Resource Assessment and

Watershed Level Plan for Agriculture in the

East Creek Watershed,

Addison and Rutland Counties, Vermont – August, 2018

Prepared By;
USDA/NRCS
Colchester, VT

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Cover photo of lower East Creek by Stephanie Drago, VACD

I. Background and Purpose of Plan

A. General overview of assessment area

Lake Champlain is a 6,000 square mile natural water body. Its contributing Basin (HUC-6 code 041504) has land in Vermont, New York, and Quebec. The lake is important to the Vermont economy, contributing to the recreation opportunities, transportation, water supply and environmental quality functions to half the state's land and 62% of its population. The State Capitol and four of its largest cities are in the Basin. The East Creek drainage area is a single sub-watershed at the 12-digit Hydrologic Unit Code (HUC-12) level in the National Watershed Boundary Dataset. It is in what is known by EPA and state government as the "South Lake A" segment of Lake Champlain; it is also known in state government as the Southern Lake Champlain Planning Basin.

B. Phosphorus as the primary constituent of concern

This watershed plan, developed by the Vermont NRCS and Vermont Association of Conservation Districts with support from the National Water Quality Initiative, is meant to address the need for more effective practice implementation of conservation plans on agricultural lands in one of the targeted watersheds of the Lake Champlain Basin. Past conservation practice implementation efforts have been broad in scope and have not resulted in any measurable improvements in water quality. In response to the new phosphorus TMDL for Lake Champlain and the availability of increased NRCS funding for the next five years, NRCS in Vermont has decided to use a more strategic and focused process for conservation practice implementation. Under this new process, NRCS will collaborate with the Vermont Department of Environmental Conservation (VTDEC) to contribute information for the Agricultural sections of Tactical Basin Plans (TBP's). These agricultural watershed plans will provide a comprehensive inventory of land use and resource conditions in each of the targeted watersheds.

C. Opportunities and objectives for meeting water quality goals

These watershed plans also include the results of an analysis to establish phosphorus reduction goals (in lbs/yr) for each of the targeted watersheds using existing EPA tools such as the EPA BMP Scenario Tool and HUC-12 Tool for the Lake Champlain Basin. The percent reduction in phosphorus load identified by EPA for the larger HUC-8 watershed was used to estimate the required phosphorus load reduction for each HUC-12 watershed. The EPA phosphorus reduction goal set for the South Lake A segment and East Creek Watershed is 63%.

D. NRCS' plans to help partners reach watershed goals

The information provided will then be used by Local Watershed Teams working in each watershed to identify and target specific farms and fields for further resource assessment and the development of practice alternatives; this will become their Local Watershed Team Action Plan. These Local Watershed Teams will be initially established by NRCS but will be directed by an appropriate local partner to bring all agricultural partners together to work in a coordinated and strategic effort. The Local Watershed Teams will also determine the length of the project for each watershed and what amount of phosphorus reduction they think the conservation partners and all levels of government can achieve during that time period. The timeline and amount of practice implementation may be determined to some extent by the amount of funds likely to be available, and the staff available to implement the Local Watershed Team Action Plan.

Based on the required reduction for each of the targeted watersheds, an example conservation practice scenario has been developed for the East Creek Watershed. This scenario includes a suite of individual practices and systems of practices, that when implemented will reduce phosphorus loading from agricultural lands by the required amount for each of the targeted watersheds (currently 63% for East Creek). The Local Watershed Team will modify this list of selected practices and the amount applied based on their more detailed assessment of the watershed. The amount of estimated phosphorus reduction from this modified suite of practices will be tracked on an annual basis. It is important to note that these phosphorus reduction amounts achieved by these specific practices are an estimate based on some general modeling assumptions. These modeled loading reductions can be helpful in establishing goals for a watershed and for the tracking of progress. However, these numbers are not necessarily accurate enough to be used for regulatory purposes.

II. Watershed Overview

A. Location of Watershed within the drainage network

The East Creek watershed is in both Addison and Rutland Counties and empties directly into Lake Champlain. The State of Vermont recognizes East Creek as a part of the Southern Lake Champlain Planning Basin (also known as South Lake). South Lake is subject to frequent and sometimes severe cyanobacteria blooms during the summer months, highlighting the need to do work on impaired watersheds in this section of the lake.

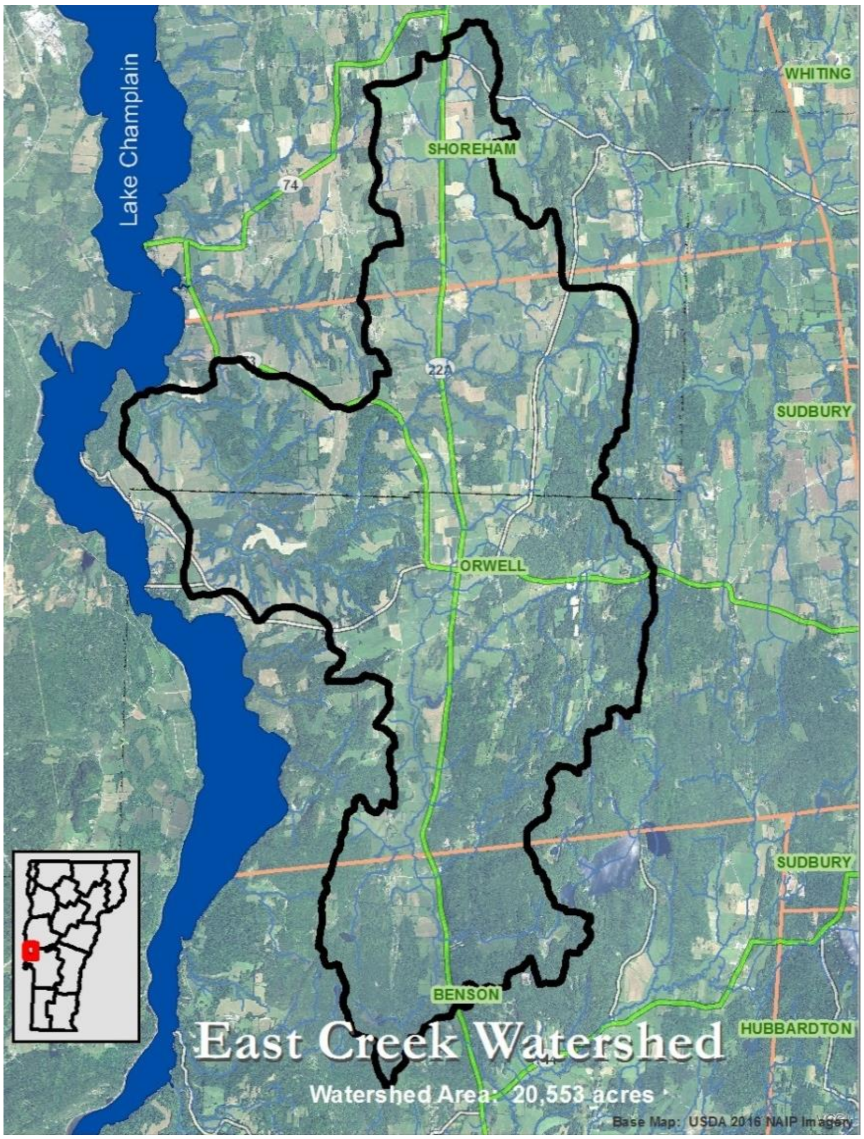

Figure 1 – Map of the East Creek Watershed

The total watershed area of East Creek is 20,555.10 acres, consisting of mostly forested land and agriculture, which contributes to the phosphorus pollution impacting Southern Lake Champlain.

B. Landscape characteristics of the MLRA/Ecoregion in which the watershed resides

East Creek is in Major Land Resource Area (MLRA) 142—St. Lawrence-Champlain Plain. This MLRA is characterized by glaciation and low relief, which has shaped the low hills of glacial till in the area's shallow lacustrine basins, and fluvial activity that creates deep and narrow valleys. Glacial till covers most of the bedrock in this area resulting in areas of glacial outwash and eolian deposits. Lacustrine deposits are common in this area as well. Ground water is abundant in this MLRA and the dominant soils are Alfisols, Inceptisols, Spodosols, and Entisols which support hardwoods and a maple-beech-birch climax forest type.

C. Climate, topography, geomorphology, geology and soils

According to the NRCS/Oregon State University PRISM climate database, East Creek receives an average of 35-37 inches annual precipitation, with average annual temperature of approximately 44.5 degrees Fahrenheit.

The highest elevation in East Creek's watershed is 941.75 feet on the southeastern side of the watershed. The lowest elevation at 93.5 feet, near the outlet into Lake Champlain. East Creek is defined by steep gullies that cut through the Vergennes Clay dominated landscape. Variations of Vergennes Clay (with the majority of the soil type being Vergennes Clay 2-6% Slope) take up 43.98% of the watershed followed by Farmington soils at 9% and variations of Taconic Soils at 8%. Vergennes Clay has a parent material of glaciolacustrine deposits of clay, resulting in a deep clay filled profile with high runoff potential (NRCS Web Soil Survey). Vergennes clay is classified in Hydrogroup D, which is the Hydrogroup that makes up 86.72% of soils currently in agricultural and 76.40% of the entire watershed. The Orwell Thrust Fault runs north to south on the eastern side of the watershed. East of the fault the topography is varied and highly forested. Striations from glacial movement are evident east of the fault, which is composed of primarily metamorphic bedrock (marble and quartzite) with some areas of dolostone. West of the fault, there are carbonate planform rocks of the Champlain Valley including calcareous shale/dolomitic silts and calcareous shale with blueish-grey limestone (State of Vermont Geologic Survey).

D. General land cover/land use

According to 2016 NAIP ortho-imagery, 45.24% of East Creek is agricultural. Most of the agriculture is hay (30.82%), followed by pasture (7.7%), corn (5.61%), orchard (1.09%), and other row crops (0.02%). Forested land takes up 43.79% of the watershed and the remainder of the land is residential, commercial, wetland or standing water (10.98%). Figure 2 displays these data graphically.

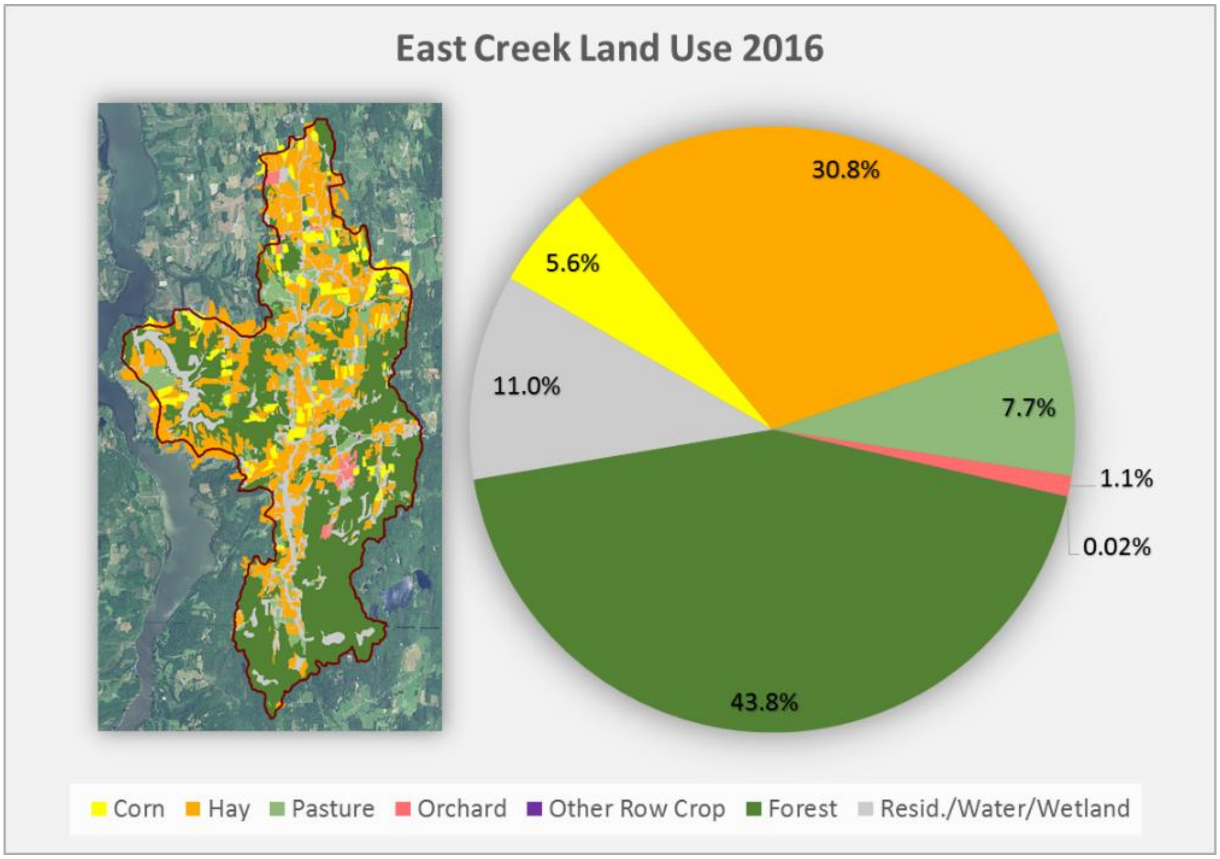

Figure 2 – Land Use across the East Creek Watershed

E. Current and planned water quality monitoring

Currently in the East Creek Watershed, flow monitoring data are being collected at two sites on the North Fork. Biomonitoring is being done at DEC sentinel monitoring sites.

III. Resource Inventories and Planning

A variety of watershed land and farm assessments were undertaken in order to provide resource condition information on a watershed scale to the Local Watershed Teams. These various data layers can be used individually or in combination with each other to help the Local Watershed Teams to target areas for further on the ground assessment, and then if appropriate conservation practice implementation. Due to the large extent of information that could be potentially developed and the short time frame in which the data is needed, we have prioritized the development of the data layers to some extent based on feedback from local NRCS employees.

For each data layer a short narrative describes the data set, briefly how it was generated, provides a watershed wide map of the data, a more detailed example map, and some tabular or graphical summary data when appropriate. Suggestions are provided as to how this data layer might be used in conjunction with other data layers. All Local Watershed Teams will be provided GIS based electronic files of each data layer for them to use in their more detailed assessments.

A. Farmstead mapping

The Farmstead Map shows the location of each active farmstead within the East Creek Watershed (Figure 3). The identification of farmsteads was conducted by visual interpretation of the 2016 NAIP imagery. Farmstead boundaries were based on the visual identification of structures and heavily disturbed ground surface. As can be seen in Figure 3, there were a total of 66 active farmsteads identified in the East Creek Watershed in 2016. These maps can be used to ensure that all farmsteads in the watershed are reviewed on the ground for potential waste management issues and to help identify farmsteads with potential resource concerns such as improperly constructed and/or maintained heavy use areas.

Figure 4 shows an example Farmstead Map for a location that has several barns, a manure storage facility and some heavy use areas, but shows no visible resource concerns. The close proximity of the manure pit to a surface ditch might warrant an onsite visual assessment of any potential resource concerns.

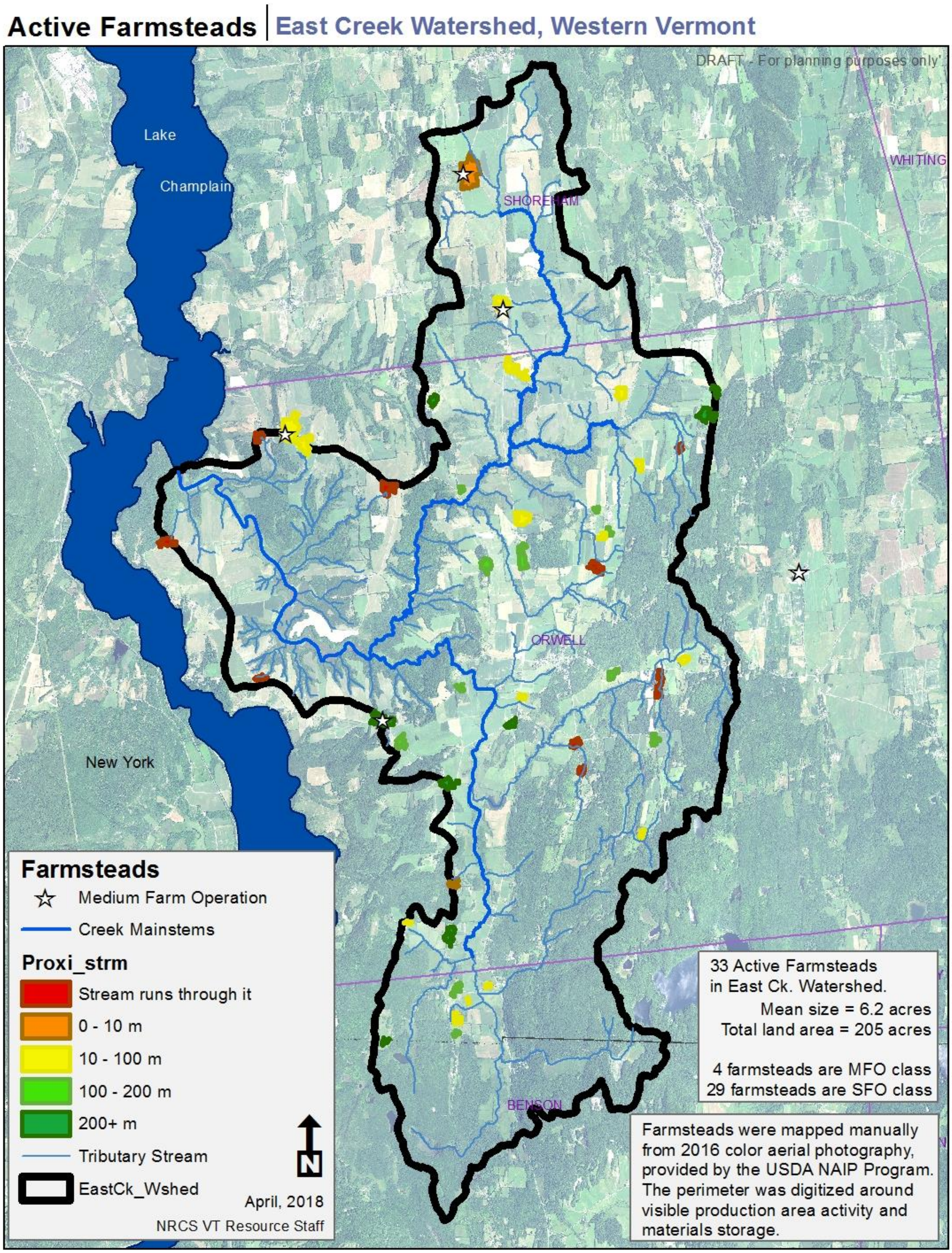

Figure 3 – Farmstead Locations in the East Creek Watershed

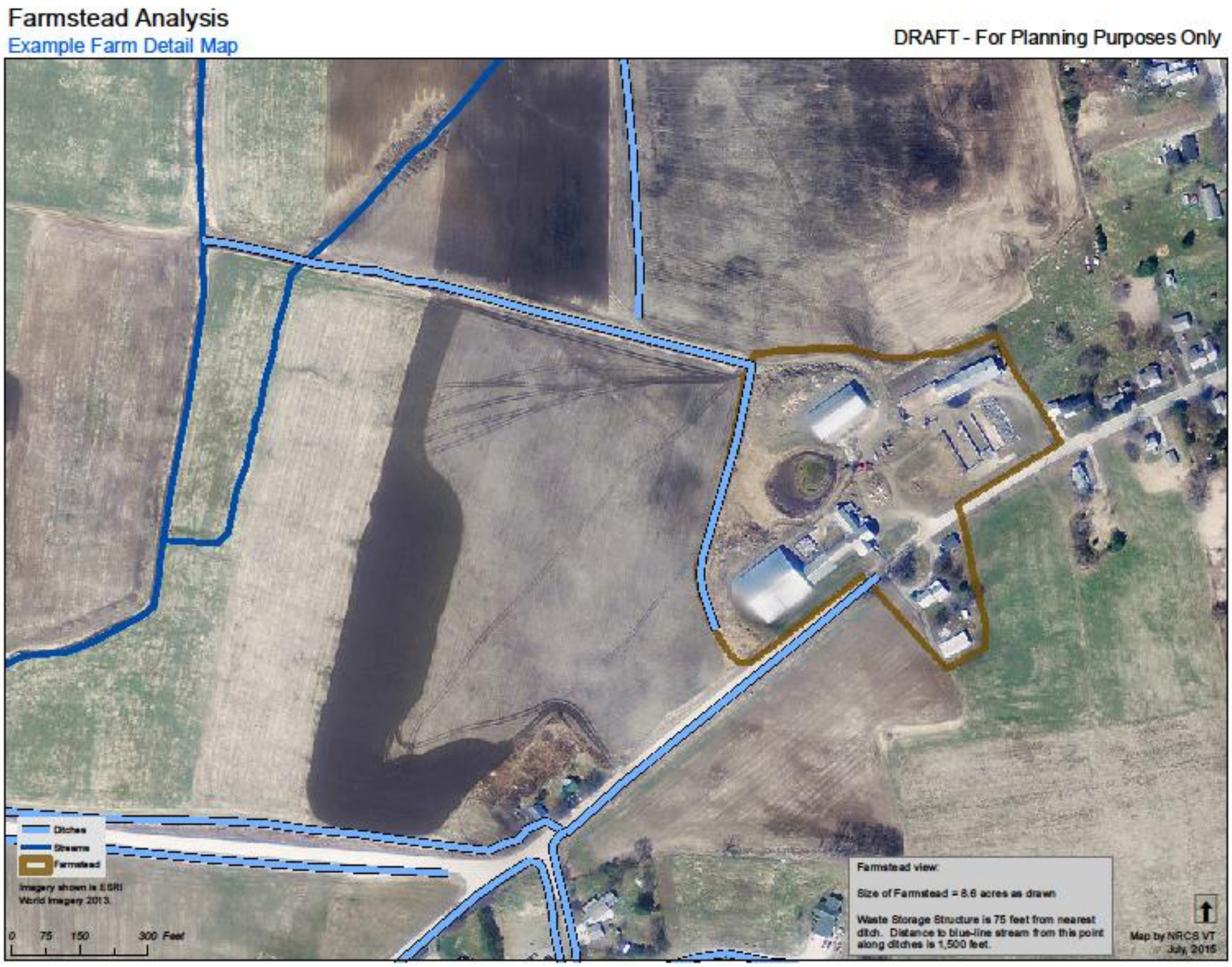

Figure 4 – Example Farm Scale Farmstead Map

B. Annual crop and hayland

One of the basic pieces of information needed for agricultural watershed planning is the extent and types of land cover in the watershed. Annual crop and hay fields as well as pasture were visually identified in the East Creek Watershed using 2016 NAIP imagery. As such the land cover is a "snapshot in time" since many crop and hay fields are rotated between annual crops such as corn and hay. An additional analysis identified fields in continuous annual crops.

Figure 5 shows the location and extent of annual cropland and hay fields in the East Creek Watershed. This information was digitized using the 2016 National Agriculture Imagery Program (NAIP), and as such may differ slightly from the NCD data presented in Figure 2. According to the NAIP photography there was a total of 4,740 ac of annual cropland, 3,954 ac. of hay and 1,077 ac. of pasture in the East Creek Watershed in 2016. This comprises a total of 42% of the 22,743 ac. watershed.

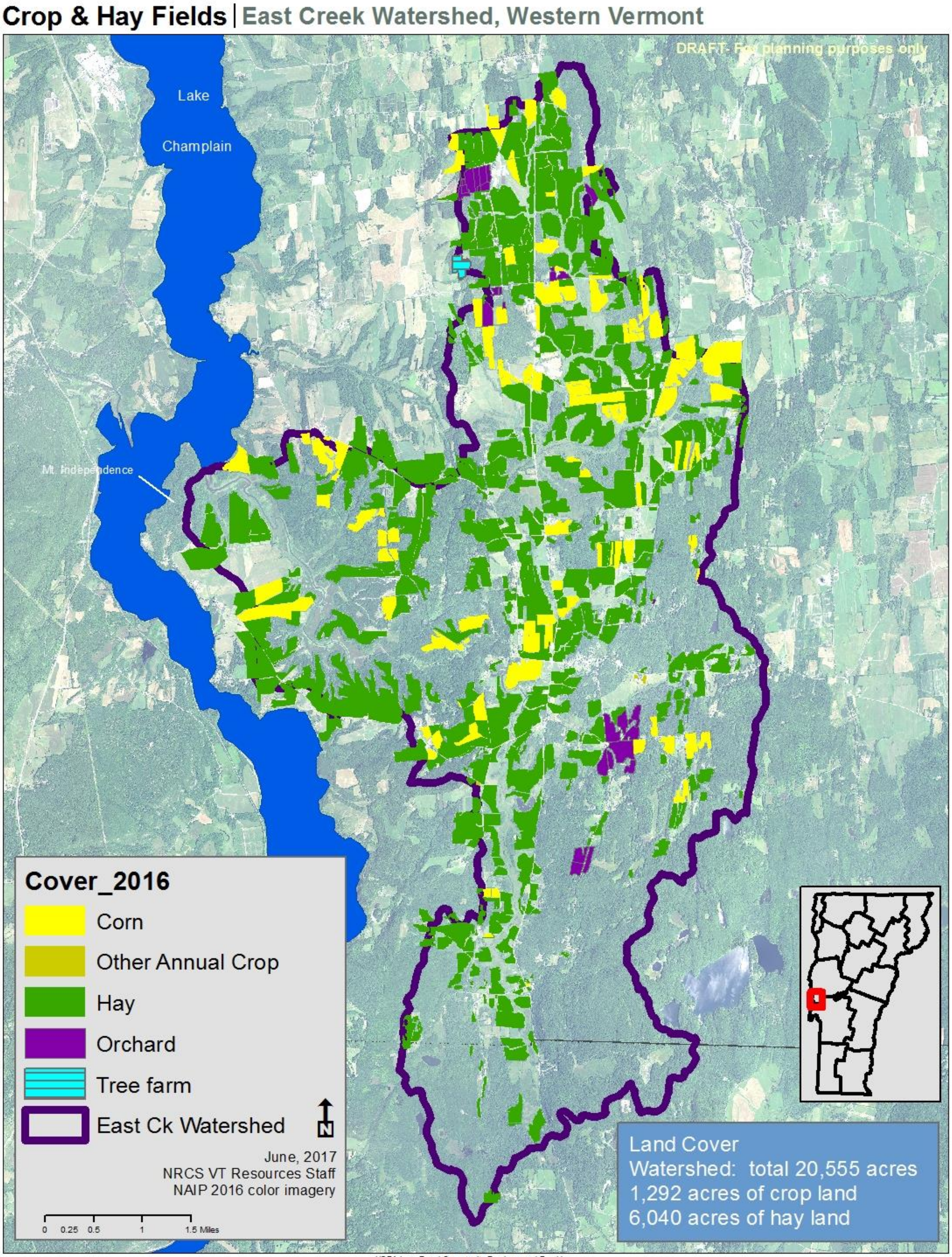

Figure 5 – Location and Extent of Annual Cropland and Hayland in the East Creek Watershed

Field scale maps can be produced by conservation planners that are working as part of the East Creek Local Watershed Team. Figure 6 is an example of a field scale map for annual cropland and hayland. The Annual Crop and Hayland maps can be used alone or overlain with other several data layers such as the Erosion and Runoff Risk Potential Maps or the Pasture Maps to evaluate specific fields for erosion and runoff risk or suitability for various conservation cropping systems. It is important to remember that these Annual Cropland and Hayland maps will represent land cover in 2016 (example in Figure 6 used 2014) and many of these fields may be in a corn/hay rotation.

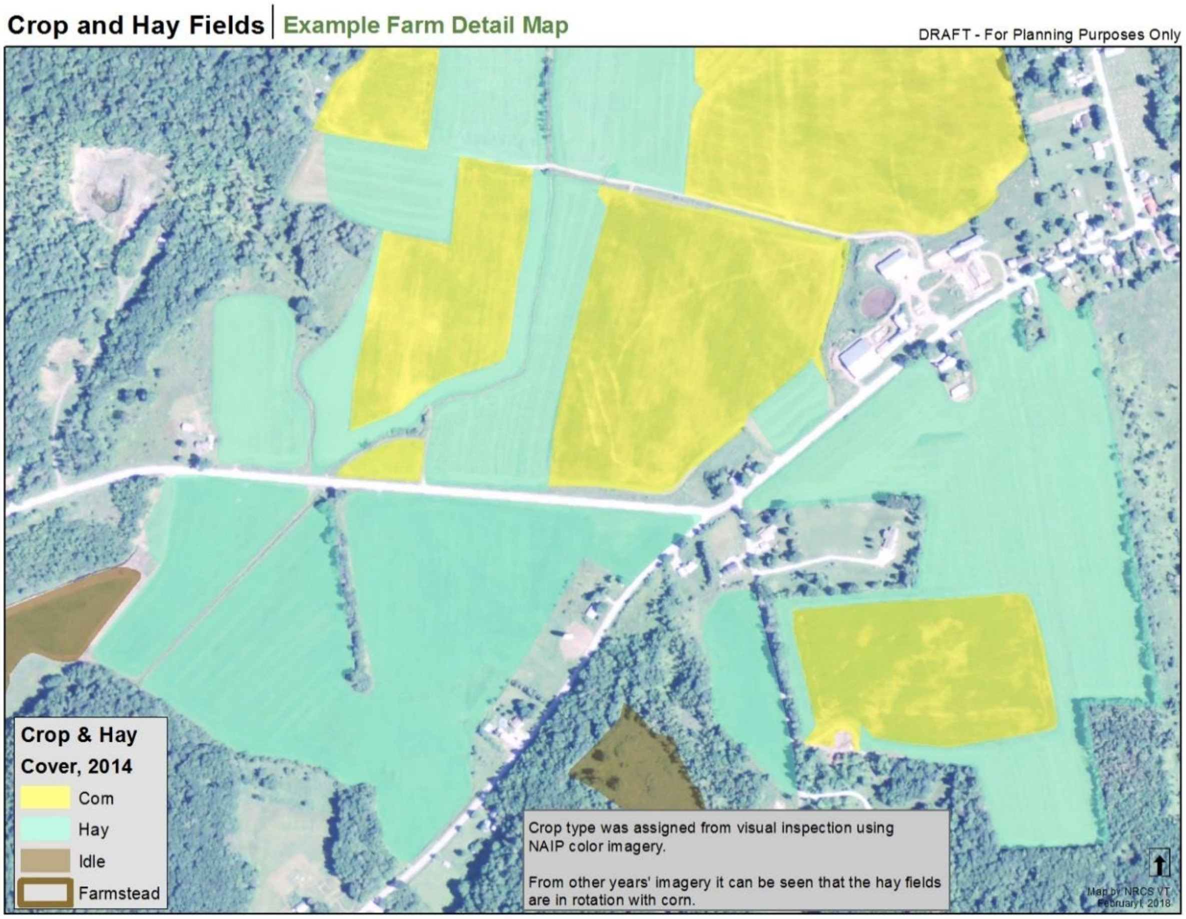

Figure 6 – Example Field Scale Map of Annual Cropland and Hayland

C. Fields in continuous annual crops

An additional analysis was performed to identify farm fields continuously planted to annual crops such as silage corn (Figure 7). These fields were visually identified using five years of aerial imagery (2009, 2011, 2013, 2014 and 2016). There is an estimated 219 acres of continuous cropland in identified in the East Creek Watershed (3% of total cropland). This analysis also provided an estimate of the total acres used for crop production (7,331 acres) and the amount of corn fields in a rotation of annual and perennial crops (in 2016, 1,068 acres were in corn, but will rotate with hay) which is also displayed in Figure 7.

Fields in continuous annual crops are likely to exhibit a number of resource concerns. These fields may have higher erosion rates, depleted organic, and higher nutrient application rates, among other concerns. For this reason these fields should be prioritized for more detailed and onsite evaluations. Any fields identified as continuous cropland, which also have a high

Erosion and Runoff Risk Potential should be considered as especially vulnerable to significant resource concerns.

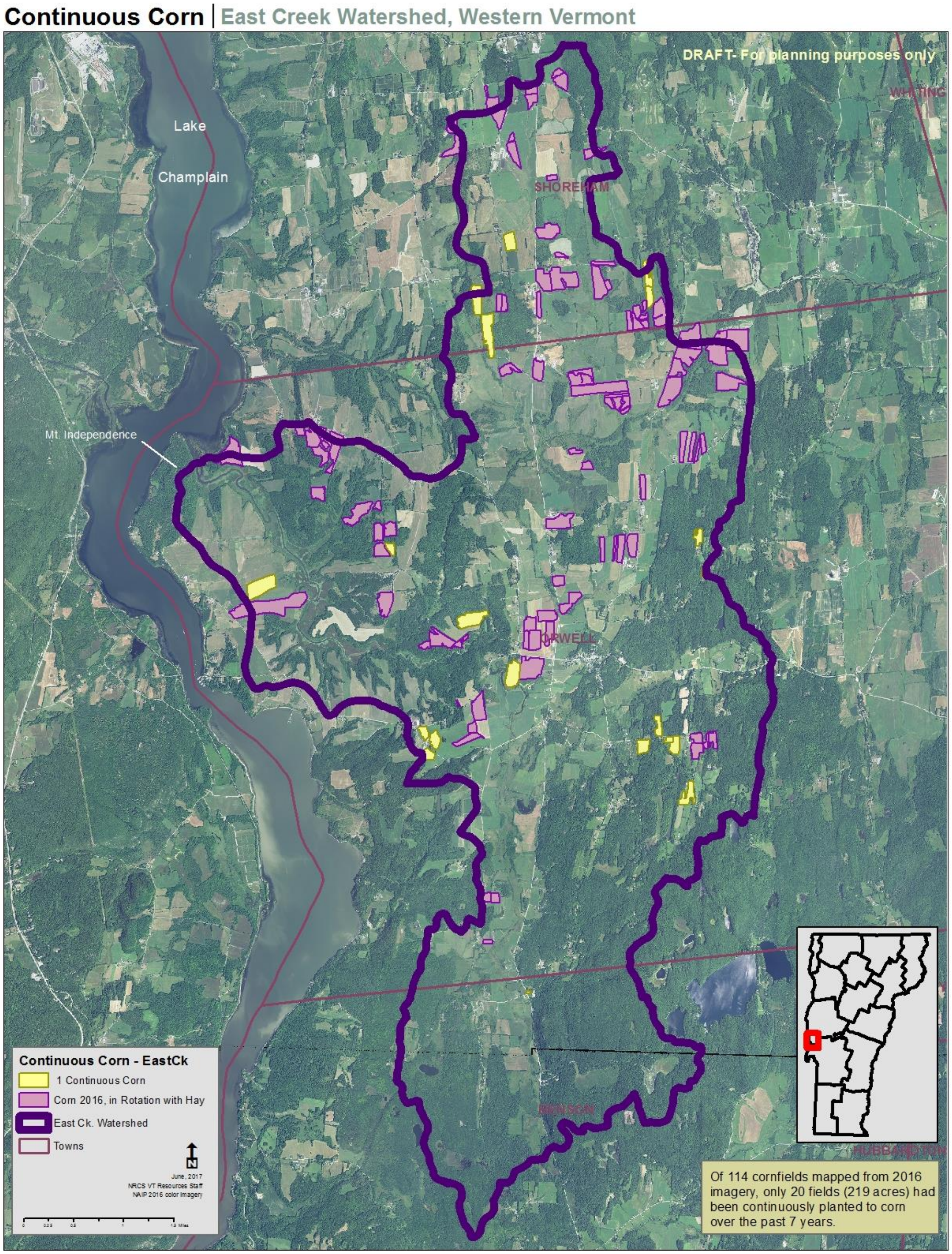

Figure 7 – Map of Fields in Continuous Annual Crops and in Rotation

D. Gully erosion and concentrated flow areas

The streams and rivers in the East Creek Watershed are deeply incised over much of the watershed. Most (81%) of the watershed's soils have clay or silty clay textures at the surface and are in Hydrologic Soil Group D. Some of these soils on agricultural lands have been drained of excess water. Typically, the combination of heavy surface textures, excessive wetness and an adjacency to steep river banks leads to the development of gullies in these areas. These gullies often first form in the woods or on non-ag land adjacent to fields and then with time, head cut into the crop fields.

This GIS analysis uses high-resolution terrain data layers derived from LiDAR elevation (slope and flow-accumulation layers) to find areas which are likely to experience excessive runoff in storms, and are susceptible to gully formation. In this watershed, agricultural areas are closely flanked by steep banks to the streams below. Head cuts and gullies often begin to form in steep areas adjacent to farm fields and continue head cutting into farm fields. It is important to identify the location of potential gullies, as they can be direct conduits of nutrients and sediment into receiving waters. The results of the analysis for the East Creek Watershed are shown in Figure 8.

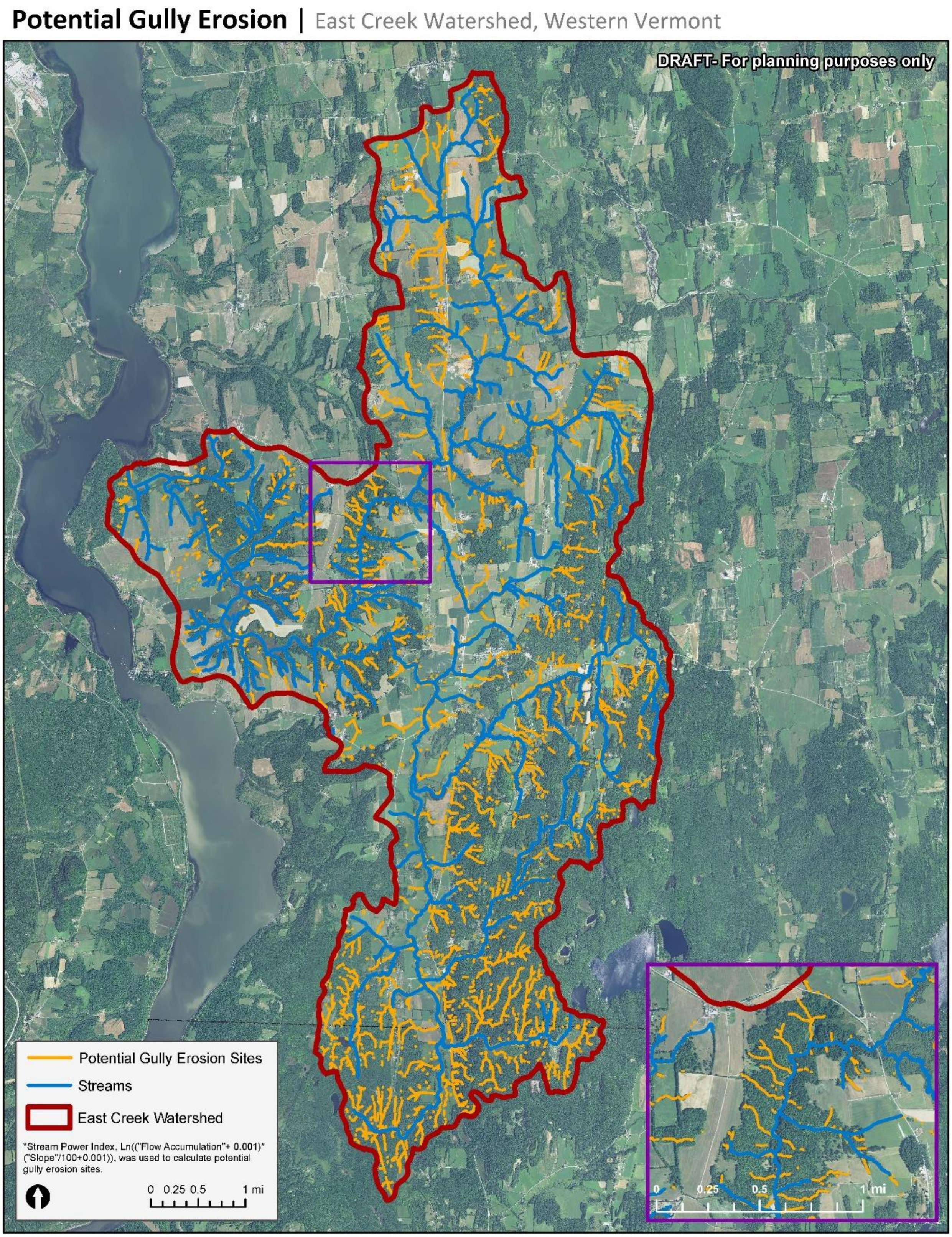

Figure 8 – Potential Gully Locations in the East Creek Watershed

Individual field scale maps, such as the one shown in Figure 9, can be developed to target in-field resource assessments. As part of the field assessment these areas should be visually checked to identify any areas with significant gully erosion.

Potential Gully Erosion |Example Farm Detail Map

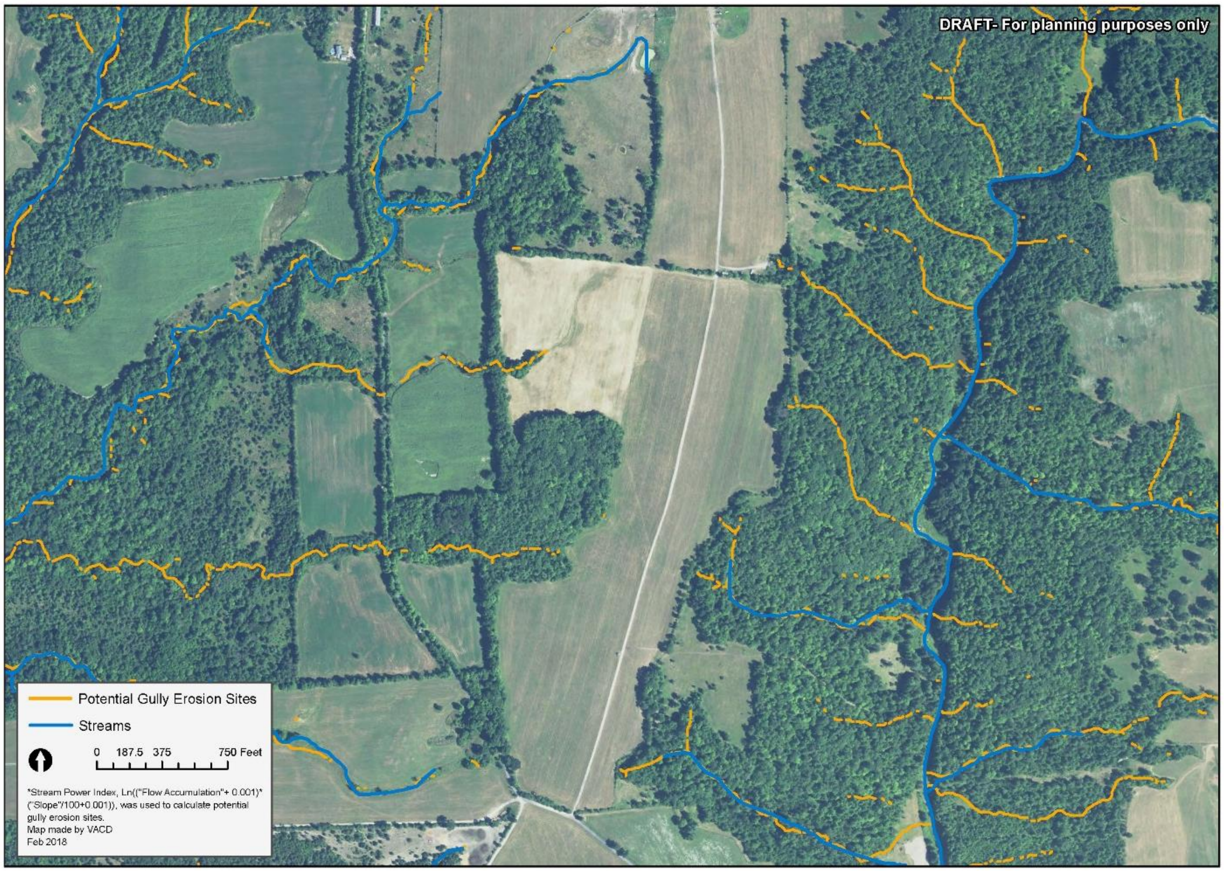

Figure 9 - Field Scale Map of Areas with Potential for Gully Erosion

E. Erosion and runoff risk potential

A GIS model was constructed to estimate the risk of erosion and runoff from farm fields based 4 factors. The factors included are the K value, hydrologic soil group, slope, and flooding potential of the soil map unit (based on Digital Elevation Model (DEM) data). The categories in the Erosion and Runoff Potential Maps are meant to represent the relative risk of sheet and rill erosion and runoff occurring from specific fields or portions of fields. As can be seen in Figure 13 a moderate portion of the fields in the East Creek Watershed have been identified having a high or very high risk for erosion and runoff. Figure 14 provides an example of the type of field level maps that can be produced from this data. It is important to note that in many situations it is only a portion of a field that is identified as having high or very high risk.

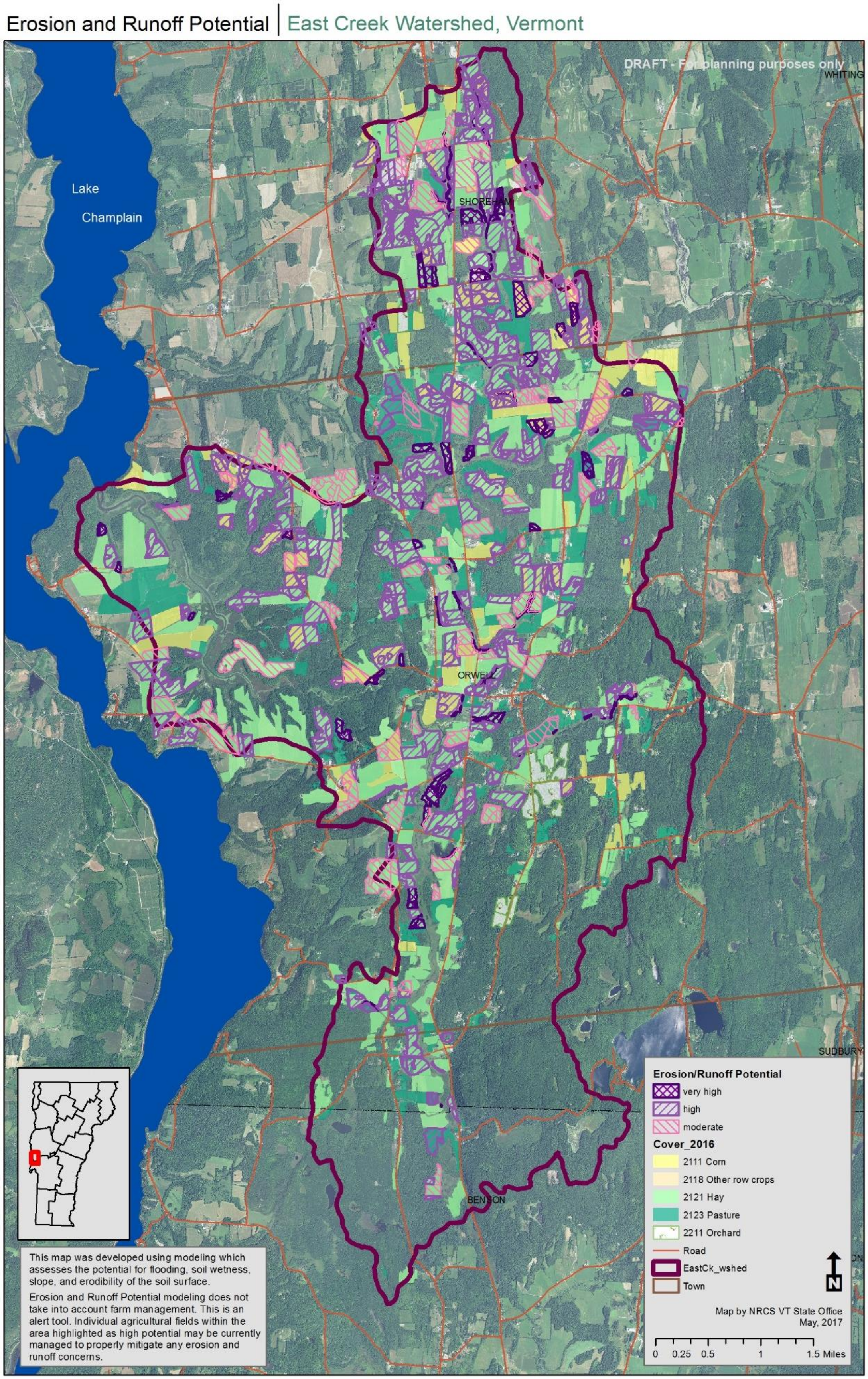

Figure 13 – Erosion and Runoff Risk Potential in the East Creek Watershed

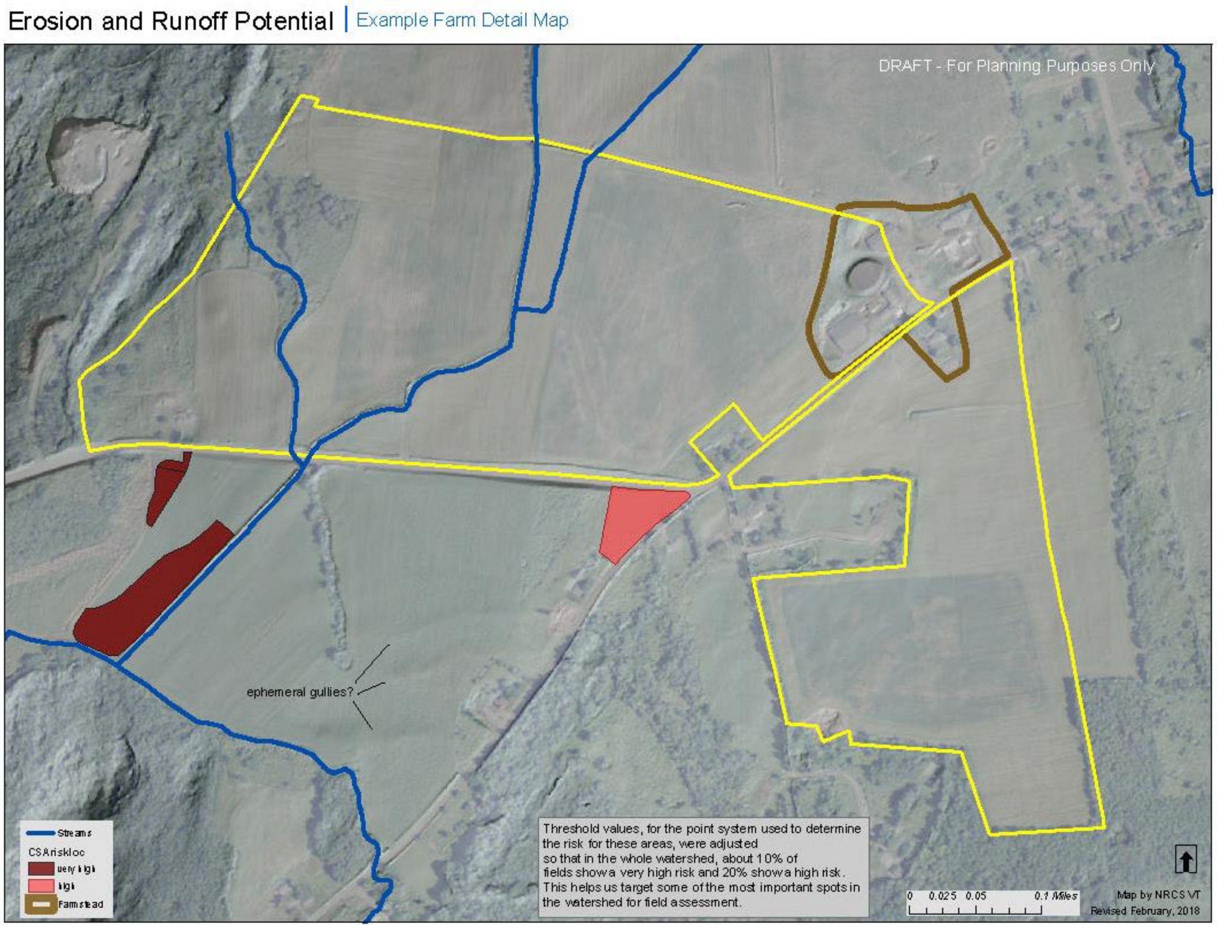

Figure 14 - Example Field Scale Erosion and Runoff Risk Potential Map

F. Farm ditch networks

Field ditches are common on agricultural land throughout the Lake Champlain Basin in Vermont. These waterways have the potential to readily transport both sediment and nutrients to streams and rivers. Under the Required Agricultural Practices recently passed by the State Legislature all ditches will be required to have a 10 ft. wide vegetated buffer adjacent to them. As such, it will become important to know the location of these ditches to ensure that the farmer has opportunities to install buffers on these ditches. Figure 15 shows the location of ditches and other drainage features in the East Creek Watershed. These drainage features were identified through visual interpretation of airphotos and LiDAR data, and as such **do not represent a completely accurate and complete depiction of drainage features in the watershed. These maps should be used for planning purposes only.** There was a total of 61 miles of field and roadside ditches identified in the East Creek Watershed. Field scale maps can also be developed as shown in Figure 16, where the ditch locations are overlain with crop field and farmstead location data. Gullies shown in Figure 15 are not modeled, they are channels picked up during visual airphoto interpretation, with LiDAR-based slope and hillshade data backdrops. While the channels certainly exist, visual interpretation methods cannot verify whether erosion is actually occurring in these areas. Thus, the mapping should be considered an alert tool, for planning purposes only.

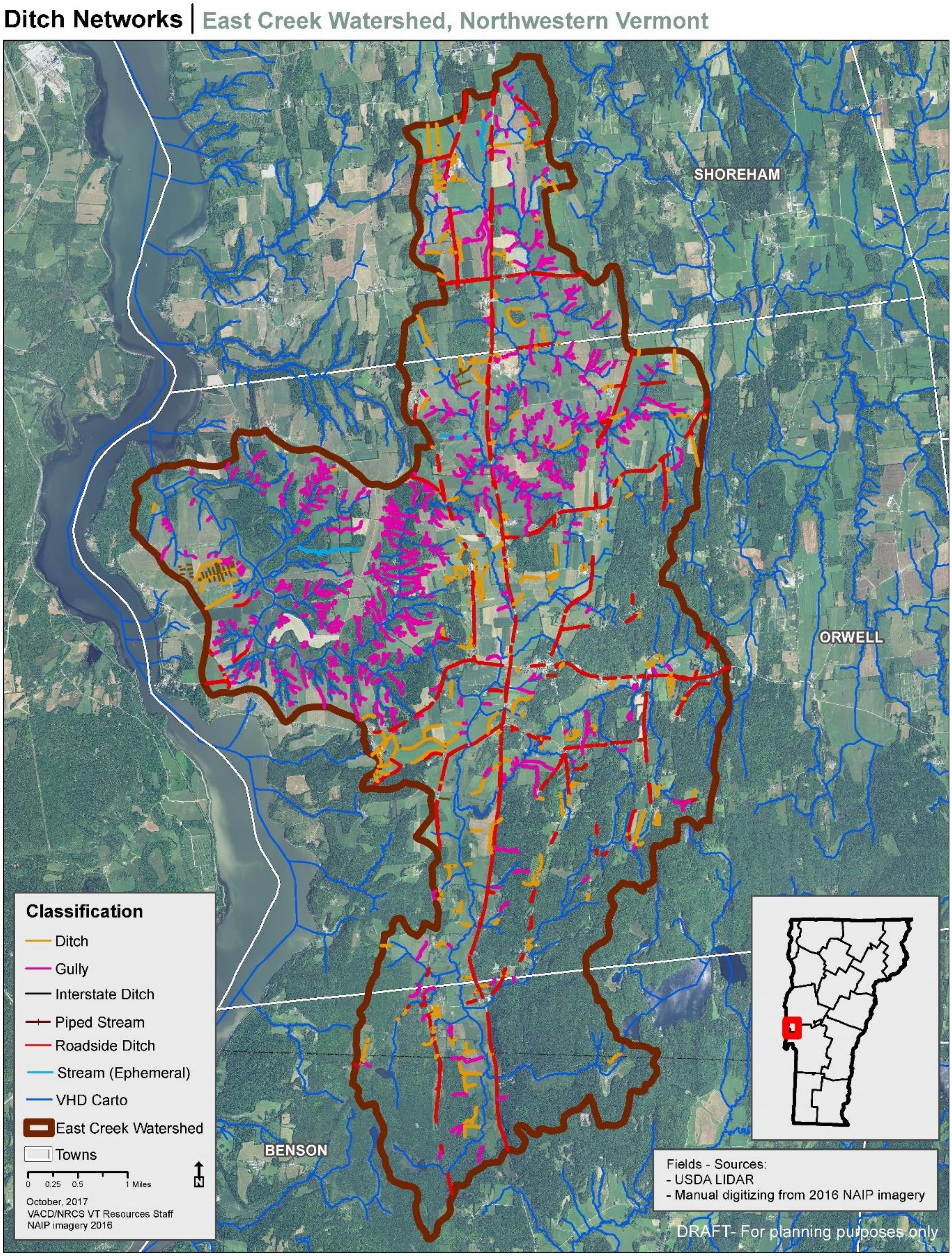

Figure 15 - Map of Field Drainage Features in the East Creek Watershed

Ditch Network | Example Farm Detail Map

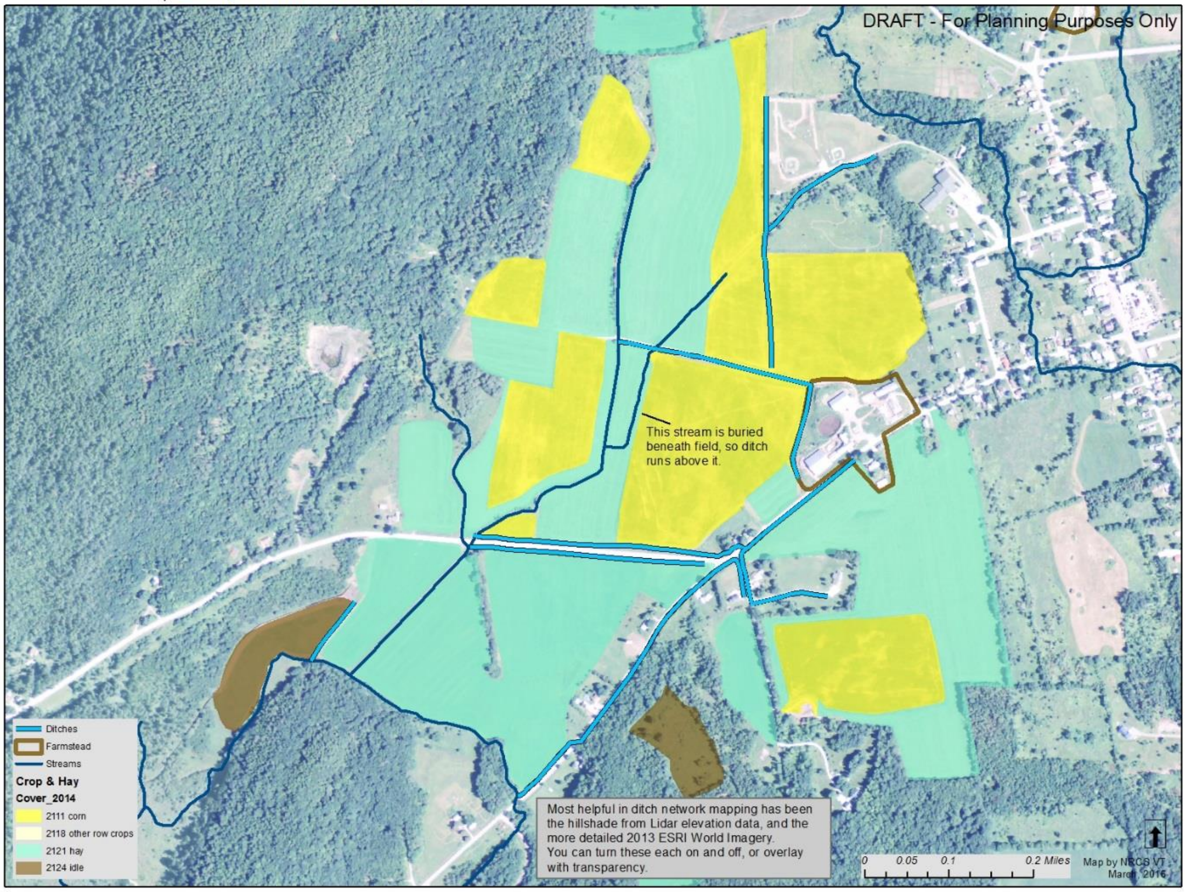

Figure 16 - Example Field Scale Map of Drainage Features

G. Riparian Buffer Gaps

Riparian corridors were evaluated in the East Creek Watershed to determine locations where adequate riparian buffers were lacking. The identification of these riparian buffer gaps was based on visual interpretation of 2016 aerial imagery and channel width information from the Vermont Department of Environmental Conservation (VTDEC) Rivers Program database (where available). Riparian zones were evaluated to determine if at least a 25-foot wide vegetated buffer was present, either herbaceous or woody. Twenty-five feet was used as the minimum requirement since the NRCS practice standard for Filter Strip requires a minimum of 25 ft and the practice standard for Riparian Forest Buffer requires a minimum of 35 ft. Where channel width data were not available, stream orders were assigned standard channel widths from which to construct the buffers.

A total of 220 miles of streambank (both sides of each stream) were evaluated. Of these, 179 miles of streambank have an adequate buffer and 51% of these support woody plant communities. However, it was estimated that 42 miles of streambank in the East Creek Watershed do not have an adequately vegetated riparian buffer. It may be useful to overlay the Riparian Buffer Map data with continuous cropland and/or erosion and runoff risk potential data. These areas may exhibit greater rates of erosion and runoff and would be a priority for well-vegetated riparian buffers.

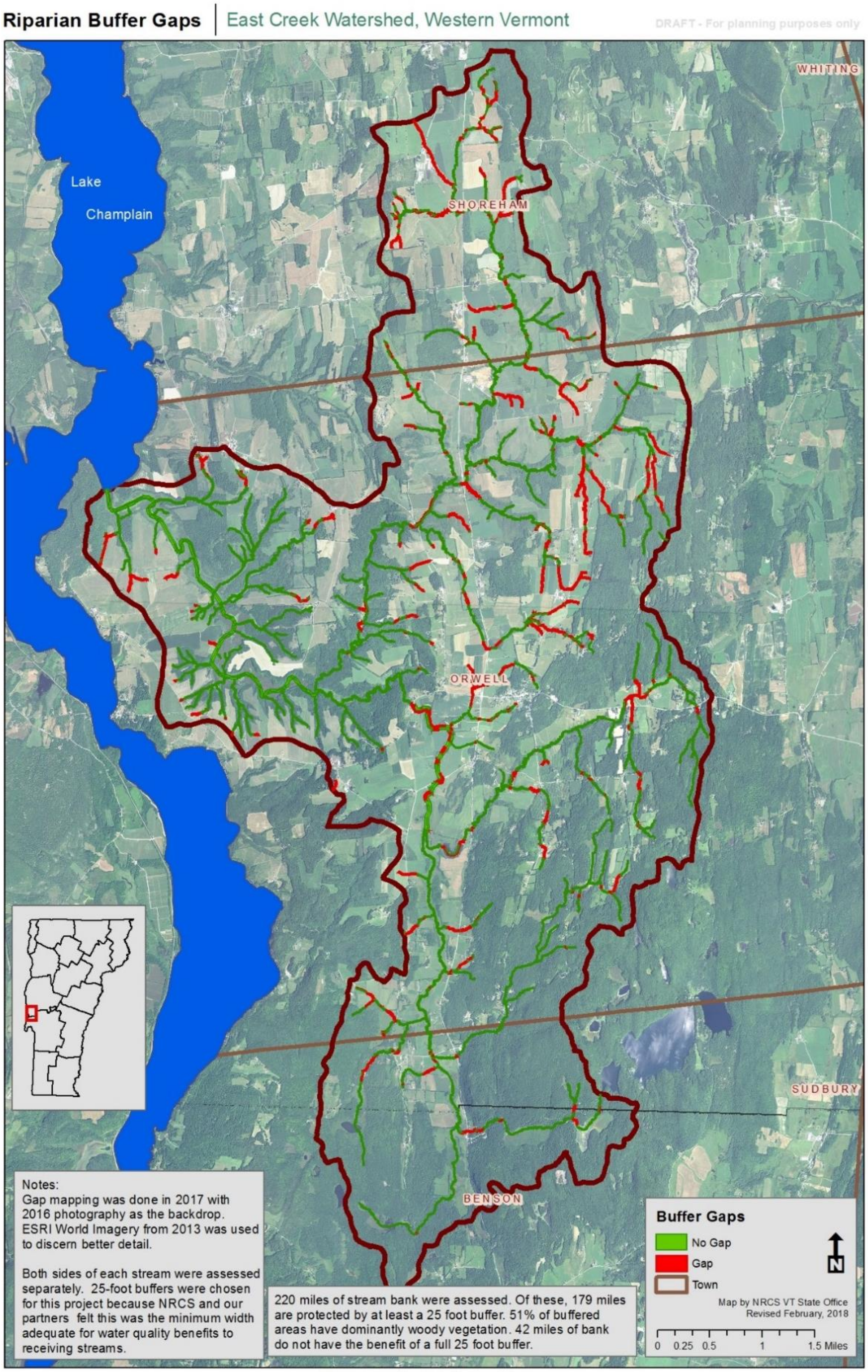

Figure 17 – Map of Riparian Buffer Gaps

H. Conserved Farmland

Recognizing that as development pressure expands outward from urban centers, the NRCS and its partners in Vermont conduct an active program to conserve farmland (prevent conversion to developed land uses) on exceptional soils. Figure 18 shows lands conserved by various agencies in and near the East Creek Watershed.

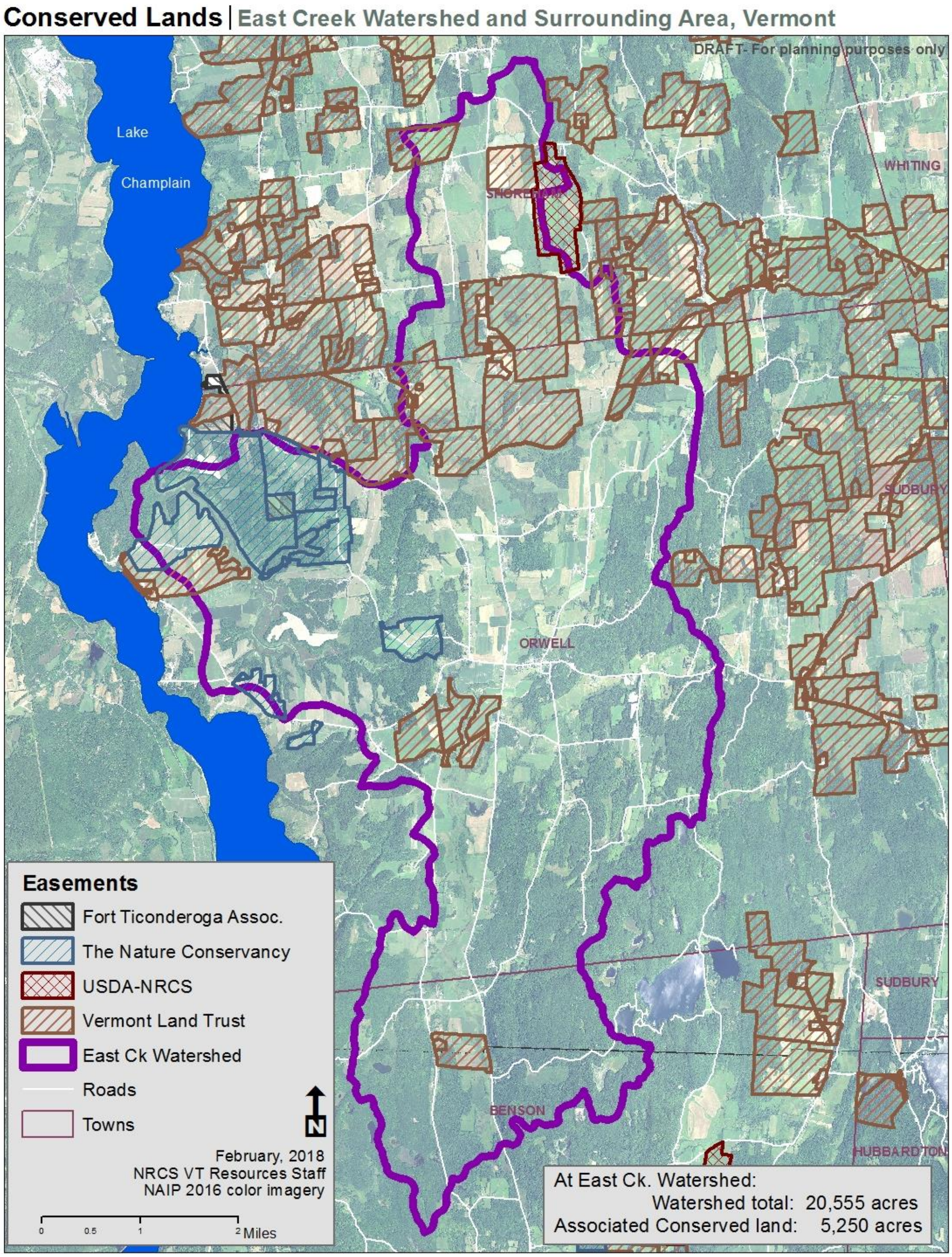

Figure 18 – Map of Conserved Lands in and near East Creek Watershed

There are 5,250 total acres of conserved easement land. Of these, 1.538 acres are natural areas near the mouth of East Creek, 3,668 acres are farmland easements, and there is a 44 acre historic site easement.

I. Pasture land

We mapped pasture lands in the watershed using 2016 aerial imagery and supporting layers, and crop/hayland information. Figure 19 shows the pasture lands; there were 313 fields covering 1,645 acres in the watershed.

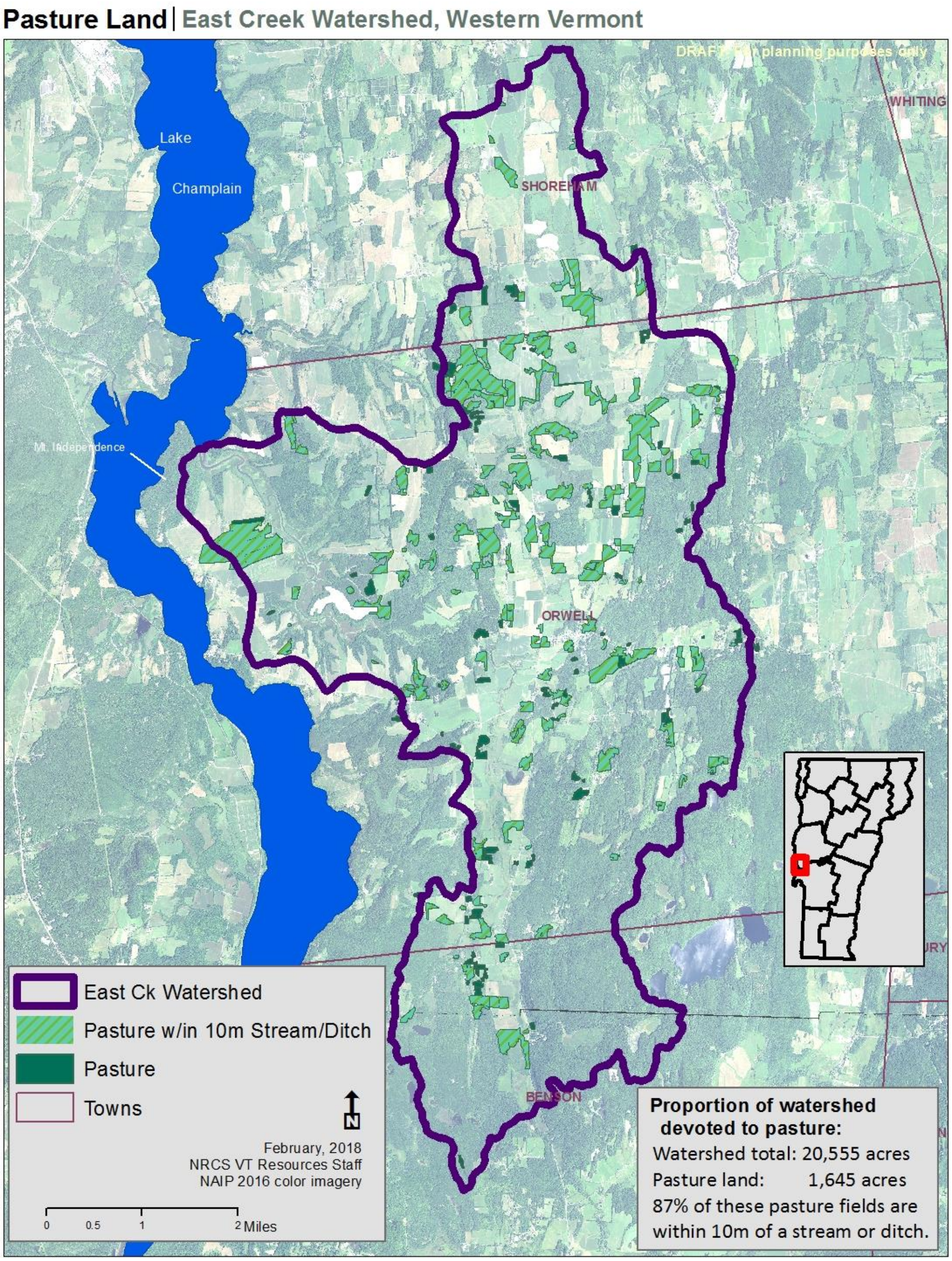

Figure 19 – Pasture fields in the East Creek Watershed

An analysis was performed to determine what proportion of the pasture fields are close to ditches or streams. In fact, 87 percent of the pastures are in close proximity to these water features. On some, the stream runs directly through the pasture. Figure 20 is a farm-level detail map showing the pastures, both near and far from streams.

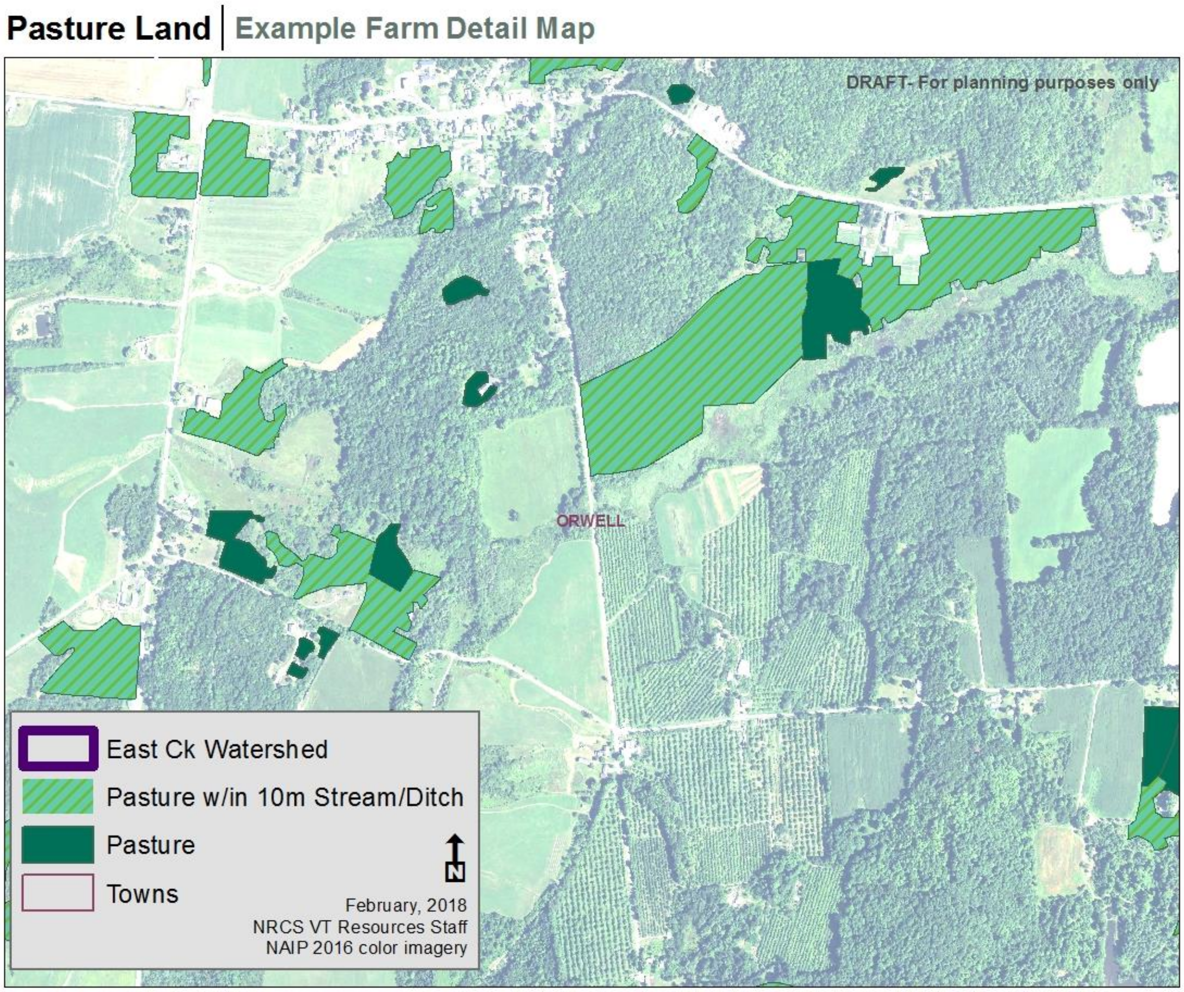

Figure 20 – Farm-level map of pastures, some in close proximity to either streams or ditches.

J. Wetland restoration potential

The Restorable Wetland data layer was developed by a variety of government agencies and private consultants in 2007. The main data input layers were: hydric soils, land-use / land-cover data from 2002 showing open land, percent slope (slopes under 5%), and National Wetland Inventory data showing disturbed wetlands. Once appropriate restoration sites had been delineated using GIS analysis, these areas were then run through a prioritization model that ranked the sites based their potential to retain phosphorus. Four prioritization categories for restoration were chosen: highest, high, moderate, and low. For further details on how the data layer was developed refer to the "Lake Champlain Wetland Restoration Plan" report.

Since this data is now 9 years old, land use changes have occurred over this time period. The data was edited to remove sites that contained house sites. The e911 "esites" data for 2017 was used to remove those areas that now show homes within the restorable wetlands. Additionally, State lands were also excluded from the data layer, since they are not eligible for NRCS wetland restoration programs. The extent and location of potentially restorable wetland areas is shown in Figure 21. These areas are located on private land and may have historic drainage and other modifications. These areas would only be available for restoration under a voluntary restoration program such as the Agriculture Conservation Easement Program for wetlands. Using field scale maps such as in Figure 22, it will be necessary for an on-site investigation to ensure that they are eligible and capable of being restored to natural wetland conditions.

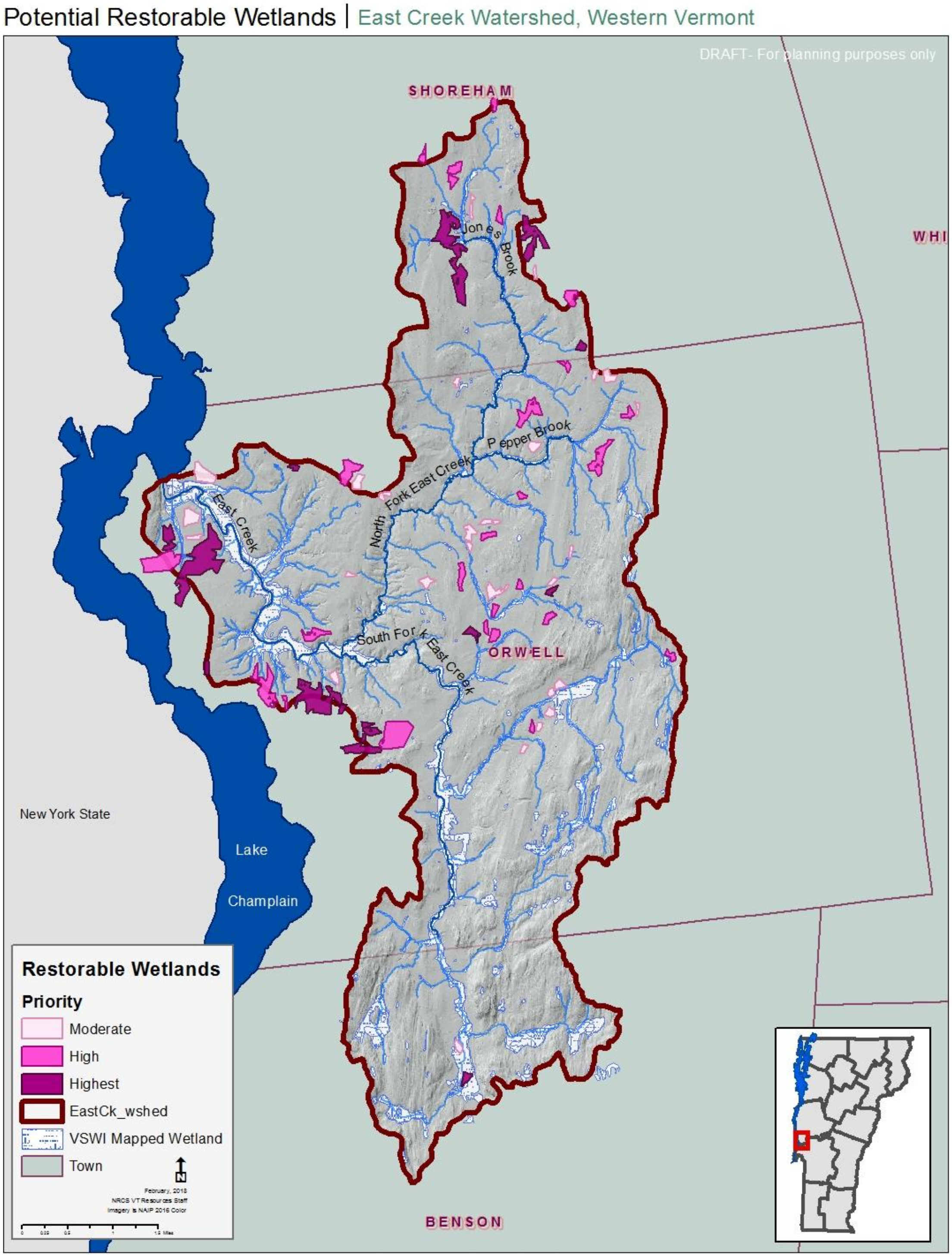

Figure 21 - Watershed Scale Map of Potentially Restorable Wetlands

The map in Figure 21 identifies over 871 aces of potentially restorable wetland in the East Creek Watershed. Of the potential acres, 22 sites of 432 acres are considered of highest priority to restore. Priority assignment reflects the potential for a restoration project and subsequent function of the wetland to sequester and retain phosphorus.

Potential Restorable Wetlands | Example Farm Detail Map

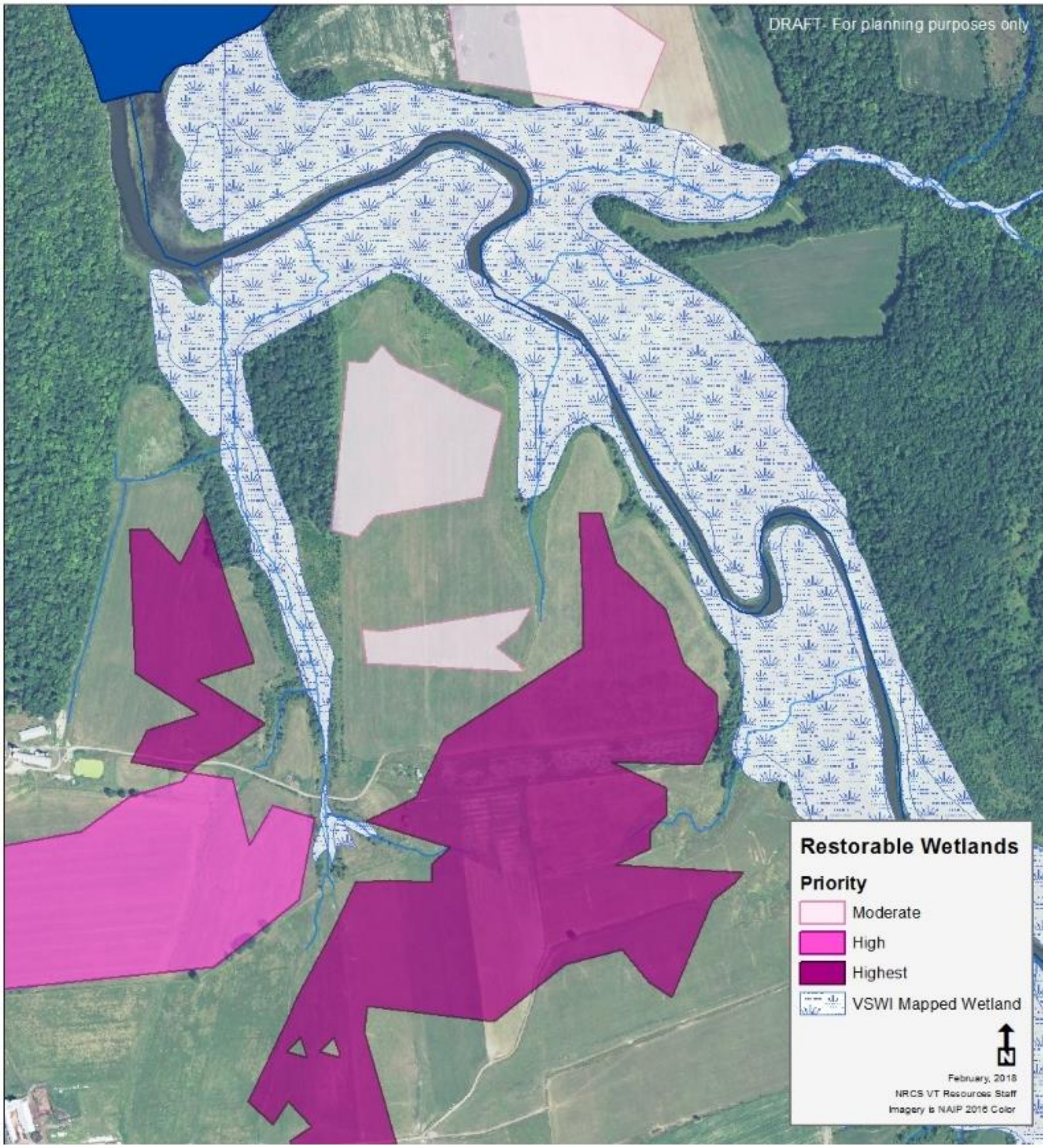

Figure 22 - Example Field Scale map of Potentially Restorable Wetlands

IV. Watershed Phosphorus Reduction and Practice Implementation Goals and Projected Costs

Under the 2016 phosphorus TMDL for Lake Champlain EPA has identified new phosphorus reduction goals for lake segments in Vermont. The new phosphorus reduction goal for the South Lake A segment is 55% for all land uses. The phosphorus reduction goal for agriculture in this lake segment is 63%.

NRCS has attempted to use the TMDL goals and EPA developed tools to estimate phosphorus loads and reductions to the extent possible for the East Creek Watershed. This includes use of the EPA HUC-12 Tool and the EPA Scenario Tool. All costs are based on NRCS payment schedules, except for a couple of situations where estimated practice costs were developed (ex. average farmstead wide practice costs). This process of estimating phosphorus reductions and projected costs is meant to be used for planning purposes only, it should not be used as a detailed accounting system for phosphorus reductions.

A. Watershed phosphorus reduction goals for agriculture

Watershed phosphorus reduction goals for agriculture were estimated using the EPA HUC-12 Tool. This tool provides an estimate of phosphorus loading for each land cover type at the HUC-12 level. Phosphorus loading from continuous corn, crop/hay rotation, continuous hay, pasture and farmland were totaled from the HUC-12 Tool to determine the total estimated phosphorus loading from agriculture. The needed amount of phosphorus reduction in lbs/yr was then estimated by multiplying the total agricultural load by the percentage reduction determined by EPA to be necessary for the larger HUC-8 watershed. Table 1 provides the necessary load reductions for the six targeted watersheds. For the East Creek Watershed, the total agricultural loading was estimated to be 14,429 lbs/yr, the reduction goal set by EPA is 63%, and **the resulting agricultural phosphorus reduction goal for the East Creek was estimated to be 9,090 lbs/yr.**

Table 1 – Agricultural Phosphorus Reduction Goals for the Six Targeted Watersheds

2016-17 Priority Watershed Estimated Ag Phosphorus Loadings and Targeted Reductions August, 2015				
Watershed Name	**Watershed Area (acres)**	**Total Estimated Ag P Loading (lbs/yr)**	**TMDL Reduction Goal**	**Ag P Reduction Goal (lbs/yr)**
Rock River	22,743	19,248	83%**	15,976
Pike River	25,088	9,599	83%**	7,967

St. Albans Bay	33,515	23,047	35%	8,066
McKenzie Brook	21,222	43,276*	60%	29,966
Hungerford Brook	12,535	4,906	85%**	4,072
East Creek	20,555	14,429	63%	9,090

*Total loading reduced 25% to remove loading from East Creek (included in the BMP Scenario Tool)
**East Creek phosphorus loading was assumed to be 25% of South Lake A loading.

B. Individual practice and practice system efficiencies

The EPA Scenario Tool is a spreadsheet tool based on SWAT modelling of watersheds in the Lake Champlain Basin. It was developed by a private consulting firm under contract by EPA Region I. Early on in the model development EPA convened a workgroup of local experts to help develop reduction efficiencies for conservation practices that are included in the SWAT model. These efficiencies and ones produced by the model were then incorporated into the EPA Scenario Tool. As such the EPA Scenario Tool is subject to the same limitations as the SWAT model. Certain agricultural practices cannot be easily included in the SWAT model, including many farmstead related practices. In the EPA Scenario Tool efficiencies for a conservation practice vary based on factors such as cropping system, soil hydrologic group and slope.

Table 2 lists the agricultural conservation practices and systems of practices that are included in the EPA Scenario Tool and provides example efficiencies for each practice. It is important to consider when multiple practices are applied to the same field as a system since the individual efficiency of each practice will decrease as additional practices are added to the same field. The efficiencies used in the model will be adjusted as better information becomes available, such as information from the Vermont Edge of Field Monitoring Projects.

Table 2 - List of Available Ag Practice and Practice Systems in the EPA Scenario Tool
and Example Practice Efficiencies*

1. Change in crop rotation 25%
2. Change in crop rotation and conservation tillage 63%
3. Change in crop rotation, grassed waterway, ditch buffer and riparian buffer** 84%
4. Change in crop rotation, grassed waterway riparian buffer 67%
5. Change in crop rotation and riparian buffer 56%
6. Conservation tillage 50%
7. Cover crop 28%
8. Cover crop, conservation tillage, grassed waterway, ditch buffer and riparian buffer 92%
9. Cover crop, conservation tillage and manure injection 64%

10. Cover crop and manure injection 28%
11. Annual crop to permanent hay 23%
12. Ditch buffer 51%
13. Grassed waterway 25%
14. Grassed waterway and riparian buffer 56%
15. Manure injection and reduced manure P applied 5%
16. Reduced manure P applied 5%
17. Reduced manure P applied and grassed waterway 29%
18. Annual cropland to permanent grass 92%
19. Riparian buffer 41%
20. Livestock exclusion/fencing/grazing system 73%
21. Farmstead practices 80%

*BMP efficiencies vary with cropping system, soil type and slope

**Riparian forest buffers and grassed filter strips are both considered as riparian buffers

Note: These practice efficiencies should only be used for planning purposes, and will change as better practice efficiency data is developed.

C. Existing and planned practice implementation and loading reduction estimates

NRCS has been working with farmers in The East Creek Watershed for an extended period of time. During this period, farmers have signed contracts with NRCS to implement a variety of different conservation practices. Over time many of the early contracts have expired and some of the practices are either discontinued or not maintained. Table 3 provides the number of several different practices that were installed in the East Creek Watershed with NRCS support over the period from 2010 – 2017. During this period, practices were tracked to determine which specific years during that time period they were implemented. At this time, it cannot be determined which practices were continued after the contracted period.

The agronomic practices that were implemented to the greatest extent included cover crops (1,198.6 ac.), waste recycling (875 ac), and nutrient management (846 ac.). Of the grazing system practices, 12,965.3 ft of fence was installed along with 3,023 ft of livestock pipeline, 1,615ft of trails and walkways, and 601.5 ac of prescribed grazing.

Table 3 also shows estimated phosphorus reductions as a result of the implementation of these practices. The largest phosphorus reductions resulted from prescribed grazing (2,978.3 lbs/yr), cover crops (697.5 lbs/yr), conservation crop rotation (233.5 lbs/yr), and residue and tillage management (reduced till) (200.1). The total annual average reduction in phosphorus reduction resulting from the implementation of these practices was 4,254.9 lb/yr. It is important to note that this is 53% of the total reduction (9,090 lb/yr) that will be required under the new TMDL. However, we are unsure how many of these practices have been continued to date.

Table 3 – NRCS Practices Implemented in the East Creek Watershed, 2010- 2017

NRCS Practices Implemented in the East Creek Watershed, 2010-2017								
Practice Group	Practice Code	Practice Name	Units	Sum of Applied Amt	Count of Practices Applied	Total P Load by Land Use: lb/yr	Average Annual P Reduction, treated acres: lb/yr	Cumulative P Reduced Over 7 yr Baseline: lb
Farmstead	313	Waste Storage Facility	no	1.0	1.0	3.1	2.5	17.4
	367	Roof and Covers	no	1.0	1.0	0	0	0
	521A	Pond Sealing or Lining, Flexible Membrane	no	1.0	1.0	0	0	0
	560	Access Road	ft	1113.0	3.0	0	0	0
	561	Heavy Use Area Protection	ac	0.4	4.0	0	0	0
	606	Subsurface Drain	ft	558.0	2.0	0	0	0
	620	Underground Outlet	ft	250.0	1.0	0	0	0
	634	Waste Transfer	no	2.0	2.0	0	0	0
Grazing (Pasture)	382	Fence	ft	12956.3	16.0	0	0	0
	528	Perscribed Grazing	ac	601.5	30.0	5415.1	421.6	2951.2
	575	Trails and Walkways	ft	1615.0	2.0	0	0	0
	528	Stream Crossing	ac	2.0	2.0	0	0	0
	516	Livestock Pipeline	ft	3023.0	6.0	0	0	0
	614	Watering Facilities	no	3.0	4.0	0	0	0
Agronomic (Crop & Hay Fields)	104	Nutrient Management Plan	N/A	4.0	4.0	0	0	0
	328	Conservation Crop Rotation	ac	481.9	32.0	915.6	233.5	1634.4
	329	Residue and Tillage management, No-Till	ac	179.8	19.0	0	0	0
	340	Cover Crop	ac	1198.6	114.0	2325.1	697.5	4882.8
	345	Residue and Tillage management, Reduced Till	ac	158.7	17.0	307.9	200.1	1400.8
	412	Grassed Waterway	ac	0.5	2.0	0.8	0.2	1.6
	557	Row Arrangement	ac	274.1	22.0	0	0	0
	633	Waste Recycling	ac	875.0	53.0	0	0	0
	512	Forage and Biomass Planting	ac	82.8	4.0	160.6	81.9	573.4
	362	Diversion	ft	890.0	3.0	0	0	0
	410	Grade Stabilization Structure	no	2.0	2.0	0	0	0
	590	Nutrient Management	ac	846.0	73.0	805.3	40.3	281.9
	391	Riparian Forest Buffer	ac	25.8	3.0	50.0	20.5	143.6
	657	Wetland Restoration	ac	25.1	2.0	0	0	0
Totals:					**425**	**9983.6**	**1698.2**	**11887.1**

Contracts with farmers written during this period also include practices that are still planned for implementation. These planned practices are summarized in Table 4. It includes a significant amount of nutrient management (693.7 ac.), cover crop (666.5 ac), and prescribed grazing (609 ac.). These recently implemented and planned practices should be considered when establishing practice implementation goals for the watershed.

Table 4 also summarizes the expected phosphorus reductions associated with the implementation of these practices over the lifespan of the practices. If implemented, forage and biomass planting (1.0 lb/ac/yr) would provide the greatest reduction, followed by riparian forest buffer (0.8 lbs/ac/yr), and prescribed grazing (0.7 lbs/ac/yr). The total expected phosphorus reduction of all planned and implemented practices is 1,698.2 lbs/yr, which is 31.4% of the EPA target for agriculture in the watershed.

Table 4 – Practices Planned for Implementation in the East Creek Watershed as of February 2018

Practices Planned for Implementation in the East Creek as of February 2018									
Practice Group	Practice Code	Practice Name	Units	Sum of Applied Amt	Count of Practices Applied	Total P Load by Land Use: lb/yr	Average Annual P Reduction, treated acres: lb/yr	Cumulative P Reduced Over 7 yr Baseline: lb	Expected P Reductions lbs/ac/yr
Farmstead	606	Subsurface Drain	ft	200	1	0	0	0	0
	620	Underground Outlet	ft	660	1	0	0	0	0
Grazing (Pasture)	382	Fence	ft	431	1	0	0	0	0
	528	Perscribed Grazing	ac	609	34	5482.7	438.4	3069.1	0.7
	575	Trails and Walkways	ft	500	1	0	0	0	0
	516	Livestock Pipeline	ft	22,161	11	0	0	0	0
	614	Watering Facilities	no	13	13	0	0	0	0
	533	Pumping Plant	no	1	1				
Agronomic (Crop & Hay Fields)	104	Nutrient Management Plan	N/A	2	2	0	0	0	0
	328	Conservation Crop Rotation	ac	374.5	36	711.6	181.4	1270.1	0.5
	329	Residue and Tillage management, No-Till	ac	353.2	37	0	0	0	0
	340	Cover Crop	ac	666.5	53	1292.9	387.9	2715.1	0.6
	512	Forage and Biomass Planting	ac	43.8	4	85.0	43.3	303.3	1.0
	590	Nutrient Management	ac	693.7	72	660.3	33.0	231.1	0
	391	Riparian Forest Buffer	ac	86.1	28	167.0	68.5	479.4	0.8
Totals:					**295**	**8399.5**	**1152.6**	**8068.1**	

D. Potential phosphorus load reductions associated with one practice scenario

A suite of individual practices and practice systems was developed as an example scenario to try and meet the required phosphorus reduction for agriculture in the East Creek Watershed. This example practice scenario was developed to provide additional guidance to the Local Watershed Team and is intended as an example for planning purposes only. The actual amount and the suite of practices identified and implemented by the Local Watershed Team will be different than the example provided here. Using this suite of practices, at the level specified, falls short of meeting the reduction goal by approximately half. The example does provide several pieces of useful information, it indicates the magnitude of the work that needs to be accomplished in order to meet the reduction goal, it provides a comparison of the effectiveness of different practices or practice systems, it provides information on the extent of available land area for different practices or practice systems and it provides one cost estimate of the necessary practices.

Table 5 provides summary information on land use in the East Creek Watershed, an example conservation practice scenario list, estimated extent of practice application, estimated phosphorus reductions by conservation practice and estimated costs. Some of the underlying assumptions built into this scenario include:

- that approximately 20% of the land in corn in 2016 was continuous corn
- this scenario represents a high implementation rate of these conservation practices
- that 94% of off annually tilled cropland will be planted to cover crops
- overall, 74% of the land in corn would use a conservation tillage-manure injection-cover crop system
- that the average cost of a grazing system that includes livestock exclusion is $50,000
- That the average cost of improvements necessary on a farmstead is $200,000

From Table 5 you can see that the greatest reductions in phosphorus loading is achieved with livestock exclusion and riparian buffer (CREP) (349 lbs/yr), cover crop-conservation tillage-manure injection on corn and hay rotation (280 lbs/yr), and cover crop corn and hay rotation (264 lbs/yr), livestock exclusion (261 lbs/yr), and cover crop-conservation tillage-manure injection (260 lbs/yr

Table 5 – Example Practice Scenario with Phosphorus Reduction | February 2018

East Creek Example Practice Scenario with Phosphorus Reductions and Costs | February 2018

Based on a Reduction Goal of 63%

Cropping System	No. of Acres	Notes
Corn in 2016	1,153	
Hay in 2016	6,334	
Pasture in 2016	1,582	
Farmstead in 2016	280	61 headquarters. 57 SFO, 6 MFO.
Cont. Corn	229	1117.1 ft of ditch (6 ditches)
Cont. Hay	6,316	
Corn-Hay Rotation	942	2707.46 ft of ditch (14 ditches)

Scenario Components	Selected BMP	No. of Acres Applied	% of Total Acres	TP Load Reduction (lbs/yr)	Practice Cost	Cost (Maximum Payment Period)	Assumptions
Cont. Corn	Cover Crop-Conservation Tillage-Manure Injection	100	44%	260	$80	$24,009	Assumed 44% of fields were suitable for reduced tillage.
Corn/Hay	Cover Crop-Conservation Tillage-Manure Injection	280	30%	280	$80	$67,225	Assumed 30% of fields were suitable for reduced tillage.
Cont. corn	Cover Crop	114	50%	136	$64	$21,772	Totals to 50% of cont. corn in cover crops. Three years in cover crops.
Corn/Hay	Cover Crop	565	60%	264	$64	$107,942	Totals to 60% of corn/hay rotation in cover crops. Assumed three years in corn with cover crops.
Cont. Corn	Crop Rotation	114	50%	114	$9	$2,962	Assumed 50% of fields would go into rotations. Assumed three years in corn with cover crops.
Corn/Hay	Crop Rotation	471	50%	191	$9	$12,237	Assumed 50% of fields need longer rotations.
Cont. Corn	Crop to hay	11	5%	31	$310	$3,550	Assumed 5% of continuous corn fields will be converted from crop to hay.
Cont. Corn	Riparian Buffer	2	1%	17	$1,334	$2,668	From the watershed analysis it was estimated that 175 ac of riparian gap exist based on a 25ft buffer width. Analysis indicated minimal gap on continuous corn (assumed 1%).
Corn/Hay	Riparian Buffer	10	6%	32	$1,334	$13,339	From the watershed analysis it was estimated that 175 ac of riparian gap exist based on a 25ft buffer width. Analysis indicated 7.25 acres of riparian gap overlap with corn in rotation (assumed 6%).
Corn/Hay	Grassed Waterways	54	25%	60	$9,583	$517,493	Assumed average field size of 10 ac. and one 50 ft. wide and 200 ft long (0.23 acres) grassed waterway per field. Also assumed 25% of fields need a grassed waterway. Every acre of grassed water way treats 5 acres of corn.
Cont. Corn	Grassed Waterways	13	25%	166	$9,583	$124,582	Assumed average field size of 10 ac. and one 50 ft. wide and 200 ft. long (0.23 acres) grassed waterway per field. Also assumed 25% of fields need a grassed waterway. Every acre of grassed water way treats 5 acres of corn.
Cont. Corn	Reduced Manure P (Nutrient Management and CAP)	23	10%	5	$26	$3,994	Assumed 10% of fields need reduced P rates.
Corn/Hay	Reduced Manure P (Nutrient Management and CAP)	94	10%	5	$26	$11,732	Assumed 10% of fields need reduced P rates.
Cont. Corn	Ditch Buffer	9	40%	89	$628	$5,506	Total ditch length is 127665 ft. We assume that half of the ditches will need 10ft buffers on one side and and half will need buffers on both sides (x1.5). 60% of ditches need buffers. We will apply buffers to 50% of ditches. Assume 1 acre of ditch buffer treats 5 acres of field runoff.
Corn/Hay	Ditch Buffer	13	60%	54	$628	$8,260	Total ditch length is 127665 ft. We assume that half of the ditches will need 10ft buffers on one side and and half will need buffers on both sides (x1.5). 60% of ditches need buffers. We will apply buffers to 50% of ditches. Assume 1 acre of ditch buffer treats 5 acres of field runoff.
Hay	Reduced Manure P and Injection	633	10%	8	$26	$62,764	6334 acres of hay. Assume 10% will be injected in the next 3 years.
Pasture	Livestock Exclusion	450	30%	261	$50,000 ea.	$150,000	Assumed 3 tracts at $50,000 ea. for a complete grazing plan and system.
Pasture	Livestock Exclusion and Riparian Buffer (CREP)	450	30%	349	N/A	$0	Assumed these projects would go into CREP.
Farmstead (SFO)	Waste Management Improvements	98	50%	251	$200,000	$7,000,000	Assumed 50% of HQ's need significant improvements and assumed average cost of $200,000 per farmstead. Includes CAP.
Farmstead (MFO)	Waste Management Improvements	20	25%	32	$200,000	$7,000,000	Assumed 25% of HQ's need significant improvements and assumed average cost of $200,000 per farmstead. Includes CAP.

Total Estimated Reduction	2,607
Watershed Reduction Target	9,090
Percentage of Goal Reached	29%
Total Cost	$15,140,033

E. **Estimated costs of P reduction by practice and system, total for scenario and costs per lb of phosphorus**

Important information for the Local Watershed Team will be the cost of practice implementation. This information will be important for the Local Watershed Team to establish reasonable reduction goals for their local project and the timeline necessary to implement the project. The costs presented in Table 5 are the NRCS costs (based on 2017 payment schedules) provided payments to farmers to implement these practices and as such represent an average of 75% of the total cost. The greatest costs are for implementing waste management improvement ($7,000,000), grassed waterways on corn and hay rotation ($517,493), grassed waterways on continuous corn ($124,582), and cover crop ($107,942). The high cost for the conservation tillage system and for crop rotations is because of the large acreage available for implementation. Farmstead costs are high because of the high cost of structural practices.

The total cost of using the practices in this scenario to meet the phosphorus reduction goals for agriculture is $15,140,033. This does not include any cost inflation factor if the implementation of practices is extended over a long time period. Another concern not addressed in this scenario is the relatively short time period for which NRCS can financially support annual practices such as cover crops. This scenario assumes only 3 years of financial support for cover crops and 3 years for other annual practices. It is unclear who will support the farmers to continue these annual practices after their NRCS contract expires or if farmers will continue these practices without financial support.

One way to reduce the total cost of a project such as this one in the East Creek Watershed is to focus on implementing those practices where you get the greatest reduction of phosphorus per dollar. Table 6 shows the phosphorus reduction efficiency of the different practices based on cost per pound of phosphorus. According to these calculations change in crop rotation on continuous corn and corn/hay rotation ($8.70/lb of P and $21.43/lb of P respectively) and cover crop – conservation tillage – manure injection on continuous corn ($30.79/lb of P), are the most cost-effective practices in reducing phosphorus losses. The farmstead practices are the least cost effective at over $78,021.86 per lb of P for SFOs and $126,278.21 per lb of P for MFOs.

However, there may not be much flexibility in the East Creek Watershed to maximize phosphorus reduction based on cost because the underlying assumption with this scenario was that it represented all reasonable practices that could be implemented by farmers.

Practice cost efficiency was calculated for the practices and practice systems included in the East Creek scenario example. These costs are based on the total cost of implementing the practice. In general, for the field-based practices, it costs between $8.70 and $9,570.90 to reduce one pound of phosphorus per year. Farmstead practices cost much more ($78,021.86 - $126,278.21) to get a pound of phosphorus reduction. This is partially due to the high cost of structural practices, the low loading rate currently in the model for farmsteads and using 5 years to average the costs over. Many structural practices have an expected lifespan longer than 5 years.

Table 6 – Cost Efficiency of Available Conservation Practices

Agricultural Conservation Practice Efficiency in Cost Per Pound of Phosphorus Reduced per year Averaged Over a Five Year Period			
Conservation Practice	NRCS Payment	Total Practice Cost	Practice Cost Efficiency ($/lb P reduction)*
1. Cover Crop - Conservation Tillage - Manure Injection – Continuous Corn	$80.03	$43.75	$30.79
1a. Cover Crop - Conservation Tillage - Manure Injection – Corn/hay rotation	$80.03	$43.75	$30.79
2. Cover Crop – Continuous Corn	$63.66	$112.00	$53.29
2a. Cover Crop – Corn/hay rotation	$63.66	$112.00	$136.68
3. Change in Crop Rotation – Continuous Corn	$8.66	$15.75	$8.70
3a. Change in Crop Rotation – Corn/hay rotation	$8.66	$15.75	$21.43
4. Crop to hay – Continuous Corn	$310.00	$542.50	$112.98
5. Riparian Buffer – Continuous Corn	$1,334.00	$2,334.50	$161.04
5a. Riparian Buffer – Corn/hay rotation	$1,334.00	$2,334.50	$411.90
6. Grassed Waterways – Continuous Corn	$9,583.20	$16,770.25	$8,628.91
6a. Grassed Waterways – Corn/hay rotation	$9,583.20	$16,770.25	$751.13
7. Reduced Manure P (Nutrient Management and CAP) – Continuous Corn	$26.00	$45.50	$114.21
7a. Reduced Manure P (Nutrient Management and CAP) – Corn/hay rotation	$26.00	$45.50	$453.43
8. Ditch Buffer – Continuous Corn	$628.02	$1,099.00	$61.72
8a. Ditch Buffer – Corn/hay rotation	$628.02	$1,099.00	$153.81
9. Reduced Manure P and Injection - Hay	$52.00	$91.00	***
10. Live Stock Exclusion/Grazing system - Pasture	$50,000	$150,000.00	$86,206.90
10a. Livestock Exclusion /Grazing system CREP (estimated average) - Pasture	N/A	N/A	N/A
11. Waste Management Improvements (estimated average) - SFO	$200,000	$350,000.00	$78,021.86
11a. Waste Management Improvements (estimated average) - MFO	$200,000	$350,000.00	$126,278.21

NA- practice was not included in example scenario		75% of practice cost	
*Based on the total NRCS cost			
**Assumes NRCS payment of $550/ac			
***Error in Model			

IV. NEPA concerns and compliance

The National Environmental Policy Act of 1964 requires all federal agencies to conduct an environmental review of all federal actions. This requirement also applies to area wide or watershed planning activities. As part of these plans the responsible federal agency is required to evaluate the individual and cumulative effects of the actions being proposed. Any project that has significant environmental impacts must be evaluated with an Environmental Assessment (EA) or Environmental Impact Statement (EIS) unless the activities are already covered under a categorical exclusion or by an existing EA or EIS.

NRCS utilizes a planning process that incorporates an evaluation of potential environmental impacts using an Environmental Evaluation checklist. NRCS also has categorical exemptions for a number of different activities that include many of our conservation practices. These categorical exemptions include conservation practices that reduce soil erosion, involve the planting of vegetation and/or restore areas to natural ecological systems.

The watershed plan for the East Creek Watershed calls the accelerated implementation of conservation practices that have been used in the region for a number of years. These practices include a number of erosion control, field-based practices that are covered by categorical exclusions and a range of structural practices that are used to address waste management issues on the farmstead. A list of practices that are likely to be used to implement the plan are included in Table 7.

Table 7 - List of Practices and Practice Systems Likely to be Used to Implement the East Creek Watershed Plan
(CE = categorically excluded, EA = included in existing environmental assessment)

1) Change in crop rotation	CE
2) Change in crop rotation and conservation tillage	CE
3) Change in crop rotation, grassed waterway, ditch buffer and riparian buffer**	CE
4) Change in crop rotation, grassed waterway riparian buffer	CE
5) Change in crop rotation and riparian buffer	CE
6) Conservation tillage	CE
7) Cover crop	CE
8) Cover crop, conservation tillage, grassed waterway, ditch buffer and riparian buffer	CE
9) Cover crop, conservation tillage and manure injection	CE
10) Cover crop and manure injection	CE
11) Annual crop to permanent hay	CE
12) Ditch buffer	CE
13) Grassed waterway	CE
14) Grassed waterway and riparian buffer	CE
15) Manure injection and reduced manure P applied	CE
16) Reduced manure P applied	CE
17) Reduced manure P applied and grassed waterway	CE
18) Annual cropland to permanent grass	CE
19) Riparian buffer	CE
20) Livestock exclusion/fencing/grazing system	CE
21) Farmstead practices	EA

As mentioned above, as part of the planning process, each planned practice will be evaluated individually and in combination with other planned practices to ensure it meets the criteria of the categorical exclusions and any existing Environmental Assessments. Any significant negative practice impacts, either individually or cumulatively, will first try to be avoided, then minimized and/or mitigated to the extent possible or eliminated from the individual farm plan if necessary. There is not an expectation that the practices planned for implementation in the East Creek Watershed will necessitate an Environmental Assessment or an Environmental Impact Statement.

V. Appendix – Local Watershed Team Actions and Outcomes

The East Creek Watershed Plan will be provided to the local NRCS office(s) working with farmers in the watershed. The Watershed Plan is not considered confidential and as such will be made available to all interested partners and the public. The Local Watershed Team also developed a number of products to guide and coordinate conservation practice implementation in the watershed.

<u>Field Scale Land Cover and Resource Maps</u>

These maps will be developed by the local NRCS office based on the spatial data layers provided to them and described in the Watershed Plan. The data layers may be used alone or overlain with layers as suggested in the Watershed Plan or as deemed necessary by the conservation planners. These maps will generally contain Personally Protected Information and will be considered confidential.

Local Watershed Team Action Plan

The East Creek Watershed Team was composed primarily of representatives of NRCS, FSA, UVM-Extension, VT DEC, OCNRCD and VAAFM. In addition, there were several farmer representatives on the Local Watershed Team including members from the Champlain Valley Farmer Coalition.

The Local Watershed Team started the process by establishing 4 Key Strategies for successfully working with farmers to meet water quality goals. The four key strategies are farmer engaged conservation, outreach to farmers, technical assistance to farmers, and financial assistance to farmers logic diagrams were developed to capture a watershed outcomes and actions needed for each of the key strategies (see Figures 19 – 22).

Then an Action Plan for the watershed was developed that identified the responsibility for each action and a timeline to complete the action as shown in Table 8 and Figure 23.

Table 8 – East Creek Watershed Action Plan

East Creek Watershed Action Plan 2018-2020					
Strategy I_ Locally-Led/Farmer Engaged Conservation					**Complete X**
Actions:	**Description**	**Who is responsible?**	**When Begin Month-Year**	**When End Month-Year**	
Assist with Watershed Planning Group Meetings.	Assist NRCS with the leadership of the East Creek Watershed Planning Group and assist with planning and implementation of approximately of 3-5* meetings in the first year. The purpose of the meetings is to identify key strategies to accelerate implementation of conservation practices, and to develop a Watershed Action plan to implement the key strategies. The plan to also include the group's consensus goal for phosphorus reduction and estimated EQIP funding required to meet the goal. (*As scheduled by NRCS, if less are scheduled the deliverable is to be reduced).	UVM & NRCS	Mar-18	Feb-19	
Assist with Watershed Planning Group Meetings.	Assist with an additional 2-3* Watershed Planning Group Meetings in the second year of the agreement. (*As scheduled by NRCS, if less are scheduled the deliverable is to be reduced).	UVM & NRCS	Mar-19	Feb-20	
Collaborate with NRCS, educational and non-profit organizations to provide peer-to-peer farmer education and networking opportunities.		UVM & NRCS	Mar-18	Feb-20	
Conduct 4 meetings on farm in watershed	Farmers within watershed will host demos/ field days showing different practices	Farmers, UVM, NRCS	Mar-18	Feb-20	

Strategy 2: Technical Assistance to Farmers					Complete X
Actions:	**Description**	**Who is responsible?**	**When Begin**	**When End**	
Develop technical assistance plan.	Include target audiences, key messages, expected outcomes and timeline. <Part of Watershed Action Plan>	UVM & NRCS	Mar-18	Sep-18	
Initiate individual contact each year with at least 50% of the 25 farmers (12-13 total per year) in the watershed to explain water quality issues in East Creek Watershed	Present the goals of the watershed planning group as it related to the EPA TMDL.	UVM	Mar-18	Feb-19	
Initiate individual contact each year with at least 50% of the 25 farmers (12-13 total per year) in the watershed to explain water quality issues in East Creek Watershed	Same as above	UVM	Mar-19	Feb-20	
Contact 1-3 farmers each year whose farmsteads are located outside of the watershed.	Inform the famers of financial assistance programs available to help them implement conservation practices to improve soil health, reduce nutrient and sediment run-off and to address other water quality concerns with the intent of improving water quality in East Creek.	UVM	Mar-18	Feb-19	
Contact 1-3 farmers each year whose farmsteads are located outside of the watershed.	Inform the famers of financial assistance programs available to help them implement conservation practices to improve soil health, reduce nutrient and sediment run-off and to address other water quality concerns with the intent of improving water quality.	UVM	Mar-19	Feb-20	

Serve as a case manager for farms by assisting farmers. Maximum to provide is 5 farmers.	Using the famer's preferred method of communication, either by email or letter offer to serve as a case manager for farms by assisting farmers in the East Creek Watershed in developing their NRCS EQIP contract application (including assisting them with completing the application form and associated documents necessary to be considered eligible for NRCS program benefits) especially related to agronomic practices (assist the participant in identifying fields for the application of cover crops, no-till, nutrient management plans and other practices). Provide the case manager services as requested by farmers.	UVM	Mar-18	Feb-20	
Outreach to farmers to encourage use of Resource Stewardship Evaluation Tool.	Obtain one participant permission to participate in the evaluation. Obtain necessary data from cooperating farm to run the tool and evaluate 10-20 representative fields depending on farm size (10 fields for farms less than 500 acres, and 20 fields for farms over 500 acres) by one year after award.	UVM	Mar-18	Feb-19	
Identify conservation practices implemented by farmers that were not contracted in EQIP.	Record this practice implementation using the "Vermont State Partner Database."	UVM	Mar-18	Feb-19	
Identify conservation practices implemented by farmers that were not contracted in EQIP.	Same as above.	UVM	Mar-19	Feb-20	
Track accomplishments.	Practices contracted and implemented as well as tracking available monitoring results made in meeting P goals and realign action plan as needed.	NRCS & UVM	Mar-18	Feb-19	
Track accomplishments.	Same as above	NRCS & UVM	Mar-19	Feb-20	
Water Sampling	Continue water sampling within the East Creek	UVM & DEC	Mar-18	Dec-18	
Tile Drain Water Sampling	Water sample testing on tile drain site. Two year study with potential extensions.	UVM, Agency of Ag, VACD	Mar-18	Dec-19	

Strategy 3: Financial Assistance to Farmers					
Actions:	**Description**	**Who is responsible?**	**When Begin**	**When End**	
Assist NRCS with certification of conservation practices.	Practices to include cover crops, no-till & cropland buffers for minimum of 2 farms and max of 5 farms per year.	UVM	Mar-18	Feb-19	
Assist NRCS with certification of conservation practices.	Practices to include cover crops, no-till & cropland buffers for minimum of 2 farms and max of 5 farms per year.	UVM	Mar-19	Feb-20	
RCPP Grant	RCPP grant for cover crop, no-till. Waiving EQIP time limitations on the practices. Possibly a shorter day corn tied in to cover crop scenario.	DEC	Jun-18	Sep-19	
RCPP Grant	Receive grants to provide funding for NRCS Nutrient Management Plan updates	VACD	06/01/18	09/30/19	
Stabilize CWIP funding	CWIP is year to year funds. Get this to be more stabilized funding source	UVM	03/02/18	Feb-20	
Other sources of funding	Apply to sources of funds	Farmers	03/02/18	Feb-20	
Strategy 4: Outreach and Education					
Actions:	**Description**	**Who is responsible?**	**When Begin**	**When End**	
Develop outreach/education plan.	Include target audiences, key messages, and expected outcomes <Part of Watershed Action Plan>	NRCS & UVM	Mar-18	Sep-18	
Work with minimum of 1 farmer to establish an on-farm demonstration.	Work to establish on-farm demonstration that highlight conservation practices including, but not limited to, cover cropping, no-till, buffers, soil health, etc.	UVM	Mar-18	Feb-19	
Conduct at least one on-farm field day.	Conduct at least one on-farm field day in one or more of the 2 watersheds (McKenzie or East Creek) showcasing the conservation practices applied.	UVM	Mar-18	Feb-20	

Identify & contact 1 farmer to be profiled in a published success story.	Identify and contact 1 East Creek watershed farmer who is willing to be profiled in published success stories with the intent of motivating other farmers to adopt conservation practices. This success story can be regarding the totality of the farmer's conservation efforts or how they successfully implemented a conservation practice or completed and EQIP contract, or otherwise wisely steward their natural resources. Coordinate with the NRCS Vermont Public Affairs Specialist to develop an outreach press release to the general public.	UVM	Mar-18	Feb-19	
Promote NRCS programs	Promote NRCS programs/ practices that are available. Focusing on underutilized practices.	UVM, Farmer, VACD, DEC, **NRCS**, Agency of Ag	Mar-18	Feb-20	
Bus Tour	To educate the general public and legislators.	**OCNRCD,** VACD, UVM, CVFC	Mar-18	Feb-20	
Conservation Farmer of the Year	Choose a farmer in the East Creek Watershed to be featured as the Conservation Farmer of the Year. Promote the "why" they were chosen.	VACD	Mar-18	Feb-20	
Legislative Breakfast	Have at least 1 farmer within the watershed and attend at least 1 of the 4 legislative Breakfast/yr	CVFC	Mar-18	Feb-20	
Identify & contact 1 farmer to be profiled in a published success story.	Identify 1 positive story to share with the media.	NRCS	Mar-18	Feb-20	
Field trials	Have cover crop trials, short season corn, soil amendment, and hayland manure injection in the East Creek Watershed.	UVM	Mar-18	Feb-20	
CEAP/ Direct to farmer funds	Capital Equipment Assistance Program $ amount available/ priority watersheds. Educate farmers/ TSPs on sources of funds	**UVM**, NRCS, CVFC, Agency of Ag.	Mar-18	Feb-20	
Watershed Boundaries	Place road side signs denoting the watershed	VACD	Apr-18	Apr-19	

The Team also developed a five-year implementation plan for the watershed. **As part of this plan the Team identified a phosphorus reduction goal that meets 29% of the TMDL goal for the watershed (2,600 lbs/yr) within 5 years.** Using information from the watershed plan, the group identified a suite of practices that could potentially meet this goal (Table 7). Practice implementation was distributed over a five year period and included high rates of implementation for practices such as conservation tillage systems, cover crops, crop rotations and ditch buffers. Annual costs of practices contracted ranged from $125,000 to $350,000 and totaled to over $1,075,000 for the five year period.

It was estimated that conservation practices implemented or planned since 2010 would result in an estimated reduction of 2,328 lbs/year of phosphorus from the East Creek Watershed. The cumulative reduction in loading from the watershed would include some portion of this phosphorus reduction in addition to any reductions achieved during the 5 year project. As local planners work with farmers in the watershed they will verify that these practices have been maintained and that phosphorus loading reductions should be applied.

<u>Tracking Database</u>
An interim database will be developed to track practice implementation and estimated phosphorus reductions. This database will be updated at least annually, and the results will be shared among partners and watershed farmers. This interim database will eventually be replaced by the "partner database" that is currently under development by the VAAFM and their consultant. Factsheets and media releases will be used to communicate progress in meeting the project goals to a wider audience.

Figure 23 – Conservation Actions and Outcomes