree with the change for no exclusion during establishment since seedlings could be damaged by nutrient rich water. Changing back and forth is a bit confusing.

***RESPONSE**: Maintenance requirements were assumed to cover the need, but a more specific requirement for initial operation will be added.*

C117: VTA topsoil requirements? Thickness?

***RESPONSE**: VTA soil will need to be suitable for establishing vegetation.*

C118: VTA construction requirements? Equipment compaction concerns during the excavation & grading process for the functionality of the VTA soil infiltration?

***RESPONSE**: Limiting compaction during maintenance activities has been included in the O&M Section. However, initial construction will be included as well.*

DEFINITION

An area of permanent vegetation used for agricultural wastewater treatment.

PURPOSE

This practice is used to accomplish the following purpose:

C16: No need for this sentence Purpose is title of section.

***RESPONSE**: National standard formatting is to introduce the bullets.*

- Improve surface water quality and reduce potential groundwater contamination by using vegetated treatment along with source control measures to reduce the loading of nutrients, organics, pathogens, and other contaminants associated with specific agricultural operations.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

C17: No need for this sentence.

***RESPONSE**: National standard formatting is to introduce the bullets.*

- A vegetated treatment area (VTA) can be constructed, operated, and maintained to treat contaminated runoff from a feedlot, feed storage area, or manure stacking area during the growing season. Final treatment of milk house wastewater is acceptable as provided in NRCS Conservation Practice Standard (CPS) 627 – Wastewater Treatment, Milk House.

  C84: In my opinion, the words above are an admission that NRCS is condoning using tax payer dollars to fund a BMP that is designed to fail when the vegetation is dormant. Liquid precipitation events are becoming more frequent in our area from November-April and the dormant vegetation that receives contaminated runoff from these events does little to provide "treatment".

  ***RESPONSE**: Specific criteria and maintenance for the non-growing season are included to address potential issues.*

  C120: I do not see where we can have winter application. [This] says "growing season" so we still need to store run off in the winter?

  ***RESPONSE**: This standard does not prohibit winter application. Agricultural stormwater discharges from small and medium AFOs are exempt from the National Pollutant Discharge Elimination System (NPDES) permit requirement.*

- A VTA is a component of a planned agricultural waste management system to improve surface water quality and reduce potential for groundwater contamination while incorporating adequate cleaning measures at contaminant source locations.

  C67: What is "adequate"? As Defined in the O&M

  ***RESPONSE**: Correct, language will be revised.*

- Paved feedlots, feed storage areas, or manure stacking areas do not exceed 0.66 acre.

  C1 // C45: How did you come up with such an odd, difficult to measure size? At the very least, change this to a round number or a number that equates to a round square footage (i.e. 35,000 = .8 acres or 26,000 = .6 acres). A number as specific and unorthodox as 0.66 requires major justification and raises questions. // Can it say 28,750 sq ft? Where did this 0.66 acre number come from? Does there have to be an acreage/size cap or can a maximum size be determined through the VTA design/evaluation process?

  ***RESPONSE**: Proposed feedlot area restrictions were selected to limit the amount of 1-year, 24-hour runoff to be treated by a VTA. The runoff volume from 0.66 acre at CN=98 is roughly equal to the runoff volume of 1 acre at CN=90. For existing feedlots, several tools are available to determine area via aerial imagery. Contributory area restrictions (along with VTA dimension restrictions) are included in the draft standard to set boundary conditions on acceptability. WinSRFR has been proposed to hydraulically size a VTA within these boundary conditions.*

  C111: How cutoff size was determined? 0.66 acre max. applies to three different waste sources (paved feedlots, feed storage areas, and manure stacking areas). It would seem likely that there might be variable size restrictions for each waste source based on different nutrient / contaminant loads.

  ***RESPONSE**: See C1 // C45 response. Available research suggests wide variability in nutrient concentrations. Numeric nutrient restrictions were not included in the standard as nutrient balances are unlikely to be achieved.*

  C29 // C126: I don't think we are ready to have a VTA for a large manure stack, consider removing it. If kept, I think we would also want additional criterial like we do for feed storage. // I'm not sure how this would work for manure stacks. We would first have to route it through a waste separation facility and then to the VTA? Are we thinking this applies to permanent manure stacks in the production area? There just isn't much detail on how this would work.

  ***RESPONSE**: References to dedicated manure stacking areas (as opposed to temporary stacking on a paved feedlot) will be removed from the standard.*

  C53: The limits on lot sizes appear to be arbitrary and fairly small, especially for feed storage areas. We request that feed storage have a greater maximum area because they have a much smaller nutrient load compared to manure stacking areas or animal feed lots. Up to 1.0 acre?

  This may require a larger VTA area, so we also request the 0.66 acres be a limit applied to one VTA and that multiple VTAs are allowed on one site.

  ***RESPONSE**: See C1 // C45 response. Standard does not prohibit multiple VTAs installed in parallel; clarification will be added.*

  C87: It sounds to me like this means if the farm has paved feedlots, feed storage areas, or manure stacking areas in excess of 0.66 acre that a VTA anywhere on the farm is off the table regardless of what treatment may already be in place in those areas. For example, if a

farm has a 1 acre feedlot that already runs to manure storage it sounds like the farm would not be allowed to install a VTA for a feed storage area under 0.66 acre. Is this the intended meaning?

***RESPONSE**: Contributory area restrictions apply to an individual VTA for the purpose of limiting the design runoff volume. Draft standard does not prohibit multiple VTAs installed in parallel.*

C88: Is the intent of these conditions to restrict the overall size of an operation that can use a VTA? If not, could the wording for feed storage area be different or include a definition that implies "active" feed storage. For example, new feed storage systems (CLeaR concept, U-Drain, Duraslot, etc.) that have a total active area less than 0.66 acres should be allowed to have a VTA to discharge to since the discharge from these systems would always be <0.66 acre.

***RESPONSE**: No, the intent is to limit the design runoff volume to an individual VTA. Discharge is expected and determined acceptable from VTAs for precipitation events larger than the 1-year, 24-hour storm (overtopping the 12-inch end berm).*

- Earthen feedlots do not exceed 1.0 acre.

C18 // C46: Why the need for size cap[s, here and in bullet above]? Won't running the program and setbacks determine the size cap? // Does there have to be an acreage/size cap or can a maximum size be determined through the VTA design/evaluation process?

***RESPONSE**: See C1 // C45 response.*

This practice does not apply on concentrated animal feeding operations (CAFOs).

CRITERIA

General Design Criteria

VTAs shall comply with all federal, state, and local laws, rules, or regulations. The operator is responsible for securing any required permits. This standard does not contain the text of the federal, tribal, state, or local laws.

Size the VTA based on infiltrating and retaining the design runoff event while minimizing deep percolation.

C89: Give a more detailed description of this same information, consider deleting this sentence.

***RESPONSE**: A detailed description is provided in the Additional Criteria for Hydraulic Design Section.*

Water balance will require evaluating soil capacity to infiltrate and retain runoff within the root zone. Use soil parameters including water holding capacity, infiltration rate, permeability, and hydraulic conductivity to determine ability to absorb and retain runoff.

C68: Doesn't happen when ground is frozen.

***RESPONSE**: Agreed.*

C98: Can you site a reference for obtaining the listed items? It looks like the soil survey but clarification would be nice.

***RESPONSE**: See References Section. Language is from national standard. Hydraulic sizing procedure in draft standard addresses necessary parameters.*

Evaluate the anticipated nutrient removal performance of the proposed vegetation during the growing season.

C30: Can this be rewritten? Perhaps write at an 8th grade level.

***RESPONSE**: An evaluation is required, though the designer is responsible for determining the best approach for a given application.*

C99: If you want field office technicians to use the standard you should provide examples of computations etc. in the EFH supplements.

***RESPONSE**: Noted.*

C127: Any way we could walk through just a couple conceptual designs using that 0.66 paved feedlot to see how the Separation facility would be sized on the 25 year storm and outflow to the VTA based on the 1 year storm would be setup. Maybe repeat on a feed storage pad with first flush collection and the manure stack. Not a full design, but a conceptual one based on volumes and discharges through the different steps.

***RESPONSE**: CPS 632 will be revised to coordinate with proposed CPS 635. Intent will be to limit normal VTA application rate via effective storage in settling basin. However, proposed CPS 635 does not prohibit larger events from being routed into VTA.*

As nutrient balances (primarily nitrogen and phosphorus) are unlikely to be achieved, review potential impact of nutrients entering surface water and groundwater at project site based on expected removal efficiencies. Use available resources to assess nutrient loading and vegetation uptake, including but not limited to Chapters 4 and 11 of the NRCS Agricultural Waste Management Field Handbook (NEH 651) and the 2006 NRCS collaborative report on vegetated treatment systems (Koelsch, et al).

C56: Add nutrient loading criteria that should be achieved by the design of the VTA.

***RESPONSE**: Noted.*

C66: There are not any VTA effluent Standard listed. Is it being left up to the designer? I am not familiar with Win SRFR, are the allowable N and P values given there?

***RESPONSE**: Yes. WinSRFR is solely being used to evaluate hydraulics.*

C69: Specify limited ppm? or something like that?

***RESPONSE**: See C66 response.*

Divert uncontaminated water away from the VTA to the fullest extent possible unless additional moisture is needed to manage vegetation growth.

C31: I think you can remove “unless additional moisture is needed to manage vegetation growth”. You already have rainfall directly falling on the VTA. I don’t see a point to giving designers an out to not install roof gutters, etc. Keeping clean water clean has been very important to NRCS, DATCP, and LCDs.

***RESPONSE**: Intent is to allow possibility of storing precipitation for later irrigation in a controlled application to help keep vegetation established.*

Routinely remove manure, uncovered feed, or other nutrient sources from feedlot, feed storage area, or manure stacking area to reduce nutrient and pathogen loads entering the VTA. Land apply removed materials per nutrient management plan.

C70: Specifics [for “routinely”]?

***RESPONSE**: Reference to O&M plan will be added.*

Use NRCS CPS 632 – Waste Separation Facility (i.e. settling basin) to pretreat contaminated runoff and thereby reduce VTA nutrient/sediment loading. Design waste separation facility concurrently with VTA to ensure a feasible basin size and VTA application rate.

C90: The 632 standard allows settling basin to discharge to VTA for the 25-year storm. Due to this, should the VTA require designs to safely pass the 25-year storms?

***RESPONSE**: See C127 response on previous page. Unless excess flow is diverted to another location, runoff exceeding the capacity of the settling basin would be sent into the VTA (and eventually overtop the 12-inch end berm).*

C104: Were we intending that to mean the 632 settling basin only needs to meet the 1 year storm matching the VTA size? CPS 632 states to size basins receiving lot runoff for a 25 year frequency so just want to be clear.

***RESPONSE**: See C127 response on previous page. Intent is for settling basin to route a 10-year, 24-hour storm. Clarifying language will be added.*

Establish and maintain permanent VTA vegetation using NRCS CPS 342 – Critical Area Planting, where applicable. Select mixture of warm-season and cool-season grass species adapted to the soil and climate to maximize nutrient uptake over the entire growing season.

C32 // C105: Remove "mixture of warm season and cool season". I don't think we need to start prescribing mixes here, best to leave it to the 342 standard. // From my understanding and speaking with others there are no sod forming warm season grasses and so warm season bunch grasses could cause preferential flow paths as well as be difficult to establish with cool season. Also references CPS 342 which states "Only sod forming grasses are permitted in concentrated flow channels."

***RESPONSE**: Species language will be revised.*

C112: Will there be a list of mixes to choose from? Concern with the compatibility of warm and cool species together as one stand of vegetation. Concern with maintaining a mixed species stand of vegetation.

***RESPONSE**: No. Species language will be revised.*

Selected species will have the capacity to achieve adequate density, vigor, and yield within an appropriate timeframe. Complete site preparation and seeding at a time and in a manner that best ensures survival and growth of the selected species.

C57: Add that contaminated runoff will not be applied to the VTA until vegetation is established.

***RESPONSE**: Agreed. Restriction will be added.*

Select vegetation that will withstand anticipated wetting or submerged conditions.

C2: Provide a table with suitable species to choose from.

***RESPONSE**: Species selection is at the discretion of the designer to be suited to site and soil conditions.*

Remove vegetation at least three times during the growing season to encourage dense/upright growth. Do not allow livestock on the VTA.

C71: This is a nice option to provide. cattle hooves may cause some holes, but tractor tires cause ruts....

***RESPONSE**: Noted.*

C91: Are you requiring landowners to physically remove all vegetation or are other practices like mowing acceptable, if so clarify.

***RESPONSE**: Intent is to remove cut vegetation from VTA so that nutrients are collected. Removal language will be revised (and moved to O&M).*

C113: Is cutting considered removing or is this meant as physically removing vegetation? Physically removing vegetation could add some landowner complications to the maintenance requirements. Potentially creating concern with damaging the VTA.

***RESPONSE**: See C91 response. Equipment use addressed in O&M Section.*

Complete land grading and install structural components necessary to maintain sheet flow throughout the VTA.

C33: Remove "Complete land grading and install structural components necessary". Just start with "Maintain sheet flow throughout….", it states the intent.

***RESPONSE**: Noted.*

Do not apply contaminated runoff to the VTA using a concentrated point of discharge, such as a pipe outlet. To encourage sheet flow across the VTA width, provide a means to disperse concentrated flow, such as a ditch, curb, gated pipe, level spreader, fiberglass reinforced plastic V-notch weir/baffle assembly, or a sprinkler system.

C3 // C19: You do not need to list the options, it is too wordy. Just stop at "means to disperse concentrated flow" and call it good. // No need to specify spreader options.

***RESPONSE**: Noted.*

Utilize inlet control structures to achieve required application rate/duration during normal operations and to isolate the VTA for maintenance.

C114: Would this be based on a minimum storm event or a minimum quantity for designing the inlet control?

***RESPONSE**: Purpose of inlet control is to regulate the VTA application rate/duration to optimize infiltration for the identified soil type.*

For contaminated runoff applications, design the VTA for full infiltration of a 1-year frequency, 24-hour duration runoff event with no discharge from the end and no more than 10 percent deep percolation. Use a Runoff Curve Number (CN) = 98 for the paved condition and CN = 90 for the earthen condition (Reference: National Engineering Handbook, Part 630, Chapter 10). Assume that the 1-year frequency, 24-hour duration precipitation event has just occurred on the VTA for all applications.

C4: This is too specific and technical of wordage for a CPS.

***RESPONSE**: Noted.*

C72: Adequate for our usual big storms?

***RESPONSE**: The work team believes so. See precipitation information in Considerations Section.*

C125: The national standard requires to "Design the VTA based on the need to treat the runoff volume from the 25-year, 24 hour storm event from the agricultural animal management facility" but the proposed standard says to "design the VTA for full infiltration of a 1 year frequency, 24 hour duration runoff event with no discharge from the end". What is our plan for storms greater than the 1 year frequency? The 632 Waste Separation Facility needs to be sized for the 25 year 24 hour storm event. The purpose,

conditions where practice applies, and general criteria have all had significant changes to national language.

***RESPONSE**: The national language with 25-year, 24-hour design storm requirement only applies in a CAFO situation. See C127//C104 responses.*

Use an earthen berm with a height of 12 inches (end block) on the downstream end of the VTA to increase infiltration time and inhibit formation of ephemeral gullies which can circumvent uniform flow.

C5: This makes it seem like we want to pond water and saturate the ground at the end of the VTA.

***RESPONSE**: Correct. The end berm facilitates minor ponding to increase infiltration and full use of the soil's water holding capacity.*

C73: Wondering if there can be more spreaders throughout the VTA to respread liquid across VTA? I often saw channels through the VTAs we constructed in the past.

***RESPONSE**: Standard includes maximum spreader spacing of 100 feet with at least one being installed. Additional spreaders are not prohibited but will reduce vegetated area.*

Minimum VTA slope is 0.5 percent, and maximum VTA slope is 3 percent. If design slope is 1 percent or greater, use a uniform slope throughout the VTA. If design slope is less than 1 percent, use an entrance slope of 1 percent on the first 25 feet of VTA length to encourage flow distribution.

C6: Usually if the situation requires a slope flatter than 1%, there is not enough of an elevation difference to drop it 1% for 25 feet. This requirement needs to be removed.

***RESPONSE**: Minimum entrance slope of 1% is from national standard, and provides better distributed flow.*

C34: This is very prescriptive, likely not necessary. The standard already says to maintain sheet flow. Some of these sites don't have the relief to have a 1% drop immediately.

***RESPONSE**: See C6 response. Slope greater than 3% increases flow velocity and significantly decreases infiltration time. It also presents computational issues for WinSRFR.*

C100: The minimum slope of 1% in the previous standard was changed from 0.5% due to difficulty with construction and ponding which killed vegetation etc. I don't agree with the 0.5% slope although it did allow a shorter strip length with previous design methods.

***RESPONSE**: Noted.*

Use a VTA flow width between 20 feet and 40 feet. Use a VTA flow length between 100 feet and 400 feet.

C35: With a VTA width of 20-40', I'm assuming we can have berms in the middle and have multiple VTAs in parallel? We've successfully done that in vegetated spillways and in VTAs in the past.

***RESPONSE**: Standard does not prohibit installation of multiple VTAs in parallel with common side berm construction. Clarifying language will be added.*

C74: Maybe having 2 widths would do a better job of keeping the liquid distributed across the VTA? I've seen the liquid veer to one side on some previously constructed VTAs (soil settles after construction? Grading is not 100% even? Soil clods get in the way? etc.)

***RESPONSE**: See C35 response.*

C47: Are there any specific design parameters to specify width and length or is it solely designer discretion?

***RESPONSE**: Designer will determine acceptable VTA width and length (within referenced boundary conditions) using WinSRFR.*

C92: [Earlier above] states "...maintain sheet flow throughout the VTA." In TR-55 300' is the maximum sheet flow length, is 400' a viable length to be able to maintain sheet flow?

***RESPONSE**: The work team believes so. See C100 response on previous page.*

Use earthen side berms with a minimum height of 12 inches to define the VTA perimeter and exclude uncontaminated runoff from adjacent areas. Minimum height applies to adjacent ground surface within and outside of VTA.

Use a managed rooting depth of 3.0 feet for grass and a Manning's n-value of 0.3 to model surface roughness/sheet flow through the vegetation.

C106: Would this be better placed under "Additional Criteria for Hydraulic Design" Section?

***RESPONSE**: Agreed. Location will be changed.*

C7 // C128: There needs to be suggested list or table of suitable grasses. There are very few grasses that root to 3 feet. // I'm curious on the seed mixes to get a 3' rooting depth on grasses, assume this would require a mixture of warm/cool seasons to accomplish. Typically 342 doesn't promote cool season/warm season combination mixes. This is a little contradictory and would need some more detail to make sure we are getting that rooting depth.

***RESPONSE**: Rooting depth is considered effective depth for grass species per National Engineering Handbook Part 652, Table 3-4. Species language will be revised.*

Locate VTAs outside of floodplains. However, if site restrictions require location within a floodplain, provide protection from inundation or damage from a 25-year flood event, or larger, if required by regulation.

C36: I can't really think of a good reason to build one in a floodplain or how it would ever pass state laws.

***RESPONSE**: Noted.*

Install VTAs so that infiltrated runoff does not mingle with groundwater at the bottom of the root zone. Subsurface drainage within the VTA is not allowed.

C37 // C48: "do not mingle with groundwater" is open to interpretation and vague. We have setbacks below . I'd remove the mingling statement. // "mingle" seems like an odd word choice for an official NRCS practice standard. (contaminate?)

***RESPONSE**: Associated language will be revised.*

C93: Clarify this statement. Standard states grass rooting depth is 3' and a 3' subsurface saturation setback, so does the subsurface setback need to be greater than 3' if a rooting depth is 3'?

***RESPONSE**: The setback was minimized to increase opportunities to use this standard.*

Do not use drainage tile to artificially lower the subsurface saturation elevation.

C8: "Mingle" is a very odd term to use here and sounds very non-technical and unprofessional. A better word may be "mix" or "intersperse".

***RESPONSE**: Language will be changed.*

Ensure that appropriate erosion control measures and sheet flow control measures (gravel spreaders or equivalent) are adequately addressed over the entire length of the VTA. Space gravel spreaders (or equivalent) evenly over the VTA length with a maximum separation of 100 feet between them and to the upstream/downstream ends of the VTA. At least one gravel spreader (or equivalent) is required.

C75: This is good. Although spreaders are also difficult to construct as exactly even across width.

***RESPONSE**: End berm will assist in achieving a more uniform application as well.*

C116: Gravel Spreader Terminology: define the type of stone. Too small of stone or stone with fines tends to restrict flow. The restriction of flow may cause the initial discharge to push elsewhere or possibly could cause the upper section(s) of a VTA to be overloaded. Inappropriate stone could create a maintenance concern.

***RESPONSE**: Associated language will be revised. Gravel spreaders are expected to be a maintenance concern regardless of composition.*

Additional Criteria for Site Suitability

Perform a soils investigation within the planned VTA footprint every 100 feet along the flow length. Provide at least one test hole at both the upstream and downstream ends. Log the soil profile using the USDA Soil Classification System to a sufficient depth below the planned VTA surface to ensure compliance with the minimum bedrock and subsurface saturation distances in the following setback list.

C9 // C20 // C38 // C49: Use the USCS descriptions; everything else in the document and anything else we do in terms of soils as technicians refers to USCS terms (SC, SM, ML, CL, etc.) [Same comments below for where soil texture mentioned.] // USCS? // Historically, our private engineers and all other designers are using the USCS classification system. I suggest we stick with that. I see once we get to WinSRFR, it's going to be an issue, but there should be a work around. We probably need to add % fines. // Our other practice standards reference USCS rather than the USDA soil classifications. What was the reasoning for going this route?

***RESPONSE**: WinSRFR uses NRCS infiltration intake families that correspond to USDA textural soil classifications. USC classifications can be cross walked to the USDA Textural Triangle.*

C61 // C94: What does "Provide at least one test hole at both the upstream and downstream ends." mean? A minimum of two test holes? An upstream and downstream test hole must be included? At least one test hole must be located at the approximate beginning and end? How far from the beginning and end? Is this asking for test holes upstream and downstream of the VTA but not actually in the VTA footprint since the previous statement "Perform a soils investigation within the planned VTA footprint every 100 feet along the flow length." Some clarification would be appreciated.? // Clarify ["one test hole at both the upstream and downstream ends"]. Is this in addition to the investigation every 100' or can these be considered part of the every 100' investigation?

***RESPONSE**: Soil investigation language will be revised.*

Do not construct a VTA at the proposed location if the investigation confirms the presence of sand, loamy sand, or sandy loam within the soil profile.

C62: Since we usually use the Unified Soil Classificat**i**on System (USCS) for engineering prac**ti**ces though, could this be changed to USCS for consistency sake. Does soil profile only refer to the top 3 feet of soil since the setbacks listed below this statement only include down to 3 feet?

***RESPONSE**: Correct. See C9//C20//C38//C49 responses.*

C39a: Sandy loam is a soil that has the characteristics of the fines that are in the soil. Excluding it doesn't make sense. Chapter 4 of the Engineering Field Handbook, page 4-29 (old version) stated:

> "Permeability of coarse-grained soils and fine-grained soils must be considered separately. In order to treat a soil as a coarse-grained soil when estimating permeability, it must have less than 5 percent fines, and the fines must be nonplastic. Sometimes, even 5 percent fines will clog the soil pores. The permeability of clean sand and gravel is controlled by the finest 10 to 20 percent of the soil.

> "The permeability of soils that have a significant content of fines depends on the characteristics of the fines. Generally, a proportion of 15 percent or more fines is enough for permeability to be controlled by the fines."

I believe this is one of the reasons that 20% fines was chosen for a subliner under concrete lined manure storage facilities and many other practices, because this was considered a safe percentage where the subliner now acts like the fine particles in it. I'm not suggesting we use 10 or 15%, but I do think we have a lot of room to use soils with less fines than what is currently listed in the 635 draft.

> ***RESPONSE**: See C9//C20//C38//C49 responses. Sandy loam can correspond to several NRCS infiltration intake families depending on how fine the sand component is. Designer will need to make a judgement call on applicability of the intake families referenced in the standard. The 0.8 intake family was determined to be a suitable breakpoint on allowing too much deep percolation on the upper section of the VTA (i.e. larger-value intake families too coarse/porous).*

C39b: We should include a % fines, since that's where the USCS classification line is typically drawn, and % fines can be determined easily in a lab.

> ***RESPONSE**: See C9//C20//C38//C49/C39a responses.*

C60: Can I haul in soil (anything other than sand, loamy sand, or sandy loam) to construct the VTA with, since there are no direct references to in situ soil?

> ***RESPONSE**: Yes. Standard does not prohibit use of borrow material.*

Maintain the minimum setbacks from the VTA listed below:

- 3 feet to bedrock. Do not excavate bedrock and backfill with soil.
- 3 feet to subsurface saturation as defined in NRCS CPS 313 – Waste Storage Facility.

  C76: Above it says that roots of vegetation will go down 3 feet. That means the root channels may take contaminated runoff down to water or bedrock.

  > ***RESPONSE**: See C7//C128//C37//C48 responses. Capillary action and the water holding capacity should hold soil moisture. Significant deep percolation should not occur until soil is fully saturated.*

- 50 feet from the perimeter to drainage tile.

  C40 // C50: This is within the lateral effect distance of some tile systems. // Can soil type/drain tile lateral effects be evaluated for setback distance?

  > ***RESPONSE**: The relative depth of the tile to the VTA bottom is also a factor in the lateral effect and drawdown time. The VTA is typically one foot deep. Tile lines are typically 3-4 feet deep. The setback was minimized to increase the opportunities to use this standard.*

  C77: Maybe no tile lines allowed below the VTA for more than 50 feet? (not sure how much more) to avoid a direct conduit to waters for nutrients from the VTA when vegetation isn't using the nutrients.

  > ***RESPONSE**: Noted.*

- 10 feet from the sides to property lines and rights-of-way.
- 100 feet from the downstream end to property lines and rights-of-way.
- 50 feet from the perimeter to private wells.

  C41: Is there a distinction between if the well is on the side or immediately downstream of the end of the VTA? Seems a bit close to me.

  > ***RESPONSE**: No. Distance is from WI Administrative Code NR812, Table A.*

- 1,000 feet from the perimeter to public wells.
- 300 feet from the perimeter to sinkholes and quarries.
- 100 feet from the downstream end to wetlands and artificial ponds.
- 300 feet from the downstream end to streams, gullies, and surface inlets.

C51: Streams and rivers tend to be their own category for setback distances in all of our other standards and specs. Not sure we would lump them in with field gullies and tile inlets.

***RESPONSE**: Noted.*

- 1,000 feet from the downstream end to lakes and flowages.

C115: [For final 3 bullets related to downstream end setbacks] With the VTA end berm requirement could the downstream land and water feature setbacks be reduced? Is gully considered by some definition or is this considered to be concentrated flow?

***RESPONSE**: Setback reduction not considered appropriate as flow is expected to occasionally travel over end berm. Gully language will be revised.*

C21: Would a table be more effective?

***RESPONSE**: Considering that some setbacks apply to the side and end of the VTA, a list was the preferred approach.*

Additional Criteria for Hydraulic Design

Use WinSRFR program developed by the USDA-Agricultural Research Service for VTA design. Version 5.1.1 is available on the national NRCS website (Resources > Tech Tools).

C22 // C52 // C97 // C122 [Comments referring to this whole section]**:** Would a reference to this program only be needed? Would this section be better in a companion document? Too technical for a standard. // Do we have any other practice standards that lay out specific computer program inputs/functions? consider removing this section and put it elsewhere. just reference the new document on how to run WinSRFR for VTA design purposes. // Should this information be listed in the standard or a separate guidance document? // Why is there information on how to use a software program in the standard, and not as a supplement to the standard?

***RESPONSE**: Noted. Software inputs are not typically included in a standard, but in this case, the inputs also provide design criteria. The minor amount of WinSRFR information was not worth the development of a companion document.*

C96: Is this [WinSRFR] the only program that can be used or are other programs allowed?

***RESPONSE**: Use of WinSRFR is required. Narrowing the design reference improves our ability to evaluate VTAs and pattern success and failures in the field.*

C95: Will this [standard] be updated every time a new [software] version comes out?

***RESPONSE**: The software is rarely updated; however, the standard language will be amended to be the most current version.*

C101: I tried to open WinSRFR and was unable to use it on my computer. If you're going to add new design tool and reference requirements to the Standards our field technicians need to have the tools and references available and easy to access. It would be very helpful if State office/SOC team would make sure the NRCS website has the design tools specified in the standard(s) in an easily accessible location. All the new references and tool requirements aren't very helpful if our field office people can't find or access them and will cause them to stop designing that practice.

***RESPONSE**: While NRCS employees will currently need to submit a software installation request to IT, WinSRFR has been accessed by reviewers outside of NRCS without issue.*

Use the following software input conditions:

1. Select a basin/border system in the “Simulation World” tab.

   C108: The tab “Simulation World” is also titled “Start Simulation” on the tab at bottom of window and also referred to as “Start Simulation” tab [in item 6 below].

   ***RESPONSE**: Language will be revised and also include instructions for assigning English units.*

2. Select the applicable NRCS Intake Family on the “Soil / Crop Properties” tab (Reference: National Engineering Handbook, Part 623, Chapter 4):

   C109: Does not tell the user to select “NRCS Intake Family” from the drop down labeled “Infiltration Equation” to have correct inputs show on screen.

   ***RESPONSE**: Language will be revised.*

   - Silt Loam – NRCS Intake Family = 0.8
   - Clay Loam – NRCS Intake Family = 0.5
   - Sandy Clay – NRCS Intake Family = 0.3
   - Clay – NRCS Intake Family = 0.1

   C10: These need to be USCS like everything else we do. [Same comment in Items 5 and 6 below, where soil texture mentioned.]

   ***RESPONSE**: See C9//C20//C38//C49/C39a responses.*

   C42: Add the sand loam, have a 40 or 50% fines cutoff. Its getting pretty conservative otherwise

   ***RESPONSE**: See C9//C20//C38//C49/C39a responses.*

3. Enter a 12-inch basin depth on the “System Geometry” tab to establish an end block. Select the blocked downstream condition on the “Inflow / Runoff” tab.

   C110: The input in the model is labeled as “Maximum Depth, Y” on system geometry tab.

   ***RESPONSE**: Language will be revised.*

4. Enter the design slope on the “System Geometry” tab. Design slope shall be the uniform slope downstream of the initial 25 feet of VTA length. Adjust slope as necessary to keep the “Verr” value in the simulation results within ±0.5%.

   C11: Looks like the + symbol was accidentally underlined here.

   ***RESPONSE**: Acceptable “Verr” value is within range of -0.5% to 0.5%. As confirmed by the software developer, the model is losing track of the water when outside this range.*

5. Select standard hydrograph method. Enter the design discharge rate from the settling basin (or milk house wastewater pretreatment) as the constant inflow rate on the “Inflow / Runoff” tab with no cutback. Calculate an inflow rate by dividing the 1-year, 24-hour runoff volume (or batch volume from milk house cleaning) by a drawdown time of 4 to 12 hours. As a starting point for optimizing infiltration, the following durations are recommended based on soil type.

   - Silt Loam = 4 hours
   - Clay Loam or Sandy Clay = 7 hours
   - Clay = 12 hours

6. Required depth on the “Start Simulation” tab is defined as the available water holding capacity within the managed rooting depth minus direct precipitation on the VTA from the design storm

event. Select the available water holding capacity per unit depth based on soil type (Reference: National Engineering Handbook, Part 652, Chapter 2).

- Silt Loam – Available Water Holding Capacity = 2.4 inches per foot
- Clay Loam – Available Water Holding Capacity = 2.4 inches per foot
- Sandy Clay – Available Water Holding Capacity = 1.9 inches per foot
- Clay – Available Water Capacity = 1.8 inches per foot

The following is an example calculation assuming silt loam, a managed rooting depth of 3 feet, and a 1-year, 24-hour precipitation depth of 2.5 inches.

$$Example\ WinSRFR\ Required\ Depth\ (in) = \left(\frac{2.4\ in}{ft}\ x\ 3\ ft\right) - 2.5\ in = 4.7\ in$$

7. Limit deep percolation ("DP" on WinSRFR results summary) to 10 percent of calculated design volume. Applied depth in excess of the required depth is considered deep percolation.
8. Given selection of an end block as the downstream condition on the "Inflow / Runoff" tab, the only solution model option on the "Execution" tab will be zero-inertia.
9. Run the simulation to calculate VTA performance. Perform trial adjustments to the geometry and flow parameters to optimize infiltration, prevent VTA discharge, and keep deep percolation to less than or equal to 10 percent.

C107: Additional Criteria for Hydraulic Design section might benefit from a reorganization of the input steps for WinSRFR as the current order has the user going back and forth between tabs a few times. Working from one tab to the next might be more clear.

***RESPONSE**: WinSRFR was not organized with VTA design in mind.*

Additional Criteria for Feed Storage Area Runoff

C78: Do this [Additional Criteria] for feedlot runoff also??

***RESPONSE**: Initial volume diversion was not considered necessary for feedlot runoff.*

Collect all leachate and the runoff volume from the initial 0.20 inches of each precipitation event in a reception structure designed in accordance with NRCS CPS 313 – Waste Storage Facility or NRCS CPS 634 – Waste Transfer. Land apply the collected liquid per nutrient management plan. Do not apply feed storage area leachate/initial runoff to the VTA.

C43: I see the original feed storage standard of capturing the 0.20" has made a comeback. It makes sense to me, as that's the vast majority of storm evens and likely the "hottest" runoff.

***RESPONSE**: Noted.*

C54: We request the requirement to collect the first 0.2 inches of runoff be reduced significantly, or better yet be eliminated. Discovery farms has studied runoff from feed storage areas and there is no evidence that first flush runoff carries any more pollutant load than any other segment of a runoff event.

***RESPONSE**: Noted.*

C55: Collection of leachate is the largest concern. Undiluted leachate should never be allowed to flow to the VTA. We request that the size of a collection structure be for the 30 day leachate volume and that the MOL be set at 1/2 that volume. Require that the tank be pumped out every two weeks, when liquid reaches the MOL, and/or after every rainfall event.

***RESPONSE**: Noted.*

Additional Criteria for Pressure Dosing Systems

Distribute the effluent over the VTA through sprinkler irrigation or other pressure dosing system. Match the application rate of sprinkler nozzles to the peak consumptive use of the vegetation, most restrictive soil infiltration rate, or other factors to prevent effluent from discharging from the VTA.

C123: When is a pressure dosing system required? If it is not a requirement I do not see people doing it. If the storm even has to be pumped up to a VTA at a higher elevation I would just use a spreader of some type to distribute the run off.

***RESPONSE**: The possibility for storage and pressurized dosing was included for CAFOs where 25-year containment and managed agronomic applications are required for a permit. This national standard language was included to allow the possibility of a pressure dosing system. There are no conditions in this standard that require use of pressure dosing and language will be removed.*

CONSIDERATIONS

For the timeframe of January 1994 through July 2023 at eight weather stations across Wisconsin, 90 percent of the total rainfall volume occurred during rainfall events with depths less than or equal to 1.95 inches on average per data acquired from the Wisconsin State Climatology Office. For comparison, the 1-year frequency, 24-hour duration, MSE3/MSE4 precipitation depths range from 2.00 to 2.69 inches for Wisconsin counties with an average of 2.36 inches.

C12 // C23 // C121: What is the point of including this paragraph? // To what does this statement refer? What is its purpose? // What is the purpose of talking about the winter storms?

***RESPONSE**: Information was included for context regarding selection of the 1-year, 24-hour storm as the design event.*

C79: How do the more recent years compare to previous years??

***RESPONSE**: More detailed analysis of the referenced data has not been completed.*

When near sensitive areas such as housing developments, consider more frequent cleaning operations to minimize potential odor concerns.

If the proposed VTA is within a watershed with documented surface water and/or groundwater impairments (nutrients, bacteria, etc.), consider providing more than one VTA to increase reliability and minimize the potential for overloading.

C80: Still will not protect the water when ground is frozen/vegetation is not growing.

***RESPONSE**: Agreed.*

Provide additional storage in the basin collection area to minimize or eliminate discharge into the VTA during rainfall events. Delay application until rainfall has ended to improve infiltration and nutrient uptake.

If active management will be pursued, consider providing multiple locations for influent distribution (e.g. secondary application point in middle of VTA) to increase uniformity of water and nutrient application across the entire VTA.

Direct VTA effluent to a waste storage facility during excessively wet or cold climatic conditions.

C81: This means a storage will still be needed? Good to know. The VTAs I worked on in the past were for small farms that did not have storage.

***RESPONSE**: Draft standard only includes winter storage as a consideration, not a requirement.*

C85: I urge the review team to ***require*** an alternate method or methods of containing contaminated runoff during the periods when vegetation is dormant. As stated now it is just a ***consideration***. A concept similar to what was used for feed leachate to capture "first flush" liquid or diverting all contaminated runoff to a storage structure when vegetation is dormant is (as listed [in Additional Criteria for Feed Storage Runoff]) is a great idea.

***RESPONSE**: Noted.*

Consider suspension of VTA application when weather conditions are not favorable for aerobic activity or when soil temperatures are lower than 39° F. When soil temperatures are between 39° F and 50° F, consider extending the duration of application.

C58: This should be criteria, not a consideration. "Suspend application to the VTA when weather conditions are not favorable for aerobic activity or when soil temperatures are lower than 39° F".

***RESPONSE**: Noted.*

VTA effluent may be stored for land application or otherwise used in the agricultural operation. Consider pumped recirculation of VTA effluent to enhance treatment.

Install fences or other measures to exclude or minimize human/animal access to the VTA. If appropriate, consider using harvested vegetation as animal feed.

C13 // C24: This last sentence has no reason to be in this document. // No need to specify as there could be multiple uses for VTA vegetation.

***RESPONSE**: Language will be removed.*

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice to achieve its intended use.

C25: No need for this sentence. Heading is sufficient.

***RESPONSE**: National standard formatting.*

As a minimum include:

- Critical construction parameters, necessary construction sequence, vegetation establishment requirements, erosion control requirements, flow control requirements, and associated practices.
- Site map showing the VTA location. Plan and profile views of the proposed installation.
- Details of VTA length, width, slope, and flow distribution controls.
- Herbaceous species, seed selection, and seeding rates to accomplish the planned purpose.
- Planting dates, care, and handling of the seed to ensure that planted materials have an acceptable rate of survival.
- Site preparation sufficient to establish and grow selected species.

OPERATION AND MAINTENANCE

Develop an operation and maintenance plan consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for its design.

C26: Change to bullet point.

***RESPONSE**: National standard formatting to introduce the section.*

As a minimum include:

- Control undesired weed species, especially state-listed noxious weeds, and other pests that could inhibit proper functioning of the VTA.
- Inspect the VTA in the spring and routinely after storm events to identify erosion issues, excessive sedimentation, plugged flow distribution controls, and unvegetated locations. Regrade, clean, and reseed problem areas as appropriate to maintain sheet flow and acceptable treatment.
- Apply supplemental water, nutrients, and soil amendments as needed to maintain the desired species composition and vegetation density.
- Routinely dethatch or aerate the VTA to promote infiltration.
- Conduct maintenance activities only when the VTA surface is dry enough to prohibit compaction.

  C119: VTA maintenance requirements? Equipment compaction and rutting concerns?

  ***RESPONSE**: Referenced O&M requirement specifies acceptable conditions. Clarifying language will be included.*

- On a weekly basis, clean exposed locations of paved feedlots, feed storage areas, and manure stacking areas to reduce the nutrient loading to the VTA. Empty settling basins at least quarterly and sooner if 50 percent filled with solids. Land apply per nutrient management plan.
- Maintain plastic covers at feed storage areas and perform routine inspections. Repair tears and punctures in plastic covers to minimize exposure to precipitation. Cover exposed feed surface after daily feeding operations are completed.
- Monitor VTAs that could be affected by high salinity or sodium content for excessive salt and sodium buildup. Take corrective action if excessive salt or sodium is found.

  C14: This is unnecessary. No landowner will have the means to test for this anyways. Wisconsin as a state does not recognize salinity as a resource concern.

  ***RESPONSE**: Language will be clarified.*

- Monitor phosphorus accumulation in the VTA soil profile and nitrogen leaching below the root zone.

  C15 // C27 // C82: How? // Would this be done by routine soil testing? // How do they do this?

  ***RESPONSE**: Language will be adjusted.*

  C59: Consider adding this to the criteria and stating a nutrient loading that should require action, such as removal and replacement of all soil in the root zone. The owner needs to know what to do when a certain loading is present.

  ***RESPONSE**: O&M language will be adjusted.*

- Manage VTA to maintain vegetative treatment effectiveness throughout the growing season. Time harvest operations such that vegetation can regrow to a sufficient height to effectively function late in the growing season.
- Minimize or prevent animal use of runoff-generating surfaces during the non-growing season to reduce VTA nutrient and pathogen loadings. Routinely perform snow removal to minimize runoff.

C83: Winter is when animals are most likely to be on the barnyard. Other seasons they can be on pasture.

***RESPONSE**: Animal use language will be moved to Considerations.*

C86: Remove "Minimize or prevent animal use of runoff-generating surfaces during the non-growing season to reduce VTA nutrient and pathogen loadings." In fact the opposite is true. Marinette County encourages on lot feeding during the frozen or wet times of the year so the manure can be better contained (and collected) in one area. Dragging a feed wagon out into a pasture or field creates nutrient hot spots and potential environmental degradation.

***RESPONSE**: Animal use language will be moved to Considerations.*

REFERENCES

Koelsch, R., B. Kintzer, and D. Meyer. (ed.) 2006. Vegetated Treatment Systems for Open Lot Runoff - A Collaborative Report. USDA/NRCS.

Koelsch, R., J. C. Lorimor, and K. R. Mankin. 2006. Vegetative Treatment Systems for Management of Open Lot Runoff: Review of Literature. Applied Engineering in Agriculture, Volume 22, pages 141-153.

C63: Is there a link that can be provided for the first two References?

***RESPONSE**: Links may change and documents are not on government websites. Documents are easily located via internet search.*

USDA/NRCS Website, WinSRFR 5.1.1 in Tech Tools. https://www.nrcs.usda.gov/resources?title=&resource_type=1970

C64: The Tech Tools link takes you to all NRCS Tech Tools not directly to WinSRFR. Can a link be provided directly to WinSRFR?

***RESPONSE**: Yes, but the link would become invalid if version changes. If filtering through tech tools is not preferred, an internet search for "nrcs winsrfr" will also take you to the download site.*

USDA/NRCS, National Engineering Handbook, Part 623, Chapter 4 – Surface Irrigation (September 2012), https://directives.sc.egov.usda.gov/

USDA/NRCS, National Engineering Handbook, Part 630, Chapter 10 – Estimation of Direct Runoff from Storm Rainfall (July 2004), https://directives.sc.egov.usda.gov/

USDA/NRCS, National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 4 – Agricultural Waste Characteristics Waste (March 2008), https://directives.sc.egov.usda.gov/

USDA/NRCS, National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 11 – Waste Utilization (September 2013), https://directives.sc.egov.usda.gov/

USDA/NRCS, National Engineering Handbook, Part 652, Chapter 2 – Soils (September 1997), https://directives.sc.egov.usda.gov/

C65: The https://directives.sc.egov.usda.gov/ link is general and from here you have to hunt for the referenced document[s] which isn't ideal. Is there a way to link to the actual referenced document[s]?

***RESPONSE**: No, not since the eDirectives website has been reorganized (only generic website link can be copied).*