NORMANDEAU ASSOCIATES
Environmental Consultants

October 18, 2016

Vermont Wetlands Program
Watershed Management Division
One National Life Drive, Main 2
Montpelier, VT 05620-3522

Re: Wetland Permit – Kayhart Brothers Dairy, LLC.

Dear Vermont Wetlands Program:

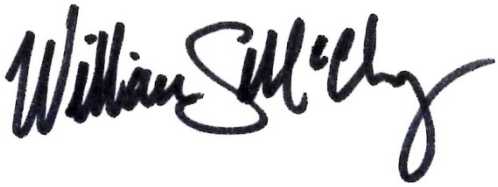
Please find a complete digital application prepared on behalf of Kayhart Brothers Dairy, LLC for proposed wetland and wetland buffer impacts associated with an upgraded farm road that will support ongoing agricultural practices and a proposed milking center. A check and a copy of the Vermont Wetlands Program Application Database Form will be submitted via US Mail.

I understand that permit review time can take 3 to 6 months; however if there is any way possible to expedite the review as much as possible Kayhart Brothers Dairy would very much appreciate the effort. A quick review would help them meet their project goals without significantly disrupting other operations at the farm.

Let me know if you have any questions – and I look forward to your quick processing of the application.

Sincerely,

NORMANDEAU ASSOCIATES, INC.



William McCloy, PWS/NHCWS
Senior Wetland Scientist

Vermont Wetlands Program
Permit Application Database Form

Under Sections 8 and 9
of the Vermont Wetland Rules

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
WETLANDS PROGRAM

Application Submittal Instructions

- If submitting via US post, include a check in the correct fee amount made payable to the "**State of Vermont**," and a CD for applications that contain large files (1 MB or greater).

  Mail to: Vermont Wetlands Program
  Watershed Management Division
  One National Life Drive, Main 2
  Montpelier, VT 05620-3522

- Applications can also be submitted via email to the following address: anr.wsmdwetlands@vermont.gov
  - If submitting via email, please mail a check in the correct fee amount, made payable to the "**State of Vermont**," and a copy of the Vermont Wetlands Program Application Database Form (this page) to the address provided above. ***It is not necessary to mail in a copy of the complete application.***

Applicant Name: Steve and Tim Kayhart; Kayhart Brothers Dairy, LLC

Application Preparer Name: William McCloy, Normandeau Associates Inc.

Town where project is located: Addison

County: Addison

Span#: 003-001-11096

Vermont Wetlands Project (VWP)# if Known: 2014-353

Project Location Description:
911 street address or direction from nearest intersection 7429 VT Route 17W, Addison, VT 05419

Brief Project Summary: Improvement of existing farm road to access proposed milking center and to better support on-going farm activities.

Application Type: ☐Individual Permit (multiple wetlands) ☐After the Fact Permit ☐Wetland Determination
☒Individual Permit (single wetland) ☐General Permit Coverage Authorization ☐Permit Amendment: VWP Project #_____

Existing Land Use Type(s): *(Check all that apply)* ☐Residential (single family) ☐Residential (subdivision) ☐Undeveloped
☒Agriculture ☐Transportation ☐Forestry ☐Parks/Rec/Trail ☐Institutional ☐Industrial/Commercial

Proposed Land Use Type(s): *(Check all that apply)* ☐Residential (single family) ☐Residential (subdivision) ☐Undeveloped
☒Agriculture ☐Transportation ☐Forestry ☐Parks/Rec/Trail ☐Institutional ☐Industrial/Commercial

Proposed Impact Type(s): *(Check all that apply)* ☐Buildings ☐Utilities ☐Parking ☐Septic/Well ☐Stormwater
☐Driveway ☐Park/Path ☐Agriculture ☐Pond ☐Lawn ☐Dry Hydrant ☐Beaver Dam Alteration ☐Silviculture
☒Road ☐Aesthetics ☐No Impact ☐Other:_____

Wetland and Buffer Impact Type: *(Check all that apply)* ☐ Dredge ☐Drain ☒Cut Vegetation ☐Stormwater
☒Trench/Fill ☐Other:_____

Wetland Delineation Date(s):

Wetland Improvements		Buffer Zone Improvements		Reason for Improvements
Restoration:	0 s.f.	Restoration:	0 s.f.	☐Correction of Violation
Creation:	0 s.f.	Creation:	0 s.f.	☒To offset permit impacts
Enhancement:	0 s.f.	Enhancement:	1620 s.f.	☒Voluntary
Conservation:	0 s.f.	Conservation:	0 s.f.	

Wetland Impact Fee Calculations: *Round to the nearest square foot. Fees will auto-calculate.*

Total Wetland Impact (minus linear clear, including ATF)	4419 square feet (s.f.)	Wetland Impact Fee:($0.75/sf)	$ 3,314.25
Total Wetland Clearing (qualified linear projects only)	0 square feet (s.f.)	Wetland Clearing Fee:($0.25/sf)	$ 0.00
After The Fact Wetland Impact (to correct a violation)	0 square feet (s.f.)	After the Fact Wetland Fee: (0.75/sf) *(Required for after the fact permit applications)*	$ 0.00

Total Buffer Zone Impacts and Calculations: *Round to the nearest square foot*

Total Buffer Zone Impact	13667 square feet (s.f.)	Buffer Impact Fee: ($0.25/sf)	$ 3,416.75

Additional Fees

	Agricultural Crop Conversion *Check here:* ☐ *(Flat fee of $200.00)*	$ 0.00
	Minimum Application Fee: ($50.00) *Required when total impact fee is less than $50.00*	$ 0.00
	Administrative Fee:	$ 240.00

Make Checks Payable to: State of Vermont **Total Check Amount:** $ 6,971.00

Vermont Individual Wetland Permit Application and Determination Petition

Under Sections 8 and 9
of the Vermont Wetland Rules

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
WETLANDS PROGRAM

Applicant Information: *If the applicant is someone other than the landowner, the landowner information must be included below*			
Applicant Name: Steve and Tim Kayhart; Kayhart Brothers Dairy, LLC			
Address: 7429 VT Route 17W	City/Town: Addison	State VT	Zip: 05419
Phone Number: 802-349-9606	Email Address: kaydairy@gmavt.net		

Applicant Certification:
By signing this application you are certifying that all of the information contained within is true, accurate, and complete to the best of your knowledge. Original signature is required.

Applicant Signature:_____ Date:_____

Landowner Information: *Landowner must sign the application. If landowner is different from the applicant this section must be filled out*			
☒ **Check this box if landowner is the same as the applicant**			
Landowner Name:			
Address:	City/Town	State:	Zip:
Phone Number:	Email Address:		

Landowner Easement: *Attach copies of any easements, agreements, or other documents conveying permission, and agreement with the landowner stating who will be responsible for meeting the terms and conditions of the permit.* ***List the attachment for this information in this section. Describe the nature of the agreement or easement in the space provided below:***

Landowner Certification:
By signing this application you are certifying that all the information contained within is true, accurate, and complete to the best of your knowledge. Original signature is required.

Landowner Signature:_____ Date:_____

Application Preparer Information: *Consultant, engineer, or other representative that is responsible for filling out the application, if other than the applicant or landowner.*			
Application Preparer Name: William McCloy	Organization/Company: Normandeau Associates, Inc.		
Address: PO Box 205	City/Town Rutland	State: VT	Zip: 05701
Phone Number: 802-861-7038	Email Address: wmccloy@normandeau.com		

Application Preparer Certification:
By signing this application you are certifying that all of the information contained within is true, accurate, and complete to the best of your knowledge. Original signature is required.

Application Preparer Signature:_____ Date:_____

Handwritten signatures are also accepted

Vermont Individual Wetland Permit Application and Determination Petition

Under Sections 8 and 9
of the Vermont Wetland Rules

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Applicant Certification:
By signing this application you are certifying that all of the information contained within is true, accurate, and complete to the best of your knowledge. Original signature is required.

Applicant Signature: Stephen E. Kayhart Date: 10/13/16

Landowner Information: *Landowner must sign the application. If landowner is different from the applicant this section must be filled out*			
■ **Check this box if landowner is the same as the applicant**			
Landowner Name:			
Address:	City/Town	State:	Zip:
Phone Number:	Email Address:		

Landowner Easement: *Attach copies of any easements, agreements, or other documents conveying permission, and agreement with the landowner stating who will be responsible for meeting the terms and conditions of the permit.* ***List the attachment for this information in this section. Describe the nature of the agreement or easement in the space provided below:***

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Landowner Signature: Stephen E. Kayhart Date: 10/13/16

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Application Preparer Name: William McCloy	Organization/Company: Normandeau Associates, Inc.		
Address: PO Box 205	City/Town Rutland	State: VT	Zip: 05701
Phone Number: 802-861-7038	Email Address: wmccloy@normandeau.com		

Application Preparer Certification:
By signing this application you are certifying that all of the information contained within is true, accurate, and complete to the best of your knowledge. Original signature is required.

Application Preparer Signature: William McCloy Date: 10/17/16

Handwritten signatures are also accepted

1. Location of wetland and project:
Location description should include the road the wetland is located on, the compass direction of the wetland in relation to the road, 911 street address if available, and any other distinguishing features.

The wetland(s) and proposed project area are located approximately 1,350 linear feet east of 7429 VT Route 17W in Addison, VT. The wetland(s) are confined to a ravine that runs north/south and is crossed by an existing farm road with an 18-inch culvert. The existing farm buildings are located to the west of the ravine and fields are located to the east.

2. Site visit date(s) and attendees:
*A site visit is **required** before the application can be called complete*

2.1 Date of Visit(s) with State District Wetland Ecologist	2.2. List of people present for site visit(s) including Ecologist, landowner, and representatives.
October 7, 2014	Julie Foley and Steve & Tim Kayhart

3. Wetland Classification:
For multiple wetlands fill out the multiple wetlands table for sections 1 and 3 through 1

3.1. The wetland is a Class II wetland because :

The wetland is contiguous to a VSWI mapped wetland

3.2. Section 4.6 Presumption
If the wetland meets the Section 4.6 Presumption, it does so primarily because:

<Choose One>
<Choose One>
<Choose One>

4. Description of the Entire Wetland:
Answer the following questions regarding the entire wetland, which includes all wetland areas connected to the wetland proposed for impact. Answers may be estimates based on desktop review when the wetland extends past the investigation area (parcel boundary). Specific questions about the wetland in the project area will follow. For multiple wetlands , fill out the multiple wetlands table.

4.1. Size of Complex in Acres:
The size of the complex can be obtained from the Wetland Inventory Map for mapped wetlands, or best estimation based on review of aerial photography or site visit. This is not the size of the of the delineated wetland on the subject property unless the entirety of the wetland is represented in the delineation.

The wetland complex includes wetlands 1W & 2W; total size estimated at approx. 6 acres north/south

4.2. Vegetation Cover Types Present:
List all wetland types in the wetland or wetland complex and their percent cover.
***For example:** 50 acres of softwood forested swamp; or 30% scrub swamp, 70% emergent wetland*

Complex cover approx. 50% forsted (mostly to N) and 40% emergent with 10% scrub-shrub

4.3. Landscape Position:
Where is the wetland located on the landscape?
***For example:** Bottom of a basin, edge of a stream, shore of a lake, etc.*

Wetland occupies bottom of linear ravine, with wetland boundary associated with toe of slope in review area.

4.4. Hydrology:
Describe the main source of water for the entire wetland. List any river, stream, lakes, or ponds

Hydrology primarily groundwater discharge and interaction with seasonal water table; along with direct precipitation input and input from surrounding upland agricultural areas

4.4.1. Direction of Flow:
***For example:** Stream flows from north to south through the wetland complex, or the wetland drains generally to the southwest.*

Groundwater and surface water generally flow from north to south through the delineated Class 2 wetlands; NHD stream only evident in field to south of existing farm road, no channel to north

4.4.2. Influence of Hydrology on the Entire Wetland:
***For example:** The river provides floodwater to the wetland in the spring.*

Wetland complex hydrology driven by groundwater and surface water inputs; groundwater provides base hydrology throughout most of year with periodic input from precip. and melting snow

4.4.3. Relation of Entire Wetland to the Project Area:
The distance between the project area and any nearby surface waters

A small intermittent stream (1S) was mapped south of the existing farm road crossing and flows south towards Hospital Creek (located 1,000 feet to south of site)

4.4.4. Entire Wetland Hydroperiod:
Discuss the frequency and duration of flooding, ponding, and/or soil saturation

The wetland complex is likely saturated at or near the surface for the majority of the year, with limited ponding or flooding during wet seasons

4.5. Surrounding Landuse of the Entire Wetland:
For example: *Rural residential and forested; Agricultural and undeveloped*

The wetland complex is surrounded by active agricultural lands and associated farm infrastructure

4.6. Relation of the Entire Wetland to Other Nearby Wetlands:
Provide any information on wetlands or wetland complexes that are close enough to contribute to the overall function of the wetland in question.

Other wetlands are likely located north of the subject wetland complex based on aerials/VSWI. These wetlands are likely similar in nature to the delineated wetlands within the project area and are located in the same landscape and landuse settings. Wetlands bordering Hospital Creek which is associated with Lake Champlain are located to the south of the Project area, are different in nature and too far away to impact the functions of the complex. Two Class 3 wetlands are located in fields to the east.

4.7. Pre-project Cumulative Impacts to the Entire Wetland:
Identify any cumulative ongoing impacts outside of the proposed project that may influence the wetland. ***Examples include but are not limited to:*** *Wetland encroachments on and off the subject property, land use management in or surrounding the wetland, or development that influences hydrology or water quality. List any past Vermont Wetland Permits or CUD's related to this property.*

The wetland complex is located within an active agricultural landscape and setting. The subject wetland complex has been crossed with other farm roads and partially/completely impounded to the north by another farm road and possibly a berm/dam based on review of aerial photos, and the complex is likely influenced by runoff from the surrounding agricultural areas in terms of nutrients and suspended sediment. The wetland complex appears to be in fair condition overall and still maintains average functional significance compared to other wetland systems found in the same setting. The wetlands are not pristine however and have been influenced in the past.

5. Description of Subject Wetland and Buffer:
Subject wetland is defined as the area of wetland in the project vicinity, but not limited to the portion of the wetland to be directly impacted by the project. For the purposes of this application, the subject wetland should encompass any portion of the wetland that could either be directly or indirectly impacted by the project, as defined by chemical, physical, or biological characteristics. This may include the entire wetland area, or wetland area off property. For multiple wetlands, fill out the multiple wetlands table.

5.1. Context of Subject Wetland:
Describe where the subject wetland is in the context of the entire wetland described in section 4 above.
For example: *Upslope, narrow eastern "finger", 400 ft. from open water portion.*

The subject wetland is located in the lower (southern) half of the greater wetland complex. The subject wetland is comprised of two different delineated wetlands (Delineation ID# 1W and 2W), which are separated by an existing farm road.

5.2. Subject Wetland Land Use:
For example: *Mowed lawn, old field, naturally vegetated.*
Describe any previous and ongoing disturbance in the subject wetland.

The subject wetland is naturally vegetated and a mix of palustrine emergent and forested areas with some smaller inclusions of scrub-shrub cover-types. The wetland is not actively used or disturbed directly except at the immediate edges of the existing farm road. Some indications of historical modifications were observed south of the site as well. Portions of the wetland buffer south of the existing farm road have been enhanced with plantings of trees (ash in/near wetland and oaks in the upland) in the past.

5.3. Subject Wetland Vegetation:
List dominant wetland vegetation cover type and associated dominant plant species.

The dominant wetland community type is palustrine emergent (PEM1) across the two delineated wetlands (70-80%) with approximatly 20% palustrine forested (broad-leaved deciduous)(PFO1) and less than 10% palustrine scrub-shrub (PSS1). Dominant plant species include: reed canary grass (Phalaris arundinacea), sedges (Carex sp.), New England aster (Symphyotrichum novae-angliae), vervain (likely Verbena hastata) and stinging nettle (Urtica dioica). Red osier dogwood (Cornus alba) was the principal shrub within the PSS portions of the wetland and small green ash were the most common tree-size woody species around the edges of the wetland. Some of the ash were planted although most were located in the immediately adjacent wetland buffer.

5.4. Subject Wetland Soils:
Use the USDA NRCS information where possible and use the ACOE Delineation Manual soil description

Soils in the delineated wetlands are mapped as Vergennes Clay (VgD) with some Covington silty clay (Cv) to the south. Soils as observed were hydric and met either the F2 indicator (Loamy Gleyed Matrix) or the F3 indicator (Depleted Matrix) indicators.

5.5. Subject Wetland Hydrology:
Use the description from the ACOE Delineation Manual

In general, the hydrology indicators observed throughout the wetland during the delineation included surface water, high water table, and saturation, along with water marks and drainage patterns. Saturation and some inundation is also visible on aerial photography.

5.6. Buffer Zone:
Describe the buffer zone of the subject wetland (50 foot envelope of land adjacent to wetland boundary).

5.6.1. Buffer Land Use:
For example: *Mowed shoulder, forested, old field, paved road, and residential lawns, etc. Describe any previous and ongoing disturbance in the buffer zone.*

The buffer areas are a mix of old field, forest and smaller areas of agricultural fields within the project area. The buffer also includes the existing farm road. Limited disturbances are on-going except of periodic mowing along the existing farm road and active management of cover crops in the field areas.

5.6.2. Buffer Vegetation:
List the vegetation cover type and dominant plant species.

The buffer areas around the wetland include upland old field areas, forested uplands, an existing farm road, and a small area of cropland. The upland areas outside of the managed fields were a mix of old field and forested areas. Species observed included wild carrot (Daucus carota), and grasses including reed canary grass (Phalaris arundinacea), and other Dactylis and Poa species. Other herbaceous species included asters (Symphyotrichum sp.), goldenrods (Solidago sp.), thistles (Cirsium sp.) and raspberry/blackberries (Rubus sp.). Woody species include staghorn sumac (Rhus typhina), white pine (Pinus strobus), shagbark hickory (Carya ovata), green ash (Fraxinus pennsylvanica), prickly-ash (Zanthoxylum americanum), cherry (Prunus serotina), maples (Acer sp.), and buckthorn (Rhamnus cathartica). Herb species within the forested areas were generally sparse; however the lateness of the season precluded identification of many of the remnants. Several tree plantings within the wetland valley and on the upland slopes were noted, especially in the vicinity of Wetland 2W. These included oaks (Quercus sp.) in the upland areas and ash in the wetland and along the wetland edge.

5.6.3. Buffer Soils:
Use USDA NRCS information where possible, and the ACOE Delineation Manual soil description.

The soils in the buffer area are primarily mapped as Vergennes clay (VgD). Plots in the upland were non hydric and generally agreed with the USGS mapping interms of texture.

6. Entire Wetland Function and Value Summary (as defined in the Vermont Wetland Rules Section 5):
Check which functions are present in the entire wetland

■ Flood/Storm Storage	☐ RTE Species
■ Surface & Groundwater Protection	☐ Education & Research
☐ Fish Habitat	☐ Recreation/Economic
■ Wildlife Habitat	☐ Open Space/Aesthetics
☐ Exemplary Natural Community	■ Erosion Control

Functions and Values: *For each function and value:*

1. *Evaluate the entire wetland and check all that apply. Use Wetland Inventory Maps for offsite areas*
2. *Evaluate how the wetland in the project area contributes to the function.*
3. *Explain how the project will not result in adverse impacts to the function.*

Include any information on specific avoidance and minimization measures.

If more than one wetland complex is involved, provide a function and value checklist for each wetland complex. In addition fill out the Multiple Wetlands Table.

7. Water Storage for Flood Water and Storm Runoff

■ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function

- ■ Constricted outlet or no outlet and an unconstructed inlet.
- ■ Physical space for floodwater expansion and dense, persistent, emergent vegetation or dense woody vegetation that slows down flood waters or stormwater runoff during peak flows and facilitates water removal by evaporation and transpiration.
- ☐ If a stream is present, it's course is sinuous and there is sufficient woody vegetation to intercept surface flows in the portion of the wetland that floods.
- ■ Physical evidence of seasonal flooding or ponding such as water stained leaves, water marks on trees, drift rows, debris deposits, or standing water.
- ☐ Hydrologic or hydraulic study indicates wetland attenuates flooding

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level. If none of the following apply, the wetland provides this function at a moderate level.

Water Storage for Flood Water and Storm Runoff Continued…

☐ Check this box if any of the following conditions apply that may indicate the wetland provides this function at a ***lower*** level.

- ☐ Significant flood storage capacity upstream of the wetland, and the wetland in question provides this function at a negligible level in comparison to upstream storage (unless the upstream storage is temporary such as a beaver impoundment).
- ☐ Wetland is contiguous to a major lake or pond that provides storage benefits independently of the wetland.
- ☐ Wetland's storage capacity is created primarily by recent beaver dams or other temporary structures.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.

☐ Check this box if any of the following conditions apply that may indicate the wetland provides this function at a ***higher*** level.

- ☐ History of downstream flood damage to public or private property.
- ☐ Any of the following conditions present downstream of the wetland, but upstream of a major lake or pond, could be impacted by loss or reduction of the water storage function.
  - ☐ Developed public or private property
  - ☐ Stream banks susceptible to scouring and erosion
  - ☐ Important habitat for aquatic life
- ☐ The wetland is large in size and naturally vegetated.
- ☐ Any of the following conditions present downstream of the wetland, but upstream of a major lake or pond, could be impacted by a loss or reduction of the water storage function.
  - ☐ Developed public or private property.
  - ☐ Stream banks susceptible to scouring and erosion.
  - ☐ Important habitat for aquatic life.
- ☐ The wetland is large in size and naturally vegetated
- ☐ Any of the following conditions present upstream of the wetland may indicate a large volume of runoff may reach the wetland.
  - ☐ A large amount of impervious surface in urbanized areas.
  - ☐ Relatively impervious soils.
  - ☐ Steep slopes in the adjacent areas.

7.1 Subject Wetland Contribution to Water Storage: ☐
Explain how the subject wetland contributes to the function listed above

The subject wetlands provide some storage for flood water and storm runoff, however there are no indications that it provides this function at a particularly high or low level. The wetland is slightly impounded by the existing farm road that crosses between Wetlands 1W and 2W and the existing 18-inch culvert. Within 1W, some indications of ponding were noted including water marks on trees near the edge of the wetland and this likely occurs in the spring and fall at times of relatively high water tables. The levels of potential ponding (up to a few inches) did not indicate that the wetland has a high capacity for capturing flood water and the wetland (1W) located north of the existing farm road did not have any indicators of a channel or stream or functioned as a floodplain. No indicators of silt or erosion were noted and the wetland did not appear to be the focus point of any turbid runoff. Additionally, it did not appear that the wetland ever overtopped the existing road or that runoff or other waters exceeded the capacity of the existing culvert - suggesting that the wetland does not perform this function in an exceptional way. The majority of the surrounding area includes a relatively natural buffer that also contributes to the trapping of flood and storm water runoff, and a review of aerial photos show other impoundments upslope and north of the project parcel.

7.2 Statement of No Undue Adverse Impact to *Water Storage for Flood Water and Storm Runoff*: ☐
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, and compensation measures relevant to this function.

No undue adverse impacts to the flood or storm water storage function of the wetland or wetland complex are anticipated as a result of the Project. The addition of fill along the immediate edge of the existing road will have a negligible effect on any flood storage capacity. The wetland likely provides this function at a low to modest level and the proposed road will not limit the future ability of the wetland to provide this function. The direct wetland impacts have been minimized by crossing at the site of an existing farm road and in a parallel fashion thus minimizing the area of new impact. A larger diameter (48 inch versus 18 inch) and more embedded culvert is proposed to replace the existing culvert which will maintain a similar hydraulic regime and not adversely effect the storage functions of the subject wetland.

8. Surface and Ground Water Protection: ☐

■ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ■ Constricted or no outlets.
- ■ Low water velocity through dense, persistent vegetation.
- ■ Hydroperiod permanently flooded or saturated.
- ☐ Wetlands in depositional environments with persistent vegetation wider than 20 feet.
- ☐ Wetlands with persistent vegetation comprising a defined delta, island, bar or peninsula.
- ■ Presence of seeps or springs.
- ☐ Wetland contains a high amount of microtopography that helps slow and filter surface water.
- ☐ Position in the landscape indicates the wetland is a headwaters area.
- ☐ Wetland is adjacent to surface waters.
- ☐ Wetland recharges a drinking water source.
- ☐ Water sampling indicates removal of pollutants or nutrients.
- ☐ Water sampling indicates retention of sediments or organic matter.
- ■ Fine mineral soils and alkalinity not low.
- ■ The wetland provides an obvious filter between surface water or ground water and land uses that may contribute point or nonpoint sources of sediments, toxic substances or nutrients to the wetland, such as: steep erodible slopes; row crops; dumps; areas of pesticide, herbicide or fertilizer application; feed lots; parking lots or heavily traveled road; and septic systems.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level. If none of the following apply, the wetland provides this function at a moderate level.

☐ Check this box if any of the following conditions apply that may indicate the wetland provides function at a ***lower*** level.

- ☐ Presence of dead forest or shrub areas in sufficient amounts to result in diminished nutrient uptake.
- ☐ Presence of ditches or channels that confine water and restrict contact of water with vegetation.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.
- ☐ Current use in the wetland results in disturbance that compromises this function.

☐ Check this box if any of the following conditions apply that may indicate the wetland provides function at a ***higher*** level.

- ☐ The wetland is adjacent to a well head or source protection area, and provides ground water recharge.
- ☐ The wetland provides flows to Class A surface water. (Check ANR Atlas)
- ☐ The wetland contributes to the protection or improvement of water quality of any impaired waters.
- ☐ The wetland is large in size and naturally vegetated.

8.1. Subject Wetland Contribution to Water Protection:
Explain how the subject wetland contributes to the function listed above.

The wetlands (1W/2W) function to protect surface and ground water at a moderate level with no indications that it performs at a particularly high or low level. Wetland 1W had fine clay soils, some seeps along the edges, and a constricted outlet due to the existing farm road and culvert. No stream channel was observed suggesting a slow sheet flow of surface and groundwater. Wetland 2W has a small, intermittent stream channel that is somewhat incised. The two wetlands protect ground and surface water quality by acting as an obvious barrier between the active agricultural areas and downstream waters by acting to trap and attenuate some levels of nutrients and other potential pollutants. No indications suggest the wetlands receive large amounts of these potentially polluting constituents; however it is assumed given the surrounding landuses and topographical/landscape setting that the wetlands are functioning in this capacity.

8.2. Statement of No Undue Adverse Impact to *Surface and Ground Water Protection*:
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, or compensation measures relevant to this function.

The Project has avoided and minimized wetland and buffer impacts where possible and is not expected to have any undue, adverse impacts on the current or future functioning of the wetland to protect ground and surface water quality. The proposed culvert will support a similar hydrologic regime while allowing additional space for passage (hydrologic and ecologic). Side slopes and other areas will be stabilized during and following construction and erosion control measures will be utilized throughout the project. A planting plan for the temporarily impacted portions of the buffer including where tree cutting is proposed will help restore/enhance that area (see attachments).

9. Fish Habitat:

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Contains woody vegetation that overhangs the banks of a stream or river and provides any of the following: shading that controls summer water temperature; cover including refuges created by overhanging branches or undercut banks; source of terrestrial insects as fish food; or streambank stability.

☐ Provides spawning, nursery, feeding or cover habitat for fish (documented or professionally judged). Common habitat includes deep marsh and shallow marsh associates with lakes and streams, and seasonally flooded wetlands associated with streams and rivers.

☐ Documented or professionally judged spawning habitat for northern pike.

☐ Provides cold spring discharge that lowers the temperature of receiving waters and creates summer habitat for salmonoid species.

☐ The wetland is located along a tributary that does not support fish, but contributes to a larger body of water that does support fish. The tributary supports downstream fish by providing cooler water and food sources.

9.1. Subject Wetland Contribution to Fish Habitat:
Explain how the subject wetland contributes to the function listed above.

The wetland complex does not support fish habitat and a small intermittent stream was the only watercourse observed within the project area. The stream did not extend north of the existing farm road. No indications of use or the capacity to support fish were observed or documented and the wetland does not support the appropriate habitat.

9.2. Statement of No Undue Adverse Impact to *Fish Habitat*:
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, or compensation measures relevant to this function.

The wetland does not include fish habitat, and therefore no undue, adverse impacts to this function are anticipated as a result of this project.

10. Wildlife Habitat ☐

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Provides resting, feeding staging or roosting habitat to support waterfowl migration, and feeding habitat for wading birds. Good habitats for these species include open water wetlands.

☐ Habitat to support one or more breeding pairs or broods of waterfowl including all species of ducks, geese, and swans. Good habitats for these species include open water habitats adjacent shallow marsh, deep marsh, shrub wetland, forested wetland, or naturally vegetated buffer zone.

☐ Provides a nest site, a buffer for a nest site or feeding habitat for wading birds including but not limited to: great blue heron, black-crowned night heron, green-backed heron, cattle egret, or snowy egret. Good habitats for these species include open water or deep marsh adjacent to forested wetlands, or standing dead trees.

☒ Supports or has the habitat to support one or more breeding pairs of any migratory bird that requires wetland habitat for breeding, nesting, rearing of young, feeding, staging roosting, or migration, including: Virginia rail, common snipe, marsh wren, American bittern, northern water thrush, northern harrier, spruce grouse, Cerulean warbler, and common loon.

☐ Supports winter habitat for white-tailed deer. Good habitats for this species include softwood swamps. Evidence of use includes browsing, bark stripping, worn trails, or pellet piles.

☐ Provides important feeding habitat for black bear, bobcat, or moose based on an assessment of use. Good habitat for these types of species includes wetlands located in a forested mosaic.

☒ Has the habitat to support muskrat, otter, or mink. Good habitats for these species include deep marshes, wetlands adjacent to bodies of water including lakes, ponds, rivers, and streams.

☐ Supports an active beaver dam, one or more lodges, or evidence of use in two or more consecutive years by an adult beaver population.

☐ Provides the following habitats that support the reproduction of uncommon Vermont amphibian species including:

- ☐ Wood frog, Jefferson salamander, blue-spotted salamander, or spotted salamander. Breeding habitat for these species includes vernal pools and small ponds.
- ☐ Northern dusky salamander and the spring salamander. Habitat for these species includes headwater seeps, springs, and streams.
- ☐ The four-toed salamander, Fowler's toad, western or boreal chorus frog, or other amphibians, found in Vermont of similar significance.

☐ Supports or has the habitat to support populations of Vermont amphibian species including, but not limited to, pickerel frog, northern leopard frog, mink frog, and others found in Vermont of similar significance. Good habitat for these types of species include large marsh systems with open water components.

☐ Supports or has the habitat to support populations of uncommon Vermont reptile species including: wood turtle, northern map turtle, eastern musk turtle, spotted turtle, spiny softshell, eastern ribbonsnake, northern watersnake, and others found in Vermont of similar significance.

☐ Supports or has the habitat to support significant populations of Vermont reptile species, including smooth greensnake, DeKay's brownsnake, or other more common wetland-associated species.

☒ Meets four or more of the following conditions indicative of wildlife habitat diversity:

- ☐ Three or more wetland vegetation classes (greater than 1/2 acre) present including but not

Wildlife Habitat Continued…

limited to: open water contiguous to, but not necessarily part of, the wetland, deep marsh, shallow marsh, shrub swamp, forested swamp, fen, or bog.

- ■ The dominant vegetation class is one of the following types: deep marsh, shallow marsh, shrub swamp or, forested swamp.
- ■ Located adjacent to a lake, pond, river or stream.
- ■ Fifty percent or more of surrounding habitat type is one or more of the following: forest, agricultural land, old field or open land.
- ☐ Emergent or woody vegetation occupies 26 to 75 percent of wetland, the rest is open water.
- ■ One of the following:
  - ■ Hydrologically connected to other wetlands of different dominant classes or open water within 1 mile.
  - ■ Hydrologically connected to other wetlands of same dominant class within 1/2 mile.
  - ■ Within 1/4 mile of other wetlands of different dominant classes or open water, but not hydrologically connected.

- ☐ Wetland or wetland complex is owned in whole or in part by state or federal government and managed for wildlife and habitat conservation.
- ☐ Contains evidence that it is used by wetland dependent wildlife species

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level. If none of the following apply, the wetland provides this function at a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a ***lower*** level.

- ☐ The wetland is small in size for its type and does not represent fugitive habitat in developed areas (vernal pools and seeps are generally small in size, so this does not apply).
- ☐ The surrounding land use is densely developed enough to limit use by wildlife species (with the exception of wetlands with open water habitat). Can be negated by evidence of use.
- ☐ The current use in the wetland results in frequent cutting, mowing or other disturbance.
- ☐ The wetland hydrology and character is at a drier end of the scale and does not support wetland dependent species.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a ***higher*** level.

- ☐ The wetland is large in size and high in quality.
- ☐ The habitat has the potential to support several species based on the assessment above.
- ☐ Wetland is associated with an important wildlife corridor.
- ☐ The wetland has been identified as a locally important wildlife habitat by an ANR Wildlife Biologist.

10.1. Subject Wetland Contribution to Wildlife Habitat Functions:
Explain how the subject wetland contributes to the function listed above.

The subject wetland (1W/2W) has some potential to provide wildlife habitat at a low to moderate level. The wetland does not include open water or deep marsh and is primarily PEM where impacts will occur adjacent to the existing road. The primary mechanism for providing wildlife habitat based on the list above is its connectivity to other wetland systems and the potential for wildlife to use the wetland ravine as a travel route between different habitat areas. The proposed road should not provide a significant barrier to terrestrial or avian species, and the larger diameter, embedded culvert will provide enhanced opportunities for amphibian and other similar species. Limited potential to support significant populations of uncommon amphibians, reptiles, migratory birds and other species listed above were observed or anticipated given the wetland habitat available, however some potential exists for isolated utilization by the avian species checked above. No vernal pools or potential vernal pools were identified and the majority of the surrounding upland areas (active agricultural fields) are not ideal for terrestrial vernal pool species habitat.

10.2. Statement of No Undue Adverse Impact to *Wildlife Habitat*:
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, or compensation measures relevant to this function.

The proposed project will not have any undue, adverse impact on the wildlife habitat function of the wetland and it is not likely that the wetland, particularly the areas proposed by impact, are exceptional or above average wildlife habitat. Direct impacts have been minimized and avoided where practicable and the restored buffer areas will provide enhanced passage opportunities around the proposed roadway, along with the larger and embedded culvert crossing.

11. Exemplary Wetland Natural Community

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Wetlands that are identified as high quality examples of Vermont's natural community types recognized by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department, including rare types such as dwarf shrub bogs, rich fens, alpine peatlands, red maple-black gum swamps and the more common types including deep bulrush marshes, cattail marshes, northern white cedar swamps, spruce-fir-tamarack swamps, and red maple-black ash seepage swamps are automatically significant for this function

The wetland is also likely to be significant if any of the following conditions are met:

☐ Is an example of a wetland natural community type that has been identified and mapped by, or meets the ranking and mapping standards of, the Natural Heritage Information Project of the Vermont Fish and Wildlife Department.

☐ Contains ecological features that contribute to Vermont's natural heritage, including, but not limited to:

☐ Deep peat accumulation reflecting a long history of wetland formation;

☐ Forested wetlands displaying very old trees and other old growth characteristics;

☐ A wetland natural community that is at the edge of the normal range for that type;

☐ A wetland mosaic containing examples of several to many wetland community types; or

☐ A large wetland complex containing examples of several wetland community types.

List species or communities of concern:

11.1. Subject Wetland Proximity to Exemplary Natural Communities

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The subject wetland complex (1W/2W) does not perform this function and is a common wetland type in Vermont. A review of the VTANR Natural Resource Atlas does not indicate the presence of any known RTE species or exemplary natural communities within the Project area. Known records in the vicinity are limited to species and/or natural communities that are not supported by the wetland proposed to be impacted.

11.2. Statement of No Undue Adverse Impact to Exemplary Wetland Natural Community:
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, or compensation measures relevant to this function.

No impacts to this function will occur as the wetland does not perform this function.

12. Rare, Threatened, and Endangered Species Habitat: ☐

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Wetlands that contain one or more species on the federal or state threatened or endangered lists, as well as species that are rare in Vermont, are automatically significant for this function.

The wetland is also likely to be significant if any of the following apply:

☐ There is creditable documentation that the wetland provides important habitat for any species on the federal or state threatened or endangered species lists;

☐ There is creditable documentation that threatened or endangered species have been present in past 10 years;

☐ There is creditable documentation that the wetland provides important habitat for any species listed as rare in Vermont (S1 or S2 ranks), state historic (SH rank), or rare to uncommon globally (G1, G2, or G3 ranks) by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department;

☐ There is creditable documentation that the wetland provides habitat for multiple uncommon species of plants or animals (S3 rank).

List name of species and ranking:

None.

12.1. Subject Wetland Contribution to RTE Habitat: ☐
Explain how the subject wetland contributes to the function listed above.

The subject wetland complex (1W/2W) does not perform this function and is a common wetland type in Vermont. A review of the VTANR Natural Resource Atlas does not indicate the presence of any known RTE species within the Project area. Known records in the vicinity are limited to species and/or natural communities that are not supported by the wetland proposed to be impacted.

12.2 Statement of No Undue Adverse Impact to *Rare, Threatened, or Endangered Species Habitat*: ☐
Explain how the proposed project will not result in any undue, adverse impact to this function. Include any avoidance, minimization, or compensation measures relevant to this function.

No impacts to this function will occur as the wetland does not perform this function.

13. Education and Research in Natural Sciences: ☐

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

☐ Owned by or leased to a public entity dedicated to education or research.

☐ History of use for education or research.

☐ Has one or more characteristics making it valuable for education or research.

13.1. Subject Wetland <u>Education and Research Potential</u>: ☐
Explain how the subject wetland contributes to the function listed above.

The subject wetland complex does not meet any of the characteristics associated with this function and is not utilized for education or research.

13.2 Statement of No Undue Adverse Impact to <u>*Education and Research in Natural Sciences*</u>: ☐
Explain how the proposed project will not result in any undue, adverse impact to this value. Include any avoidance, minimization, or compensation measures relevant to this value.

No impacts to this function will occur as the wetland does not perform this function.

14. Recreational Value and Economic Benefits: ☐

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

☐ Used for, or contributes to, recreational activities.

☐ Provides economic benefits.

☐ Provides important habitat for fish or wildlife which can be fished, hunted or trapped under applicable state law.

☐ Used for harvesting of wild foods.

Comments:

None.

14.1. Subject Wetland <u>Recreational and Economic Value</u>: ☐
Explain how the subject wetland contributes to the value listed above.

The subject wetland complex does not meet any of the characteristics associated with this function and is not utilized for recreational or economic benefits.

14.2. Statement of No Undue Adverse Impact to <u>*Recreational Value and Economic Benefits*</u>: ☐
Explain how the proposed project will not result in any undue, adverse impact to this value. Include any avoidance, minimization, or compensation measures relevant to this value.

No impacts to this function will occur as the wetland does not perform this function.

15. Open Space and Aesthetics:

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Can be readily observed by the public; and

☐ Possesses special or unique aesthetic qualities; or

☐ Has prominence as a distinct feature in the surrounding landscape;

☐ Has been identified as important open space in a municipal, regional or state plan.

Comments:

None.

15.1. Subject Wetland Aesthetic Value:
Explain how the subject wetland contributes to the value listed above.

The subject wetland complex does not meet any of the characteristics associated with this function and is not open space or aesthetically significant.

15.2. Statement of No Undue Adverse Impact to *Open Space and Aesthetics:*
Explain how the proposed project will not result in any undue, adverse impact to this value. Include any avoidance, minimization, or compensation measures relevant to this value.

No impacts to this function will occur as the wetland does not perform this function.

16. Erosion Control Through Binding and Stabilizing

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☒ Erosive forces such as wave or current energy are present and any of the following are present as well:

☒ Dense, persistent vegetation along a shoreline or stream bank that reduces an adjacent erosive force.

☐ Good interspersion of persistent emergent vegetation and water along course of water flow.

☐ Studies show that wetlands of similar size, vegetation type, and hydrology are important for erosion control.

What type of erosive forces are present?

☐ Lake fetch and waves

☐ High current velocities:

☐ Water level influenced by upstream impoundment

Erosion Control Through Binding and Stabilization Continued...

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level. If none of the following apply, the wetland provides this function at a *moderate level*.

☒ Check box if any of the following conditions apply that may indicate the wetland provides this function at a ***lower*** level.

☒ The stream is artificially channelized and/or lacks vegetation that contributes to controlling the erosive force.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a ***higher*** level.

☐ The stream contains high sinuosity.

☐ Has been identified through fluvial geomorphic assessment to be important in maintaining the natural condition of the stream or river corridor.

16.1. Subject Wetland Contribution to Erosion Control:
Explain how the subject wetland contributes to the function listed above.

The subject wetland complex (1W/2W) is not subject to substantial wave or current energy; however a small intermittent stream is located within 2W and supports flows during wet times and seasons. This stream is moderately incised and does not support dense vegetation that contributes substantially to controlling erosive forces, and therefore the wetlands only contribute at a lower level. The stream channel appears stable. See 8. above for discussion of wetlands ability to trap incoming sediment.

16.2. Statement of No Undue Adverse Impact to *Erosion Control:*
Explain how the proposed project will not result in any undue, adverse impact to this function. include any avoidance, minimization, or compensation measures relevant to this function.

The proposed project will not have any undue, adverse impacts on the wetland functioning to bind soils. Impacts have been avoided and minimized where possible and the proposed project will not adversely impact the hydrologic regime within the wetland. Impacts are only located parallel to and near the existing farm road.

17. Project Description:

17.1. Overall Project Purpose:
Description of the basic project and why it is needed. Partial projects with no clear purpose will not be accepted.
For example: *six-lot residential subdivision; expansion of an existing commercial building, building a single family residence.*

The purpose of the Project involves the improvement of an existing farm road for two reasons: to facilitate safer and better access to eastern portions of the existing farm and 2) to support the proposed expansion of the existing dairy farm operations including a new barn complex/milking center and associated infrastructure.

17.2. Description of Project Component Impacting Wetland or Buffer:
Explain in general terms which portions of the project will impact wetlands or buffer zones.
For example: *Cross the wetland with a driveway to construct a residential subdivision, upgrade existing road through buffer to improve access, extend a trail system.*

The portion of the Project that will impact wetlands/buffer areas is the improvement of the existing farm road where it currently crosses between two wetland areas and the associated buffer zones. No Class 2 or Class 3 wetlands (or Class 2 wetland buffers) are proposed to be impacted by the proposed barn/milking center portion of the project.

17.3. Acreage of Parcel(s) or Easements(s):
Acreage of subject property.

Two parcels: 10.4 acres and 317 acres; Total: 327.4 acres

17.4. Acreage of Project Area:
Acreage of area involved in the project.

Approximately 7 acres including the farm road and barn areas.

18. Project Details:
Provide details regarding specific impacts to the wetland and buffer zone.

For multiple wetlands fill out the multiple wetland table.

18.1. Specific Impacts to Wetland and Buffer Zone Dimensions:
List portions of the project that will specifically impact the wetland or buffer zone and their dimensions.
For example: *driveway crossing with 16' wide fill; installation of buried sewer force main with 5' trench Including fill footprint; addition of Stormwater outfall which directs flow to northern portion of wetland*

Permanent wetland and buffer fill associated with the improved and elevated road is approximately 58 feet wide at the base and 18 feet wide at the top; the width of the fill tapers narrower as the alignment approaches the sides of the ravine; an additional 10 foot wide area of temporary impact area beginning at the base of the proposed road fill in wetland and buffer to accommodate construction is also proposed and will be restored. Two linear areas of additional tree clearing within the buffer but outside of the direct (permanent/temporary) work area total 1,620 SF; stumps will remain and shrub plantings are proposed to stabilize soils (see below).

18.2. Bridges and Culverts:
Culvert circumference, length, placement and shapes, or bridge details. List any stream alteration permits that are required or obtained where perennial streams or rivers are involved.

An 18-inch culvert under the existing farm road will be replaced with a new 70 foot long 48-inch culvert that will be partially embedded to provide aquatic organism and hydraulic passage through the area and will be an improvement over the existing undersized culvert. Review by NRCS suggested a 36-inch culvert would be sufficient but a larger diameter was chosen to facilitate passage.

18.3. Construction Sequence:
Describe any details pertaining to the work planned in the wetland and buffer in terms of sequence or phasing that is relevant. Describe the construction limits of disturbance, how those will be marked, and check to ensure these are shown on the site plans as well.

The proposed road will be constructed from the bottom up, utilizing the existing road initially for access and then the proposed road-bed thereafter. LImits of disturbance will be staked and erosion control measures including silt fence and fiber rolls will be installed along the limits of the area within the buffer and wetland. The new culvert will be installed along the same general alignment as the existing culvert with the outlets in nearly the same location. The proposed road will be built up to the specified elevation with sideslopes stabilized with mulch as work progresses. 12-inch rip-rap material will be installed where slopes are >5% and topsoil/seed will be used in other places (see Attached Profile View Plan Sheet).

18.4. Stormwater Design**
List any stormwater permits obtained or applied for. Describe stormwater and/or erosion controls proposed. ***** Erosion prevention is <u>required</u> in order to prevent sediment from entering the wetland.***

Stormwater and erosion control during construction will be a top priority given the topography and location of the proposed farm road. The LOD will be staked and silt fence and fiber rolls will be installed and maintained at the edge of the proposed fill material. The installed erosion controls will be monitored and maintained as appropriate as construction progresses and additional measures will be installed as needed to prevent sediment from running into adjacent wetland and buffer areas. As the roadbed is constructed from the bottom up, the side slopes will first be temporarily stabilized with mulch and then subsequently stabilized with rip-rap or topsoil/seed/mulch where slopes dictate. Stabilized grass swales will be installed along the portions of the farm road and any runoff from the flat portions of the site away from the wetland and buffer will be diverted away. The goal is to have a constantly stabilized road bed and sideslopes as construction progresses from active stages to finished grade. Permit: Vermont Construction General Permit 3-9020 for Moderate Risk Projects

18.5. Permanent Demarcation of Limit of Impacts**
Describe any boulders, fencing, signage, or other memorialization that provides permanent on-the-ground boundaries for the limits of disturbance for ongoing uses. *****Permanent demarcations are <u>required</u> for projects with ongoing activities in or near wetlands or buffer zones such as houses, yards, woody clearing or parking areas, and needs to be depicted on the site plans.***

Boulders/large rocks and/or posts are proposed along the edge of the traveled road surface within the buffer/wetland areas to prevent any accidental encroachment on the wetland/buffer. Topographic limitations of the site (steep slopes outside of the proposed farm road) will prevent access to other portions of the wetland/buffer.

19. Wetland and Buffer Zone Impacts:

For multiple wetlands provide narrative overview for each section below, and fill out the Multiple Wetland Tables

19.1. Wetland Impacts:

Summarize the square footage of impact in the appropriate category. Add After-the-Fact impacts here too. ***Round to the nearest square foot***

Permanent Wetland Fill	1905	s.f.
Temporary Wetland Impact	2514	s.f.
Other Permanent Wetland Impact ***(this number includes clearing of woody vegetation, dredging, and does not include fill)***	0	s.f.
Total Wetland Impact:	4419	s.f.

Describe in detail the proposed impact to wetlands
For example: *Fill for road crossing, temporary impacts for trench and fill related to utility installation.*

General narrative required here even for projects with multiple wetlands and impacts

The proposed (permanent) wetland fill will be associated with the roadbed material required to construct the farm road to the proper elevation and grade. The material will vary depending on the portion of the roadbed being constructed but will generally consist of clean, bank run gravel and/or stone, rock and other appropriate materials. A portion of the area proposed for fill consists of the existing upland farm road and that area will be utilized during construction. The proposed road was sited to overlap with the existing road to minimize the amount of direct wetland impact required. Temporary wetland impacts are associated with areas along the edge of the proposed road fill that will be temporarily disturbed during the installation of silt fence and/or other erosion control measures. The temporary wetland impact area is the area within 10 feet of the edge of the proposed road fill within the wetland and will be restored when the project is complete and the soils are stabilized.

19.2. Buffer Zone Impacts:

Summarize the square footage of impact in the appropriate category.

Temporary Buffer Impact	4283	s.f.
Permanent Buffer Impact	9384	s.f.
Total Buffer Impact:	13667	s.f.

Describe in detail the proposed impact to buffer zones
For example: Addition of fill along roadway embankment extending into buffer zone.

General narrative required here even for projects with multiple wetlands and impacts.

The permanent buffer impact will be associated with the roadbed material required to construct the farm road to the proper elevation and grade. The material will vary depending on the portion of the roadbed being constructed but will generally consist of clean, bank run gravel and/or stone, rock and other appropriate materials. A portion of the area proposed for fill consists of the existing upland farm road and that area will be utilized during construction. The proposed road was sited to overlap with the existing road to minimize the amount of direct wetland impact required. Temporary buffer impacts are associated with areas along the edge of the proposed road fill that will be temporarily disturbed during the installation of silt fence and/or other erosion control measures. The temporary wetland impact area is the area within 10 feet of the edge of the proposed road fill within the wetland and will be restored when the project is complete and the soils are stabilized. Note: Per discussion with Julie Foley in 2015, the area of the existing farm road within the proposed road footprint has been subtracted from the total as this area is not currently a functioning buffer area.

19.3. Cumulative Impacts:

List any potential cumulative or ongoing, direct and indirect impacts on the functions of the wetland.
For example: *Increased noise from parking lot, vegetation management, inputs from stormwater pond outlet, reduction in flood storage volume from the addition of fill from the project.*

No significant cumulative or on-going direct or indirect impacts are anticipated following the proposed project above the ambient levels of impact or input (runoff) associated with on-going farm and cropping activities. The footprint will be somewhat larger and will have a minimal effect on the current and future functions and values associated with the wetlands. The project site will be adequately stabilized during construction and following construction.

20. Mitigation Sequence:

Before you begin, please read all of Section 20 to respond most appropriately to specific questions. Questions specifically related to Section 9.5b of the Vermont Wetland Rules.

20.1. Avoidance of Wetland Impacts:

20.1.1. Can the activity be located on another site owned or controlled by the applicant, or reasonably available to satisfy the basic project purpose? If not, indicate why. Cite any alternative sites and explain why they were not chosen.

The primary reason for the citing of the project at its current location is that there is not enough room adjacent to the existing infrastructure (west of the wetland & existing farm road) to accommodate the proposed facility and still meet the project purpose/goals. Site was chosen because there was already an established roadway and there is no other access from any other location due to property boundaries with other abutting landowners. To shift the access further to the south would have involved crossing the same ravine at a much greater depth and cost.

20.1.2. Can the proposed activity be practicably located outside the wetland/buffer zone? If not, indicate why. Explain the alternatives you have explored for avoiding the wetland and buffer onsite, And why they are not feasible.

The proposed project cannot be practicably located outside the wetland/buffer zone for several reasons. These reasons include: 1) the wetland complex is located across the entire parcel owned by the applicant and must be crossed to reach the existing fields and proposed barn site; and 2) the existing farm road is too narrow and contains curves and grades that are too steep to allow for the required vehicles to safely access the eastern side of the parcel. Several more direct alternatives were discussed however those would have not utilized the existing farm road crossing and would have resulted in more substantial impacts to protected wetland/buffer functions and values. Not utilizing the existing road would have increased the expense of the project as well.

20.2. Avoidance to the Impact to Functions and Values:

20.2.1. If the proposed activity cannot be practicably located outside the wetland/buffer zone, have all practicable measures been taken to avoid adverse impacts on protected functions? ■ Yes ☐ No

20.2.2. What design alternatives were examined to avoid impacts to wetland function?
For example: *Use of matting, relocation of footprint, etc.*

Several alternatives were examined including: 1) the footprint of the up-graded farm road was shifted to parallel and overlap with the existing farm road this reducing the impact area and limiting impacts to within a few feet of the existing road; 2) the proposed elevation of the up-graded farm road was reduced as much as possible thereby resulting in a narrower overall footprint; 3) oversized culvert was chosen to facilitate hydrologic passage and ecologic passage; 4) finished width of proposed farm road was reduced as much as possible also reducing the width of the impact area

20.2.3. What steps have been taken to minimize the size and scope of the project to avoid impacts to wetland functions and values? Include information on project size reduction and relocation.

The size of the proposed farm road was reduced as much as possible by minimizing the width of the finished road and reducing the elevation as low as possible to limit the footprint and potential impact on wetland function & values. Wetland Impact Avoided/Minimized: If the proposed farm road was constructed at a different location other than the where the existing farm road crosses, wetland impacts would have likely exceeded 6,000 SF, resulting in approx. 3,000 SF of avoided/minimized wetland impact. Buffer Impact Avoided/Minimized: If the proposed farm road followed the existing farm road and averaged 40 feet wide at the base due to slopes it is likely that buffer impacts would have approached 13,000 SF, resulting in approx. 5,000 SF of avoided/minimized buffer impact.

20.2.4. Explain how the proposed project represents the least impact alternative design. Explain why other alternatives, which you described above, were not chosen.

Following a review of avoidance measures (discussed above), the proposed project represents the least impact alternative. Alternatives were carefully reviewed and several measures designed to minimize unavoidable impacts to the wetland/buffer zone and protected functions and values to the greatest extent practicable were implemented: These include: 1) the proposed farm road will cross the wetland at the same site as the existing farm road thereby limiting the amount of direct wetland impact; 2) the elevation of the finished road surface has been lowered as much as possible while maintaining safe grades in order to limit the base width of proposed fill; 3) the proposed farm road is located at the narrowest portion of the wetland and buffer zone that also includes impact from existing road; 4) the proposed farm road will cross perpendicular to the ravine minimizing buffer and wetland impacts; and 5) a larger embedded culvert will be installed to provide adequate passage. Crossing the ravine along a more direct route would have increased wetland impact and substantially increased the cost.

20.3. Minimization and Restoration:

20.3.1. If avoidance of adverse effects on protected functions cannot be practically achieved, has the proposed activity been planned to minimize adverse impacts on the protected function? ■ Yes ☐ No ☐ N/A

20.3.2. What measures will be used during construction and on an ongoing basis to protect the wetland and buffer zone?
***For example*:** *Stormwater treatment, signs, fencing, etc.*

Stormwater and erosion control during construction will be a top priority given the topography and location of the proposed farm road. The LOD will be staked and silt fence and fiber rolls will be installed and maintained at the edge of the proposed fill material. The installed erosion controls will be monitored and maintained as appropriate as construction progresses and additional measures will be installed as needed to prevent sediment from running into adjacent wetland and buffer areas. As the roadbed is constructed from the bottom up, the side slopes will first be temporarily stabilized with mulch and then subsequently stabilized with rip-rap or topsoil/seed/mulch where slopes dictate. Stabilized grass swales will be installed along the portions of the farm road and any runoff from the flat portions of the site away from the wetland and buffer will be diverted away. The goal is to have a constantly stabilized road bed and sideslopes as construction progresses from active stages to finished grade.

Minimization and Restoration Continued…

20.3.3. Has a plan been developed for the prompt restoration of any adverse impacts on protected functions? ☒ Yes ☐ No ☐ N/A

Restoration Narrative:
For example: *Planting along the stream.*

As requested by VTDEC, Kayhart Brothers Dairy, LLC will complete a voluntary buffer enhancement project to help maintain soil stability in the areas adjacent to the proposed farm road upgrade where additional tree clearing has been proposed. The restoration will consist of the planting of native shrub species and additional seeding of areas disturbed during construction and/or tree clearing activities. Enhancement species will be planted in the first growing season following tree removal and thorough erosion control (thick mulching) will be employed and maintained leading up to and following buffer enhancement work. See attached Planting Plan.

Quantification of Restoration:

Wetland Area (sqft)	Buffer Area (sqft)	Functions/Value s Addressed
0	1600	Soil Stabilization

20.4. Compensation: ☐

Please refer to Section 9.5c of the Vermont Wetland Rules for compensation, which is required when the project will result in net adverse impact to wetland function. Not all functions are presumed to be compensable. ***All projects requiring compensation need prior consultation with the Vermont Wetlands Program.***

If compensation is proposed please include a summary here. Also list any supporting documents you may have attached to the application including In-Lieu-Fee proposal or detailed compensation plan.

No net adverse impact to wetland function is anticipated and therefore no compensation is proposed. Voluntary buffer stabilization plantings will be completed where tree clearing is proposed.

21. Wetland Determination:

If the application involves a wetland determination please answer the following. For multiple wetlands provide narrative overview for each section below, and fill out the Multiple Wetland Tables.

☐ Wetland is mapped or contiguous to the Vermont Significant Wetland Inventory Map
☐ Wetland is not mapped on or contiguous to the Vermont Significant Wetland Inventory Map

21.1. Reason for Petition:

Please choose one from the dropdown menu.

<Choose One>

21.2. Determination Narrative:

Please provide any narrative to support the petition for a wetland determination here, including previous decisions by the Secretary or Water Board.

22. Supporting Materials:

*****ADDITIONAL MATERIAL REQUIRED TO CALL APPLICATION COMPLETE***

22.1. **Location Map:

Provide a location map that is 8 ½" x 11" and separate from any site plans.
The Vermont Natural Resources Atlas is appropriate using USGS topography map base layer, roads, and VSWI wetlands at a minimum.

Date	Title
10/12/2016	Kayhart Brothers Dairy Site Location Map

22.2. **Site Plan(s):

List as specified below. Plans must be legible and include wetland delineation and buffer zones, limits of disturbance, erosion controls, building envelopes, and any permanent memorialization.

Title	Author	Date	Date of Last Revision
Site Plan showing a portion of lands of Kayhart Brothers Farm, LLC [Plan View]; LaRose Surveys, PC; July 2015, Rev. 10/12/16			
Site Plan showing a portion of lands of Kayhart Brothers Farm, LLC [Cross Section View]; LaRose Surveys, PC; July 2015, Rev. 10/12/16			
Addison			
Plan View Site Expansion Kayhart Brothers Dairy, LLC; A. Weiss Engineering, PLLC, Date: 10/16			
Kayhart Brothers Dairy Wetland Map, Normandeau Associates; 9/26/16			

22.3. **U.S. Army Corps of Engineer Wetland Delineation Forms:

List attachment names, dates data was collected, cover types sampled, and number of paired plots included

Attachment #/Title	Range of Collection Dates	Vegetation Cover Types	# of Paired Plots
22.3-1	11/25/16	PEM1E, Upland	2

22.4. Other Supporting Documents:

Provide any other documentation that supports the application.
Examples include but are not limited to: *Photographs, easements, agreements, restoration/plan, GIS shapefiles, additional ACOE forms.*

Date	Last Revision	Author	Title
12/15/14	n/a	Normandeau Assoc.	Summary of Wetland Delineation
October, 2016	n/a	Normandeau Assoc.	Buffer Tree Clearing Restoration Plan

23. Abutting Landowners ☐

Please provide abutting landowner information so that all persons owning property within, or adjacent to, the affected wetland area of buffer zone can be notified during the public notice period. **Please use additional sheets if necessary**.

23.1. Abutting Land Owner Information: Please list as first names first followed by last name		
1. Name: **Street/Road:** **City/State/Zip:**	Timothy and Patty Marrinan 3332 West 56th Street Edina, MN 55410	**16. Name:** **Street/Road:** **City/State/Zip:**
2. Name: **Street/Road:** **City/State/Zip:**	R. Lee and Patricia Kayhart 7428 VT Route 17W Addison, VT 05491	**17. Name:** **Street/Road:** **City/State/Zip:**
3. Name: **Street/Road:** **City/State/Zip:**		**18. Name:** **Street/Road:** **City/State/Zip:**
4. Name: **Street/Road:** **City/State/Zip:**		**19. Name:** **Street/Road:** **City/State/Zip:**
5. Name: **Street/Road:** **City/State/Zip:**		**20. Name:** **Street/Road:** **City/State/Zip:**
6. Name: **Street/Road:** **City/State/Zip:**		**21. Name:** **Street/Road:** **City/State/Zip:**
7. Name: **Street/Road:** **City/State/Zip:**		**22. Name:** **Street/Road:** **City/State/Zip:**
8. Name: **Street/Road:** **City/State/Zip:**		**23. Name:** **Street/Road:** **City/State/Zip:**
9. Name: **Street/Road:** **City/State/Zip:**		**24. Name:** **Street/Road:** **City/State/Zip:**
10. Name: **Street/Road:** **City/State/Zip:**		**25. Name:** **Street/Road:** **City/State/Zip:**
11. Name: **Street/Road:** **City/State/Zip:**		**26. Name:** **Street/Road:** **City/State/Zip:**
12. Name: **Street/Road:** **City/State/Zip:**		**27. Name:** **Street/Road:** **City/State/Zip:**
13. Name: **Street/Road:** **City/State/Zip:**		**28. Name:** **Street/Road:** **City/State/Zip:**
14. Name: **Street/Road:** **City/State/Zip:**		**29. Name:** **Street/Road:** **City/State/Zip:**
15. Name: **Street/Road:** **City/State/Zip:**		**30. Name:** **Street/Road:** **City/State/Zip:**

24. Modified Distribution *(Newspaper Notification)*: In situations where there is an application within a large wetland or buffer zone that has a large number of landowners, applicants can choose to limit the distribution list with a supplemental newspaper notification. At a minimum the applicant must 1) provide notice to immediate abutters, 2) provide notice to all persons owning property containing the wetland or buffer within 500 ft. of the project area, and 3) shall have the VWP publish notice of the application in a local newspaper generally circulating in the area where the wetland is located. *****The applicant will be billed directly by the newspaper listed. Use of newspaper notification may extend the notice period, depending on when the notice posts in the newspaper*****

Name of Newspaper(s)

Kayhart Brothers Dairy, LLC

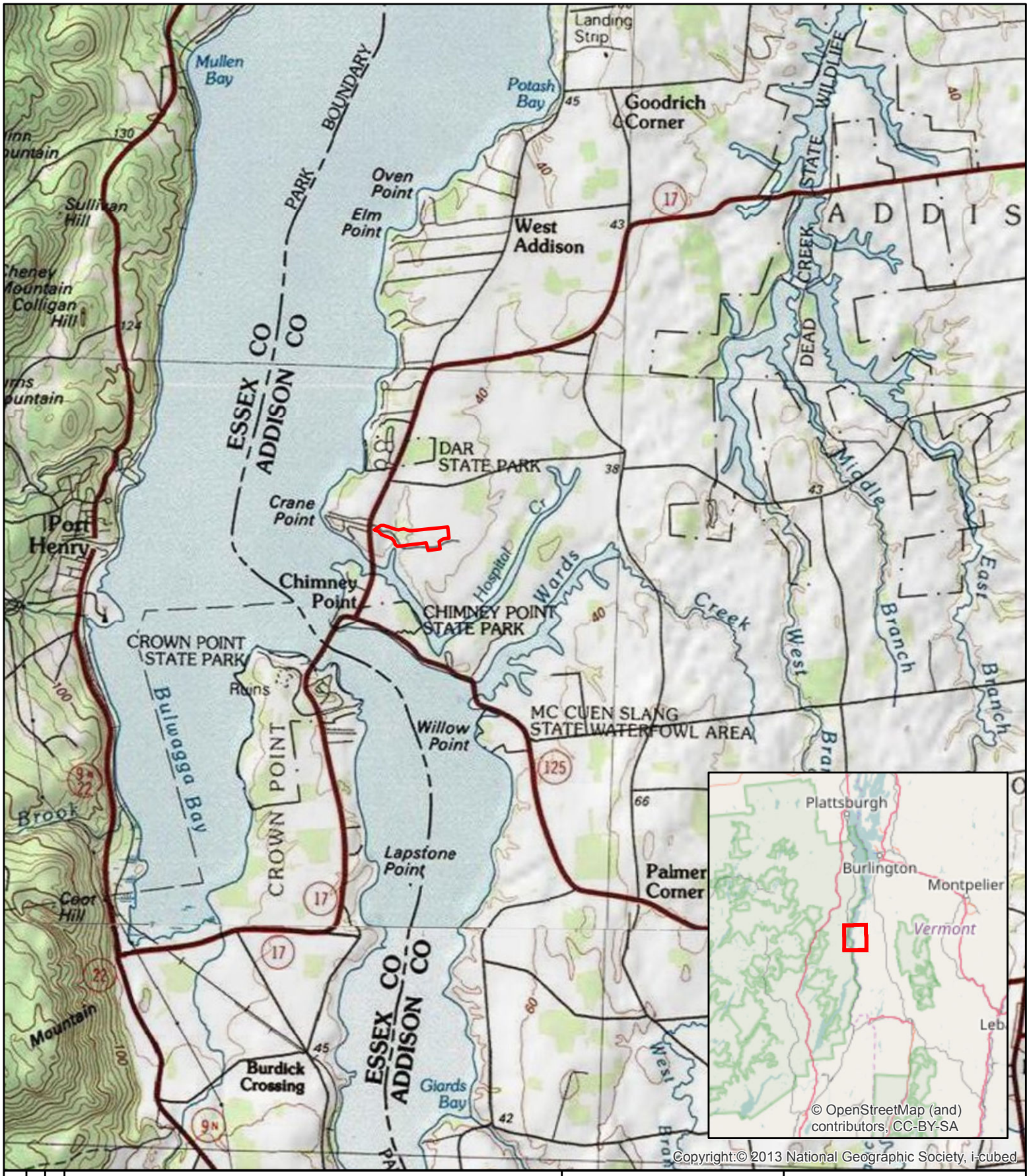
VWP Application

Supporting Materials 22.1 through 22.4

Kayhart Brothers Dairy, LLC

VWP Application

22.1 Location Map



Project No: XXXXX.XXX

Drawn By: wmccloy

Date : 10/12/2016

Kayhart Dairy Project Area

N

W E

S

0 0.5 1

Miles

NORMANDEAU ASSOCIATES
Environmental Consultants

Base Map: VCGI

Kayhart Brothers Dairy Site Location Map

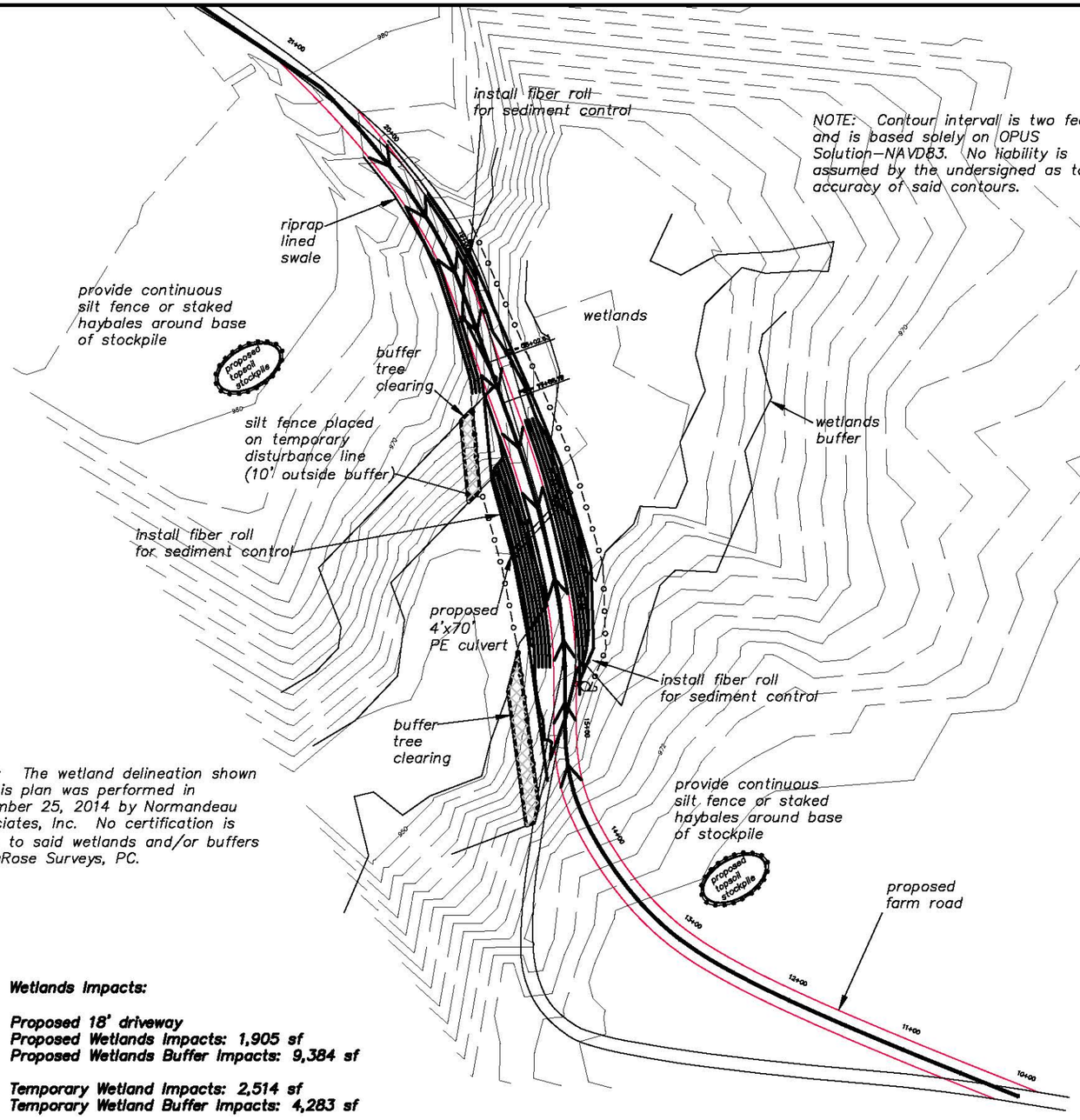
Addison, VT

Path: J:\Projects\Kayhart_Dairy_VT\Kayhart_SiteLoc.mxd

Kayhart Brothers Dairy, LLC

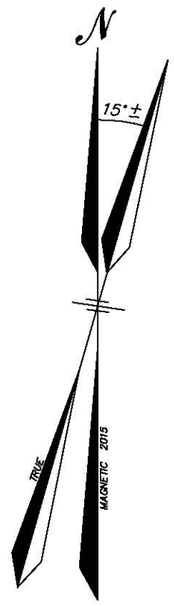
VWP Application

22.2 Site Plans



NOTE: Contour interval is two feet and is based solely on OPUS Solution—NAVD83. No liability is assumed by the undersigned as to the accuracy of said contours.

IMPORTANT NOTE:
This is not a boundary survey. The property lines and easements shown hereon are for the Vermont Agency of Natural Resources only. No certifications, expressed or otherwise, are made to the boundary lines shown hereon. This plan does not meet the requirements for a land survey as described in 26 VSA §2502(4) and shall not be used in lieu of a survey as the basis of any land transfer or establishment of any property right. LaRose Surveys, P.C. waives any and all responsibility from problems and/or issues relating to the boundary lines shown hereon including but not limited to setback lines and encroachments.



NOTE: The wetland delineation shown on this plan was performed in November 25, 2014 by Normandeau Associates, Inc. No certification is made to said wetlands and/or buffers by LaRose Surveys, PC.

Wetlands Impacts:

Proposed 18' driveway
Proposed Wetlands Impacts: 1,905 sf
Proposed Wetlands Buffer Impacts: 9,384 sf

Temporary Wetland Impacts: 2,514 sf
Temporary Wetland Buffer Impacts: 4,283 sf

0 100 200 300 400 500

GRAPHIC SCALE 1 inch = 100 feet

a site plan
showing a portion of lands of

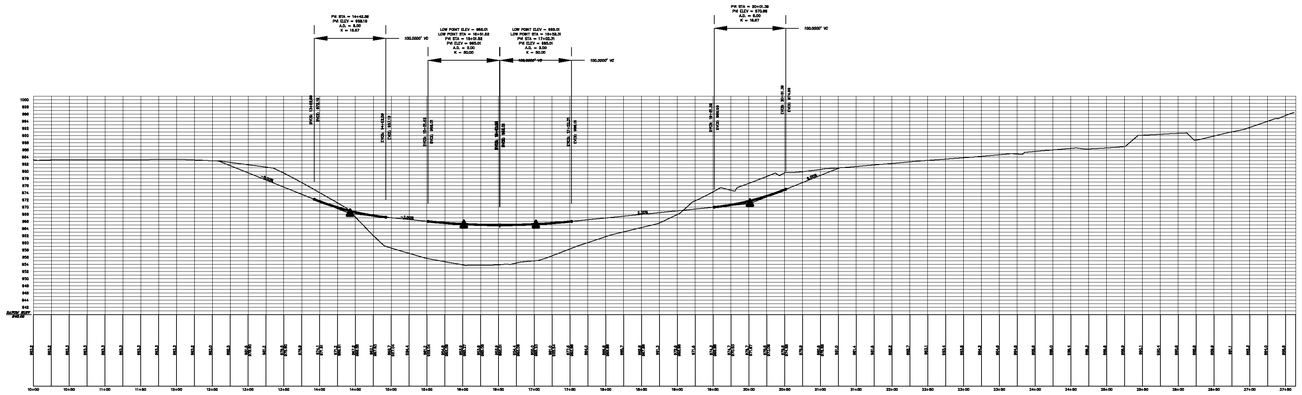
KAYHART BROTHERS FARM, LLC

Route 17
Addison, Addison County, Vermont

July 1, 2015

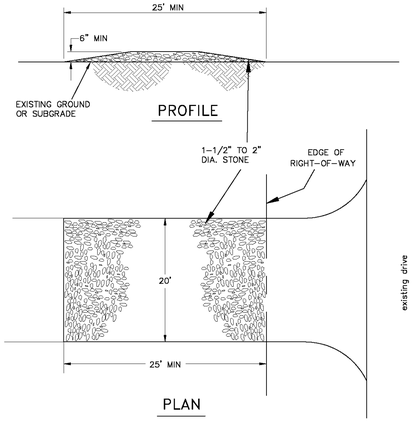
Revised 10/12/16

PROJECT #15001



Road Construction Narrative:

Stake out limits of disturbance, set up erosion control (silt fence & fiber rolls). Grub site, strip topsoil, and stockpile topsoil for future use. Remove old culvert. Use bankrun gravel for fill. Install 48"x70' culvert during initial fill–phase and construct swale for run–off to existing drainage way. Stabilize side slopes with mulch as work progresses. 12" riprap material to be installed where slopes exceed 5% to eliminate or minimize any erosion and to direct run–off. Otherwise, grass–lined swales are acceptible. Next, fill–phase will be roadbase material. The last fill–phase will be screened gravel up to finish grade. Soil, seed, and mulch both slopes. The finish driveway will consist of 18–foot wide travel way with 1–foot wide shoulders.

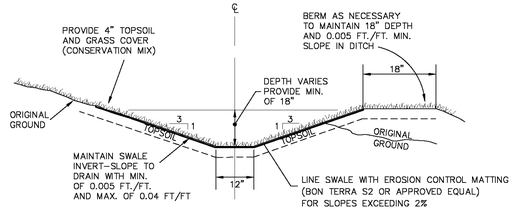


NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT ONTO PUBLIC RIGHTS–OF –WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT TRACKED, SPILLED, OR WASHED ONTO PUBLIC RIGHTS–OF–WAY SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR.
2. THE USE OF CALCIUM CHLORIDE OR WATER MAY BE NECCESSARY TO CONTROL DUST DURING DRY PERIODS.
3. PROVIDE APPROPRIATE TRANSITION BETWEEN CONSTRUCTION ENTRANCE AND EDGE OF RIGHT–OF–WAY.

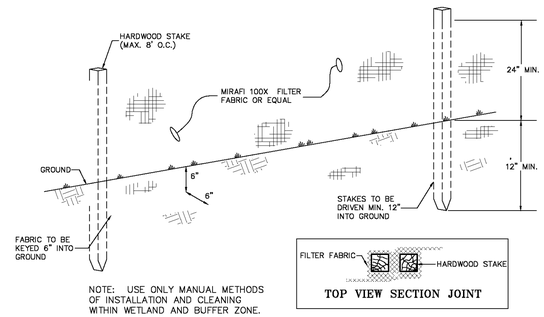
Stabilized Construction Entrance

NTS



Grass Drainage Swale

NTS



Temporary Silt Fence

NTS

0 100 200 300 400 500

GRAPHIC SCALE 1 inch = 100 feet

Erosion Prevention and Sediment Control Plan and Timetable

The purpose of the Erosion & Sediment Control Plan is to use best management practices (BMPs) to minimize pollution resulting from stormwater runoff and off–site sediment deposition during land disturbance activities.

The proposed plan seeks to minimize the area disturbed at any one time and limit the amount of time the disturbed portions remain exposed by requiring frequent (weekly) temporary seeding and/or mulching and by requiring that surfaces brought to finish grade be topsoiled and seeded within 48 hours.

All non–impervious surfaces shall be topsoiled, seeded and mulched within 48 hours of establishing finish grade. At least once a week, the Contractor shall temporarily mulch any disturbed areas that have been exposed for five days or more and re–mulch any previously mulched areas as directed by the on–site coordinator. Any disturbed area to be left for more than fourteen days shall be temporarily seeded and mulched. Between September 15th and October 15th, all disturbed areas shall be temporary seeded and mulched in preparation for winter.

Structural erosion and sediment control measures include prefabricated silt fence, stabilized construction entrances, and erosion control blankets in areas with higher erosion potential or closer proximity to water courses.

a site plan showing a portion of lands of

KAYHART BROTHERS FARM, LLC

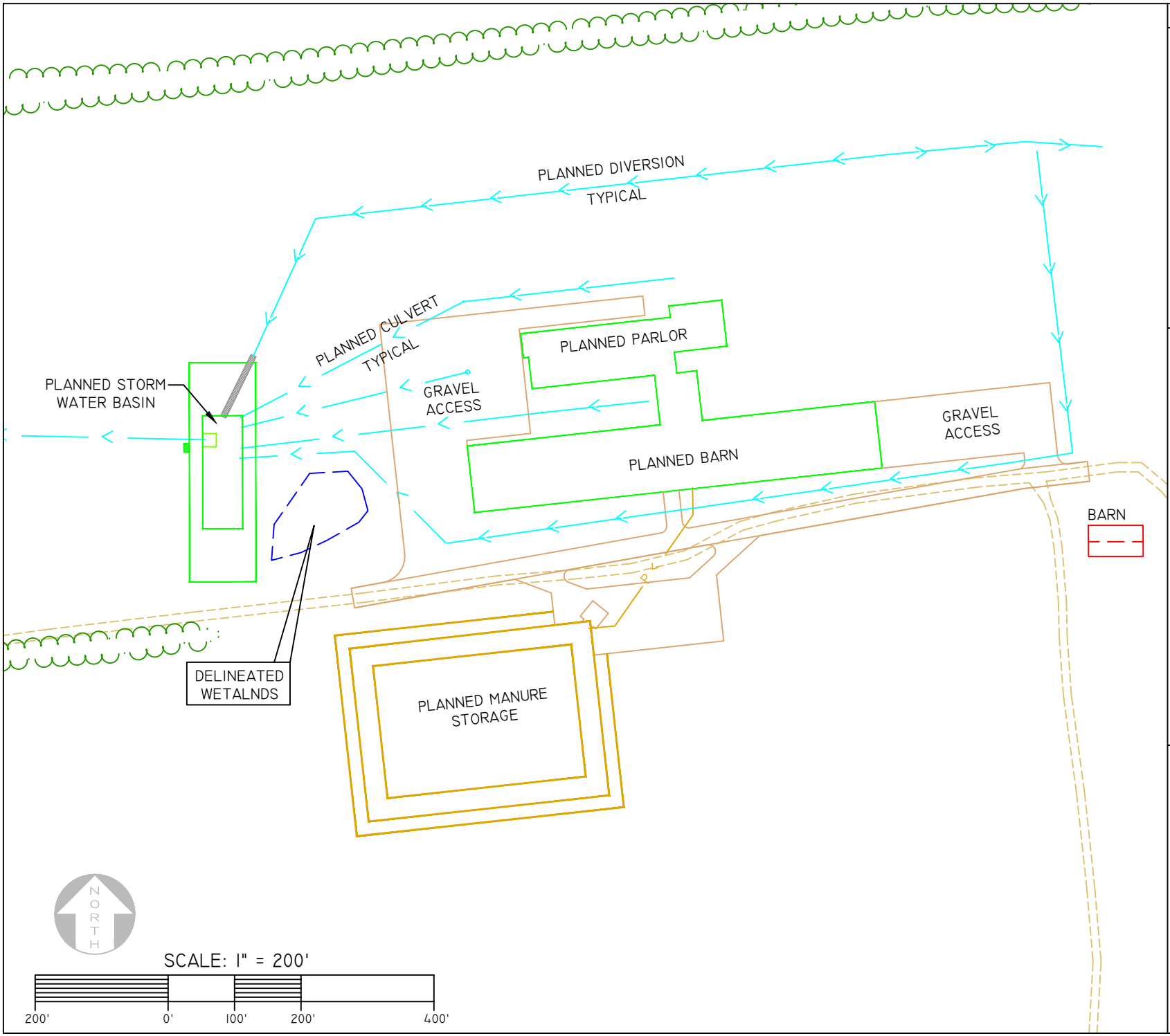
Route 17

Addison, Addison County, Vermont

August 8, 2016

Revised 10/12/16

PROJECT #15001



SHEET 1 OF 1

Plan View
Site Expansion
Kayhart Brothers Dairy, LLC

IT IS A VIOLATION OF THE LAW FOR ANY PERSON UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ARCHITECT/ENGINEER TO ALTER THIS DRAWING IN ANY WAY. ALTERATIONS MUST HAVE THE SEAL AFFIXED ALONG WITH A DESCRIPTION OF THE ALTERATION, THE SIGNATURE AND DATE.

DRAFTED BY: B. CADMUS	DATE:10/16
CHECKED BY: A. WEISS	DATE:10/16
DWG NAME: 15-049 USAC	REVISION No:

A. WEISS
ENGINEERING, PLLC
3179 SOUTH HILL ROAD
MCGRAW NY 13101-9408
PHONE (607) 749-0991

Project No: 23563.000

Drawn By: wmccloy

Date : 9/26/2016

- Wetland
- Wetland Buffer (50 Feet)
- Wetland Extends
- Intermittent Stream
- Corps Data Plot
- GPS Control Point
- Study/Project Area
- Culvert
- Road (VCGI)
- VSWI (VCGI)

N W E S

0 200 400

Feet

NORMANDEAU ASSOCIATES
Environmental Consultants

Base Map: VCGI

Kayhart Brothers Dairy Wetland Map

Addison, VT

Path: J:\Projects\Kayhart_Dairy_VT\Kayhart_Wet_Map.mxd

Kayhart Brothers Dairy, LLC

VWP Application

22.3 U.S. Army Corps of Engineer Wetland Delineation Forms

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Kayhart Brothers Dairy City/County: W. Addison Sampling Date: 11/25/14
Applicant/Owner: Steve Kayhart State: VT Sampling Point: 1W Wet
Investigator(s): W. McCloy Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Gully Local relief (concave, convex, none): Concave
Slope (%): 0-2 Lat.: 44° 2' 40.931" N Long.: 73° 24' 39.542" W Datum:
Soil Map Unit Name Vergennes clay, 12 to 25 percent slopes NWI Classification: PEM1E
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

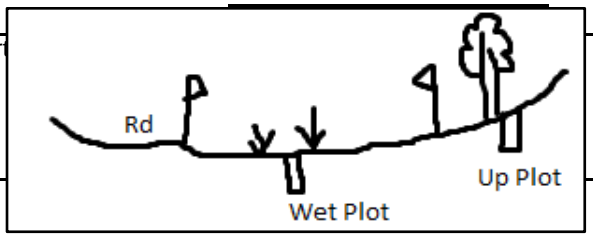
SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y
Hydric soil present? Y
Indicators of wetland hydrology present? Y

Is the sampled area within a wetland? Y

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report



HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Saturated and water at the surface; drainage patterns present

VEGETATION - Use scientific names of plants

Sampling Point: 1W Wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Fraxinus pennsylvanica*	5	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		5	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	100	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	1	3
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	105	x 2 =	210
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	105 (A)		210 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** 1W Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
1-0	10YR/2/1	100					Fibric material	O Horizon; Organic
								saturated
0-24	Gley1/4/10Y		10YR/4/4	10	C	M	Clay	A/B Horizon; clay; gleyed
								saturated

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Suface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: None
Depth (inches): _____

Hydric soil present? Y

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Kayhart Brothers Dairy City/County: W. Addison Sampling Date: 11/25/14
Applicant/Owner: Steve Kayhart State: VT Sampling Point: 1W Up
Investigator(s): W. McCloy Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Gully Slope Local relief (concave, convex, none): None
Slope (%): 20-Oct Lat.: 44° 2' 41.104" N Long.: 73° 24' 38.757" W Datum:
Soil Map Unit Name Vergennes clay, 12 to 25 percent slopes NWI Classification: Upland forest slope
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

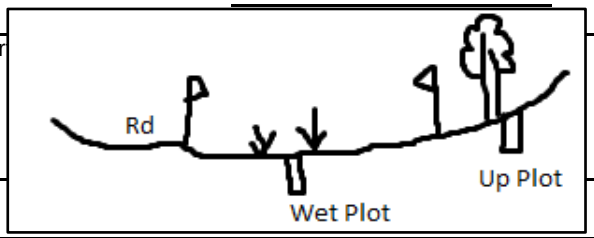
SUMMARY OF FINDINGS

Hydrophytic vegetation present? N
Hydric soil present? N
Indicators of wetland hydrology present? N

Is the sampled area within a wetland? N

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate repor



HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	____
Water table present?	Yes	____	No	X	Depth (inches):	____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches):	____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: 1W Up

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Carya ovata*	40	Y	FACU
2	*Pinus strobus*	30	Y	FACU
3	*Fraxinus pennsylvanica*	20	Y	FACW
4	*Prunus serotina*	2	N	FACU
5				
6				
7				
8				
9				
10				
		92	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Zanthoxylum americanum*	20	Y	FACU
2	*Carya ovata*	10	Y	FACU
3	*Fraxinus pennsylvanica*	10	Y	FACW
4	*Rhamnus cathartica*	10	Y	FAC
5				
6				
7				
8				
9				
10				
		50	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*	100	Y	-
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	18	46
Sapling/Shrub Stratum	10	25
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 8 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 37.50% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	10	x 3 =	30
FACU species	102	x 4 =	408
UPL species	0	x 5 =	0
Column totals	142 (A)		498 (B)

Prevalence Index = B/A = 3.51

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Herbs were very sparce under dense tree and shrub/sapling overstory. Late season conditions precluded complete review - however remnants suggested very sparce to trace amounts within plot.

SOIL **Sampling Point:** 1W Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-6	5Y/3/1	100					Clay	A-Horizon: common fine roots
								moist, castings - lots of
								worms
6-16+	2.5Y/4/3	100					Clay	B-Horizon, moist

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: None
Depth (inches): _____

Hydric soil present? N

Remarks:

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Kayhart Brothers Dairy City/County: W. Addison Sampling Date: 11/25/14
Applicant/Owner: Steve Kayhart State: VT Sampling Point: 2W Wet
Investigator(s): W. McCloy Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Gully Local relief (concave, convex, none): Concave
Slope (%): 0-2 Lat.: 44° 2' 39.833" N Long.: 73° 24' 40.780" W Datum:
Soil Map Unit Name Vergennes clay, 12 to 25 percent slopes NWI Classification: PEM1E
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

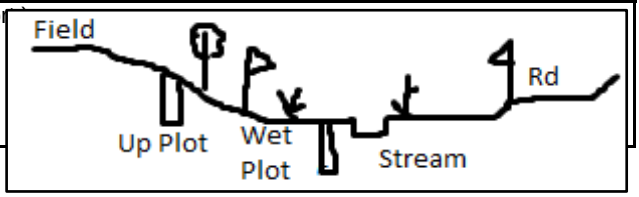
SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y
Hydric soil present? Y
Indicators of wetland hydrology present? Y

Is the sampled area within a wetland? Y

If yes, optional wetland site ID:

Remarks: (Explain alternative procedures here or in a separate report)



HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches):	____
Water table present?	Yes	____	No	X	Depth (inches):	____
Saturation present? (includes capillary fringe)	Yes	X	No	____	Depth (inches):	6

Indicators of wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Saturated at 6 inches; drainage patterns present; near stream

VEGETATION - Use scientific names of plants

Sampling Point: 2W Wet

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
6				
7				
8				
9				
10				
		0	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Phalaris arundinacea*	90	Y	FACW
2	*Urtica dioica*	10	N	FAC
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		100	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	0	0
Sapling/Shrub Stratum	0	0
Herb Stratum	20	50
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		210 (B)

Prevalence Index = B/A = 2.10

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** 2W Wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR/3/2	100	7.5YR/4/3	4	C	M	Clay	A Horizon: saturated at 6 in
								redox at 6 inches
10-18+	2.5Y/4/2	100	7.5YR/4/3	4	C	M	Clay	B Horizon: moist/saturated

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: None
Depth (inches): _____

Hydric soil present? Y

Remarks:

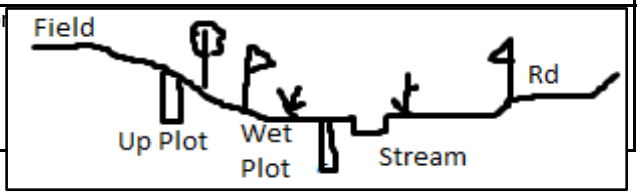
WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Kayhart Brothers Dairy City/County: W. Addison Sampling Date: 11/25/14
Applicant/Owner: Steve Kayhart State: VT Sampling Point: 2W Up
Investigator(s): W. McCloy Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Gully Slope Local relief (concave, convex, none): None
Slope (%): 20-Oct Lat.: 44° 2' 39.817" N Long.: 73° 24' 41.829" W Datum:
Soil Map Unit Name Vergennes clay, 12 to 25 percent slopes NWI Classification: Upland forest slope
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? circumstances" present? Yes
(If needed, explain any answers in remarks)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	N
Hydric soil present?	N		
Indicators of wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate repor



HYDROLOGY

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Microtopographic Relief (D4)

Field Observations:

Surface water present?	Yes	____	No	X	Depth (inches): ____
Water table present?	Yes	____	No	X	Depth (inches): ____
Saturation present? (includes capillary fringe)	Yes	____	No	X	Depth (inches): ____

Indicators of wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION - Use scientific names of plants

Sampling Point: 2W Up

Tree Stratum	Plot Size (30)	Absolute % Cover	Dominant Species	Indicator Status
1	*Fraxinus pennsylvanica*	50	Y	FACW
2				
3				
4				
5				
6				
7				
8				
9				
10				
		50	= Total Cover	

Sapling/Shrub Stratum	Plot Size (15)	Absolute % Cover	Dominant Species	Indicator Status
1	*Rhamnus cathartica*	20	Y	FAC
2				
3				
4				
5				
6				
7				
8				
9				
10				
		20	= Total Cover	

Herb Stratum	Plot Size (5)	Absolute % Cover	Dominant Species	Indicator Status
1	*Poa pratensis*	20	Y	FACU
2	*Symphyotrichum lateriflorum*	20	Y	FAC
3	*Rubus idaeus*	10	N	FACU
4	*Taraxacum officinale*	10	N	FACU
5	*Cirsium vulgare*	10	N	FACU
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
		70	= Total Cover	

Woody Vine Stratum	Plot Size ( )	Absolute % Cover	Dominant Species	Indicator Status
1	*None in Plot*			-
2				
3				
4				
5				
		0	= Total Cover	

50/20 Thresholds

	20%	50%
Tree Stratum	10	25
Sapling/Shrub Stratum	4	10
Herb Stratum	14	35
Woody Vine Stratum	0	0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 75.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	40	x 3 =	120
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column totals	140 (A)		420 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines - All woody vines greater than 3.28 ft in height.

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL **Sampling Point:** 2W Up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-13	10YR/3/2	100					Silty Clay Loam	A-Horizon: common fine roots
								moist
13-16+	2.5Y/6/2	100					Clay Loam	B-Horizon, moist

*Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains
**Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

___ Histisol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Suface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: None
Depth (inches): _____

Hydric soil present? N

Remarks:

Soils were very dry on a steep slope above wetland and downslope from field. Fine clay loam texture - although B horizon was quite light in color - it did not appear to be from wetness given landscape postion. Perhaps it was an old E-horizon, however quite thick a did not auger/dig below 16 inches due to dense material. No redox. I don't believe this meets any of the indicators.

Kayhart Brothers Dairy, LLC

VWP Application

22.4 Other Supporting Documents

NORMANDEAU
environmental consultants

December 15, 2014

Steve Kayhart
Kayhart Brothers Dairy, LLC.
7429 VT Route 17W
Addison, VT 05491

Re: Summary of Wetland Delineation
Addison, Vermont

Dear Steve,

At your request, Normandeau Associates, Inc. (Normandeau) conducted a wetland delineation within an approximately 29 acre portion (study area) of your farm property located at 7429 VT Route 17W in Addison, Vermont (see Site Location Map in Attachment 1A). The delineation was completed on November 25, 2014 to formally document the extent of wetlands within the study area. A brief summary of the methodology, site characteristics, results of the field delineation, and permitting considerations are provided below.

METHODOLOGY

William McCloy of Normandeau Associates, a Professional Wetland Scientist (PWS), reviewed the study area for wetlands and streams. Wetland boundaries were delineated according to the *1987 Corps of Engineers Wetland Delineation Manual* and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, which utilize the three parameter approach (i.e., evaluating the site for the presence of hydric soils, hydrophytic vegetation and wetland hydrology) for identifying wetlands and determining their jurisdictional limits[1,2]. The 1987 Corps Manual and the Regional Supplement describe the methodology that is required for wetland delineations that are subject to review under the Vermont Wetland Rules (VWR). The wetland boundaries are flagged with pink "Wetland Delineation" flagging and the stream is flagged with blue flagging. The flags for the wetlands and stream are sequentially numbered and remain at the site for

[1] U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1,U.S. Army Engineer Waterways Experiments Station.

[2] U.S. Army Corps of Engineers. 2011. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, C. V. Noble, and J. F. Berkowitz. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

future reference. Data from paired U.S. Army Corps of Engineers (USACE) data plots were collected along transects to document representative wetland boundary information.

Wetland delineations were conducted outside of the growing season as defined by the Corps Manual and Regional Supplement; however the two delineated features were well defined by topographical breaks, hydrological indicators and changes in plant community and structure. Additional review may be necessary during the growing season in the spring to confirm the boundaries or review portions of the fields within the study area depending on the final location of the proposed road and barn(s).

Wetland boundaries were GPS-surveyed at the time of delineation using a Trimble® GPS unit and post-processed against known base stations. These GPS points were translated into a detailed map depicting the results of the delineation that also includes applicable wetland buffers and other details using Normandeau's geographic information system (GIS) software (Attachment 1B).

SITE CHARACTERISTICS

The study area consists of approximately 29 acres of land, the majority of which is actively farmed for various cover crops including hay, alfalfa and corn. The western portion of the study area includes the existing barns and other buildings associated with the dairy farm along with an existing gravel road and hay/alfalfa field. The landform is generally level with no wetlands or streams. The eastern portion of the study area consists of alfalfa and corn fields that are in regular rotation. The western and eastern portions of the study area are separated by a small valley/gully that includes wetlands and a stream. An existing gravel access road passes from west to east through the valley, connecting the two sides of the farm parcel. The side-slopes of the valley are generally forested or a mixture of old field and scrub habitat.

The upland areas outside of the managed fields were a mix of old field and forested areas. Species observed included wild carrot (*Daucus carota*), and grasses including reed canary grass (*Phalaris arundinacea*), and other *Dactylis* and *Poa* species. Other herbaceous species included asters (*Symphyotrichum* sp.), goldenrods (*Solidago* sp.), thistles (*Cirsium* sp.) and raspberry/blackberries (*Rubus* sp.). Woody species include staghorn sumac (*Rhus typhina*), white pine (*Pinus strobus*), shagbark hickory (C*arya ovata*), green ash (*Fraxinus pennsylvanica*), prickly-ash (*Zanthoxylum americanum*), cherry (*Prunus serotina*), maples (*Acer* sp.), and buckthorn (*Rhamnus cathartica*). Herb species within the forested areas were generally sparse; however the lateness of the season precluded identification of many of the remnants. Several tree plantings within the wetland valley and on the upland slopes were noted, especially in the vicinity of Wetland 2W. These included oaks (*Quercus* sp.) in the upland areas and ash in the wetland and along the wetland edge. Wetland areas are described in detail below.

The US Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) has mapped two soils within the study area, including: Covington and Panton silty clays and Vergennes clay (2 to 6 and 12 to 15 percent slopes) (see NRCS Custom Soil Resource Report for Addison County, Vermont – Kayhart Brothers Dairy in Attachment 2). The Covington soils are generally mapped in

the areas to the east and west of the valley; these soils are considered predominately hydric, poorly drained and common in depressions on historic lake terraces. The Vergennes soils are mapped in the valley within the study area and are considered predominantly non-hydric, moderately well drained and common on terraces. Both soil types have inclusions of non-hydric and hydric soils, respectively. Based on general observations, it would seem that the mapping is not particularly accurate as the non-hydric soils are found in the valley in wetlands areas and the hydric soils are mapped in the fields where corn and alfalfa are grown. Therefore, the wetland soils are represented as inclusions within the upland soils. A detailed soil study was not performed.

One intermittent stream is located within the parcel and drains through the southern wetland within a clearly defined channel. To the north of the existing gravel road, no channel was observed; however moderate flow was being captured by the culvert at the time of the investigation and discharged into the mapped channel. This watercourse is an unnamed tributary to Hospital Creek, which is adjacent to Lake Champlain. The stream reach within the parcel is described in more detail below.

WETLAND AND STREAM CHARACTERISTICS

Two wetlands and an associated stream were delineated within the study area (see Wetland Map in Attachment 1B). As noted above, wetlands were delineated by William McCloy (Professional Wetland Scientist, #2225). A brief description of each resource is included below, and representative photographs are included in Attachment 3. USACE data plots documenting each wetland are included in Attachment 4 and the plot locations are also shown on the Wetland Map.

Wetland 1W

Wetland 1W includes three Palustrine (P) wetland classes: emergent (PEM) wetland (70%), broad-leaved deciduous forested wetland (PFO) (20%), and palustrine scrub-shrub (PSS) wetland (10%) that are seasonally flooded/saturated (PEM1/FO1/SS1E) according to the Cowardin wetland classification system[3]. The wetland totals approximately 0.74 acres within the study area, and continues to the north.

The emergent portion of the wetland is located in the southern and central portion of the system, with forested and scrub-shrub areas distributed to the north and around the periphery of the emergent areas. Common herbaceous species observed include reed canary grass, sedges including a very robust species (possibly *Carex lacustris*) and greater bladder sedge (*C. intumescens*), New England aster (*Symphyotrichum novae-angliae*), vervain (likely *Verbena hastata*) and stinging nettle (*Urtica dioica*). Common duckweed (*Lemna minor*) is an aquatic species that was observed within the scattered areas of shallow ponded water within the wetland. Red osier dogwood (*Cornus alba*) was the principal shrub within the PSS portions of the wetland and small green ash were the most common tree-size

[3] Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm (Version 04DEC1998).

woody species around the edges of the wetland. Several of the ash were standing snags and appeared to be dead.

Soils observed within the wetland were hydric and met the F2 indicator (Loamy Gleyed Matrix). There was a very shallow O/A-horizon and more than 24 inches of gleyed clay where sampled.

Hydrology indicators observed throughout the wetland during the delineation included surface water, high water table, and saturation, along with water marks and drainage patterns. Saturation and some inundation is also visible on aerial photography. One transect perpendicular to the wetland boundary was utilized to complete detailed USACE wetland data plots (1W Wet and 1W Up) (see Attachment 4).

Wetlands provide several important ecological functions and values. The Vermont Wetland Rules (VWR) and the USACE[4] address these functions and values in similar ways. Wetland 1W provides, or is suitable to provide, several functions and values, including groundwater discharge, floodflow alteration, sediment retention, nutrient removal, shoreline stabilization, and wildlife habitat. The VWR describe the functions and values differently, but with significant overlap. The VWR functions and values applicable to Wetland 1W include water storage for flood water and storm runoff, surface and groundwater protection, wildlife habitat, and erosion control through binding and stabilizing the soil.

Wetland 1W is not mapped by the Vermont Significant Wetland Inventory (VSWI); however Julie Foley, a District Wetlands Ecologist with the VT DEC, indicated during a site visit that the wetland would likely be considered Class Two. Additionally, a VSWI wetland is mapped to the north of the study area within the same valley and the size (>0.5 acres) of Wetland 1W would likely trigger Class Two designation. A fifty-foot buffer from the edge of the wetland boundary will need to be considered during future permitting and land use decisions. This buffer is depicted on the Wetland Map for reference.

Wetland 2W

Wetland 2W is predominantly an emergent (PEM) wetland (80%) with a broad-leaved deciduous forested wetland (PFO) (20%) inclusion that is seasonally flooded/saturated (PEM1/FO1E)[5]. The wetland totals approximately 0.68 acres within the study area, and continues to the south. Common herbaceous species observed include reed canary grass, sedges, New England aster and stinging nettle. Green ash was the most common tree-size woody species around the edges of the wetland.

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[4] USACE, New England District. 1999. *The Highway Methodology Handbook: Supplement. Wetland Functions and Values – A Descriptive Approach.* NAEEP-360-1-30a, September 1999.

[5] Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm (Version 04DEC1998).

Soils observed within the wetland were hydric and met the F3 indicator (Depleted Matrix). The A-horizon was approximately 10 inches deep and underlain by a depleted B-horizon with 4 percent redoximorphic concentrations.

Hydrology indicators observed throughout the wetland during the delineation included high water table and saturation, along with drainage patterns. Wetland 2W was noticeably drier than Wetland 1W, likely due to the way the existing road acts to impound some water within Wetland 1W and the incised stream functioning partially as a ditch. One transect perpendicular to the wetland boundary was utilized to complete detailed USACE wetland data plots (2W Wet and 2W Up) (see Attachment 4).

Wetland 2W provides, or is suitable to provide, several functions and values, including groundwater discharge, floodflow alteration, sediment retention, nutrient removal, shoreline stabilization, and wildlife habitat. The VWR describe the functions and values differently, but with significant overlap. The VWR functions and values applicable to Wetland 2W include water storage for flood water and storm runoff, surface and groundwater protection, wildlife habitat, and erosion control through binding and stabilizing the soil.

As with Wetland 1W, Wetland 2W is not mapped by the Vermont Significant Wetland Inventory (VSWI); however Julie Foley, a District Wetlands Ecologist with the VT DEC, indicated during a site visit that the wetland would likely be considered Class Two. Additionally, the wetland is associated with a stream and the size of the wetland would likely trigger Class Two designation. A fifty-foot buffer from the edge of the wetland boundary will need to be considered during future permitting and land use decisions. This buffer is depicted on the Wetland Map for reference.

Stream 1S

Stream 1S is an intermittent stream that drains through Wetland 2W. Observations throughout the year by the Kayharts indicate that there are periods of time when there is very little or no flow during the summer and fall; hence the classification as intermittent. No channel was observed within Wetland 1W, however it is clear that hydrology is passing horizontally though the system and is concentrated at the culvert under the existing road. It is classified as a Riverine, Intermittent, Stream Bed with Sand substrate (R4SB4) system according to the Cowardin methodology. The stream channel varies in width from 2 to 5 feet and is quite incised with nearly vertical banks and a relatively deep channel compared to the width of the channel. The stream continues to the south out of the study area and into Hospital Creek and Lake Champlain.

PERMITTING CONSIDERATIONS AND RECOMMENDATIONS

Wetlands are regulated in Vermont by the Vermont Department of Environmental Conservation (VTDEC) under the Vermont Wetland Rules (VWR) [10 V.S.A. § 6025(d)(5)] and by the U.S. Army Corps of Engineers (USACE) through Section 404 of the Clean Water Act (CWA). The VWR cover significant wetlands that are designated as either Class Two or Class One, which would include W1

because it is included on the VSWI[6]. The USACE asserts jurisdiction over waters of the U.S. and any discharge of dredged or fill material, including temporary, permanent and secondary impacts. These regulations are described in the Department of the Army General Permit for the State of Vermont (NAE-2012-1167)[7].

The VWR outline thresholds for two types of permits. Projects may require a Vermont General Wetland Permit or a Vermont Wetland Permit (often referred to as an "individual permit"), depending on the nature of the anticipated activities and the area of proposed impacts to regulated wetlands and their applicable buffers. A new road would likely be considered a linear project, and projects that impact fewer than 3,000 square feet (SF) in natural areas or 5,000 SF in managed areas (which would likely be the case here given the existing road) of wetland and/or buffer area may qualify for the simpler and more streamlined general permit. This assumes all the general conditions are met. This also assumes that the project is not elevated to an individual permit due to other circumstances. Other circumstances include a finding by the Secretary that the project will have an undue adverse impact on protected wetland functions and values or a finding that sufficient avoidance and minimization within the wetland and buffer zone were not been applied prior to submittal of the permit application. Projects that do not qualify for a general permit require an individual permit, which necessitates more extensive documentation, including a detailed review of wetland functions and values, measures taken to limit impacts, and an alternatives analysis. This process can take up to 90 days to secure a permit following submittal. Fees based on the area of anticipated impacts are associated with both permits. Consultation with the VWP would be necessary to determine exactly what permit will be necessary.

The USACE Vermont General Permit program (which differs from the VWR general permit) describes three types of federal permits depending on the size and scope of proposed impacts to wetlands and other waters of the U.S. A USACE Category 1 permit is applicable for projects where total impacts (permanent, temporary and secondary) are less than 3,000 SF assuming that all the general conditions are met. USACE Category 1 permits involve limited coordination with the USACE and the submittal of a Self-Verification Form prior to work. USACE Category 2 permits are required for proposed impacts between 3,000 SF and 1 acre, and require a detailed application be submitted to the USACE, written authorization, and a more involved and time consuming permitting process. A USACE individual permit is required for impacts over 1 acre. To determine the type of permit necessary, coordination with USACE is recommended if any impacts to the wetland itself are anticipated. Note that the USACE only regulates impacts within the delineated wetland boundary and does not include any buffer areas, as differentiated from the VWR.

Normandeau would be happy to continue to provide professional services including agency coordination and permitting support as your project progresses. I would recommend working with an engineering firm to develop the grading, fill, and stormwater plans associated with the various aspects of the proposed road and structures. I have experience working with several local engineering firms. These include Otter Creek Engineering (Middlebury/Rutland), Phelps Engineering

[6] http://www.nrb.state.vt.us/wrp/rulemaking/wetlands2010/filedruledocs/VWR%207-16-10.pdf

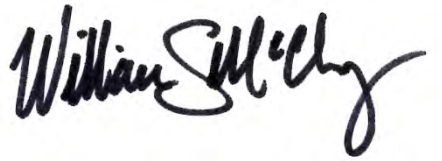
[7] http://www.nae.usace.army.mil/Missions/Regulatory/StateGeneralPermits/VermontGeneralPermit.aspx

(Middlebury) and Enman Engineering (Rutland). We would be happy to provide other recommendations; however these are likely the most local.

Please let me know if you have any questions.

Sincerely,

NORMANDEAU ASSOCIATES INC.



William McCloy, PWS, NHCWS

Wetland Scientist

Attachments

Attachment 1A and B:

Site Location Map &

Wetland Map

Kayhart Bros. Dairy Study Area

N W E S

0 0.5 1

Miles

NORMANDEAU environmental consultants

Base Map: VCGI

Kayhart Brothers Dairy Site Location Map

Addison, VT

Project No: XXXXX.XXX

Drawn By: wmccloy

Date : 12/9/2014

Path: C:\GIS\Projects\Kayhart_Dairy\Kayhart_SiteLoc.mxd

Project No: 23563.000

Drawn By: wmccloy

Date : 12/10/2014

Wetland

Wetland Buffer (50 Feet)

Wetland Extends

Intermittent Stream

Corps Data Plot

GPS Control Point

Roads (VCGI)

Study Area

VSWI Wetland (VTDEC)

Culvert

N

W E

S

0 150 300

Feet

NORMANDEAU environmental consultants

Base Map: VCGI

Kayhart Brothers Dairy Wetland Map

Addison, VT

Path: C:\GIS\Projects\Kayhart_Dairy\Kayhart_Wet_Map.mxd

Attachment 2:

NRCS Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Addison County, Vermont

Kayhart Brothers Dairy

November 25, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,460 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Addison County, Vermont
Survey Area Data: Version 16, Sep 24, 2014

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

Date(s) aerial images were photographed: Jun 19, 2010—Oct 8, 2011

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

Map Unit Legend

Addison County, Vermont (VT001)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Cv	Covington silty clay, flooded	1.6	1.1%
Cw	Covington and Panton silty clays	87.7	60.8%
MrA	Melrose fine sandy loam, 0 to 3 percent slopes	0.2	0.1%
MrC	Melrose fine sandy loam, 8 to 15 percent slopes	0.0	0.0%
VgB	Vergennes clay, 2 to 6 percent slopes	32.4	22.5%
VgC	Vergennes clay, 6 to 12 percent slopes	4.2	2.9%
VgD	Vergennes clay, 12 to 25 percent slopes	16.2	11.3%
W	Water	1.8	1.3%
Totals for Area of Interest		**144.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with

some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Addison County, Vermont

Cv—Covington silty clay, flooded

Map Unit Setting

National map unit symbol: 9fnh
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Covington and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Covington

Setting

Landform: Depressions on lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Clayey glaciolacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D

Minor Components

Livingston

Percent of map unit: 5 percent
Landform: Depressions

Panton

Percent of map unit: 5 percent
Landform: Knolls

Vergennes

Percent of map unit: 5 percent

Cw—Covington and Panton silty clays

Map Unit Setting

National map unit symbol: 9fnj
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Panton and similar soils: 45 percent
Covington and similar soils: 45 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Covington

Setting

Landform: Depressions on lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D

Description of Panton

Setting

Landform: Depressions on lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D

Minor Components

Livingston

Percent of map unit: 5 percent
Landform: Depressions

Vergennes

Percent of map unit: 5 percent

MrA—Melrose fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9fpm
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Melrose and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Melrose

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Coarse-loamy glaciolacustrine deposits over clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 23 inches: fine sandy loam
H3 - 23 to 65 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C

Minor Components

Elmwood, coarse variant

Percent of map unit: 5 percent

Elmwood

Percent of map unit: 5 percent

MrC—Melrose fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9fpp
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Melrose and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Melrose

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave, convex

Across-slope shape: Concave, convex
Parent material: Coarse-loamy glaciolacustrine deposits over clayey glaciolacustrine deposits

Typical profile
H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 23 inches: fine sandy loam
H3 - 23 to 65 inches: clay

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Minor Components

Elmwood
Percent of map unit: 5 percent

Elmwood, coarse variant
Percent of map unit: 5 percent

VgB—Vergennes clay, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 9fqq
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Vergennes and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vergennes

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Concave, convex, linear
Parent material: Clayey glaciolacustrine deposits

Typical profile

H1 - 0 to 6 inches: clay
H2 - 6 to 16 inches: clay
H3 - 16 to 29 inches: clay
H4 - 29 to 65 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D

Minor Components

Covington

Percent of map unit: 3 percent
Landform: Depressions

Livingston

Percent of map unit: 3 percent
Landform: Depressions

Panton

Percent of map unit: 3 percent
Landform: Depressions

Vergennes, moderately shallow variant

Percent of map unit: 3 percent

VgC—Vergennes clay, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 9fqr
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Vergennes and similar soils: 91 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vergennes

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Linear, convex, concave
Parent material: Clayey glaciolacustrine deposits

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D

Minor Components

Covington

Percent of map unit: 3 percent
Landform: Depressions

Panton

Percent of map unit: 3 percent
Landform: Depressions

Vergennes, moderately shallow variant
Percent of map unit: 3 percent

VgD—Vergennes clay, 12 to 25 percent slopes

Map Unit Setting
National map unit symbol: 9fqs
Elevation: 90 to 600 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition
Vergennes and similar soils: 91 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vergennes

Setting
Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Concave, convex, linear
Across-slope shape: Concave, convex, linear
Parent material: Clayey glaciolacustrine deposits

Typical profile
H1 - 0 to 6 inches: clay
H2 - 6 to 16 inches: clay
H3 - 16 to 29 inches: clay
H4 - 29 to 65 inches: clay

Properties and qualities
Slope: 12 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D

Minor Components

Covington
Percent of map unit: 3 percent
Landform: Drainageways

Panton
Percent of map unit: 3 percent
Landform: Drainageways

Vergennes, moderately shallow variant
Percent of map unit: 3 percent

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit (Kayhart Brothers Dairy)

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

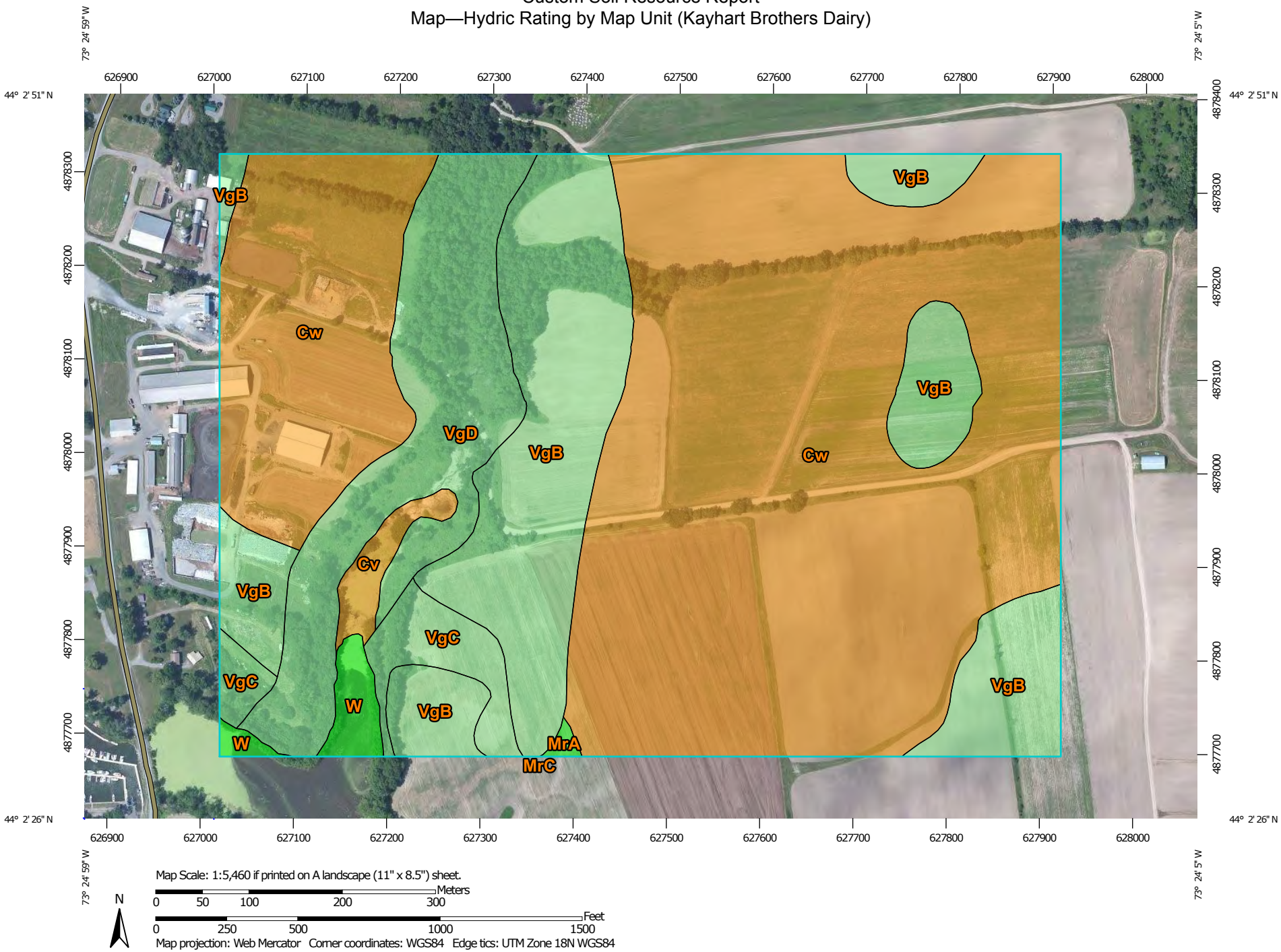
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit (Kayhart Brothers Dairy)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Lines

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Soil Rating Points

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially hydric (33 to 65%)
- Predominatly nonhydric (1 to 32%)
- Nonhydric (0%)
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Addison County, Vermont
Survey Area Data: Version 16, Sep 24, 2014

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

Date(s) aerial images were photographed: Jun 19, 2010—Oct 8, 2011

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

Table—Hydric Rating by Map Unit (Kayhart Brothers Dairy)

Hydric Rating by Map Unit— Summary by Map Unit — Addison County, Vermont (VT001)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Cv	Covington silty clay, flooded	95	1.6	1.1%
Cw	Covington and Panton silty clays	95	87.7	60.8%
MrA	Melrose fine sandy loam, 0 to 3 percent slopes	0	0.2	0.1%
MrC	Melrose fine sandy loam, 8 to 15 percent slopes	0	0.0	0.0%
VgB	Vergennes clay, 2 to 6 percent slopes	9	32.4	22.5%
VgC	Vergennes clay, 6 to 12 percent slopes	6	4.2	2.9%
VgD	Vergennes clay, 12 to 25 percent slopes	6	16.2	11.3%
W	Water	0	1.8	1.3%
Totals for Area of Interest			**144.2**	**100.0%**

Rating Options—Hydric Rating by Map Unit (Kayhart Brothers Dairy)

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Soil List - All Components (Kayhart Brothers Dairy)

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria

are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
    A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
    B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

Report—Hydric Soil List - All Components (Kayhart Brothers Dairy)

Hydric Soil List - All Components–VT001-Addison County, Vermont					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
Cv: Covington silty clay, flooded	Covington	85	Depressions on lake terraces	Yes	2
	Livingston	5	Depressions	Yes	2,4
	Panton	5	Knolls	Yes	2
	Vergennes	5	—	No	—
Cw: Covington and Panton silty clays	Covington	45	Depressions on lake terraces	Yes	2
	Panton	45	Depressions on lake terraces	Yes	2
	Livingston	5	Depressions	Yes	2
	Vergennes	5	—	No	—
MrA: Melrose fine sandy loam, 0 to 3 percent slopes	Melrose	90	Terraces	No	—
	Elmwood-Coarse variant	5	—	No	—
	Elmwood	5	—	No	—
MrC: Melrose fine sandy loam, 8 to 15 percent slopes	Melrose	90	Terraces	No	—
	Elmwood	5	—	No	—
	Elmwood-Coarse variant	5	—	No	—
VgB: Vergennes clay, 2 to 6 percent slopes	Vergennes	88	Terraces	No	—
	Covington	3	Depressions	Yes	2
	Livingston	3	Depressions	Yes	2
	Panton	3	Depressions	Yes	2
	Vergennes-Moderately shallow variant	3	—	No	—
VgC: Vergennes clay, 6 to 12 percent slopes	Vergennes	91	Terraces	No	—
	Covington	3	Depressions	Yes	2
	Panton	3	Depressions	Yes	2
	Vergennes-Moderately shallow variant	3	—	No	—
VgD: Vergennes clay, 12 to 25 percent slopes	Vergennes	91	Terraces	No	—
	Covington	3	Drainageways	Yes	2
	Panton	3	Drainageways	Yes	2
	Vergennes-Moderately shallow variant	3	—	No	—

Hydric Soil List - All Components–VT001-Addison County, Vermont					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
W: Water	Water	100	—	Unranked	—

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

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Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

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Attachment 3:

Photographs

Photo 1: View west from proposed building site towards existing farm buildings

Photo 2: View east of corn field and approximate building site

Photo 3: View southeast along existing road

Photo 4: View east from upper field across gully towards fields and project site

Photo 5: View west towards existing farm structures

Photo 6: View north from existing road of Wetland 1W

Photo 7: View south from existing road of Wetland 2W, Stream S1 and culvert outlet

Photo 8: Interior view of Wetland 1W looking north including emergent, ponding, and woody vegetation

Photo 9: Stream 1S within Wetland 2W

Photo 10: Wetland 1W wetland Corps plot location looking east towards upland

Photo 11: Wetland 1W water marks on green ash within the wetland

Photo 12: Wetland 1W Corps plot site looking west (and downslope) towards wetland edge

Photo 13: Wetland 2W Corps plot site looking south

Attachment 4:

USACE Data Forms

See Attachment 22.3 of VWP (above)

Kayhart Brothers Dairy, LLC.
Buffer Tree Clearing Restoration Plan
October, 2016

As requested by VTDEC, Kayhart Brothers Dairy, LLC will complete a voluntary buffer enhancement project to help maintain soil stability in the areas adjacent to the proposed farm road upgrade where additional tree clearing has been proposed. The restoration will consist of the planting of native shrub species and additional seeding of areas disturbed during construction and/or tree clearing activities. Enhancement species will be planted in the first growing season following tree removal and thorough erosion control (thick mulching) will be employed and maintained leading up to and following buffer enhancement work.

It is recommended that shrubs (containers and or tublings) and seed mix be purchased from Vermont Wetland Plant Supply, LLC. (VWPS)[1]. VWPS is a local supplier of native, locally collected wetland and buffer plants and shrubs and this will help facilitate the success of the enhancement project. Use of another local/regional supplier is acceptable as long as the stock is native and in good condition.

Recommended Species/plant mixes:

- *Cornus sericea,* Red osier dogwood (1 gal) – to be planted near wetland edge and on flatter areas
- *Spiraea tomentosa*, steeplebush (1 gal) – compatible throughout buffer
- *Spiraea alba*, meadowsweet (1 gal) – compatible throughout buffer
- *Cornus racemosa*, gray dogwood (1 gal) – compatible throughout buffer; better suited away from immediate wetland
- Conservation & Wildlife Mix (25 lbs/acre; 1 lb/1600 SF; 2 lbs recommended) – for seeding after shrubs have been planted; or NRCS approved seed mix for bank/slope areas and soil stability

General Notes:

- ✓ Care will be taken during construction and tree cutting to minimize soil disturbance and to fell trees away from the wetland and areas not proposed to be cleared.
- ✓ Stumps and root systems from cut trees shall remain and will not be grubbed or removed
- ✓ Care will also be taken to minimize disturbance to existing shrub and sapling vegetation that is currently established in the restoration area – with planting placed around these remaining species.
- ✓ Woody vegetation shorter than 8-10-feet in height will be left.
- ✓ Area will not be put into agricultural use
- ✓ Planting will not begin until growing season and will not be completed until final grading is achieved
- ✓ Carefully follow the planting instructions that come with your shrub. If specific instructions are not available, follow these tips[2]:
    - Before digging, call your local utilities to identify the location of any underground utilities.
    - Dig a hole twice as wide as, and slightly shallower than, the root ball. Roughen the sides and bottom of the hole with a pick or shovel so that roots can penetrate the soil.
    - With a potted tree or shrub, gently remove the tree/shrub from the container. Lay the tree/shrub on its side with the container end near the planting hole. Hit the bottom and sides of the container until the root ball is loosened. If roots are growing in a circular pattern around the root ball, slice through the roots on a couple of sides of the root ball. With trees/shrubs wrapped in burlap, remove the string or wire that holds the burlap to the root crown. It is unnecessary to completely remove the burlap. Plastic wraps must be completely removed. Gently separate

[1] http://www.vermontwetlandplants.com/; P.O. Box 153, Orwell, VT 05760; 802-948-2553
[2] http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/home/?cid=nrcs143_023591

circling roots on the root ball. Shorten exceptionally long roots, and guide the shortened roots downward and outward. Root tips die quickly when exposed to light and air, so don't waste time.

- Place the root ball in the hole. Leave the top of the root ball (where the roots end and the trunk/stem begins) 1/2 to 1 inch above the surrounding soil, making sure not to cover it unless roots are exposed. For bare root plants, make a mound of soil in the middle of the hole and spread plant roots out evenly over mound. Do not set trees/shrubs too deep. As you add soil to fill in around the tree/shrub, lightly tamp the soil to collapse air pockets, or add water to help settle the soil. Form a temporary water basin around the base of the tree/shrub to encourage water penetration, and water thoroughly after planting. A tree/shrub with a dry root ball cannot absorb water; if the root ball is extremely dry, allow water to trickle into the soil by placing the hose at the trunk of the tree/shrub.
- Mulch around the tree/shrub. A 3-foot diameter circle of mulch is common.
- Depending on the size of the tree/shrub and the site conditions, staking may be beneficial. Staking supports the tree/shrub until the roots are well established to properly anchor it. Staking should allow for some movement of the tree/shrub. After trees/shrubs are established, remove all support wires. If these are not removed they can girdle the tree/shrub, cutting into the trunk and eventually killing the tree.

✓ For seed: gently rake the area where seed will be applied. Hand sow seed according to recommended rate provided by VWPS. Water and mulch as needed to ensure adequate cover, soil retention and moisture.

Planting Plan:

See Figure 1 and 2 below for a general plan. Recommended plantings will depend on location and density of remaining woody shrubs and other plants following tree clearing. Existing woody shrubs and understory species are present in higher quantities on the east side (Figure 2). See General Notes, above, for additional details regarding the planting of container shrubs and seed. Also see attached information and that provided by VWPS.

Symbol:	Species (1 gal):	Number:
	*Cornus sericea*, Red osier dogwood	11
	*Spiraea tomentosa* or *S. alba*	12
	*Cornus racemosa*, gray dogwood	12

A review of the area at the end of the first growing season will be performed to determine the success of the shrub and seed plantings. Success of existing woody and herbaceous cover that remained following the tree cutting will also be taken into consideration given the purpose of the work which is the achieve a stable bank area with limited/no erosion. The goal will be at least 75% of the surface of the enhancement area must be established with native plant species within two growing seasons – included planted shrubs, existing/remaining shrubs and seeded area. If not, additional seeding and/or shrub plantings will be completed. The area will also be checked for invasive species – which will be removed if identified.

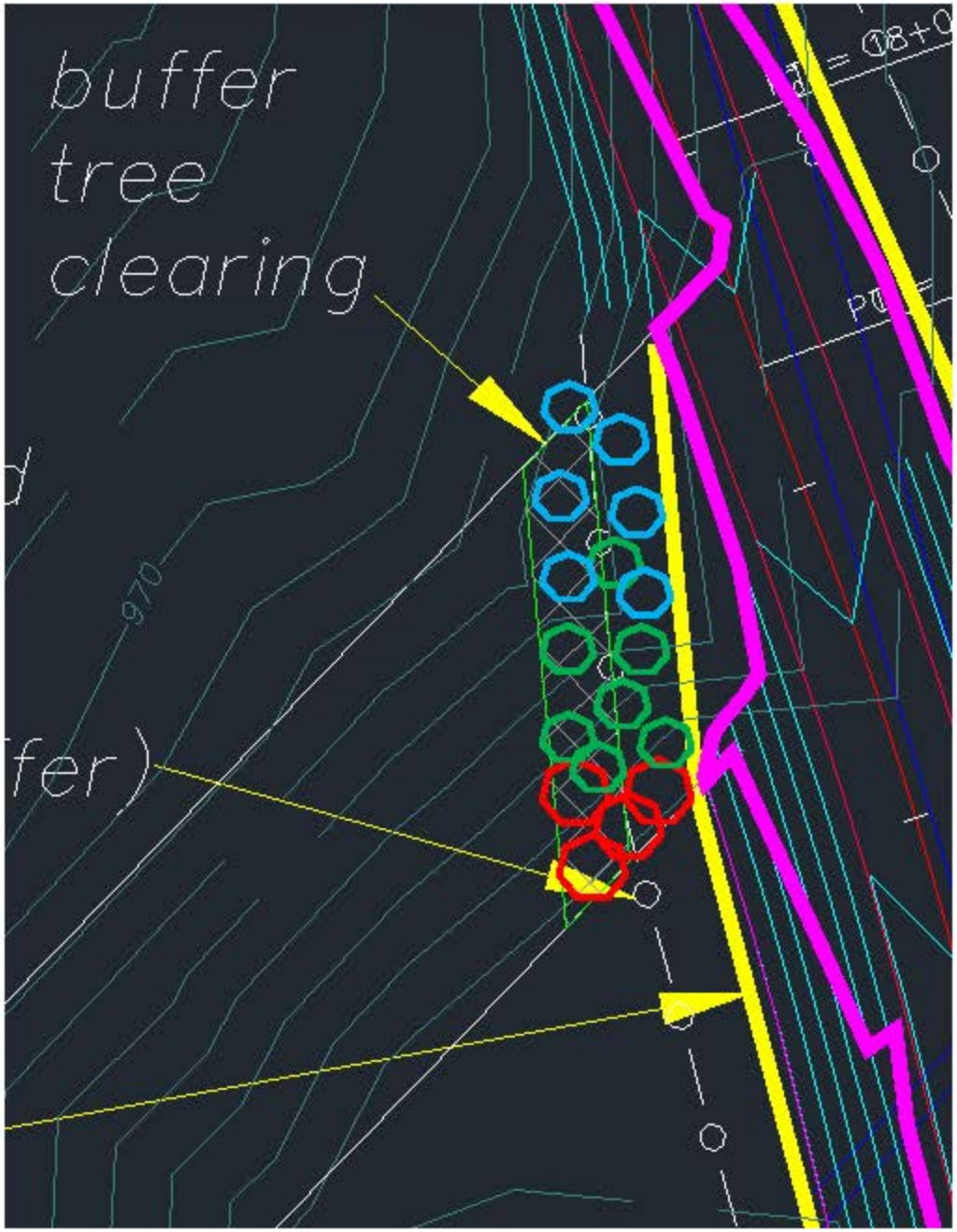


Figure 1. Buffer Enhancement Area (West Side)

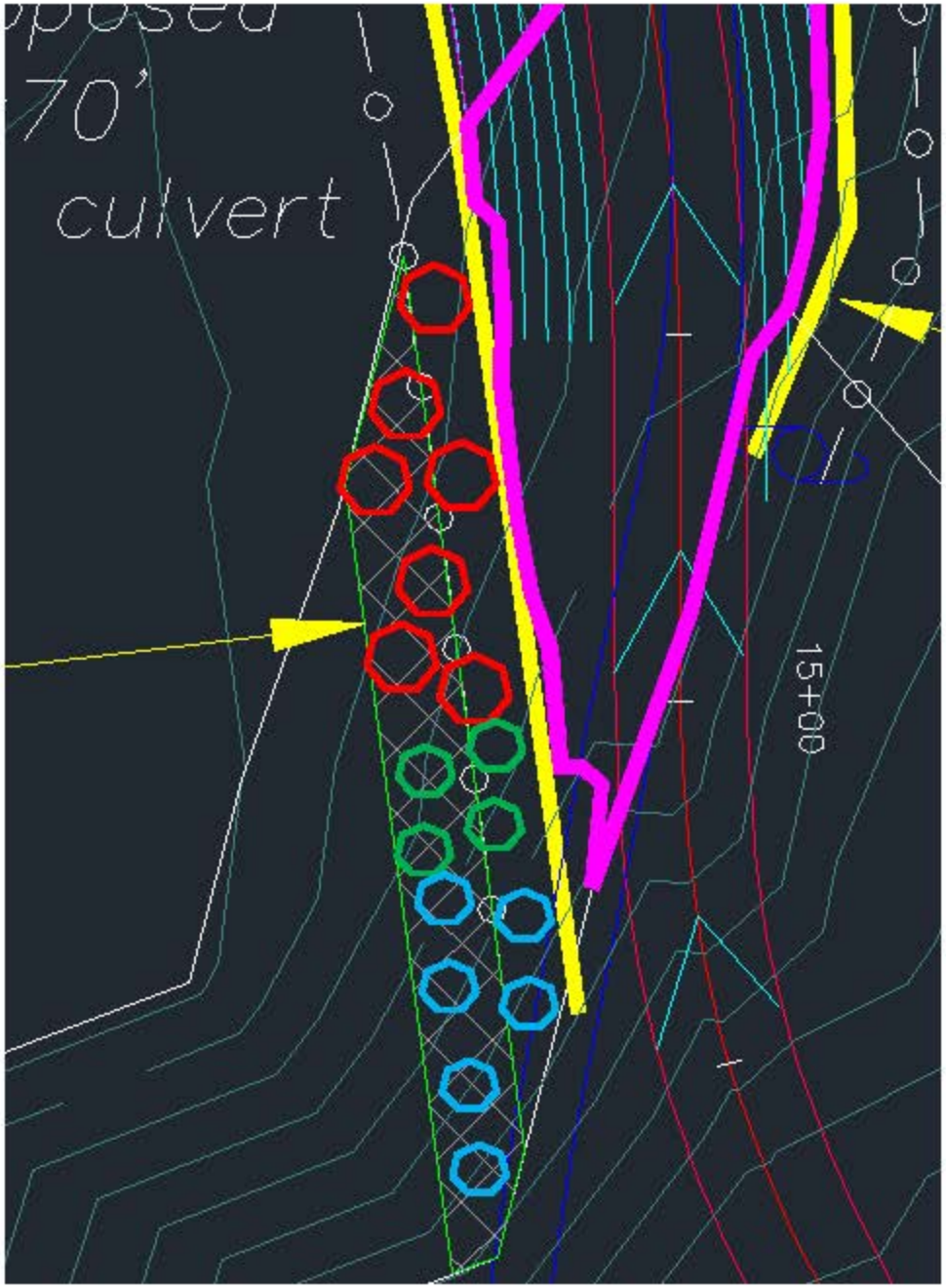


Figure 2. Buffer Enhancement Area (East Side)

Additional Information

How to Plant Containerized Trees

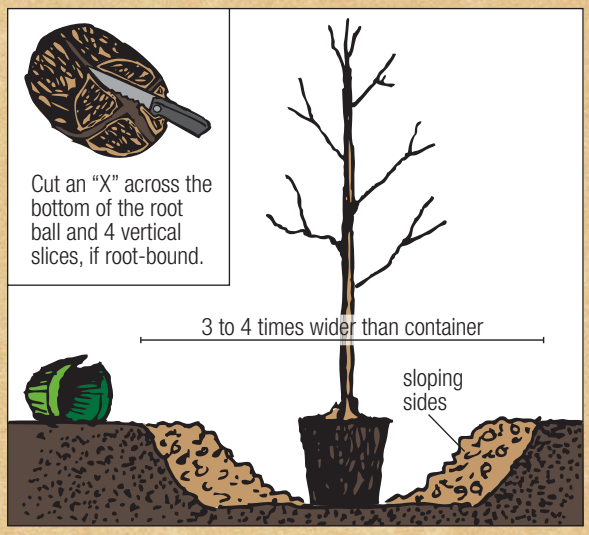
Trees from nurseries are often potted in a container. These instructions are for planting containerized trees.

1. Dig a hole the same depth of the container and 3 to 4 times wider than the container. The hole should have sloping sides like a saucer to allow for proper root growth.

2. Lay the tree on its side and carefully remove the tree from the container, keeping the soil around the roots intact. It helps to tap the outside of the container to loosen the edge. Carefully slide the tree from the container. Don't yank the tree out of the container as this can separate the roots from the tree.

3. Sometimes containerized trees become root-bound or the roots look like they're about to circle the root ball. If your tree is like this, cut an X across the bottom of the root ball and four vertical slices along the sides of the root ball with a sharp knife.

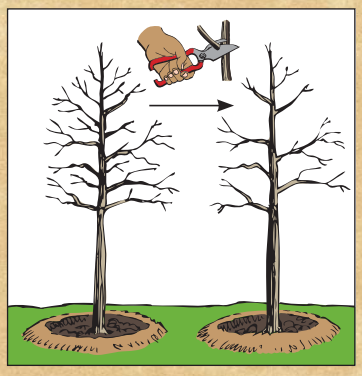
4. Set the tree in the middle of the hole. Avoid planting the tree too deep. If the root collar sits below the top of the hole, compact some soil under the tree so that the root flare at the base of the trunk is slightly above ground level. Using some soil, secure the tree in a straight position, then fill and firmly pack the hole with the original soil, making sure there aren't any air pockets. Keep backfilling until the soil is just below the root collar.



5. Create a water-holding basin around the hole and give the tree a good watering. After the water has soaked in, spread protective mulch 2-4 inches deep in a 3-foot diameter area around the base of the tree, but not touching the trunk.

6. The soil and mulch around your trees should be kept moist but not soggy. During dry weather, generously water the tree every 7 to 10 days during the first year. Water slowly at the dripline.

7. Remove any tags and labels from the tree as these will affect the tree as it grows. You may need to prune any broken or dead branches. (Please refer to the **arborday.org** pruning guide.)



Fertilizer? DO NOT use fertilizer, potting soil, or chemicals on your newly planted trees. Such products will kill your young trees.

Watering: Keeping your trees watered is important during their first year. Keep the soil and mulch moist but not soggy. In dry weather, you should water generously every 7 to 10 days. The water should soak into the soil and mulch. Avoid watering so much that you see standing water.

Arbor Day Foundation®
100 Arbor Avenue • Nebraska City, NE • 68410 888-448-7337
arborday.org

For step by step videos and more planting info go to **arborday.org/HowToPlant**

90174201

REDOSIER DOGWOOD

Cornus sericea L. ssp sericea

Plant Symbol = COSES

Contributed By: USDA NRCS National Plant Data Center & Carlinville (IL) Field Office

Robert H. Mohlenbrook
USDA, NRCS, Wetland Science Institute
@ PLANTS

Alternative Names

Red willow, redstem dogwood; *Cornus stolonifera* var. *nevadensis* Jepson and *Cornus stolonifera* Michaux (Hickman 1993). A related subspecies, *Cornus sericia* spp. *occidentalis* (Torr. & Gray) Fosberg is known as western dogwood.

Uses

Ethnobotanic: Native Americans smoke the inner bark of redosier dogwood in tobacco mixtures used in the sacred pipe ceremony. Dream catchers, originating with the Potawotami, are made with the stems of the sacred redosier dogwood. Some tribes ate the white, sour berries, while others used the branches for arrow-making, stakes, or other tools. In California, peeled twigs were used as toothbrushes for their whitening effect on teeth (Strike 1994). Bows and arrows were made from *Cornus* shoots. The inner bark is used for tanning or drying animal hides.

The Apache, Cheyenne, Dakota, Montana Indians, Ojibwa, Potawatomi, Omaha, Ponca, and Thompson Indians all use the inner bark in a tobacco mixture for smoking the sacred pipe (Moerman 1986). The leaves and/or inner bark of redosier dogwood are also used as a smoking mixture by the Okanagan-Colville, the Flathead, the Kootenay, and the Blackfeet peoples in the western United States and Canada (Hellson 1974, Hart 1976, Turner 1978, Turner et al. 1980, Johnston 1987). The Navaho-Kayentaf and Navaho-Ramah used the plant ceremonially as a Mountain-top-way emetic (Moerman 1986). An infusion of redosier dogwood bark was used as an anti-diarrheal by the Chippewa and the Potawatomi, an antidote for weak kidneys by the Shuswap, and a pediatric aid for children who wet the bed by the Shuswap. The Chippewa used an infusion of the bark for eruptions caused by poison ivy. The Chippewa and the Micmac used a decoction of redosier dogwood root for sore eyes and catarrh. The Okanagan and the Thompson Indians took a decoction of the leaves. Other remedies treated by redosier dogwood included headaches, sore throats, a wash for ulcers, a substitute for “larb”, and a decoction of bark was taken as an antidote for weakness.

The Maidu of Northern California used redosier dogwood as a tonic, a laxative, emetic, and cathartic (Strike 1994). Maidu women took a dogwood decoction after childbirth.

The fruits were eaten by the Indians of the Missouri region (Densmore 1974). The berries are known to be tart and bitter, but were nonetheless eaten by all of the southern Interior peoples of British Columbia, including the Nlaka’pamux, Lillooet, Okanagan-Colville, Shuswap, Kootenay, Blackfeet, and the Flathead of Alberta and Montana (Kuhnlein and Turner 1991). The fruits were gathered from August to October and eaten fresh, a few at a time, or, more commonly, were pounded and mixed with other fruits, such as chokecherries (*Prunus virginiana*) or Saskatoons (*Amelanchier almifolia*). Some people mashed the berries and dried them in cakes; others dried and stored them. Eating a few raw fruits was considered to be a good tonic among the Nlaka’pamux and the Okanagan-Colville, who ate them, raw as a kind of “relish” (Turner 1978; Turner et al. 1990).

Redosier dogwood is used for basket weaving. Sometimes called red willow, both *Salix* species and *Cornus sericea* are used interchangeably. Differences in stem color create a multi-hued design

element. Indian people from the mid-Columbia River used redosier dogwood to make "ribbons" for basket decorations (Schlick 1994). If gathered in the early spring, the bark will retain its deep red color when dried and could be mistaken for cherry. The Hidatsa, Arikara, and Mandan made twill plaited burden baskets with two-toned dark and light designs; these baskets were made of willow (*Salix nigra*), redosier dogwood, and boxelder (*Acer negundo*) splints (Turnbaugh et al. 1986, Hart 1976). Willow and redosier dogwood were used by the Cheyenne, Arapaho, Kiowa, Pawnee, and Teton Sioux to make a coarsely coiled gambling basket for dice.

The Ojibwa and the Chippewa used redosier dogwood bark as a dye. The inner bark was mixed with other plants or minerals and used to make a red dye, a light red dye, a black dye, and an ecru or "khaki" colored dye (Densmore 1974).

Wildlife: The fleshy fruits of dogwoods are very valuable to wildlife, particularly in the Northeast (Martin et al. 1951). The fruit ripens in late summer, and besides being available through the fall, some of the berries may persist on the plants into the winter months. Wildlife browse the twigs, foliage, and fruits. Birds known to eat the fruit include: wood ducks, eastern bluebirds, cardinals, catbirds, long-tailed chats, crows, purple finches, yellow-shafted flickers, crested flycatchers, grosbeaks, kingbirds, American magpies, mockingbirds, crested mynah birds, orioles, robins, yellow-bellied sapsuckers, European starlings, tree swallows, scarlet tanagers, brown thrashers, thrushes, vireos, pine warblers, cedar waxwings, and woodpeckers. Game birds who eat both the fruits and buds include grouse, ring-necked pheasants, band-tailed pigeons, greater prairie chickens, bobwhite quail, and wild turkeys. The shrubs provide excellent nesting habitat for songbirds. Mammals that eat the fruit and foliage include black bear, beaver, mountain beaver, cottontail rabbits, raccoons, eastern skunks, squirrels, chipmunks, mice, and rats. Deer, elk, Mountain goat, and moose browse the twigs and foliage.

Landscaping & ornamental: Redosier dogwood is often planted as an ornamental, both to beautify the landscape and to attract birds. Dogwood is often used for landscaping and as a secondary plant in windbreaks.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status and wetland indicator values.

Description

General: Dogwood Family (Cornaceae). Redosier dogwood is a woody deciduous shrub generally 1.4-6 m (4.6-20 ft) tall. The bark and twigs are reddish to purple and fairly smooth from autumn to late spring; after the leaves have fallen, the deep burgundy branches add color to the winter landscape. The bark, twigs, and leaves are bright green in spring through summer. The simple, opposite leaves are 5-10 cm (2-4 in) long, dark green above and hairy and lighter-colored below, with smooth margins, rounded bases, pointed tips, and falsely parallel veins. Flowering occurs from June to August. The inflorescence is a cyme, with 2-3 mm (0.08-0.12 in) white to cream-colored flowers. The white berries are smooth on the faces, furrowed on the sides.

Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. Redosier dogwood has a wide distribution from California north to Alaska and throughout the country to the eastern United States south to Mexico. It generally grows at elevations below 2500 m.

Establishment

Adaptation: Redosier dogwood grows in soils that are saturated for at least a portion of the growing season. Redosier dogwood is common on the edges of lakes, ponds, within wetlands, and along streams. Not as tolerant of long-term root saturation as are some other shrubs, dogwood seems to prefer wetland margins where soils are nitrogen-rich, saturated, and shallowly inundated in the spring, and may be completely dry by late summer. It is tolerant of fluctuating water tables. The "osier" in redosier dogwood is derived from French, meaning "willow-like"; it is often called red willow because of its red stems.

Propagation from cuttings: Redosier dogwood can be started easily by division, French layering, and hardwood cuttings. To propagate suckers by division:

- Lift a root with suckers on it without disturbing the parent plant. Check that there are fibrous roots at the base of the suckers.
- Remove the suckering roots by cutting it off close to the parent plant. Firm the soil around the parent plant.

- Cut the main root back to the fibrous roots, then divide the suckers so that each has its own roots. Cut back the top-growth by about half.
- Treat each sucker or hardwood cutting at the base with IBA at 20,000 ppm liquid formulation to promote rooting. Alternatively, treatment with 2 percent IBA talc; this will promote rooting on both suckers and stem cuttings.
- Replant the suckers in open ground in prepared holes with good potting soil. Firm the soil around the suckers and water.
- Before growth starts in the spring, lift the plant. Break the clump into sections, retaining those with vigorous shoots and well-developed roots.
- Prune any damaged roots, and cut back the top-growth by one-third to a half to reduce water loss. Replant the divisions in the open and water in dry weather.
- Ultimately, simply lift a suckering root, sever it from the parent plant, and then replant it in the open.

To ensure survival of cuttings or suckers through the following winter in cold climates, the potted cuttings should be kept in heated cold frames or poly-houses to hold the temperature between 0-7°C (32-45°F). Rooted cuttings that had shoot growth in the fall, but were not given nitrogen, had the best over-winter survival in a cold frame with microfoam.

French layering: Layering is a method where a stem is encouraged to develop roots before being removed from the parent plant.

- In spring, plant a rooted layer or young plant, label it, and grow it for a season. Then, in the dormant season, cut back the stem to within 3 inches (8 cm) of the ground.
- In the following spring, apply a balanced fertilizer at the rate of 2-4-oz/sq yd (60-110 g/sq m). Space the stems evenly again; dropping each into a 2-inch (5-cm) deep trench. Peg down each stem and cover with soil, leaving the shoot tips exposed. Hill up all but 2-3 inches (5-8 cm) of the new shoots as they develop, until the mound is 6 inches (15 cm) high. Water as needed.
- After leaf fall, carefully fork away the soil from around the new shoots until the stems that were laid horizontally are exposed. Cut these flush with the basal area of the stems. Then cut the stems to separate the rooted sections. Pot these or plant them out in the open garden, and label them. The same redosier dogwood basal area may be used to propagate further layers.

Propagation by seed: Redosier dogwood is established easily from seed. The best germination is obtained if the seeds are gathered as soon as the fruit starts to color or ripen, from August to October. If the seeds are allowed to dry out, it is best to remove seeds from the fruit and soak in water.

The best results are obtained from fall sowing of freshly harvested seeds. Fruits collected too late to sow in the fall should be stored, pre-chilled until the next season, and sown outdoors the following fall. To effectively condition the seed for germination, store for two months in moist sand at 5ºC for 90 days. After pre-chilling, expose the seeds to fluctuating temperatures from 12/72ºC for 10 days (Young and Young 1992). With some species, the warm stratification period may be replaced by mechanical scarification or soaking in sulfuric acid. Seeds sown in nursery beds should be covered with 0.25-0.5 in (0.6-1.25 cm) of soil. Fall-sown beds should be mulched during the winter.

Management

Redosier dogwood is often coppiced in late fall after the leaves turn brown and fall off the stem. Cut all stems to approximately 2-3 in (5-8 cm) from the base before growth begins in spring. Apply fertilizer around the shrub to promote new growth, then apply mulch around the base. Coppicing stimulates the growth of new, vigorous stems whose deep burgundy color is especially vivid.

Traditional resource management: Redosier dogwood was traditionally tended by pruning or burning to produce long straight stems.

- Often basket weavers will prune many redosier dogwood stems, sometimes replanting the stems, so there will be nice straight basketry material the following year.
- Before gathering, offerings of thanks and prayers for permission to gather are given. Often tobacco or sage or other offerings are given before beginning to gather.
- Basket weavers process materials with their hands and mouths. Herbicides sprayed along streams have a much higher health risk for humans when they are processed and used for traditional materials.

Overgrazing, especially by livestock and big game, frequently changes plant species composition and growth form, density of stands, vigor, seed production of plants, and insect production. Livestock grazing can cause the replacement of bird and mammal species requiring the vertical vegetation structure of riparian habitat to species, which are

ubiquitous in their habitat preferences. Previous heavy cattle grazing changed the bird and small mammal community composition in riparian areas through reduction of shrub and herbaceous cover.

Cultivars, Improved and Selected Materials (and area of origin)

Cultivars: 'Alman's Compacta', 'Allamans', 'Bailey', 'Cardinal', 'Coloradensis', 'Flaviromea', 'Isanti', 'Kelseyi', 'Lutea', 'Ruby', 'Silver' and 'Gold', and 'White Gold' have been planted in the growing range of redosier dogwood.

Consult your local nurseries to choose the right cultivar for your specific landscape.

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Prepared By
Michelle Stevens
Formerly USDA NRCS National Plant Data Center
Ivan Dozier
USDA NRCS, Carlinville, Illinois

Species coordinator
M. Kat Anderson
USDA, NRCS, National Plant Data Center
c/o Plant Science Department, University of California, Davis, California

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Fact Sheet

GRAY DOGWOOD

Cornus racemosa Lam.

Plant Symbol = CORA6

Contributed by: USDA NRCS Plant Materials Program

Chris Miller
USDA NRCS Plant Materials Program

Uses
Gray dogwood is useful as a low-growing wild hedge which provides summer food and some cover for small animals and birds.

Status
Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description
Cornus racemosa Lam, gray dogwood, is a thickly branched, slow growing dogwood seldom more than 6 feet high at maturity. Its flowers, which bloom in June or July, are white and loosely clustered, and its white fruit, which appears in September and October, is set off by bright red fruit-stalks. Its leaves are opposite, taper-pointed and oval.

Adaptation
Gray dogwood has a range of adaptability equaled by few other shrubs, and it tolerates many climatic conditions. Tolerance to shade is considered intermediate. It is not well adapted to coastal plain conditions.

Gray dogwood is distributed throughout the northeastern United States. For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Establishment
Only seedlings of gray dogwood are practical. All should be planted as early in the spring as possible. When using dogwood for streambank planting, eroded or steep banks should be graded before planting. Plant in the early spring with dormant planting stock. Planting after May will severely reduce chances for success. One-year rooted cuttings or seedlings can be planted vertically into the bank with one or two inches of cutting wood protruding. They should be stuck in a hole large enough to accommodate the root system when well spread. The soil must be tamped well around the roots. Fresh, unrooted hardwood cuttings, easier to handle but less reliable, should be stuck vertically into the bank, leaving one to two inches above ground. A dibble can be used to make a hole. Tamp adequately to provide complete contact between the cutting and the soil. Cuttings may also be buried horizontally two inches deep in damp soil, if the ground is stony. Fresh hardwood cuttings, 3/8 to 1/2 inch at the thick end, 9 inches long, and made while dormant, are ideal. Without cold storage, planting should be done as soon as possible after cutting. Plant both rooted cuttings and unrooted hardwood cuttings on 2 feet spacing in a diamond pattern.

When using for wildlife or screening purposes, the planting site should be cultivated to destroy existing vegetation. If not, the sod should be removed from an area two feet across for each plant. The holes should be deep enough to allow for the full extension of the roots. Spacing for hedges and screens should be staggered and 2 x 2 feet, and 4 to 5 feet for windbreaks. A small handful of fertilizer can be placed around each plant.

Management
Dogwoods used on streambanks are subject to mechanical damage. The site should be inspected annually for needed repairs in the spring after heavy runoff or ice floes. Fill in gaps by replanting or by laying down and covering branches of nearby plants. Any mechanical measures used to control the bank,

such as riprap, must be kept in repair to maintain effective protection.

Competing vegetation should be controlled around all dogwood plants used for hedges, screens, etc. This is particularly important during the first few years after planting.

Pests and Potential Problems
There are currently no serious pests of gray dogwood.

Cultivars, Improved, and Selected Materials (and area of origin)
No cultivars are available at this time, however common seedlings are available at most commercial hardwood nurseries.

Prepared By & Species Coordinator:
USDA NRCS Plant Materials Program

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>