Report of Survey Results and Plan for Impact Avoidance and Minimization: Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Communities

NEW ENGLAND CLEAN POWER LINK

Grand Isle, Rutland, and Windsor Counties, Vermont

Prepared for **Champlain VT, LLC d/b/a TDI New England**

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1.0 Introduction

In April of 2014, TRC Environmental (in collaboration with VHB, HDR, and Arrowwood Environmental ("AE")) submitted the Rare, Threatened, and Endangered species ("RTE"), Necessary Wildlife Habitat, and Natural Community Survey Program ("Survey Program") to the Vermont Agency of Natural Resources ("VT ANR") and Vermont Fish and Wildlife Department ("VT FWD") for the proposed New England Clean Power Link ("NECPL" or "Project") to be developed by Champlain VT, LLC d/b/a TDI-New England ("TDI-NE"). The Survey Program provided initial assessments of potential impacts or threats to Vermont Natural Heritage Inventory ("NHI") known Element Occurrences ("EO"s) (i.e., the database of documented RTE and significant natural communities maintained by the VT ANR NHI), and made recommendations for survey protocols for RTE, natural communities and necessary wildlife habitat that could be impacted by the Project. The Survey Program was presented during a meeting held with VT ANR stakeholders on April 24, 2014, and subsequent concurrence with the Survey Program approach was received from ANR via email correspondence (with some additional agency comments, as noted in this document).

RTE, natural communities, and necessary wildlife habitat were surveyed by AE and Gilman & Briggs Environmental based on the recommended Survey Program protocol from June to September of 2014. This Summary Report and enclosed attachments serve as a follow up to the Survey Program and summarize the methodology employed in the surveys, the survey results, and the plans to minimize and avoid undue, adverse impacts to the species and communities identified during the surveys.

2.0 Survey Objective and Project Overview

The NECPL is a proposed high-voltage direct-current ("HVDC") electric transmission line that will provide electricity generated by renewable energy sources in Canada to the New England electric grid. The line will run from the Canadian border at Alburgh, Vermont to Ludlow, Vermont along underwater and underground routes.

The transmission line will be comprised of two approximately 5 inch diameter cables – one positively charged and the other negatively charged – and will be solid-state dielectric and thus

contain no fluids or gases. The nominal operating voltage of the line will be approximately 300 to 320 kV, and the system will be capable of delivering 1,000 megawatts (MW) of electricity.

The proposed underwater portion of the transmission line, approximately 98 miles in length, will be buried to a target depth of three to four feet in the bed of Lake Champlain except at water depths of greater than 150 feet where the cables will be placed on the bottom and self-burial of the cables in sediment will occur. In areas where there are obstacles to burial (e.g. existing infrastructure, bedrock), protective coverings will be installed.

The overland portion of the transmission line, approximately 56 miles in length, will be buried approximately four feet underground within existing public (state and town) road rights-of-way ("ROW"s).[1] The cables will be installed within a railroad ROW for approximately 3.5 miles in the towns of Shrewsbury and Wallingford. Very short sections of the route at the Lake Champlain entry and exit points, as well as at the converter site in Ludlow, will be located on private land that is owned or controlled by TDI-NE.

In Ludlow, the HVDC line will terminate at a converter station that will convert the electrical power from direct current ("DC") to alternating current ("AC"). An underground AC transmission line will then run to the existing 345 kV Coolidge Substation in Cavendish, Vermont, located approximately 0.3 mile to the south that is owned and operated by the Vermont Electric Power Company ("VELCO").

The Project overland route, or terrestrial segment (and approximate linear lengths), is defined as follows:

1. (0.5 miles) Overland Route from Canadian Border along Bay Road to 55 Bay Road, Alburgh; enter Lake Champlain to start Lake Cable Route
2. (97.6 miles) Marine Cable Route within Lake Champlain
3. (4.3 miles) Exit Lake Champlain to start Overland Route at 113 Stoney Point Road, Benson to Lake Road to VT Route 22A,
4. (8.2 miles) VT Route 22A to US Route 4

[1] The only potential areas where underground burial may not occur is at two stream/river crossings in Ludlow where the cables may be placed in conduit and attached to a bridge or culvert headwall.

5. (17.4 miles) US Route 4 to US Route 7
6. (2.7 miles) US Route 7 to VT Route 103
7. (3.8 miles) VT Route 103 to Railroad in Shrewsbury
8. (3.5 miles) Railroad in Shrewsbury to VT Route 103 in Wallingford
9. (10.6 miles) VT Route 103 to VT Route 100
10. (0.8 Miles) VT Route 100 to Town Roads in Ludlow
11. (4.5 miles) Town Roads in Ludlow to Converter Station Site
12. (0.3 miles) Town Roads in Ludlow and Cavendish, from Converter Station Site in Ludlow to Coolidge Substation in Cavendish

Along the overland route, the transmission cables will be installed underground by utilizing a combination of open-trench excavation ("OTE"), horizontal directional drilling ("HDD"), and jack-and-bore construction. The transmission line will be buried in public road ROWs, railroad ROW, or private property controlled by TDI-NE. Along town roads (in Benson, Alburgh and Ludlow), the cables are proposed to be installed in the existing roadways. Along state-controlled roads, the transmission line will primarily be installed along the edge of the road ROW, although some in-road installation is proposed.

State and federal environmental permitting for this Project (e.g., Vermont Section 248 Petition for a Certificate of Public Good, U.S. Department of Energy Presidential Permit, U.S. Army Corps Section 10/404 permits), as well as related consultations (e.g., Endangered Species Act Section 7 consultations with federal resource agencies) require natural resource evaluations. In order to facilitate this review, EOs of RTE species and significant natural communities within 0.25 mile of the proposed Project centerline were provided to ANR and summarized in the Survey Program. Tables A-1, A-2 and A-3 (see Attachment A) identify the 18 RTE animal occurrences, 44 RTE plant occurrences, and 14 natural communities previously documented within 0.25 mile of the terrestrial route centerline. Tables A-4 and A-5 (see Attachment A) identify the 17 aquatic RTE animal occurrences and 10 aquatic or shoreline RTE plant occurrences previously documented within 0.25 mile of the lake segment centerline. TRC provided the following three survey recommendations in the Survey Program:

- Identify species or significant natural communities associated with known occurrences in the vicinity of the Project survey area;

- Identify whether there is potential for suitable or preferred habitat for these species in the Project survey area; and
- Identify whether the proposed work areas for the Project have the potential to directly or indirectly affect actual species, habitat, or natural communities.

AE and Gilman & Briggs Environmental conducted the terrestrial segment resource surveys based on the recommendations contained in the Survey Program and applicable follow-up consultation described in Section 3.0 of this report. HDR Engineering Inc. ("HDR"), in cooperation with Biodrawversity LLC, conducted the lake segment resource surveys based on follow-up consultation with the VT FWD regarding the Survey Program as described in Section 4.0 of this report.

Since preparation of the Survey Program in April 2014, a 3.5 mile railroad ROW route segment has been evaluated as the preferred route in Shrewsbury and Wallingford. Both the railroad ROW and the alternative route along VT Route 103 in Shrewsbury and Wallingford were evaluated and results are included in this report.

AE's report entitled RTE, Natural Community and Critical Wildlife Habitat Inventory Report is provided in Attachment C, and Gilman & Briggs Environmental' s NECPL Project Survey Memorandum is included in Attachment D. AE completed the primary terrestrial segment assessments described in this report, while Gilman & Briggs Environmental (with support from TRC) completed the assessments for the Ludlow Converter Station Site, temporary off-ROW workspaces (e.g., temporary construction areas, staging and laydown areas), and the 3.5 mile railroad segment. The results of these surveys are briefly summarized in Section 3 of this report. The Survey Program states that an RTE Protection Plan will be developed in consultation with VT ANR/VT FWD and will include appropriate minimization or mitigation measures for species that may be impacted by the Project. Proposed protection measures are described in Section 4 of the report for the Project as currently proposed.

3.0 Survey Results: Terrestrial Cable Route

3.1 RTE Plants

AE conducted the RTE plant surveys by utilizing the EO locations and conducting field surveys based on the recommended protocol in the Survey Program. Plant rarity ranks were based on the Vermont Natural Heritage Inventory list dated September 15, 2014. Species with an S-rank of S1 ("very rare"), S2 ("rare") or S2S3 ("rare to uncommon"), SH ("possibly extirpated"), or SU ("unrankable"/unknown) were mapped to sub-meter accuracy and a VT FWD Rare Plant Occurrence Reporting Form was completed. For uncommon species (S3), points were collected with a mapping grade GPS to illustrate the general vicinity of the populations, and no forms were recorded.

During the surveys, 101 RTE plant populations and 83 uncommon plant populations were identified. These populations are comprised of 53 different plant species. This includes three State Endangered and six State Threatened species. These are summarized in Table A-1 in Attachment A, and Vermont Rare Plant Forms are included with AE's report included as Attachment C.

No federally listed[2] threatened or endangered plant species were encountered.

3.2 RTE Animals

AE conducted RTE animal surveys and habitat assessments by utilizing the EO locations and conducting field surveys based on the recommended protocol in the Survey Program. Fourteen different RTE animal species were identified as potentially occurring along the terrestrial segment of the Project. AE confirmed that the general habitat features preferred by the rare animal species were present within or in the vicinity of the documented EOs within 0.25 mile of the Project's terrestrial route centerline, but no specific features, such as snake hibernacula, were discovered. The survey results for each of these areas is summarized in Table A-2 of Attachment A, and the AE report included as Attachment C.

[2] Refers to listing under the Federal Endangered Species Act.

RTE Snake Species: Eastern Ribbonsnake, Eastern Ratsnake, Timber Rattlesnake

Following submittal of the Survey Program, VT FWD (Doug Blodgett) was consulted regarding state RTE snake species that may be affected by the Project, including eastern ribbonsnake (*Thamnophis sauritus sauritus*), eastern ratsnake (*Pantherophis alleghaniensis*) and timber rattlesnake (*Crotalus horridus*). None of these species are federally listed. Protocol for avoidance and minimization of impacts to individual snake species during construction for segments of the overland route in the vicinity of known EOs and within areas of potential habitat in Benson, Fair Haven, West Haven, and Castleton are defined in Section 5.2.

RTE Turtle Species: Eastern Musk Turtle and Wood Turtle

Following submittal of the Survey Program, the VT FWD (Doug Blodgett) was consulted regarding RTE species that may be affected by the Project. The eastern musk turtle (*Sternotherus odoratus)* and the wood turtle (*Glyptemys insculpta*), although not federally or state listed species, are considered state uncommon (rank "S2" for the musk turtle and "S3" for the wood turtle) species and are both Species of Special Concern ("SSC"). They were both identified as species that may potentially occur in portions of the terrestrial segment of the Project. Specifically, both of these turtles may occupy larger rivers encountered in the Project area and terrestrial habitat located in the vicinity (i.e., typically within 1,000 feet) of such rivers. Although the species is less likely to occur at higher elevations encountered by the Project (e.g., in Ludlow and Mount Holly), it may be present in each of the towns traversed by the Project. No musk or wood turtles were observed during field surveys. As recommended by VT FWD, musk turtle and wood turtle monitoring, avoidance, and minimization measures are identified in Section 5.2 of this report.

RTE Bat Species: Indiana Bat and Northern Long-Eared Bat

Following submittal of the Survey Program, it was determined that tree removal may be required for the Project. Based on follow-up telephone consultation with the VT FWD (Scott Darling) and U.S. Fish and Wildlife Service ("USFWS", Susi Van Oettingen) during the summer of 2014, a habitat assessment protocol was developed for the state- and federally-endangered Indiana bat (*Myotis sodalis*), and potential roosting tree assessments were performed as described in Attachment E. In total, 116 potential roosting trees were identified in the study area. Indiana Bat avoidance and minimization measures are identified in Section 5.2 of this report.

Additionally, the northern long-eared bat (*Myotis septentrionalis*) has the potential to occur in the Project area. It is a state-endangered species and, as of April 2, 2015, received a threatened listing under the federal Endangered Species Act. VT FWD (Scott Darling) recommended no additional or specific surveys or assessments for northern long-eared bat. Because this species may occur throughout the State of Vermont and its habitat requirements are not as specific as Indiana bat (i.e. it has fewer unique habitat requirements), this bat could occur in numerous habitats along the overland component of the proposed Project. It is expected that the proposed limited tree removal along existing road and rail ROWs and at the converter site will not imperil this species, as it may utilize many alternative habitats in the vicinity of the Project. No additional assessments or minimization measures are proposed for the northern long-eared bat by the Project.

Migratory Birds

Following submittal of the Survey Program, the VT FWD (John Buck) was consulted regarding migratory bird species. It was indicated during that consultation that known bald eagle (*Haliaeetus leucocephalus*) nests are documented along Lake Champlain in Benson. Based on a VT FWD desktop review of the Project route, it was determined that no known bald eagle nests have been documented at the proposed shoreline transition for the Project (148 Stony Point Road, Benson). The proposed work area, including setup for the HDD, for the shoreline transition in Benson is located within a cleared area adjacent to an existing home, and no Bald Eagle nests were observed during field surveys. Other large bodies of water that may provide suitable habitat for bald eagles include Lake Bomoseen and Otter Creek. No bald eagles or nests were observed during field surveys.

Migratory bird habitat in the Project study area is limited, since the majority of the route is along busy roadways. The Lake Champlain shoreline approaches are within existing, cleared parcels and no tree removal along shoreline resources will be required. The forested Ludlow Converter Station parcel contains mature mixed hardwoods and conifers that will be removed for the Project and may be providing migratory bird habitat, but no habitat features were observed that indicate this area is a unique or critical habitat for migratory bird species. Grassland and wetland migratory bird habitats are encountered along the overland route, but Project construction activities will be within existing road or railway ROWs that provide low-quality habitat for migratory birds.

3.3 Natural Communities

Vermont natural community occurrences can be considered "state-significant" (or "significant") based on an evaluation of the rarity of the natural community type and the quality of the natural community occurrence (per ANR Guidelines for the Conservation and Protection of State-significant Natural Communities, October 2004, and updated ranking protocols). State-significant natural communities can be recommended for consideration or designation as Rare and Irreplaceable Natural Areas ("RINA") under Act 250 Criterion 8, however every instance of RINA is not defined or designated by VT ANR. Although not specifically defined by statute, prior Act 250 precedent suggests evaluation of whether an area in question is a "natural area" and if so, whether the natural area is "rare and irreplaceable."

The ANR-approved Survey Program provided protocol recommendations for surveying significant natural communities and potential RINA. AE and Gilman & Briggs Environmental conducted natural community assessments concurrent with the RTE plant and animal surveys to identify any natural communities that would warrant designation as state-significant. AE and Gilman & Briggs Environmental assessed targeted locations in the vicinity of known EOs of natural communities as well as a general evaluation for potential significant natural communities in the survey area.

AE conducted a desktop review of upland and wetland communities in the study area surrounding the Project that included significant natural community EOs (which may be considered to be RINA), State Natural Areas listed by the Vermont Department of Forests, Parks, and Recreation ("VT FPR", considered to be RINA), and used remote sensing to identify potentially significant natural communities based on orthophoto imagery, topographic maps, soil surveys and Vermont Significant Wetland Inventory ("VSWI") mapping within 0.25 mile of the study area. This information was used to guide field surveys to locate potentially significant natural areas.

No Vermont State Natural Areas occur within the study area. Fourteen previously documented significant natural community EOs occur within the 0.25 mile of the study area, but none of these were found to occur within the study area. Nine new potential and likely significant communities were identified in the study area during field surveys. Table A-3 in Attachment A provides the details of the natural community evaluation. Section 5.3 identifies avoidance and minimization measures for potential and likely significant natural communities.

Non-Native Invasive Species

The Survey Program called for a general documentation of non-native invasive species ("NNIS") populations (Class A and B Noxious Weeds as identified in the Vermont Noxious Weed Quarantine Rule, 2002) observed in vegetative communities within the Project survey area. The intention of this documentation was to provide a general idea of the presence/absence of NNIS and the general location and extent to inform Project planning.

In accordance with the Survey Program, AE conducted an inventory of NNIS concurrent with the RTE surveys. The full report entitled Non-Native Invasive Species Inventory Report is in Attachment F. Additional NNIS inventory data for the Railroad Option and Ludlow Converter Site is included in the NECPL Project Survey Memorandum by Gilman & Briggs Environmental included as Attachment C.

Meander surveys for NNIS were conducted throughout the survey area by three botanists, and GPS points were collected along with data on phenology and geographic distribution. A total of 10 NNIS species were documented throughout the survey area and most of these were recurrent. Honeysuckle (*Lonicera spp*.), purple loosestrife (*Lythrum salicaria*) and common buckthorn (*Rhamnus cathartica*) were present throughout the study area, although these are most abundant along US Route 4. The Non-Native Invasive Species Inventory Report (Attachment F) includes a table that summarizes the NNIS data as well as the number of individual infestations and total linear miles. NNIS monitoring and control measures are proposed in the Project Vegetation Management Plan (VHB, 2015).

3.4 Necessary Wildlife Habitat

Necessary wildlife habitat is defined under Act 250 as "concentrated habitat which is identifiable and is demonstrated to be decisive to the survival of wildlife at any point in its life, including breeding and migratory periods." Necessary wildlife habitat is most often considered as deer wintering areas ("DWA") and black bear habitat (forage or travel).

Deer Wintering Areas

AE, TRC, and Gilman & Briggs Environmental conducted surveys for deer wintering areas within the study area by reviewing available digital databases and aerial imagery and assessing those areas that intersected the study areas for on-site habitat characteristics. For white-tailed deer (*Odocoileous virginianus*) wintering habitat, areas with coniferous and mixed conifer/hardwood forest communities

within the study area were assessed for appropriate forest structure and evidence of utilization by over-wintering white-tailed deer. Five stands within the survey areas were identified as having both the appropriate tree species and adequate structure suitable for deer wintering habitat (see Section 1 in Attachment C). This included one NHI-mapped Deer Wintering Area at milepost 137.4 to 138.0. Other NHI-mapped deer wintering areas were determined to not have suitable tree species and/or structure for deer wintering in the study area. Within the five stands, no indications of use by deer as overwintering habitat were evident.

Black Bear Habitat

For black bear (*Ursus americanus*), the presence/absence of necessary habitat was assessed by AE and Gilman & Briggs Environmental (with support from TRC) by reviewing available data including a Black Bear Habitat in Vermont map by VT FWD, the Vermont Biodiversity Project "Bear Points", and 2006 road kill data as well as conducting field assessments. Necessary habitat that was assessed included travel corridors, spring feeding wetlands and areas with stands of mast-producing trees. Habitat in the Project study area is fragmented and disturbed due to traffic and human activities, so biologically-critical black bear habitat was found to be limited or not present. The Project intersects one potential black bear travel corridor on VT Route 103 near the Mount Holly and Ludlow town line, and signs of bear crossing were observed. This area has been designated "Bear Production Habitat" by the State of Vermont and relatively remote and contiguous forest blocks are located north and south of VT Route 103 in this area. The Project survey area is likely limited in function to its role as part of a travel corridor in this area wherein bears are moving quickly between the forest blocks north and south of the roadway/study area, where more appropriate biologically-critical habitat exists.

4.0 Survey Results: Marine Cable Route

The April 2014 Rare, Threatened, and Endangered Species (RTE), Necessary Wildlife Habitat, and Natural Community Survey Program recommended no further RTE assessments for the marine cable route in Lake Champlain. Based on follow-up consultation with Mark Ferguson, VT FWD, surveys for state RTE mussel species were recommended and completed. The Lake Champlain survey effort was completed by HDR and detailed results were provided to VT FWD under a separate cover in

the report entitled New England Clean Power Link, Lake Champlain Freshwater Mussel Survey Report (August 2014). No live threatened or endangered mussel species were observed.

Based on the survey results, the VT FWD concurred in September 2014 that endangered or threatened mussel species are not likely to persist within the Project area. Therefore, VT ANR concluded that mussel relocation and monitoring for the Project as currently proposed will not be required.

A summary of aquatic RTE EOs within 0.25 mile of the centerline of the lake route, based on the April 2014 Rare, Threatened, and Endangered Species (RTE), Necessary Wildlife Habitat, and Natural Community Survey Program and conclusions are included in Tables A-4 and A-5 in Attachment A.

5.0 Impact Minimization and Avoidance

5.1 RTE Plants

Six state rare plant species occur within the Project area as currently proposed, occurring in a total of 20 distinct populations. They are located within the permanent cable easement and/or temporary construction ROW and could be impacted by earth disturbing activities associated with Project construction. The majority of populations of these six rare plant species occur within the exiting Vermont Department of Transportation ("VTrans") "Clear Zone" and are thus already subject to roadside mowing and maintenance independent of the Project (as described in detail in the following sections). Mitigation measures identified below are designed to avoid and minimize any additional potential impacts as a result of the Project.

The remaining observed RTE plant species in the study area will likely be avoided.

No state listed threatened or endangered plant species will be impacted by the Project; proposed utilization of HDD and route and workspace re-configurations will successfully avoid all known occurrences of protected, state listed plants.

As noted above in Section 3.2, there are no federally listed threatened or endangered plant species in the project area.

General RTE Plant Protection Measures

The following plant protection measures will be implemented for all RTE plant species located in the Project area:

- Prior to any site preparation activities and other preconstruction measures outlined below, a qualified botanist will re-delineate all rare plant populations within or adjacent to the final Project alignment and all construction work areas;
- All previously identified RTE plant populations will be clearly demarcated (utilizing high visibility fencing or other acceptable alternative) by a qualified botanist prior to site preparation or construction activities;
- Preconstruction training will be provided for work crews on identifying the RTE plant protection demarcation and to avoid all such areas during construction;
- If the proposed Project alignment is changed such that impacts to any state threatened or endangered plants would occur, then a Vermont Endangered & Threatened Species Takings Permit would be secured, and additional minimization and mitigation measures may be required and would occur per further coordination with VT ANR. Examples of possible additional minimization and mitigation measures for listed species include:
    - Using temporary construction matting to create a barrier between RTE plants and construction equipment (in place matting not to exceed 5 consecutive days, where feasible);
        - If matting must be left in place longer than 5 consecutive days during the growing season, then the population will be considered impacted and mitigation would be necessary according to the following provisions:
            - TDI-NE will provide for mitigation if 20 percent or more of any rare plant population is impacted;
            - Mitigation may take the form of transplantation of plants or rhizomes, seed collection, and/or planting;
    - Narrowing work zones to minimize the area or number of plants in an RTE population that may be impacted;

- Post-construction annual monitoring of impacted RTE plant populations for a period of 5 years following construction. Annual monitoring reports will be submitted to VT ANR by December 31 of each of the five years. Annual monitoring will include the following:
    - Inspect populations of RTE at each site and assess the health and vigor of the population;
    - Assess the area for evidence of accidental intrusion or unanticipated impacts;
    - Compare health and vigor of population to the previous year;
    - Obtain digital photographs of the site and population of RTE;
    - Monitoring reports shall describe these observations and include recommendations for adaptive management of the populations, if warranted, to be evaluated and/or implemented in consultation with VT ANR; and
    - If any Project induced population decline of more than 20 percent is observed during annual monitoring, TDI-NE would consult with VT ANR to determine an appropriate course of remedial action(s) and may include plant relocation, soil (seedbank) redistribution, or other such activities;
- Previously identified populations of RTE plants will be re-surveyed every 8 years for the life of the Project, and documentation of these efforts will be recoded using the Vermont Rare Plant Sighting Form, to be submitted to VT ANR before December 31 of the year of the population survey;
- Where construction activity occurs in the immediate vicinity of RTE plants, the area will be lightly mulched with certified weed free hay so as to facilitate recolonization of RTE plant populations and exclude colonization by NNIS; and
- Implement special construction and operation-phase vegetation management as outlined in the NECPL Vegetation Management Plan, including NNIS monitoring and control.

Species- and population-specific plant protection measures are identified in the following sections, for the six RTE plant species, occurring as 20 distinct populations, present within the current Project area and are likely to be impacted by the Project as currently proposed. Natural Resource Maps included in Attachment B depict their locations.

Short-stalked False Bindweed (*Calystegia silvatica ssp. fraterniflora*)

Short-stalked false bindweed is a perennial vine identified in four locations along the Project route. It is state-ranked S2 ("rare") and is not listed as a state threatened or endangered species. It grows in meadows and fields, especially in previously disturbed areas. Two Project areas where the plant is documented will be avoided, but two areas will likely be impacted by the Project.

- Polygon 2014-RTE-CS-2, located at MP 112.3, is a small population (1 genet, 10 ramets) on the roadside, north of the US Route 4 westbound lane. The population grows in the actively-mowed VTrans Clear Zone and is visibly stressed.
- Polygon 2014-RTE-CS-5, located at MP 122.7, is a medium population (over 100 plants) on the roadside, southwest of the US Route 4 eastbound lane. The population is in the actively-mowed VTrans Clear Zone, on the outer perimeter of a potential Mesic Red Oak-Northern Hardwood Forest natural community.

The following protection measures will be implemented for Short-stalked False Bindweed:

- Transplanting of the entire population that occurs beyond the VTrans mowed area that was observed to be visibly stressed during field surveys. Transplanted plants will be replanted in a nearby location of suitable habitat, subject to input from VT ANR;
- Segregate topsoil and place adjacent to the work areas. Clearly mark the segregated topsoil with signage. This will contain the plant's rhizomes for future re-propagation of the population following construction and restoration;
- Post construction, replace topsoil and restore the work area in the population area; and
- Stabilize soil with straw mulch (only); seed with annual mix (e.g. annual rye).

Shore Sedge (*Carex lenticularis*)

Shore sedge is a perennial sedge identified in a single location along the Project route. It is state-ranked S2S3 ("rare/uncommon") and is not listed as a state threatened or endangered species. It is found in alpine and subalpine zones as well as the shores of rivers and lakes, and wetland fringes (obligate wetland status). Polygon 2014-RTE-CL-1, located at MP 140.8, consists of a population of approximately four plants in a roadside ditch wetland north of VT Route 103 and will likely be impacted by the Project route.

The following protection measures will be implemented for Shore sedge:

- Transplant the several plants in this small population to an area outside of the Project impact area in a permanently-saturated area or temporarily store in an irrigated area for re-planting following construction completion;
- Segregate topsoil and place adjacent to the work areas. Clearly mark the segregated topsoil with signage and replace following construction; and
- If attempting to re-plant the RTE plants in Project impact area, ensure that pre-existing hydrology is maintained
    - Field indication of suitably maintained hydrology may include saturated soil and similar pre-Project microtopography at the specific planting location
    - If hydrology does not appear to have been maintained at the replanting site, then an alternative planting site will be selected that exhibits similar habitat (cover, soil, hydrology) to the pre-Project growing conditions.

Long-leaved Bluets (*Houstonia longifolia*)

Long-leaved bluets is a perennial wildflower that was identified in multiple locations along VT Route 22A and Route 4 within the Project study area. It is state-ranked S2 ("rare") and it is not listed as a state threatened or endangered species. It grows in rocky or gravelly soil in full to partial sun, including man- made and disturbed areas, rocky upland woodlands, meadows and fields, and ledges.

Eight populations were identified, five of which will be avoided by the Project. Three population areas, designated as Polygons 2014-RTE-HL-1, 2014-RTE-HL-3, and 2014-RTE-HL-4 will likely be impacted on and adjacent to an outcrop adjacent to VT Route 22A at MP 108.5 and 108.6. The overall metapopulation that will be impacted includes greater than 200 plants, although not all are located in the Project area.

The following protection measures will be implemented for long-leaved bluets:

- Transplant plants to other suitable habitat in the VTrans corridor outside of Project disturbance areas (e.g., immediately east of the Project temporary construction area in the rocky wood line) prior to construction; and
- If transplantation is not feasible (e.g., for plants growing directly in ledge), collect seeds during the end of the growing season prior to construction and store in a cool, dry location

for re-seeding following construction. Spread seeds in rocky or gravelly areas in the temporary construction area following construction and restoration of the Project.

Smaller Forget-me-not (*Myosotis laxa*)

Smaller forget-me-not is an annual/biennial (sometimes short-lived perennial) herb identified in fifteen locations along the Project route. It is state-ranked S2 ("rare") and is not listed as a state threatened or endangered species. It grows in marshes, shores of rivers and streams and wetland fringes (obligate wetland status).

Nine areas where the plant is documented will be avoided, but six populations will be impacted. Polygon 2014-RTE-ML-3, located at MP 140.0, is a mid-sized population (500 to 1,000 plants) on VT Route 103 on the corner of Packer Road. The population grows in a roadside jurisdictional ditch. Polygon 2014-RTE-ML-4, located at MP 140.5, is a small population of approximately 30 plants north of VT Route 103. The population grows in a non-jurisdictional roadside ditch within a maintained ROW. Polygon 2014-RTE-ML-7, located at MP 140.6 is comprised of approximately 100 to 200 plants, north of VT Route 103. Part of the population occurs in a ditch within the roadside ROW, and part occurs in a mowed residential lawn. Polygon 2014-RTE-ML-9, located at MP 142.8, is comprised of approximately 150 plants, north of VT Route 103. The population grows in roadside wetland ditch in a disturbed area. Polygon 2014-RTE-ML-12, located at MP 146.5, is a small population comprised of approximately 30 plants south of VT Route 103. The population grows in a roadside ditch at the confluence with a small stream. Finally, polygon 2014-RTE-ML-13, located at MP 146.7, is a small population comprised of approximately 45 plants south of VT Route 103. The population grows in a roadside ditch along a culverted intermittent stream.

The populations of smaller forget-me-not that will likely be impacted by the Project as currently proposed are primarily concentrated within the actively mowed and maintained VTrans Clear Zone along VT Route 103.

The following protection measures will be implemented for smaller forget-me-not:

- Complete construction and restoration work in the population areas during the dormancy period if practical. Alternatively, if work cannot be completed during the dormancy period,

collect seeds during the end of the growing season prior to construction and store in a cool, dry location for re-seeding following construction; and

- Segregate topsoil and place adjacent to the work areas. Clearly mark the segregated topsoil with signage. This will contain the plant's seed bank for future re-propagation of the population following construction and restoration; and
- Post-construction, replace topsoil and restore the work area in the population area. If seeds were collected, utilize for re-seeding within the restored population area.

Smooth Blue Aster (*Symphyotrichum laeve var. leave*)

Smooth blue aster is a perennial herb identified in thirteen locations along the Project route. It is state-ranked S2S3 ("rare/uncommon") and is not listed as a state threatened or endangered species. It grows in meadows, fields and woodlands and can be found in previously disturbed areas.

Seven of thirteen areas where the plant is documented will be avoided. The following six populations will likely be impacted.

- Polygon 2014-RTE-SL-4, located at MP 107.5, is comprised of a single plant of smooth blue aster. It is located on the west side of VT Route 22A at the top of a dry outcrop near the roadway.
- Polygons 2014-RTE-SL-8, 2014-RTE-SL-9, 2014-SL-10, and 2014-SL-11 represent small populations with an unknown number of plants on an outcrop east of VT Route 22A between MP 108.4 and 108.7 (also with the Long-leaved bluets populations that will be impacted as previously described).
- Finally, polygon 2014- SL-12 is a population comprised of more than 100 plants located on a rocky side slope and adjacent to VT Route 22A at MP 109.8.

The following protection measures are recommended to be implemented for smooth blue aster:

- Transplant plants to other suitable habitat in the VTrans corridor outside of Project disturbance areas prior to construction; and
- If transplantation is not feasible (e.g., for plants growing directly in ledge), collect seeds during the end of the growing season prior to construction and store in a cool, dry location for re-seeding following construction. Spread seeds in rocky or gravelly areas in the temporary construction area following construction and restoration of the Project.

False Pennyroyal (*Trichostema brachiatum*)

False pennyroyal is an annual herb identified in eight locations along the Project route. It is state-ranked S1 ("very rare") and is not listed as a state threatened or endangered species. It grows in dry meadows and fields, ridges or ledges, shores of rivers or lakes and woodlands. It is a calciphile, and, based on survey results, is apparently tolerant of dry, gravelly soil at the immediate edge of road pavement and tolerates impacts from winter road salt application.

Six areas where the plant is documented will be avoided, but the following two areas will be impacted. Polygon 2014-RTE-TB-6, located at MP 123.9, is a very small isolated population (few plants) just west of a much larger population on the south side of the US Route 4 eastbound lane. Polygon 2014-RTE-TB-7 is a large population located at MP 124.5 comprised of thousands of plants. It is on the south side of the US Route 4 eastbound lane and occurs off the road shoulder. This is the largest population of this species in the state.

The following protection measures are recommended to be implemented for false pennyroyal:

- In the year preceding construction, seeds will be collected from both populations that are proposed to be impacted by the Project. Seeds will be sent to the VT ANR botanist or will be planted according to VT ANR instruction outside of the Project impact area in a suitable habitat;
- Complete construction and restoration work in the population area during the dormancy period, if practical, or during the early or later periods of the normal growing season. Alternatively, if work cannot be completed during the dormancy period or during the beginning or end of the growing season, collect seeds during the growing season prior to construction and store in a cool, dry location for re-seeding following construction;
- Segregate topsoil and place adjacent to the work areas. Clearly mark the segregated topsoil with signage. This will contain the plant's seed bank for future re-propagation of the population following construction and restoration;
- Complete construction, replace topsoil and restore the work area in the population area; and
- Leave soil bare or, if required by Erosion Prevention and Sediment Control ("EPSC") Plan, temporarily stabilize with fine limestone chips or gravel and a light layer of mulch, and seed

with annual mix (e.g., annual rye). If seeds were collected, utilize for re-seeding within the restored population area.

5.2 RTE Animals

The following impact avoidance measures are proposed for construction in the vicinity of known RTE animal occurrences. These protocols have been developed in coordination with and following pre-filed testimony ("PFT") provided by VT FWD (Doug Blodgett, Scott Darling) for the Project (VT Public Service Board Docket 8400). Prior to site preparation or construction within certain habitats, the Project will obtain a Vermont Endangered & Threatened Species Takings Permit, if required, to address the possible need for capture and handling of protected species (eastern ratsnake, timber rattlesnake). For on-site construction monitoring for RTE snakes and turtles, a qualified individual will be designated as the Project's Herpetologist, subject to review and approval of qualifications by VT FWD. The Herpetologist will be the primary contact for communication and reporting with TDI and VT FWD and will be responsible for training staff biologists and construction crews as necessary. The Herpetologist will be someone who has professional experience with the identification, biology, and handling of target species, in particular with safety and handling of venomous snakes for the safety of the animal, themselves, and work crews. In addition to the designated Herpetologist for construction monitoring, any other trained biologists or crew members that may conduct work that could include capture or handling of protected species under direction of the Herpetologist will be identified on the takings permit as sub-permittees as necessary.

Wood Turtle (*Glyptemys insculpta*, S3, Special Concern)

The following protective measures will be implemented for areas of concern for wood turtle, generally defined as areas within approximately 1,000 feet of rivers and streams and any associated adjacent wetland complexes within the Project corridor which contain suitable and preferred habitats for this species. In those Project areas where there is no suitable habitat despite being within 1,000 feet of a river containing potentially suitable habitat, no monitoring is proposed. An example of one such area is MP 119.6 through 121.9, where the Castleton River is within 1,000 of the Project, however it is on the south side of US-Route 4, and potential wood turtle habitat would not exist due to the US Route 4 roadway, fill, and associated infrastructure as well as the presence of large slate bedrock outcroppings in the Project area. Through communication with VT FWD (Doug Blodgett), the rivers with potential wood

turtle habitat that will require this specific construction monitoring were identified, and are included in Table 1 below.

Table 1. Wood Turtle Construction Monitoring				
Waterbody Name	**Mile Post (MP) Segment**	**Dominant Bed-Bank Substrate**	**Road(s) within MP Segment**	**Town**
Hubbardton River	104.2 – 105.0	Gravel, sand, silt	VT-22A	Benson
Mud Brook	109.8 – 110.1, 110.2 – 110.5	Silt	VT-22A	Fair Haven
Castleton River	121.5 - 121.6, 121.7 – 121.9	Gravel, sand	US-4	Castleton
Clarendon River	123.5 – 123.6	Gravel, sand	US-4	West Rutland
Otter Creek	126.2 – 126.4, 126.5 – 126.6, 126.8 - 127	Silt	US-4	Rutland Town
Branch Brook	144.9 – 145.2	Sand, silt	VT-103	Mount Holly

These waters within proximity to the Project are of moderate gradient, slow to moderate flow velocity, and contain a predominance of sand, silt, and/or organic substrate in their bed and banks. In some instances, Project construction within portions of the MP ranges indicated above would be performed through HDD, as opposed to OTE, thus not presenting a risk to wood turtles. The monitoring within these MP ranges would only be required to occur outside of the designated HDD segments. The specific protocols to be followed will be as follows:

- On site monitoring activities will occur throughout the day: in the morning as construction activities begin and then periodically during daily operations until construction is complete for the day
    - Monitoring for wood turtles will be conducted by the Herpetologist and/or trained personnel on site during construction;
- Open trenches without temporary covering (e.g., steel plates) will be visually inspected for entrapped wood turtles;
- The entire construction area adjacent to the trench-line where equipment traverse will occur will also be monitored;
- Entrapped animals shall be removed from the work zone by the Herpetologist or trained personnel;
- Turtles observed to be in imminent, likely, or potential threat of disturbance or mortality by

construction activities will be captured and relocated to a safe location within reasonable distance[3]; and

- Each time a wood turtle is encountered during monitoring activities, data will be recorded using project-specific field forms or a standardized field journal. Field data will be submitted to VT FWD via electronic mail at least on a weekly basis throughout the duration of Project construction. Data collection shall include at least the following:
    - Confirmation of species identification
    - Date, time, mile post of Project and brief qualitative description (i.e. within trench, adjacent to trench within construction area, on the edge of the construction area)
    - Photographic documentation (if possible)
    - Any signs of visible stress or physical disturbance to the animal
    - Description of handling methods and relocation of the animal
    - Duration of the encounter from detection through final relocation and/or release as necessary

Musk Turtle (*Sternotherus odoratus*, S2, Special Concern)

The following protective measures will be implemented for areas of concern for the eastern musk turtle. Areas of concern are those open trench construction work areas between approximately MP 103 and MP 110 in the towns of Benson, West Haven, and Fair Haven, and which are also being monitored for target snake species described below. The specific protocols to be followed will be as follows:

- On site monitoring activities will occur throughout the day: in the morning as construction activities begin and then periodically during daily operations until construction is complete for the day
    - Monitoring for musk turtles will be conducted by the Herpetologist and/or trained personnel on site during construction;
- Open trenches without temporary covering (e.g., steel plates) will be visually inspected for entrapped wood turtles;

[3] Safe location within reasonable distance will be determined by the professional judgement of the trained herpetologist and is intended to be a release site with suitable cover/shelter and at enough distance from the Project that the animal will not likely wander back into harm's way in the interim before the next routine monitoring activities. VT FWD suggested a rule of thumb distance of 50 yards, however this may vary depending on an individual site or encounter.

- The entire construction area adjacent to the trench-line where equipment traverse will occur will also be monitored;
- Entrapped animals shall be removed from the work zone by a Herpetologist or trained personnel;
- Turtles observed to be in imminent, likely, or potential threat of disturbance or mortality by construction activities will be captured and relocated to a safe location within reasonable distance[4]; and
- Each time a musk turtle is encountered during monitoring activities, data will be recorded using project-specific field forms or a standardized field journal. Field data will be submitted to VT FWD via electronic mail at least on a weekly basis throughout the duration of Project construction. Data collection shall include at least the following:
    - Confirmation of species identification
    - Date, time, mile post of Project and brief qualitative description (i.e. within trench, adjacent to trench within construction area, on the edge of the construction area)
    - Photographic documentation (if possible)
    - Any signs of visible stress or physical disturbance to the animal
    - Description of handling methods and relocation of the animal
    - Duration of the encounter from detection through final relocation and/or release as necessary.

Eastern Ribbonsnake (*Thamnopis sauritus*, S2, Special Concern), Eastern Ratsnake (*Pantherophis alleghaniensis*, S2, State Threatened)

The following protective measures will be implemented for areas of concern for both the eastern ribbonsnake and the eastern ratsnake. Areas of concern are construction work areas within the OTE overland route segments defined in Table 2 below. These areas have been selected because they are within proximity to an EO of current record and were observed to have potential habitat for the RTE snake species. Additionally for the eastern ribbonsnake, VT FWD suggested to include monitoring within approximately 150 feet of all wetlands within the towns of current EO record, which have been included in this plan as indicated in Table 2.

[4] See Footnote 3

Table 2. Eastern Ratsnake and Eastern Ribbonsnake Construction Monitoring			
Species	**Mile Post (MP) Segment**	**Road(s) within MP Segment**	**Town(s)**
Eastern Ratsnake	97.7 – 100.8	Stony Point Road, North Lake Road, Old North Lake Road	Benson
	101.7 – 102.1	Hulett Hill Road, VT-22A	Benson
	103.6 – 109.6	VT-22A	Benson, West Haven, Fair Haven
	112.5 – 113.4	US-4	Castleton
Eastern Ribbonsnake	97.7 – 100.8	Stony Point Road, North Lake Road, Old North Lake Road	Benson
	101.7 – 102.1	Hulett Hill Road, VT-22A	Benson
	132.3 – 134.3, 134.6 – 136.6	VT-103	
	Multiple; within approx. 150 feet of any wetland along the Project		Benson, West Haven, Fair Haven, Castleton

The specific protocols to be followed will be as follows:

- On site monitoring activities will occur throughout the day: in the morning as construction activities begin and then periodically during daily operations until construction is complete for the day
    - Monitoring for ratsnakes and ribbonsnakes will be conducted by the Herpetologist and/or trained personnel on site during construction;
- Open trenches without temporary covering (e.g., steel plates) will be visually inspected for entrapped target snake species;
- The entire construction area adjacent to the trench-line where equipment traverse will occur will also be monitored;
- Entrapped animals shall be removed from the work zone by the Herpetologist or trained personnel;
    - In the case of necessary capture of a ratsnake (state threatened), handling will be conducted only by the Herpetologist and/or other sub-permittees identified on the Vermont Endangered & Threatened Species Takings Permit, if required;

- Snakes observed to be in imminent, likely, or potential threat of disturbance or mortality by construction activities will be captured and relocated to a safe location within reasonable distance[5]; and
- Each time a target snake species is encountered during monitoring activities, data will be recorded using project-specific field forms or a standardized field journal. Field data will be submitted to VT FWD via electronic mail at least on a weekly basis throughout the duration of Project construction. Data collection shall include at least the following:
    - Confirmation of species identification
    - Date, time, mile post of Project and brief qualitative description (i.e. within trench, adjacent to trench within construction area, on the edge of the construction area)
    - Photographic documentation (if possible)
    - Any signs of visible stress or physical disturbance to the animal
    - Description of handling methods and relocation of the animal
    - Duration of the encounter from detection through final relocation and/or release as necessary
    - The Herpetologist or trained personnel as described above will observe erosion control matting used in monitoring areas to confirm that it is free of plastic mesh or similar backing which pose hazards to snakes, and shall instead be constructed of loosely-woven, natural fibers, or bonded fiber matrix (EPSC Project plans contain Project specifications for erosion control matting).

Timber Rattlesnake (*Crotalus horridus*, S1, State Endangered)

The following protective measures will be implemented for areas of concern for the state endangered timber rattlesnake. Areas of concern for this species are construction work areas within the overland route segments between approximately MP 103 and MP 110 in the towns of Benson, West Haven, and Fair Haven. The specific protocols to be followed will be as follows:

- On-site monitoring activities will occur throughout the course of construction activities when open trenching activities are occurring within the target MP segment and will be conducted by the Herpetologist;

[5]See Footnote 3

- Open trenches without temporary covering (e.g., steel plates) as well as adjacent areas within the path of construction equipment will be monitored;
- Entrapped animals in the trench shall be removed from the work zone by the Herpetologist who has experience in venomous snake capture and handling;
- Snakes observed outside of the trench but in imminent, likely, or potential threat of disturbance or mortality by construction activities will be captured and relocated to a safe location within reasonable distance[6];
- Special protocol for all encounters with timber rattlesnakes during construction monitoring:
    - If a timber rattlesnake is encountered, VT FWD shall be notified immediately;
    - If a timber rattlesnake is captured, it shall be temporarily held by the Herpetologist, and VT FWD will be consulted prior to relocation and release to discuss an appropriate location;
- If a timber rattlesnake is encountered during monitoring activities, data will be recorded using project-specific field forms or a standardized field journal. Field data will be submitted to VT FWD via electronic mail at least on a weekly basis throughout the duration of Project construction. This data will be provided in addition to the immediate VT FWD notification protocol described above. Data collection shall include at least the following:
    - Confirmation of species identification
    - Date, time, mile post of Project and brief qualitative description (i.e. within trench, adjacent to trench within construction area, on the edge of the construction area)
    - Photographic documentation (if possible)
    - Any signs of visible stress or physical disturbance to the animal
    - Description of handling methods and relocation of the animal
    - Duration of the encounter from detection through final relocation and/or release as necessary; and
- The Herpetologist or trained personnel as described above will observe erosion control matting used in monitoring areas to confirm that it is free of plastic mesh or similar backing which pose hazards to snakes, and shall instead be constructed of loosely-woven, natural fibers, or bonded fiber matrix (EPSC Project plans contain Project specifications for erosion control matting).

[6] See Footnote 3

Indiana Bat (S1, State Endangered, Federally Endangered)

The following protective measures will be implemented for Indiana bat:

- Prior to any site preparation or construction activities, all potential roosting trees identified during biological surveys (116 trees) will be demarcated in the field with high visibility flagging;
- As part of environmental training during construction orientation, work crews will be advised of the flagging color that was used for potential roost trees and that such trees are not to be cut during construction activities;
- All potential Indiana bat roosting trees will be avoided by construction and operation of the Project as currently proposed;
- If design changes result in impacts or removal of any identified potential roosting trees, bat exit surveys of the impacted trees will be conducted in accordance with the following criteria:
    - Surveys will be conducted during the months of June and July in order to determine the presence of, or absence of use by, roosting Indiana bats;
    - For each potential roost tree proposed to be impacted, a total of five detector nights of acoustic survey will be completed, with the detector aimed at the tree proposed for removal or impact;
    - At least one detector cone will be placed such that it covers the target tree bole from 10 feet above the ground up to full canopy height, which typically would require that the detector be placed between approximately 50 to 60 feet from the base of the tree with the microphone pointed at the correct angle;
    - At least four of the detector nights will have conditions above 50 degrees Fahrenheit, winds less than 9 miles per hour, and no sustained rainfall;
    - Acoustic survey results will be presented to the VT FWD upon completion of each tree's surveys, and consultation from VT FWD will precede any tree cutting;
    - Any potential roost tree that is found to exhibit the following conditions will be considered to have no protected bats present:
        - No cat calls recorded; or
        - No *Myotis spp*. bat calls recorded during the dusk period (up to 2 hours after sunset) or dawn period (Within 2 hours prior to sunrise);

- The presence of roosting bats will be presumed for every tree for which *Myotis spp*. bat calls have been recorded during dawn or dusk periods. In order to overcome this presumption, TDI-NE will conduct emergence surveys consisting of 3 consecutive nights of emergence surveys to establish the absence of roosting bats. The bat emergence surveys, if required, would include the following:
    - Specific methodology outlined in the USFWS 2015 Range-wide Indiana Bat Summer Survey Guidelines, Appendix E Phase 4 Emergence Surveys – Emergence Surveys for Potential Roost Trees;
    - Emergence surveys to be conducted by at least one person, and will commenced at least one-half hour before sunset and not end earlier than one hour after sunset;
    - Data will be recorded using the USFWS Bat Emergence Survey Dataset provided in the USFWS Guidelines appendix;
- All survey work and acoustic data analysis will be conducted by individuals trained in bat monitoring and acoustic identification and subject to approval by VT FWD. TDI-NE will provide VT FWD with the identification and qualifications of proposed surveyors at least 30 days prior to the survey window. Approval of proposed individuals who possess the appropriate qualifications shall not be unreasonable withheld;

- Any potential roost tree for which surveys indicate no bat use may be removed by TDI-NE at any time of year as long as the tree does not exceed 16 inches diameter at breast height ("DBH"). For any tree greater than 16 inches DBH for which survey data indicates no bat use, TDI-NE may only cut the tree within 10 days of the last emergence count or acoustic survey night, or during the winter season between October 1 and March 31; and
- No cutting of roost trees found to contain Indiana bats will occur unless VT FWD reviews the exit survey data and determines that the tree may be cut during the winter season between October 1 and March 31.

5.3 Natural Communities

None of the significant natural community E0s identified within 0.25 mile of the Project are present within the areas proposed for construction disturbance. The field surveys identified four new

potentially-significant natural communities (each of which would require an off-ROW investigation to confirm) and five likely significant communities. All are forest communities located adjacent to roadside ROWs.

Eight areas will incur minimal permanent impacts to their periphery, where they abut roadside ROWs. Impacts can be distinguished between permanent and temporary tree clearing. The Project as currently proposed will require approximately 5.51 acres of tree removal in these areas. Of this, 4.73 acres will be allowed to regenerate to pre-construction conditions following construction of the Project when temporary workspaces are no longer required and after all EPSC restoration measures have been completed. The 4.73 acres that would be allowed to regenerate naturally is defined as 4.72 acres in collateral environmental permit language (USACE), however is reported here as 4.73 acres due to rounding to report acreage measurements to three significant figures.

Only 0.79 acre within potential or likely significant natural communities will be permanently converted from a forested state to herbaceous and low-growing scrub-shrub cover (coinciding with the 12 foot wide permanent cable easement), which will be managed in accordance with the Project Vegetation Management Plan (VHB, 2015). The cutting includes areas located adjacent to the US Route 4 Clear Zone along the edges of much larger forested blocks, thereby creating a negligible effect on the area or overall quality of the subject communities. Tree removal requirements for the Project as currently proposed are summarized in Table 3. Post construction NNIS monitoring and management will be implemented in accordance with the Project Vegetation Management Plan. No undue adverse impacts to the communities will occur from this limited tree removal along an existing highway corridor.

If significant changes to the Project design result in changes to the necessary tree clearing for Project construction, then coordination with the VT FWD will be completed in order to discuss any additional avoidance or minimization protocols.

Table 3: Potential Significant Natural Communities and Approximate Tree Removal Impacts						
MP	**Site Name**	**Natural Community**	**State Rank**	**Rank Comment**	**Temporary Tree Removal (Acres)**	**Permanent Tree Removal (Acres)**
112.0	Green Dump Hills	Dry Oak-Hickory-Hophornbeam Forest	S3	May be significant natural community, would require further study off-ROW to confirm.	None	None
114.5	Pine Pond West	Temperate Hemlock-Hardwood Forest	S4	May be significant natural community, would require further study off-ROW to confirm.	0.99	0.32
115.0	Pine Pond East	Temperate Hemlock Forest	S4	May be significant natural community, would require further study off-ROW to confirm.	0.32	0.01
117.0	Blueberry Hill	Mesic Maple-Ash-Hickory-Oak Forest	S3	Likely significant natural community	0.73	0.09
119.3	Mount Hanley West	Mesic Maple-Ash-Hickory-Oak Forest	S3	Likely significant natural community	0.04	0.02
120.4	Mount Hanley East	Mesic Maple-Ash-Hickory-Oak Forest	S3	Likely significant natural community	0.8	0.13
121.3	Twin Mountain	Mesic Maple-Ash-Hickory-Oak Forest	S3	Likely significant natural community	0.57	0.01
122.6	Herrick Mountain NE	Mesic Red Oak-Northern Hardwood Forest	S4	May be significant natural community, would require further study off-ROW to confirm.	1.28	0.21
135.1	Mill River, Railroad	Sugar Maple-Ostrich Fern Riverine Floodplain Forest	S1	Likely significant natural community	None	None

5.4 Necessary Wildlife Habitat

As currently proposed, the Project will avoid tree removal in all potential DWA with the exception of one limited area immediately adjacent to VT Route 103 from approximate MP 140.7 to 140.9. In this area, a narrow (between approximately 10 to 30 feet wide) swath of trees adjacent to VT Route 103 will be removed for construction and operation of the Project. This will include approximately 0.3 acre of temporary tree removal and 0.3 acre of permanent tree removal. No adverse impacts to this potential DWA will occur from this limited tree removal along an existing highway corridor.

If, during refinement of the Project design, it is determined that additional tree removal will be required in potential DWA, further consultation with the VT FWD will be conducted to determine any necessary additional avoidance and minimization strategies.

Regarding necessary wildlife habitat for black bear, a potential bear travel corridor within mapped "Bear Production Habitat" along VT Route 103 near the Mount Holly and Ludlow town border will be traversed by the Project. Limited tree removal may be required along the VT Route 103 corridor in this area to install the cable within the VTrans ROW. This limited tree removal will not affect critical Bear Production Habitat since the habitat in the Project area is fragmented and disturbed due to traffic and human activities. Additionally, the temporary construction activities will not significantly impede movement of Black Bear during construction (especially relative to pre-existing traffic in the area) nor will the Project have a permanent effect on the travel corridor.

6.0 Summary and Regulatory Context

This Summary Report and the enclosed attachments describe state and federal RTE species, natural communities and necessary wildlife habitat within the study area of the proposed NECPL Project. Additionally, it details the Project avoidance and minimization measures that will be implemented to avoid undue Project-related adverse impacts to the RTE species, natural communities and necessary wildlife habitat.

If Project design changes subsequent to the preparation of this report have the potential to adversely affect RTE species, natural communities or necessary wildlife habitat, follow-up consultation with VT ANR and/or USFWS will be conducted.

6.1 Conclusion Regarding Section 248(b) Criteria

This Summary Report addresses the potential effect on RTE species, significant natural communities or RINA, and necessary wildlife habitat in accordance with Section 248(b)(5) of Title 30, Vermont Statutes Annotated (V.S.A.), which provides that a generation or transmission facility should not have an undue adverse effect on the natural environment with due consideration having been given to the environmental criteria specified in 10V.S.A. § 6086(a)(1)(8) and 10 V.S.A. § 6086(a)(1)(8)(A).

Specifically, criterion 8(A) of Act 250 provides that a Certificate of Public Good will not be granted if it is demonstrated by a party opposing a project that the project will "destroy or significantly imperil necessary wildlife habitat or any endangered species." The Act 250 criterion for wildlife habitat defines "necessary wildlife habitat" as "concentrated habitat which is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life, including breeding and migratory periods" (10 V.S.A. Section 6001(12)). Additionally, Act 250 Criterion 8 provides that before granting a Certificate of Public Good, the Public Service Board must determine that the project will not have an undue adverse effect on "rare or irreplaceable" natural areas ("RINA"), among other resources.

This Report details the avoidance and minimization measures to avoid undue Project-related adverse impacts to the RTE species, significant natural communities or RINA, and necessary wildlife habitat. With implementation of the avoidance and minimization measures included herein, we conclude the Project will not have an undue, adverse effect upon necessary wildlife habitat, RINA, nor will it destroy or significantly imperil rare, threatened, or endangered species.

6.2 Federal Endangered Species Consultation

With implementation of the Indiana bat and northern long-eared bat habitat avoidance measures described in Section 5.2, no federally threatened or endangered animal species will be adversely affected by the Project.

Based on survey results described in this report, no federally threatened or endangered plants are present in the study area. No federally listed plants will be affected by the Project.

6.3 State Endangered Species Consultation

With implementation of the RTE Animal monitoring and protection measures described in Section 5.2, no state threatened or endangered animal species will be adversely affected by the Project.

Based on survey results described in this report and Project design as currently proposed, no state threatened or endangered plants will be impacted. Six threatened and three endangered plant species were identified in the study area; all have been avoided with the proposed implementation of HDD construction, or route and workspace reconfiguration.

7.0 References

Champlain, VT, LLC d/b/a TDI New England. Vegetation Management Plan - New England Clean Power Link. Prepared by VHB, revised July 27, 2015.

ATTACHMENT A

Table A-1: Plants Element Occurrences within 0.25-mile of the Terrestrial Cable Route and New Observed RTE and Uncommon Plant Populations

Milepost	NR Map Number	EO ID (or RTE ID for observed occurrences)	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/ Life History	Identification	EO Record Location	Survey Location/Notes	Survey Results/Impact Avoidance
RTE Plant Element Occurrences													
98	2	4957	*Peltandra virginica*	Arrowleaf	S2S3	Not Listed	-	2012	Within or along the shores of freshwater lakes, ponds, rivers, and streams, swamps, bogs, and wetland margins. Blooms spring to late summer.	Leaf: green to purple green, basal, heart-shaped or arrow-shaped leaf blade with backward facing round or pointed lobes, 90 to 570 millimeters long; Flower: pistallate, pale green to greenish white; Inflorescence: spike; Fruit: berry-fleshy with a wall enclosing one or more sections with two or more seeds.	Plants in exposed mud along west edge of wetland 30 feet from edge of F&W access parking and 70 feet south of bridge.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
103.7	7	7780	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed	-	1990	Upland woods in poor, dry, often sandy soil, man-made or disturbed habitats, river or stream floodplains, meadows, fields, ridges, ledges, shores of rivers and lakes, or woodlands. Blooms from June to August.	Plant: perennial; Leaf: simple, entire, opposite lobed or unlobed, not separated into leaflets; Flower: blue to purple, pink to red, or white, radially symmetrical, 4 petals, 4 stamens; Fruit: dry, splits open when ripe.	On east side of Route 22A, south of the turn on Lake Road to Benson village.	Not observed in vicinity of EO location.	The habitat assessment and species survey identified the presence of this species over 5 miles away from the vicinity of this occurrence. See RTE IDs 2014-RTE-HL-1, 2014-RTE-HL-2, 2014-RTE-HL-3 and 2014-RTE-HL-4 for descriptions of the mapped populations and impact avoidance.
103.7	7	9189	*Lonicera hirsuta*	Hairy Honeysuckle	S2	Not Listed	-	1990	Rich rocky slopes on marble or limestone bedrock; forests, ridges or ledges, or woodlands. Bloom mid- to late June.	Plant: perennial, deciduous vining or tailing shrub; Leaf: yellow, oval, simple, entire, 2 leaves, 50 to 110 mm long	On east side of Route 22A, south of the turn on Lake Road to Benson village. Formerly called "Cunningham Cobble."	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
103.9	7	9546	*Ulmus thomasii*	Cork Elm	S1	Threatened	-	1990?	Moist,loamy soils, rich woods, streambanks and floodplains, or dry uplands, especially rocky slopes, limestone outcrops, ridges and exposed ledges. Flowers bloom between	Plant/Form: medium-sized tree reaching heights of 70 to 80 feet with a narrower more upright crown; Leaf:	On the east side of Route 22A, south of Lake Road.	Not observed in vicinity of EO location.	This occurrence is off-ROW and no tree clearing is proposed in vicinity. Species was not observed during general RTE surveys.
104	7	9760	*Sisyrinchium angustifolium*	Narrow Blue-eyed-grass	S2S3	Not Listed	-	1983	Meadows and fields, shores of rivers or lakes, and wetland margins.Blooms spring to early summer.	Plant: perennial herb, dark olive green to bronze or blackish; Leaf: alternate, grow at the base of the	Ditch by roadside rest area, west side of Route 22A between Lake Road and East Road.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
105.8	8	4307	*Carya glabra*	Pignut Hickory	S2	Not Listed	-	2012	Dry ridgetops and sideslopes, but also moist sites in oak-hickory forests.Blooms in June; Fruits ripens in September and October.	Leaf: Alternate, pinnately compound, 8 to 12 inches long, with 5 to 7 leaflets; Flower: males are yellow-	East of Route 22A and west of Beaver Meadow along Rattlesnake Ridge.	Not observed in vicinity of EO location.	This occurrence is off-ROW and no tree clearing is proposed in vicinity. Species was not observed during general RTE surveys.
106	9	9035	*Boechera missouriensis*	*Green Rock-cress*	S1	Not Listed	-	2005	Rocky woodlands, cliffs and other rocky habitats.Blooms May to June.	Height: 8 to 20 inches; Leaves: Clasping stem leaves are up to 3 inches in length and numerous. Basal leaves	Along the Great Ledge on the east side of Route 22A, south of the Benson/West Haven townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
106	9	4796	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed	-	2012	Upland woods in poor, dry, often sandy soil, man-made or disturbed habitats, river or stream floodplains, meadows, fields, ridges, ledges, shores of rivers and lakes, or	Plant: perennial; Leaf: simple, entire, opposite, lobed or unlobed, not separated into leaflets;	Along the Great Ledge on the east side of Route 22A, south of the Benson/West Haven townline.	Not observed in vicinity of EO location.	The habitat assessment and species survey identified the presence of this species over 3 miles away from the vicinity of this occurrence. See RTE IDs 2014-RTE-HL-1, 2014-RTE-HL-2, 2014-RTE-HL-3 and 2014-RTE-HL-4 for descriptions of the mapped populations and impact avoidance.
106.1	9	3507	*Corylus americana*	American Hazelnut	S2S3	Not Listed	-	2008	Moist to dry; open woods, thickets, hillsides, roadsides, fence rows. Vibrant red fall foliage.Blooms early spring.	Plant: perennial, erect, open, rounded shrub to 11' tall; smooth bark light gray; branches erect, twigs hairy;	East subpopulation: northern 9 acres of small clayplain forest parcel between Hubbardton River and Route 22A. West	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
106.4	9	1270	*Boechera stricta*	Drummond's Rock-cress	S1	Endangered	-	1987	Rocky forests, cliffs, and talus slopes on moderate to high pH rock.	Plant: 11 to 35 inches tall; Leaves: basal clump near the caudex, up to 3 inches long. Leaves also along	Along the Great Ledge on the east side of Route 22A, south of the Benson/West Haven townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
106.4	9	7556	*Cardamine parviflora var. arenicola*	Small-flower Bitter-cress	S2	Not Listed	-	2000	Cliffs, balds, or ledges, forests, ridges or ledges, talus and rocky slopes, woodlands. Blooms April to June.	Plant: annual, erect to spreading; Flower: white, radially symmetrical, 4 separate petals; Leaf:	Along the Great Ledge on the east side of Route 22A, south of the Benson/West Haven townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
106.4	9	2678	*Carex brevior*	Fescue Sedge	S3	Not Listed	-	1987	Prairies, meadows, open woods, dry road banks, often in calcareous or neutral soils. Fruits early to mid-summer.	Plants densely cespitose; rhizomes sometimes short-prolonged, appearing elongate in old clumps.	Along the Great Ledge on the east side of Route 22A, south of the Benson/West Haven townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
112.6	14	8850	*Lespedeza hirta*	Hairy Bush-clover	S1	Threatened	-	2012	Man-made or disturbed habitats and woodlands. Blooms late summer.	Plant: perennial herb; Leaf: compound, alternate, one leaf per node, entire; Flower: cream-colored	0.5 miles north of Hydeville. Along Point of Pines Road, 450 feet to the west of its southern junction with Creek Road along	Plants observed in vicinity of EO.	The habitat assessment and species survey identified the presence of this species in the vicinity of this occurrence. See RTE IDs 2014-RTE-LH-3, 2014-RTE-LH-4, 2014-RTE-LH-5, 2014-RTE-LH-6 and 2014-RTE-LH-7 for descriptions of the mapped populations and impact avoidance.
112.7	14	1339	*Proserpinaca palustris*	Marsh Mermaid-weed	S2S3	Not Listed	-	1977	Still to slow-moving, neutral to basic water and the shores of lakes, ponds, rivers, and pools, shallow waters of bogs, fens, swamps, and wetland margins.	Plant: perennial, aquatic, submersed and emergent plant communities; Leaf: submersed and emersed	Large lake in towns of Hubbardton and Castleton, west of Route 30 and north of Route 4.	NA	This area was not surveyed for the occurrence since it will be bypassed with the use of HDD at Lake Bomoseen and impacts to potential habitat will be avoided.

Milepost	NR Map Number	EO ID (or RTE ID for observed occurrences)	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/ Life History	Identification	EO Record Location	Survey Location/Notes	Survey Results/Impact Avoidance
112.8	14	1513	*Potamogeton strictifolius*	Straight-leaf Pondweed	S2S3	Not Listed	-	1996	Lakes, ponds, and slow-moving streams to depths of 9 feet of water on sandy or hard, muddy substrates.	Plant: annual, linear-leaved aquatic; Leaf: rigid, two-ranked, submersed leaves, 0.5 to 1.5 millimeters wide,	Southern channel of Lake Bomoseen just north of Route 4, near shore.	NA	This area was not surveyed for the occurrence since it will be bypassed with the use of HDD at Lake Bomoseen and impacts to potential habitat will be avoided.
113	15	8633	*Myriophyllum verticillatum*	Whorled Water-milfoil	S2S3	Not Listed	-	2009	Lakes, ponds, ditches and small streams.	Plant: perennial, aquatic, submersed and emergent plant communities; Submersed and emersed	Indian Bay at the southeast end of Lake Bomoseen.	NA	This area was not surveyed for the occurrence since it will be bypassed with the use of HDD at Lake Bomoseen and impacts to potential habitat will be avoided.
117	19	7476	*Aureolaria flava*	Smooth False-foxglove	S2	Not Listed	-	2011	Dry upland woods; associated with red and white oak. Blooms late summer to early fall, between July and September.	Plant: 7 feet tallt; Leaves: Opposite arrangement; upper leaves are toothed while the lower leaves are	North of Route 4, east of the junction with East Hubbardton Road.	Plants observed in vicinity of EO.	The habitat assessment and species survey identified the presence of this species in the vicinity of this occurrence. See RTE IDs 2014-RTE-AF-1 and 2014-RTE-AF-2 for descriptions of the mapped populations and impact avoidance.
121	22	9693	*Conopholis americana*	Squaw-root	S3	Not Listed	-	2009	Forests and forest edges where species of oak are present. Bloom late spring to early summer.	Plant: perennial, erect, unbranched; Flowers: thick spike of cream-colored flowers, 0.5 inch long each.	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.3	22	6182	*Corallorhiza odontorhiza*	Autumn Coral-root	S2	Threatened	-	1983	Dry woodlands; hardwood to mixed upland forest.Blooms August to September.	Flowers: 5 to 15, drooping, petals are 3 to 4.5 millimeters long, reddish-purple above with an entire	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	6080	*Aureolaria virginica*	Downy False-foxglove	S1	Not Listed	-	1902	Woodlands and ridges populated by oak species.Blooms June to August.	Height: 1.5 to 5 feet; Leaves: simple, opposite, leaves can have lobes and teeth or neither; Flowers: yellow, 1.5	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	7786	*Boechera missouriensis*	Green Rock-cress	S1	Not Listed	-	1893	Rocky woodlands, cliffs and other rocky habitats.Blooms May to June.	Height: 8 to 20 inches; Leaves: Clasping stem leaves are up to 3 inches in length and numerous. Basal leaves	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	5011	*Chenopodium foggii*	Fogg's Goosefoot	S1	Not Listed	-	1900	Cliffs, balds, or ledges, forests, talus and rocky slopes, woodlands. Fruits late summer.	Plant: annual, erect; Leaf: small, alternate, slightly lobed near the base, covered with inflated hairs;	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	4107	*Chimaphila maculata*	Spotted Wintergreen	S2S3	Not Listed	-	2009	Forests and woodlands.Blooms early summer.	Leaf: alternate but appearing whorled, evergreen, thickened, lance shaped with sharp serration,	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	8634	*Crataegus intricata*	Intricate Hawthorn	SH	Not Listed	-	1910	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, ridges or ledges, woodlands. Blooms in May; fruits ripen in September.	Plant: perennial, deciduous shrub or tree with spines, prickles, or thorns growing to 9 feet high; Leaf:	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in August 2014 found no species in the vicinity of the occurrence, within the VTrans ROW. The species is likely extirpated.
121.4	22	8849	*Crataegus jesupii*	Jesup's Hawthorn	SH	Not Listed	-	1909	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields.Blooms in spring.	Plant: perennial, deciduous shrub or tree with spines, prickles, or thorns; Leaf: simple, lobed, and toothed	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in August 2014 found no species in the vicinity of the occurrence, within the VTrans ROW. The species is likely extirpated.
121.4	22	9212	*Crataegus succulenta*	Fleshy Hawthorn	S1?	Not Listed	-	1902	Forest edges and forests, meadows and fields, riverbanks and floodplains, lake shores, ravines. Blooms in spring.	Plant: perennial, deciduous shrub or tree with thorns up to 10 centimeters long; Leaf: simple and toothed along	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	9543	*Eragrostis capillaris*	Lace Love-grass	S2S3	Not Listed	-	1912	Dry sandy or rocky soils; man-made or disturbed habitats including sandy roadsides, open balds, rocky ridges, ledges, and floodplains. Fruits August to October.	Plant: annual grass, tufted and erect, growing to 20 to 40 centimeters Leaves: 2 to 4 mm wide; Inflorescence:	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	5507	*Juncus secundus*	Secund Rush	S1	Endangered	-	1902	Dry, open, sterile soil and clearings such as rocky summits and outcrops. Flowering and fruiting in late spring to summer.	Plant: rush with grass-like morphology , small flowers with 6 tepals located along the inner side of the	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.4	22	8301	*Sisyrinchium angustifolium*	Narrow Blue-eyed-grass	S2	Not Listed	-	1902	Meadows and fields, shores of rivers or lakes, and wetland margins. Blooms spring to early summer.	Plant: perennial herb, dark olive green to bronze or blackish; Leaf: alternate, grow at the base of the	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	10175	*Chamaecrista nictitans*	Wild Sensitive Plant	S2	Not Listed	-	1982	Open woods prairies, thickets, wet or dry shores, on sandy soils, and commonly in disturbed habitats. Blooms July to September.	Plant: annual, up to 50 centimeters in height; Leaf: alternate, compound pinnate with 10 to 25	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	9187	*Crataegus biltmoreana*	Biltmore Hawthorn	S1	Not Listed	-	2009	Forest edges, forests, ridges or ledges, woodlands	Plant: perennial, deciduous shrub or tree with spines, prickles, or thorns; Leaf: simple, lobed, and toothed	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	8313	*Lespedeza violacea*	Violet Bush-clover	S2S3	Not Listed	-	2011	Dry forests and woodlands, usually on sandstone bluffs. Blooms late June through late July; Fruiting occurs late July through September.	Plant: perennial; Leaf: 3 leaflets, 1 to 4 centimeters each, elliptic, hairy beneath and smooth or nearly so	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	3419	*Muhlenbergia sobolifera*	Sprout Muhly	S2	Not Listed	-	2009	Dry rocky or gravelly woodlands, shaded ledges, rocky summits, talus and outcrops. Fruits September to October.	Grass with small, single flowered spikelets (1.6 to 3 millimeters long) with folded floral scales. Slender	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.

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121.5	23	2799	*Paronychia canadensis*	Smooth Forked Chickweed	S1	Not Listed	-	1895	Rocky forests and forest edges, talus and rocky slopes, and woodlands. Blooms June to September.	Plant: erect, annual forb with smooth, forking stems; Flower: green, 5-parted, no petals, round sepals;	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	8269	*Polygonum douglasii*	Douglas' Knotweed	S2	Endangered	-	2011	Thin soils at the base of cliffs, on ledges, and in rocky woodlands. Blooms June to October.	Plant: annual; Stems: unusual for knotweeds, sharply angled and square in cross-section; Leaf: narrow,	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.5	23	8305	*Scutellaria parvula var. parvula*	Small Skullcap	S2	Not Listed	-	2010	Shallow soils over bedrock; cliffs, balds, or ledges, ridges or ledges, shores of rivers or lakes, and woodlands. Bloom late spring to early summer.	Plant: perennial; Leaf: principal leaves sessile, ovate to rotund, 10 to 15 mm long, surface covered	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.6	23	1921	*Aureolaria flava*	Smooth False-foxglove	S2	Not Listed	-	2009	Dry upland woods; associated with red and white oak. Blooms late summer to early fall, between July and September.	Plant: 7 feet tall; Leaves: Opposite arrangement; upper leaves are toothed while the lower leaves are	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline within the	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
121.6	23	8302	*Desmodium cuspidatum*	Large-bracted Tick-trefoil	S1	Endangered	-	2009	Dry, rocky, open areas such as forested edges, rocky ridges, embankments, and man-made and disturbed sites, and especially scrubby, shrub-dominated areas with	Plant: erect, perennial herb growing up to 6 feet. Leaf: alternate and pinnately compound, each leaf has 3	Along the Taconic Range north of Route 4 and Castleton River, east of the Castleton/West Rutland townline within the	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
124.3	25	1110	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed	-	1898	Along streams on gravel bars, glades, rocky banks, outcroppings. Blooms in late summer to early fall between July and October.	Plant: erect, annual, 8 to 16 inches tall, aromatic forb, finely hairy; stems square with many branches;	Boardman Hill, West Rutland.	Plants observed in vicinity of EO.	The habitat assessment and species survey identified the presence of this species in the vicinity of this occurrence. See RTE IDs 2014-RTE-TB-3, 2014-RTE-TB-4, 2014-RTE-TB-5, 2014-RTE-TB-6, 2014-RTE-TB-7 and 2014-RTE-TB-8 for descriptions of the mapped populations and impact avoidance.
127.6	26	558	*Pycnanthemum verticillatum*	Whorled Mountain-mint	S2S3	Not Listed	-	1989	Open, calcareous wetlands, usually on wet sandy substrates, and abandoned fields, swampy meadows, marshes and woods. Blooms July though August.	Perennial herb with a branching, square stem up to 1.5 meters tall, minutely pubescent throughout.	In 1989, found in an old field which is now the site of the Rutland Mall.	Not observed in vicinity of EO location.	The habitat assessment and species survey identified the presence of this species over 2 miles away from this occurrence. See RTE IDs 2014-RTE-PY-1 and 2014-RTE-PY-2 for descriptions of the mapped populations and impact avoidance.
133.4	33	5049	*Pycnanthemum muticum*	Blunt Mountain-mint	S1	Not Listed	-	2011	Dry woods, thickets, and clearings, man-made or disturbed habitats, cliffs, balds, or ledges, ridges, meadows or fields. Blooms July to September.	Plant: perennial, herbaceous; Flower: white in button-like heads at the top of the stem, bilaterally	Northeast of Route 103 and southeast of Lincoln Hill Road within a powerline ROW.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
144.1	43	9921	*Malaxis monophyllos var. brachypoda*	White Adder's-mouth	S2S3	Threatened	-	pre-1983	Bogs, fens and swamps with northern white cedar. Blooms June to August.	Plant: perennial, glaborous, 10 to 20 centimeters tall; Leaf: solitary, located above the base of the stem, 3 to 10	East of Mount Holly, rock walls along the Rutland Railroad just south of the Village of Summit.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
147	45	4609	*Stellaria alsine*	Trailing Stitchwort	S2	Not Listed	-	1983	Shores of rivers or lakes, swamps, wetland margins. Blooms in spring to early-summer.	Plant: perennial, creeping; Flower: white, radially symmetrical, 5 separate petals; Leaf: simple,	Northeast of Route 103 and east of Buttermilk Falls.	Not observed in vicinity of EO location.	A habitat assessment and species survey in summer 2014 found no species in the vicinity of the occurrence, within the VTrans ROW.
149.7	48	3534	*Juncus greenei*	Greene's Rush	S2	Threatened	-	2011	Damp shores, thickets, open wetlands. Fruits July to August.	Plant: perennial rush with grass-like morphology , small flowers with 6 tepals, and 3-valved capsules. Small	On either side of Structure 16 of the 350 Line, on steep slope east of East Lake Road/Route 100, Ludlow.	Plants are present in transmission line ROW outside of study area.	A habitat assessment and species survey in summer 2014 found no species in the town road ROW / study area.
Observed RTE Plant Species													
0.5	1	2014-RTE-HA-1	*Helenium autumnale*	Sneezeweed	S1	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, shores of rivers or lakes		NA	Dry outrcop; One of only 2 extant populations in the state; >1000 ramets; > 500 genets	Avoided. HDD proposed under population.
100.6	4	2014-RTE-SC-1	*Sanicula canadensis var. canadensis*	Short-styled Snakeroot	S2S3	Not Listed		2014	Deciduous woodlands		NA	Forest; 2 flowering plants and 4 vegetative rosettes in dry, rich forest edge; 6 plants	Avoided. Cable to be installed within roadway.
104	7	2014-RTE-SL-1	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Forest edge; Edge of dry oak forest, vigorous plants, healthy population; 82 plants	Avoided.
107.3	10	2014-RTE-SL-2	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Moderate sized population on dry embankment; 50 plants	Avoided.
107.3	10	2014-RTE-SL-3	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Moderate sized population on dry embankment; 200 plants	Avoided.
107.5	10	2014-RTE-SL-4	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Dry outcrop; Single plant at top of roadcut; 1 plant	1 plant, likely to be impacted. Implement RTE Protection plan described in Section 5.1.
108	10	2014-RTE-SL-5	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Two plants along roadside; 2 Plants	Avoided by HDD.

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108	10	2014-RTE-SL-6	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Small population along roadside; 2 plants	Avoided by HDD.
108.1	10	2014-RTE-SL-7	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Small population along roadside; 10 plants	Avoided by HDD.
108.4	11	2014-RTE-SL-8	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Dry roadside embankment; Small population occupying 1% cover within polygon; Unknown	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.5	11	2014-RTE-HL-1	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry outcrop; Series of metapopulations totalling > 200 plants; Unknown; Pop. total > 200 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.5	11	2014-RTE-HL-2	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry outcrop; Series of metapopulations totalling > 200 plants; Unknown; Pop. total > 200 plants	Small population on outcrop, will be avoided.
108.4	11	2014-RTE-SL-9	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Dry roadside embankment; Small population occupying 2% cover within polygon; Unknown	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.5	11	2014-RTE-HL-3	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry outcrop; Series of metapopulations totalling > 200 plants; Unknown; Pop. total > 200 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.6	11	2014-RTE-HL-4	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry outcrop; Series of metapopulations totalling > 200 plants; Unknown; Pop. total > 200 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.6	11	2014-RTE-SL-10	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; Four plants along roadside; 4 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
108.6	11	2014-RTE-SL-11	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside; A few plants scattered in area; 4 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
109.7	12	2014-RTE-CD-1	*Crataegus dodgei*	Dodge's Hawthorn	SH	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields		NA	Dry outcrop; 15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years; Pop. total 15-20 plants	Avoided.
109.8	12	2014-RTE-CD-2	*Crataegus dodgei*	Dodge's Hawthorn	SH	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields		NA	Dry outcrop; 15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years; Pop. total 15-20 plants	Avoided.
109.8	12	2014-RTE-GP-1	*Galium pilosum*	Hairy Bedstraw	S1	Not Listed		2014	Forest edges, meadows and fields, woodlands		NA	Wetland on shore of Lake Champlain; Large population in shoreline wetland; appx 300 plants	Avoided.
109.8	12	2014-RTE-SL-12	*Symphyotrichum laeve var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Roadside and dry outcrop; Large population on margin of fields and dry outcrops; > 100 plants	Small population on outcrop will be impacted. Implement RTE Protection Plan described in Section 5.1.
109.8	12	2014-RTE-CD-3	*Crataegus dodgei*	Dodge's Hawthorn	SH	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields		NA	Dry outcrop; 15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years; Pop. total 15-20 plants	Avoided.
112	14	2014-RTE-LH-1	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Dry outcrop; Two patches in this sub-population totalling appx 100 plants; appx 160 ramets; 80 genets	Avoided.
112.1	14	2014-RTE-HL-5	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry summit and ledge outcrop; Series of metapopulations totalling > 1000 plants; Unknown; Pop. total > 1000 plants	Population on ledge outrcop, will be avoided.
112.1	14	2014-RTE-LH-2	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Dry outcrop; Two patches in this sub-population totalling appx 100 plants; appx 20 plants	Population on ledge outrcop, will be avoided.
112.1	14	2014-RTE-LV-1	*Lespedeza violacea*	Violet Bush-clover	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, grassland, meadows and fields, ridges or ledges, woodlands		NA	Dry outcrop; Small population on dry ledge above road; 50 75 plants	Population on ledge outrcop, will be avoided.

Milepost	NR Map Number	EO ID (or RTE ID for observed occurrences)	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/ Life History	Identification	EO Record Location	Survey Location/Notes	Survey Results/Impact Avoidance
112.2	14	2014-RTE-HL-6	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry summit and ledge outcrop; Series of metapopulations totalling > 1000 plants; Unknown; Pop. total > 1000 plants	Population on ledge outrcop, will be avoided.
112.3	14	2014-RTE-CS-2	*Calystegia silvatica ssp. fraterniflora*	Shortstalk false bindweed	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields		NA	Roadside; Plants stressed and mowed; 10 ramets; 1 genet	Population will be impacted. Implement RTE Protection plan described in Section 5.1.
112.3	14	2014-RTE-CS-1	*Calystegia spithamaea ssp. spithamaea*	Low Bindweed	S2	Threatened		2014	Anthropogenic (man-made or disturbed habitats), grassland, meadows and fields, sandplains and barrens, woodlands		NA	Dry open outcrop; Small habitat patch; 30 ramets; 1 genet	Avoided. On opposite side of road.
112.4	14	2014-RTE-HL-7	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry summit and ledge outcrop; Series of metapopulations totalling > 1000 plants; Unknown; Pop. total > 1000 plants	Population on ledge outrcop, will be avoided.
112.5	14	2014-RTE-HL-8	*Houstonia longifolia*	Longleaf Bluet	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), floodplain (river or stream floodplains), meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Dry summit and ledge outcrop; Series of metapopulations totalling > 1000 plants; Unknown; Pop. total > 1000 plants	Population on ledge outrcop, will be avoided.
112.5	14	2014-RTE-LH-3	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Under powerline and dry outcrop above road; Large population in multiple patches north of road; Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Avoided.
112.6	14	2014-RTE-LH-4	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Under powerline and dry outcrop above road; Large population in multiple patches north of road; Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Avoided.
112.6	14	2014-RTE-LH-6	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Under powerline and dry outcrop above road; Large population in multiple patches north of road; Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Avoided.
112.6	14	2014-RTE-LH-5	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Under powerline and dry outcrop above road; Large population in multiple patches north of road; Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Avoided.
112.6	14	2014-RTE-LH-7	*Lespedeza hirta ssp. hirta*	Hairy Bush-clover	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), woodlands		NA	Under powerline and dry outcrop above road; Large population in multiple patches north of road; Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Avoided.
112.8	14	2014-RTE-GO-1	*Galium obtusum*	Large Marsh Bedstraw	S2S3	Not Listed		2014	Floodplain (river or stream floodplains), forests, swamps		NA	Wetland along roadside; Small backwater wetland; 15-20 ramets; 5-10 genets	Avoided.
112.7	14	2014-RTE-PV-1	*Peltandra virginica*	Arrowleaf	S2S3	Not Listed		2014	Lacustrine (in lakes or ponds), riverine (in rivers or streams), shores of rivers or lakes, swamps, wetland margins (edges of wetlands)		NA	Wetland; Marsh in bay of Lake Bomoseen; more plants north of ROW; 2 plants	Avoided.
113.2	15	2014-RTE-RE-1	*Rubus enslenii*	Enslen's blackberry	SU	Not Listed		2014	Cliffs, balds, or ledges, forests, ridges or ledges, woodlands		NA	Roadside; One small patch occupying 5' x 5' area; Unknown	Avoided.
113.9	16	2014-RTE-WV-1	*Woodwardia virginica*	Virginia Chain-fern	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), bogs, marshes, swamps, wetland margins (edges of wetlands)		NA	Wetland; Hardwood swamp, population likely extends out of ROW and is much larger; 5-10 plants	Avoided by HDD.
113.9	16	2014-RTE-WV-2	*Woodwardia virginica*	Virginia Chain-fern	S1	Threatened		2014	Anthropogenic (man-made or disturbed habitats), bogs, marshes, swamps, wetland margins (edges of wetlands)		NA	Wetland; Hardwood swamp, population likely extends out of ROW and is much larger; 5-10 plants	Avoided by HDD.
114.5	16	2014-RTE-CS-3	*Calystegia silvatica ssp. fraterniflora*	Shortstalk false bindweed	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields		NA	Roadside; Scatterd along base of cliff; 20 ramets; 2 genets	Avoided. On opposite side of road.
114.7	16	2014-RTE-ML-1	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetland; Large population in natural wetland below road; 500-1000 plants	Avoided. On opposite side of road.
115	16	2014-RTE-BS-1	*Boechera stricta*	Drummond's rockcress	S1S2	Endangered		2014	Cliffs, balds, or ledges, forests, talus and rocky slopes, woodlands		NA	Cliff face; Good population in crevices and ledges of natural cliff and roadcut; 59 plants	Avoided. On opposite side of road.
115.1	17	2014-RTE-ML-2	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetland; Nice population in natural wetland below road; appx 300 plants	Avoided. On opposite side of road.

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117.2	19	2014-RTE-AF-1	*Aureolaria flava var. flava*	Smooth False-foxglove	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, forests, ridges or ledges, woodlands		NA	Open south facing slope; In flower; 58 plants	Population on top of outcrop, will be avoided.
117.3	19	2014-RTE-AF-2	*Aureolaria flava var. flava*	Smooth False-foxglove	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, forests, ridges or ledges, woodlands		NA	Dry open outcrop; Nice, healthy population, plants in flower; 223 plants	Population on top of outcrop, will be avoided.
117.3	19	2014-RTE-DR-1	*Desmodium rotundifolia*	Prostrate Tick-trefoil	S1	Threatened		2014	Forests, talus and rocky slopes, woodlands		NA	Dry south-facing outcrop; Plants in bloom; 8 ramets; 3 genets	Population on top of outcrop, will be avoided.
117.3	19	2014-RTE-DR-2	*Desmodium rotundifolia*	Prostrate Tick-trefoil	S1	Threatened		2014	Forests, talus and rocky slopes, woodlands		NA	Dry south-facing outcrop; Plants in bloom; 8 ramets; 4 genets	Population on top of outcrop, will be avoided.
117.3	19	2014-RTE-LV-2	*Lespedeza violacea*	Violet Bush-clover	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, grassland, meadows and fields, ridges or ledges, woodlands		NA	Dry outcrop on edge of woods; Small population on dry ledge; 27 plants	Population on top of outcrop, will be avoided.
117.3	19	2014-RTE-SL-13	*Symphyotrichum leave var. laeve*	Smooth Blue Aster	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Dry open outcrop; Small population on edge of woods on open outcrop; 15 plants	Population on top of outcrop, will be avoided.
117.5	19	2014-RTE-BE-1	*Brachyelytrum erectum*	Shorthusk	S2S3	Not Listed		2014	Moist to somewhat dry, high quality forests		NA	Rich Forest; Small population on forest edge; appx 200 plants	Within forest, will be avoided.
117.8	19	2014-RTE-LV-3	*Lespedeza violacea*	Violet Bush-clover	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, grassland, meadows and fields, ridges or ledges, woodlands		NA	Dry outcrop; Large population, dense cover of plants on dry ledge above road; > 500 plants	Population on top of outcrop, will be avoided.
118.8	20	2014-RTE-CS-4	*Calystegia spithamaea ssp. spithamaea*	Low Bindweed	S2	Threatened		2014	Anthropogenic (man-made or disturbed habitats), grassland, meadows and fields, sandplains and barrens, woodlands		NA	Roadside; Mostly vegetative, in un-mowed roadside; 200 plants	Avoided. On opposite side of road.
118.8	20	2014-RTE-CA-1	*Carex argyrantha*	Hay sedge	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Dry roadside embankment; Small population in dry, open habitat; 10 ramets; 2 genets	Avoided. On opposite side of road.
119.3	21	2014-RTE-COA-1	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; In roadside at edge of ROW; 13 ramets; 2 genets	Avoided. On opposite side of road.
120.4	22	2014-RTE-COA-2	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; Very large shrub, to 18ft tall; 50 ramets; 1 genet	Avoided. On opposite side of road.
120.4	22	2014-RTE-COA-3	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; Vegetative; 4 ramets; 1 genet	Avoided. On opposite side of road.
120.4	22	2014-RTE-CF-1	*Carex foena*	Bronze sedge	S2	Endangered		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields, woodlands		NA	Disturbed mesic forest edge; 6 plants in fruit; 11 plants	Avoided. On opposite side of road.
120.4	22	2014-RTE-COA-4	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; A few fruits; 6 ramets; 1 genet	Avoided. On opposite side of road.
120.5	22	2014-RTE-COA-5	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Shrubby berm; Fruiting heavily; 25 ramets; 1 genet	Avoided. On opposite side of road.
120.5	22	2014-RTE-COA-6	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; Vegetative; 6 ramets; 1 genet	Avoided. On opposite side of road.
120.7	22	2014-RTE-COA-7	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; In dense shrubs; 10 ramets; 1 genet	Avoided. On opposite side of road.
120.8	22	2014-RTE-COA-8	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; 4' tall at mowed edge; 2 genets	Avoided. On opposite side of road.

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120.8	22	2014-RTE-COA-9	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; 4' tall at mowed edge; 2 genets	Avoided. On opposite side of road.
120.9	22	2014-RTE-COA-10	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; A few fruits; 1 plant	Avoided. On opposite side of road.
121.5	23	2014-RTE-COA-11	*Corylus americana*	American Hazelnut	S2S3	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), forest edges, forests, meadows and fields, shrublands or thickets		NA	Roadside; Two plants at edge of ROW along fence; 2 genets	Avoided. On opposite side of road.
122.7	24	2014-RTE-CS-5	*Calystegia silvatica ssp. fraterniflora*	Shortstalk false bindweed	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields		NA	Roadside; Plants mowed, none in flower; > 100 plants	Actively mowed population in VTrans Clear Zone will be impacted (ROW overlaps entire population). Implement RTE Protection plan described in Section 5.1.
123.3	24	2014-RTE-TB-1	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; Single plant in bloom beneath guardrail; 1 plant	Avoided by HDD.
123.3	24	2014-RTE-TB-2	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; Single plant in bloom beneath guardrail; 1 plant	Avoided by HDD.
123.5	24	2014-RTE-TB-3	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; On edge of pavement in road shoulder; appx 125 plants	Avoided (in median).
123.6	24	2014-RTE-TB-4	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; On edge of pavement in road shoulder; 100s of plants	Avoided.
123.6	24	2014-RTE-TB-5	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; Hundreds of plants in road shoulder; 100s of plants	Avoided by HDD setup.
123.9	24	2014-RTE-TB-6	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; A few plants in this location; 3 plants	Small population in actively mowed VTrans Clear Zone will be impacted. Implement RTE Protection plan described in Section 5.1.
124.3	25	2014-RTE-TB-8	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; A few stems on north shoulder with guardrail; 3 plants	Avoided. On opposite side of road.
124.5	25	2014-RTE-TB-7	*Trichostema brachiatum*	False Pennyroyal	S1	Not Listed		2014	Forests, meadows and fields, ridges or ledges, shores of rivers or lakes, woodlands		NA	Roadside; Thousands of plants on road shoulder near pavement; largest population in the state; 1000s of plants	Largest population in state, along road shoulder from MP 124.7-125.2 in actively mowed VTrans Clear Zone between road and outcrop. ROW overlaps entire population. Implement RTE Protection plan described in Section 5.1.
128.2	28	2014-RTE-EP-1	*Equisetum palustre*	Marsh Horsetail	S2	Threatened		2014	Marshes, shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Marsh wetland; Good-sized population in small wetland along stream; appx 100 plants	HDD to be implemented to avoid avoid wetland habitat/population.
128.3	28	2014-RTE-EP-2	*Equisetum palustre*	Marsh Horsetail	S2	Threatened		2014	Marshes, shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Marsh wetland; Only 4 plants in this polygon, most of population on other side of road; 4 plants	Avoided. On opposite side of road.
129.9	30	2014-RTE-PY-2	*Pycnanthemum verticillatum var. verticillatum*	Whorled Mountain-mint	S2S3	Not Listed		2014	Dry to moist fields, thickets and forests.		NA	Roadside; Roadside opening under powerline; mowed; 13 plants	Population will be avoided by narrow temporary ROW.
130	30	2014-RTE-PY-1	*Pycnanthemum verticillatum var. verticillatum*	Whorled Mountain-mint	S2S3	Not Listed		2014	Dry to moist fields, thickets and forests.		NA	Roadside; Roadside opening under powerline; mowed; 4 plants	Population will be avoided by narrow temporary ROW.
132.0	32	2014-RTE-AT-1	*Asclepias tuberosa*	Butterfly-weed	SH	Threatened		2014	Anthropogenic (man-made or disturbed habitats), grassland, meadows and fields		NA	Old pasture; Probably an escape from cultivation; 1 plant	Avoided. On opposite side of road.
132.4	32	2014-RTE-CM-1	*Carex merritt-fernaldii*	Fernald's sedge	S1	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, meadows and fields, woodlands		NA	Dry sandy roadside; Small population on dry open roadside; 8 plants	Avoided by HDD.
Road 136	36	2014-RTE-SA-1	*Stellaria alsine*	Trailing Stitchwort	S2	Not Listed		2014	Shores of rivers or lakes, swamps, wetland margins (edges of wetlands)		NA	Roadside wetland and ditch; Nice population in roadside seepage, stream and ditch; 100-200 plants	Population will be avoided.

Milepost	NR Map Number	EO ID (or RTE ID for observed occurrences)	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/ Life History	Identification	EO Record Location	Survey Location/Notes	Survey Results/Impact Avoidance
140	39	2014-RTE-ML-3	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Large population in roadside ditch; 500-1000 plants	Portion of population in maintained roadside ditch in VTrans Clear Zone will be impacted. Implement RTE Protection plan described in Section 5.1.
140.5	39	2014-RTE-ML-5	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetland along roadside; Small population in wetland along drainage; 20 plants	Avoided. On opposite side of road.
140.5	39	2014-RTE-ML-6	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetland along roadside; Small population in wetland along drainage; 4 plants	Avoided. On opposite side of road.
140.5	39	2014-RTE-ML-4	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Small population in roadside ditch; 30 plants	Portion of population in maintained roadside ditch in VTrans Clear Zone will be impacted. Implement RTE Protection plan described in Section 5.1.
140.6	39	2014-RTE-ML-7	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Population in roadside dtich and wet lawn; 100-200 plants	Portion of population in maintained roadside ditch in VTrans Clear Zone will be impacted. Implement RTE Protection plan described in Section 5.1.
140.8	40	2014-RTE-CL-1	*Carex lenticularis*	Shore sedge	S2S3	Not Listed		2014	Alpine or subalpine zones, shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Four plants in roadside ditch; 4 plants	Small population (4 plants) will be impacted. Implement RTE Protection plan described in Section 5.1.
141.9	41	2014-RTE-ML-8	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Small population in seepy roadside ditch; 50 plants	Avoided. On opposite side of road.
142.8	41	2014-RTE-ML-10	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetlands along roadside; Disturbed roadside wetlands and ditch; 25 plants	Avoided. On opposite side of road.
142.8	41	2014-RTE-ML-11	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetlands along roadside; Disturbed roadside wetlands and ditch; 100-200 plants	Avoided. On opposite side of road.
142.8	41	2014-RTE-ML-9	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetlands along roadside; Disturbed roadside wetlands and ditch; 150 plants	Portion of population in roadside ditch will be impacted. Implement RTE Protection plan described in Section 5.1.
145.8	44	2014-RTE-CS-6	*Calystegia silvatica ssp. fraterniflora*	Shortstalk false bindweed	S2	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields		NA	Roadside; Plants mowed, 1 in flower; 75 plants	Avoided. On opposite side of road.
146.2	45	2014-RTE-CP-1	*Carex panicea*	Grass-like sedge	SU	Not Listed		2014	Anthropogenic (man-made or disturbed habitats), meadows and fields		NA	Roadside; New record for state; not native; 100's in fruit; 100 ramets; 2 genets	Avoided. On opposite side of road.
146.2	45	2014-RTE-JG-1	*Juncus greenei*	Greene's Rush	S2	Endangered		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, grassland, meadows and fields, ridges or ledges		NA	Dry sandy roadside; New location in roadside, mowed; 390 ramets; 39 genets	Avoided. On opposite side of road.
146.3	45	2014-RTE-JG-2	*Juncus greenei*	Greene's Rush	S2	Endangered		2014	Anthropogenic (man-made or disturbed habitats), cliffs, balds, or ledges, grassland, meadows and fields, ridges or ledges		NA	Dry sandy roadside; New location in roadside, mowed; 20 ramets; 2 genets	Avoided. On opposite side of road.
146.5	45	2014-RTE-ML-12	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Small population in ditch at confluence with small stream; 30 plants	Population will be impacted along ditch / edge of road in VTrans Clear Zone. Implement RTE Protection plan described in Section 5.1.
146.7	45	2014-RTE-ML-13	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Small population in ditch and along stream; 45 plants	Population will be impacted along ditch / edge of road in VTrans Clear Zone. Implement RTE Protection plan described in Section 5.1.
147.8	46	2014-RTE-ML-14	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Roadside ditch; Small population in ditch by culvert; 50 plants	Avoided. On opposite side of road.
147.8	46	2014-RTE-ML-15	*Myosotis laxa*	Smaller Forget-me-not	S2	Not Listed		2014	Marshes, riverine (in rivers or streams), shores of rivers or lakes, wetland margins (edges of wetlands)		NA	Wetland; Nice population in natural wetland, mostly out of ROW; > 100 plants	Avoided. On opposite side of road.
149.1	47	2014-RTE-AT-2	*Asclepias tuberosa*	Butterfly-weed	SH	Threatened		2014	Anthropogenic (man-made or disturbed habitats), grassland, meadows and fields		NA	Garden; Clearly planted at end of driveway; 1 plant	Avoided. Cable to be installed within roadway.
Observed Uncommon (S3) Plant Species													

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97.8	2	2014-RTE-CES-1	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Scrubby thicket edge; Four small plants in thicket; 4 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
98	2	2014-RTE-CES-2	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Plants all vegetative; 9 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
98.1	2	2014-RTE-CES-3	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Forest edge; In fruit along hedgerow; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
98.2	2	2014-RTE-CES-4	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Two small plants in roadside; 2 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
98.9	3	2014-RTE-VR-1	*Viburnum rafinesquianum var. rafinesquianum*	Downy arrowwood	S3	Not Listed		2014	Non-RTE		NA	Roadside; Two short shrubs along roadside; 2 shrubs	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
99.1	3	2014-RTE-AN-2	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Roadside; Single tree; 4" DBH; 1 tree	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
99.6	3	2014-RTE-CES-5	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Large vine in cottonwood tree; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
99.6	3	2014-RTE-AN-3	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Roadside; Single sapling, 3' tall; 1 sapling	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
100.1	4	2014-RTE-VR-2	*Viburnum rafinesquianum var. rafinesquianum*	Downy arrowwood	S3	Not Listed		2014	Non-RTE		NA	Roadside; Forested edge, some plants mowed; 4 shrubs	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
100.2	4	2014-RTE-VR-3	*Viburnum rafinesquianum var. rafinesquianum*	Downy arrowwood	S3	Not Listed		2014	Non-RTE		NA	Forest; Two small shrubs in rich woods; 2 shrubs	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
100.3	4	2014-RTE-VR-4	*Viburnum rafinesquianum var. rafinesquianum*	Downy arrowwood	S3	Not Listed		2014	Non-RTE		NA	Forest; In rich woods and forest edge; 5 shrubs	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
100.4	4	2014-RTE-VR-5	*Viburnum rafinesquianum var. rafinesquianum*	Downy arrowwood	S3	Not Listed		2014	Non-RTE		NA	Forest edge; A few plants in ROW, likely many more in forest; 3 shrubs	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
100.7	4	2014-RTE-CL-1	*Carex laxiculmis*	Loose sedge	S3	Not Listed		2014	Non-RTE		NA	Dry rich knoll; Plants in fruit; 12 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
102.8	6	2014-RTE-EF-1	*Eragrostis frankii*	Frank's Love-grass	S3	Not Listed		2014	Non-RTE		NA	Roadside; Disturbed area along road; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
103.3	6	2014-RTE-EF-2	*Eragrostis frankii*	Frank's Love-grass	S3	Not Listed		2014	Non-RTE		NA	Roadside; Disturbed area along road; appx 30 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
103.7	7	2014-RTE-RO-1	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Roadside and woods edge; Dense stand in 20' x 30' area on edge of woods; partly mowed; Unknown	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
103.9	7	2014-RTE-CES-6	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; 1 large vine in fruit, edge of small roadcut; 6 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
104	7	2014-RTE-AN-4	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Forest edge; One sapling on edge of rich woods; 1 sapling	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
104	7	2014-RTE-AN-5	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Forest edge; On edge of woods; saplings to 8 ft tall; 3 saplings	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.

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104	7	2014-RTE-CL-2	*Carex laxiculmis*	Loose sedge	S3	Not Listed		2014	Non-RTE		NA	Dry rich woods edge; On clay soil; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.3	10	2014-RTE-AN-6	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Forest edge; Sapling 3' tall; 1 sapling	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.3	10	2014-RTE-CES-7	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Forest edge; Vegetative, short stems; 8 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.3	10	2014-RTE-CES-8	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; 1 stem in fruit; 20 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.4	10	2014-RTE-RO-3	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Roadside and rock outcrop; Large population, likely contiues out of ROW; appx 150 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.4	10	2014-RTE-RO-2	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Forest edge; On edge of forest near road cut; 25-40 ramets; 1 genet	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.4	10	2014-RTE-RO-4	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Forest edge; On top of road cut on edge of woods; 4 stems in fruit; 12 ramets; 1 genet	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.5	10	2014-RTE-QM-1	*Quercus muehlenbergii*	Yellow Oak	S3	Not Listed		2014	Non-RTE		NA	Forest; Saplings in dry, rich woods; 2 saplings	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.5	10	2014-RTE-QM-2	*Quercus muehlenbergii*	Yellow Oak	S3	Not Listed		2014	Non-RTE		NA	Forest; Sapling in dry, rich woods; 1 sapling	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
107.8	10	2014-RTE-RO-5	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Roadside; 200 square feet occupied by plants in open roadside; Unknown	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
108.2	10	2014-RTE-RO-6	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Roadside; A 10' x 20' area with 90% cover of plants in open roadside; Unknown	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
108.7	11	2014-RTE-AN-7	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Under powerline and dry outcrop above road; Two plants under powerline; 2 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
108.8	11	2014-RTE-CT-1	*Carex trichocarpa*	Hairy Sedge	S3	Not Listed		2014	Non-RTE		NA	Slope along roadside; 200'x20' area; Unavailable	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
110.8	13	2014-RTE-NT-1	*Nabalus trifoliolatus*	Three-leaved Rattlesnake-root	S3	Not Listed		2014	Non-RTE		NA	Rich woods; A few plants in woods in ROW; 4 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
111.6	14	2014-RTE-PH-1	*Persicaria hydropiperoides*	Mild Water-pepper	S3	Not Listed		2014	Non-RTE		NA	Wetland; Plants occupy and area 40' x 70' at 80% cover; Unknown	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
113.8	15	2014-RTE-CPS-1	*Carex pseudocyperus*	False Cyperus Sedge	S3	Not Listed		2014	Non-RTE		NA	Wetland along roadside; Five plants in roadside wetland; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
113.9	16	2014-RTE-LL-1	*Liparis loeselii*	Loesel's Twayblade	S3	Not Listed		2014	Non-RTE		NA	Wet roadside; Plants scattered over area with 15' radius; Unknown	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
114.4	16	2014-RTE-WO-1	*Woodsia obtusa ssp. obtusa*	Blunt-leaved Woodsia	S3	Not Listed		2014	Non-RTE		NA	Cliff face; Moist, shaded cliff, some fertil fronds; 4 genets	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
115	17	2014-RTE-CO-1	*Clematis occidentalis ssp. occidentalis*	Purple Clematis	S3	Not Listed		2014	Non-RTE		NA	Base of cliff; Recently mowed; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.

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115	17	2014-RTE-CO-2	*Clematis occidentalis ssp. occidentalis*	Purple Clematis	S3	Not Listed		2014	Non-RTE		NA	Moist cliff face; Vigorous plants in fruit covering 20'X20' vertical rock face; 10 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
115	17	2014-RTE-WO-2	*Woodsia obtusa ssp. obtusa*	Blunt-leaved Woodsia	S3	Not Listed		2014	Non-RTE		NA	Cliff face; Moist, shaded cliff, some fertil fronds; 11 genets	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
115.7	17	2014-RTE-CB-1	*Carex brevior*	Fescue sedge	S3	Not Listed		2014	Non-RTE		NA	Roadside; Flat, open area; 1 ramet; 1 genet	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.1	19	2014-RTE-CES-9	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Forest edge; Vegetative, short stems; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.1	19	2014-RTE-CPP-1	*Cypripedium parviflorum var. pubescens*	Large Yellow Lady's-slipper	S3	Not Listed		2014	Non-RTE		NA	Open edge of rich woods; 1 genet mowed; 1 genet in flower; 43 ramets; 5 genets	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.1	19	2014-RTE-SLA-1	*Scrophularia lanceolata*	Hare Figwort	S3	Not Listed		2014	Non-RTE		NA	Forest edge; Plants in bloom or fruit in edge of rich forest; 32 ramets; 5 genets	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.3	19	2014-RTE-DP-1	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Plants within a 30' x 50' area; 15 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.3	19	2014-RTE-DP-2	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Plants in bud; 12 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.4	19	2014-RTE-QM-3	*Quercus muehlenbergii*	Yellow Oak	S3	Not Listed		2014	Non-RTE		NA	Forest; Large trees, co-dominant in dry, rich woods; 7 trees	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.8	19	2014-RTE-DP-3	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; 8' x5' area 100% cover; appx 50 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.8	19	2014-RTE-DP-4	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; 8' x 6' area 100% cover; appx 50 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
117.8	19	2014-RTE-DP-5	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Plants in bud; 35 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
118.6	20	2014-RTE-CB-4	*Carex brevior*	Fescue sedge	S3	Not Listed		2014	Non-RTE		NA	Roadside; Plants in 4' diameter area; 15 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
118.8	20	2014-RTE-CB-3	*Carex brevior*	Fescue sedge	S3	Not Listed		2014	Non-RTE		NA	Roadside; Most in fruit; 9 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
118.8	20	2014-RTE-CES-10	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Vegetative, short stems; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
118.8	20	2014-RTE-CES-11	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Vegetative, short stems; 3 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
119	20	2014-RTE-CB-4	*Carex brevior*	Fescue sedge	S3	Not Listed		2014	Non-RTE		NA	Roadside; Dry shrubby area; 2 ramets; 1 genet	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
119.2	20	2014-RTE-DP-6	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Plants within 15square foot area; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
119.3	20	2014-RTE-DP-7	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Nice population along appx 50' of road; 80 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.

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120	21	2014-RTE-DP-8	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Nice population, plants in bud; 44 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.1	21	2014-RTE-DP-10	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Plants within 10' x 20' area; 20 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.1	21	2014-RTE-DP-11	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; 10'x10' area, plants in bud; some browsed; 10 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.1	21	2014-RTE-DP-9	*Desmodium paniculatum*	Panicled Tick-trefoil	S3	Not Listed		2014	Non-RTE		NA	Dry south-facing outcrop; Nice, large population, many plants in bud; 100's of plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.1	21	2014-RTE-QM-4	*Quercus muehlenbergii*	Yellow Oak	S3	Not Listed		2014	Non-RTE		NA	Forest; 1 tree and 5 saplings in dry, rich woods; 6 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.8	22	2014-RTE-CES-12	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Thin forest canopy; Vegetative, short stems; 9 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
120.9	22	2014-RTE-CES-13	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; 2m tall, in fruit; 1 plant	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
121.2	22	2014-RTE-CES-14	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Vegetative, short stems; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
121.4	22	2014-RTE-CES-15	*Celastrus scandens*	American bittersweet	S3	Not Listed		2014	Non-RTE		NA	Roadside; Vegetative, short stems; 9 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
122.5	23	2014-RTE-QM-5	*Quercus muehlenbergii*	Yellow Oak	S3	Not Listed		2014	Non-RTE		NA	Forest; Single tree, 3" DBH in dry rich woods; 1 tree	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
123.4	24	2014-RTE-RO-7	*Rhus aromatica*	Fragrant Sumac	S3	Not Listed		2014	Non-RTE		NA	Roadside embankment; Planted, dense stand of shrubs; Hundreds	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
126	26	2014-RTE-LL-2	*Liparis loeselii*	Loesel's Twayblade	S3	Not Listed		2014	Non-RTE		NA	Wet sloping roadside; Plants in fruit at time of visit; 8 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.2	31	2014-RTE-SP-5	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Small patch 15' long in area; 10 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
132.2	32	2014-RTE-SR-2	*Selaginella rupestris*	Rock Spikemoss	S3	Not Listed		2014	Non-RTE		NA	Roadside; Large population on dry, exposed embankment; 38 genets	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
132.1	32	2014-RTE-SR-1	*Selaginella rupestris*	Rock Spikemoss	S3	Not Listed		2014	Non-RTE		NA	Roadside; Large population on dry, exposed embankment; 1000s of plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
98.1	2	2014-RTE-AN-1	*Acer nigrum*	Black Maple	S3	Not Listed		2014	Non-RTE		NA	Roadside; Large tree, 2' DBH; 1 tree	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
129.6	30	2014-RTE-SP-1	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; 2 plants flowering, 5m radius patch; 5 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
130.8	31	2014-RTE-SP-2	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Moderate sized population in roadside ditch; 60+ plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131	31	2014-RTE-SP-3	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Along small stream in 30' x 90' area; 20 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.

Milepost	NR Map Number	EO ID (or RTE ID for observed occurrences)	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/ Life History	Identification	EO Record Location	Survey Location/Notes	Survey Results/Impact Avoidance
131.1	31	2014-RTE-SP-4	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Three-quarters of plants with flowering stalks; 30+ plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.2	31	2014-RTE-SP-6	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Small population in roadside ditch; 12 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.3	31	2014-RTE-SP-7	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; A few plants in roadside ditch; 2 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.4	31	2014-RTE-SP-8	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; A few plants in roadside ditch; 2 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.5	31	2014-RTE-SP-9	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Large population in roadside ditch; appx 100 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.6	32	2014-RTE-SP-12	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Fairly large population in roadside ditch; 100s of plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.7	31	2014-RTE-SP-10	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Moderate sized population in roadside ditch; 30 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.
131.8	32	2014-RTE-SP-11	*Solidago patula*	Roughleaf Goldenrod	S3	Not Listed		2014	Non-RTE		NA	Roadside ditch; Small population in roadside ditch; 30 plants	No special impact avoidance measures are proposed for uncommon plants. They will be avoided where possible in consideration with other environmental and engineering constraints.

Notes:

1 - State Rank
S1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors
S2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
S3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors
S4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors
S5 - Common (Secure): widespread and abundant
H - Possibly extinct/extirpated: Missing; known from only historical occurrences but still some hope of rediscovery

2 - State and Federal Threatened and Endangered Status
ST - Listed as Threatened in the State of Vermont
SE - Listed as Endangered in the State of Vermont
SSC - Listed as Special Concern in the State of Vermont
FT - Federally-listed as Threatened
FE - Federally-listed as Endangered

Table A-2: Animals with Element Occurrences within 0.25-mile of the Terrestrial Cable Route

Milepost	NR Map Number	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered	Federal Threatened or Endangered	Date Observed	Habitat Characteristics/ Life History	EO Record Location	Survey Result	Impact Avoidance Measures
98	2	7911	*Thamnophis sauritus*	Eastern Ribbonsnake	S2	SSC	-	2007	Wetland edges with sunny exposed basking sites in warm, low-elevation, largely undeveloped areas. The presence of nearby rocky woodlands and talus increases the likelihood of their occurrence in these areas. Mating occurs in the spring (April to May) after snakes emerge from hibernation, and may potentially occur again in the fall. Young are typically born in late summer (July or August) growing rapidly to reach sexual maturity in 1 to 3 years.	Benson, in the road east of the junction of North Lake Road and Lake Road about 0.1 mile.	EO record location is approximately 1200' from the study area. Appropriate general habitat present in the study area. No obvious hibernacula identified.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
98	2	5418	*Sternotherus odoratus*	Stinkpot (Eastern Musk Turtle)	S2	SSC	-	2010	Musk turtles are almost entirely aquatic, spending the vast majority of their time in shallow, heavily vegetated waters of slow moving creeks, or in ponds. They typically only venture onto land when the female lays her eggs, or in some cases, to bask. Females dig shallow nests at the water's edge under rotting logs or dead leaves. Eggs are laid between February and June, and hatchlings emerge 60 to 84 days later.	Lake Champlain off Benson Landing, including under the dock.	EO record location is approximately 2000' south of the study area. The shoreline at the Lake in the study area is rocky substrate. No surveys conducted.	Will avoid potential habitat and impacts.
100.1	4	7565	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	2012	Eastern Ratsnake is typically found in and around old buildings, old fields, and edges of woods near rocky areas and ledges. In New England, hibernacula must be located In areas with south facing exposures to receive maximum thermal warmth from winter sun, and provide nearby basking in spring and fall. Mating occurs in the spring (April to early June) after snakes emerge from hibernation. Females lay eggs approximately 5 weeks after mating under hollow logs, leaves, or abdandoned burrows. Eggs hatch 65 to 70 days later. Two clutches of eggs may be laid per year if conditions allow.	Tar road from the town of Benson down to Benson Landing.	Appropriate general habitat present. No hibernacula present within the study area.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
100.5	4	10349	*Thamnophis sauritus*	Eastern Ribbonsnake	S2	SSC	-	2012	See previous Eastern Ribbonsnake entry.	In Benson in Strong Swamp is found between Lake Road to the south, North Lake Road to the west, and Old Lake Road to the north and east.	EO record location is approximately 1200' from the study area. Appopriate habitat present in the study area. No obvious hibernacula identified.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
102	5	3223	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	2012	See previous Eastern Ratsnake entry.	North-central part of Benson, Pond Woods WMA and vicinity. More specifically (2011), 1) On Route 144, 0.5 mile east of the intersection of 22A and 144. 2) On 22A between Brookside Farm in Orwell and Coates Road in Benson. 3) 971 Route 22A, just north of Perch Pond Road.	Appropriate general habitat present. No hibernacula present within the study area.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
103.5	6	3874	*Bartramia longicauda*	Upland Sandpiper	S2B	SE	-	1999	Large areas of grasslands, fallow fields, and meadows (often associated with pastures, farms, and airports) comprised of short and tall grasses for foraging and nesting. Upland sandpipers reach breeding grounds in late April to early May. Nests are created by scraping the ground under a bush or clump of grass. Scrapes may be completely unlined or built up with twigs and leaves. Males and female incubate the eggs which hatch in 21-27 days. Chicks fledge approximately one month after hatching.	Abandoned Getty Station 0.6 miles south of the turn to Benson on Route 22A.	Extensive potentially appropriate habitat throughout the area.	Cable installation along edge of actively maintained Route 22A corridor is unlikely to adversely affect this species.

Milepost	NR Map Number	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered	Federal Threatened or Endangered	Date Observed	Habitat Characteristics/ Life History	EO Record Location	Survey Result	Impact Avoidance Measures
104.7	7	9727	*Lasmigona costata*	Fluted-shell	S2	SE	-	2012	Sand, mud, or fine gravel in medium to large rivers with slow to moderate flow. Age to sexual maturity for this species is unknown. Males release sperm into the water, which are taken by the females through their respiratory current. The eggs are internally fertilized, then passed into water tubes of the gills where they develop into larvae, called glochidia. Fluted shells are long-term brooders carrying eggs from early August to late May until they release the glochida into the water column. Breeding occurs once a year during the warmer summer months.	West Haven, Hubbardton River, near the north end of the Hubbardton River Clayplain, and near TNC lands.	No surveys recommended or conducted per survey protocol approved by VT ANR.	HDD planned for the stream in this area (Hubbardton River). Will avoid potential habitat and impacts.
104.7	7	6848	*Ichthyomyzon unicuspis*	Silver Lamprey	S2?	SSC	-	2012	Large streams and lakes where host fish are present for parasitic adults. Larval habitat includes lotic depositional and estuarine areas of streams with organic matter and stable substrate. Spawning occurs in riffle areas comprised of sand and gravel. In Vermont, the silver lamprey spawns in the lower sections of several tributaries of Lake Champlain. Spawning occurs in May to June when water temperatures reach 50°F. After hatching, ammocoetes (larvae) burrow into mud or loose sediments for 4 to 7 years. After emergence and transformation, silver lampreys travel to large river or lakes to enter the parasitic adult stage for 1 to 2 years.	Hubbarton River; approximately 0.8 miles downstream of Route 22 crossing in Benson.	No surveys recommended or conducted per survey protocol approved by VT ANR.	HDD planned for the stream in this area (Hubbardton River). Will avoid potential habitat and impacts.
105.6	8	4546	*Bartramia longicauda*	Upland Sandpiper	S2B	SE	-	1989	Large areas of grasslands, fallow fields, and meadows (often associated with pastures, farms, and airports) comprised of short and tall grasses for foraging and nesting. Upland sandpipers reach breeding grounds in late April to early May. Nests are created by scraping the ground under a bush or clump of grass. Scrapes may be completely unlined or built up with twigs and leaves. Males and female incubate the eggs which hatch in 21 to 27 days. Chicks fledge approximately one month after hatching.	Along Route 22A in West Haven. At Devil's Bowl Speedway just south of Benson/West Haven town line and hayfields to the south.	Historic site of Devil' Bowl Speedway has short mowed lawn, no longer good habitat. Extensive potentially appropriate habitat throughout the area.	Cable installation along edge of actively maintained Route 22A corridor is unlikely to adversely affect this species.
106.4	9	5540	*Crotalus horridus*	Timber Rattlesnake	S1	SE	-	2012	Forested rocky hills. Hibernating dens can be found in crevices in rocky, south-facing cliffs or piles of large boulders. Mating occurs in the summer months from mid-July to October. Females store sperm through the winter for use in the spring when they emerge from hibernation. Females begin the formation of eggs and yolk in the late summer and fall, those eggs then ovulate the following spring. Eggs are incubated and hatched within the female. The live young are born in the autumn, from August through October. Males become sexually mature at 4 to 6 years, while females do not mature until 7 to 13 years.	Great Ledge and Rattlesnake Ridge. Also, found dead on Route 22A.	The Great Ledge and Rattlesnake Ridge are not within the study area. Appropriate general habitat within the study area. No hibernacula present within the study area.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
106.8	9	5869	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	2006	See previous Eastern Ratsnake entry.	Great Ledge and Rattlesnake Ridge. Along top of the ledge on the east side of Route 22A.	The Great Ledge and Rattlesnake Ridge are not within the study area. Appropriate adjacent general habitat present. No hibernacula present within the study area.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
107.9	10	1873	*Crotalus horridus*	Timber Rattlesnake	S1	SE	-	2007	See previousTimber Rattlesnake entry.	Inman Pond and Beaver Meadow.	Appropriate general habitat present in the study area. No hibernacula present within study area.	Impact to active individuals unlikely; mobility of species allows them to avoid construction activities. RTE Snake Protection measures summarized in Section 5.2 of Summary Report.
108.6	11	6871	*Ichthyomyzon unicuspis*	Silver Lamprey	S2?	SSC	-	2012	See previou Silver Lamprey entry.	Poultney River/East Bay, West Haven, between Billings and Finch Marshes.	No surveys recommended or conducted per survey protocol approved by VT ANR. Potential habitat is not encountered in this area.	Will avoid potential habitat and impacts.

Milepost	NR Map Number	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered	Federal Threatened or Endangered	Date Observed	Habitat Characteristics/ Life History	EO Record Location	Survey Result	Impact Avoidance Measures
120.2	21	8483	*Setophaga cerulea*	Cerulean Warbler	S1S2B	SSC	-	2010	Mature forested areas with large and tall trees of broad-leaved, deciduous species and relatively little undergrowth. They may also inhabit wet bottomlands, some second-growth forests, and mesic upland slopes. Nests are open-cup style found in the mid-story canopy, usually over an open area concealed by leaves from branches below. Nests consist of bark, weed stalks, fine grasses, lichen, and moss. One brood is raised per season. Breeding occurs from New England to the southern U.S. in late April to early May. Migration begins in August to return south to South America.	At the north end of Ira, just east of the Blueberry Hill WMA, roughly 1500 feet east of a rest area on the north side of Route 4.	No surveys recommended or conducted per survey protocol approved by VT ANR. Preferred habitat is located further in forest away from Route 4 / proposed cable route.	Will mostly avoid potential habitat (limited tree removal along edge of forest habitat may occur). Cable installation along edge of actively maintained Route 4 corridor is unlikely to adversely affect this species.
121.8	23	2357	*Podilymbus podiceps*	Pied-billed Grebe	S2S3B	SSC	-	1997	Streams, ponds, lake and freshwater marshes. Breeds on seasonal or permanent ponds with dense stands of emergent vegetation, bays and sloughs. Uses most types of wetlands in winter, including estuarine and marine habitats. Breeding begins in mid-May. Pied-billed grebe nest in an open bowl in a platform of floating vegetation.	About 1 mile west of West Rutland; north of Route 4A along the Castleton River.	Appropriate habitat in wetlands along the Castleton River and West Rutland Marsh. No surveys conducted	Will primarily avoid preferred habitat in wetland along Castleton River and West Rutland Marsh, although some impacts to the wetlands will occur along the edge of the Route 4 ROW. General migratory bird protection measures identified in Section 5.3 of Summary Report.
126.6	27	6106	*Lasmigona compressa*	Creek Heelsplitter	S2	-	-	1978	This species occurs principally in rivers and streams of various sizes, even in very small creeks and is rare in lakes. It is found on substrates of gravel, sand, or mud. Age to sexual maturity for this species is unknown. Males release sperm into the water, which is taken in by the females through their respiratory current. The eggs are internally fertilized in the suprabranchial chambers, then pass into water tubes of the gills for up to 11 months, where they develop into larvae, called glochidia. These are then released into the water where they must attach to the gill filaments and/or general body surface of the host fish. After attachment, epithelial tissue from the host fish grows over and encapsulates a glochidium, usually within a few hours. The glochidia then metamorphoses into a juvenile mussel within a few days or weeks. After metamorphosis, the juvenile is sloughed off as a free-living organism. Juveniles are found in the substrate where they develop into adults.	Above falls at the Route 125 overpass in Middlebury; Off Route 7 at town road overpass in Mt. Tabor; Off Route 7 at town road overpass in Clarendon.	No surveys recommended or conducted per survey protocol approved by VT ANR.	HDD planned for the stream in this area (Otter Creek). Will avoid potential habitat and impacts. No surveys recommended.
142.4	41	5884	*Setophaga tigrina*	Cape May Warbler	S1B	-	-	1987	Breed in coniferous woodland, and overwinter in various habitats including settled areas. Nests are open-cup style in dense foliage near the base of tree trunks.	Rest area on Route 103 in Mount Holly.	No surveys recommended or conducted per survey protocol approved by VT ANR.	No significant tree clearing is proposed. Cable installation along edge of actively maintained Route 103 corridor is unlikely to adversely affect this species.
97.7-112.1	2-14	N/A	*Myotis sodalis*	Indiana Bat	S1	SE	FE	-	Wooded areas where they roost under loose tree bark on dead or dying trees. Indiana bats forage in or along the edges of forested areas. Hibernation during the winter months occurs in caves under 50°F. Mate before the fall before they hibernate. Females store sperm through the winter and become pregnant in the spring after they emerge from hibernation.	-	Roosting tree assesment conducted, 116 potential roosting trees identified. Report provided in Attachment E.	Identified roosting trees will be avoided. If removal of a potential roosting tree is required, further consultation wtih VT FWD / USFWS will be conducted.
All	All	N/A	*Myotis septrentrionalis*	Northern Long-eared Bat	S1	SE	Proposed for Listing	-	Roosting habitat can be under bark, in cavities, or in crevices of both live and dead trees, or in cooler places such as mines and caves. They rarely roost in structures such as barns and sheds. Northern long-eared bats forage in the understories of forested hillsides and ridges feeding on insects. Winter hibernation takes place in large caves or mines with large entrances where temperatures are constant, and there is high humidity with no air currents.	-	No surveys or habitat assessments were recommended by VT FWD.	Limited tree removal along active roadways and/or railways and at Ludlow Converter Site will occur. Species has broad habitat requirements and occupies a broad range; therefore proposed tree removal is not expected to imperil this species. No impact avoidance measures proposed.
All	All	N/A	*Glyptemys insculpta*	Wood Turtle	S3	SSC	-	-	Large rivers and streams with clear water, sandy or gravelly bottoms and/or muddy banks. Terrestrial habitat utilized is typically within 1,000 feet of suitable streams and reivers and includes riparian forests, wetlands, hayfields, and other early successional habitats.	-	No surveys or habitat assessments were recommended by VT FWD.	HDD planned for large rivers will avoid preferred aquatic habitat. No adverse effects to terrestrial habitat will occur. Minimization measures are proposed in Section 5.2 for implementation during construction in the vicinity (i.e., within 1,000 feet) of large, named rivers as recommended by VT FWD.

Milepost	NR Map Number	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered	Federal Threatened or Endangered	Date Observed	Habitat Characteristics/ Life History	EO Record Location	Survey Result	Impact Avoidance Measures

Notes:

1 - State Rank

S1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors

S2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors

S3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors

S4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors

S5 - Common (Secure): widespread and abundant

B - Breeding

N - Nonbreeding

H - Possibly extinct/extirpated: Missing; known from only historical occurrences but still some hope of rediscovery

2 - State and Federal Threatened and Endangered Status

ST - Listed as Threatened in the State of Vermont

SE - Listed as Endangered in the State of Vermont

SSC - Listed as Special Concern in the State of Vermont

FT - Federally-listed as Threatened

FE - Federally-listed as Endangered

Table A-3: Natural Community Element Occurrences within 0.25-mile of the Terrestrial Cable Route and New Observed Potential Significant Natural Communities

Milepost	NR Map Number	EO ID	Name	State Rank	Date Observed	Community Characteristics	Location/Site Name	Survey Results/Impact Avoidance
103.5	6	4347	Vernal Pool	S3	2009	Vernal pools are small, temporary bodies of water that occur in forest depressions, underlain by a relatively impermeable layer. Water depths are typically less than 4 feet, and usually dry sometime during the summer, but may fill again during fall rains. Vernal pools generally lack both inlet and outlet, although water may flow during heavy rains or rapid snow melt. All have very small watersheds. They have thick organic soil layers and lack vegetation. They are characterized by their fauna: invertebrates and amphibians, which breed in vernal pools. Vegetation, if present at all within the pool, may consist of sensitive or marsh fern, cutgrass, and bugleweed.	On the east side of Route 22A, south of Lake Road.	Confirmed outside the study area during natural community field assessment. Will be avoided.
103.8	6	661	Dry Oak-Hickory-Hophornbeam Forest	S3	1990	These forests occur on till-derived soils, but they are often found on hilltops, and bedrock exposures are common. Soils are well drained but are more fertile than in Dry Oak Forests. Red oak, sugar maple, hophornbeam, and shagbark hickory are variously dominant. This particular community is dominated by red and white oak, shagbark hickory, hophornbeam and white ash. The bedrock consists of slate and shale with calcareous till on top .	On the east side of Route 22A, south of Lake Road.	Confirmed outside the study area during natural community field assessment. Will be avoided.
104	6	3473	Transition Hardwood Talus Woodland	S3	1990	Small areas of rockfall slopes below cliffs in the warmer regions of Vermont. Boulders of various sizes and type are abundant. Communities consisting of limestone, dolomite, and marble contain nutrient-rich soils as a result of the settling and weathering of the rocks, while shale and slate produce nutrient-poor, droughty soils. Vegetation varies with the nature of the bedrock. In this particular community, the steepest selection of this slope has a fairly mature forest of white ash, American basswood, and black maple. The understory of this forest supports bulblet fragile fern and virginia-creeper. Northeast and southeast of this, where the slope is slightly less steep, the forest is younger and is dominated by hophornbeam and shagbark hickory. Hitchcock's sedge and handsome sedge are present in the northern portion.	Site is on the west side of Route 22A, just over 1 mile south of the turn to Benson Village.	Confirmed outside the study area during natural community field assessment. Will be avoided. Forest at this location is small example of Mesic Maple-Ash-Hickory-Oak forest with planted red and white pine, and is not a signficant community.
106.4	9	2774	Temperate Calcareous Outcrop	S3	1987	These low elevation (below 1,800 feet) outcrops are composed of limestone, marble, dolomite, or calcium-bearing quartzite. Scattered trees include northern white cedar, eastern red cedar, yellow oak, and shagbark hickory. Characteristic shrubs and herbs include downy arrowwood, snowberry, longleaf bluet, Seneca snakeroot, and balsam ragwort. This particular community is characterized as a dry ridge top with large expanses of exposed bedrock and otherwise sparsely vegetated soil. Dominant species include shagbark hickory, chestnut and white oak, eastern white pine, common juniper, rock harlequin, hophornbeam and bluet	Located in Fair Haven on the west end of Rattlesnake Ridge on the Fair Haven line between Route 22A and Beaver Meadow.	Confirmed outside the study area during natural community field assessment. Will be avoided.
106.4	9	3080	Transition Hardwood Talus Woodland	S3	1983	Small areas of rockfall slopes below cliffs in the warmer regions of Vermont. Boulders of various sizes and type are abundant. Communities consisting of limestone, dolomite, and marble contain nutrient-rich soils as a result of the settling and weathering of the rocks, while shale and slate produce nutrient-poor, droughty soils. Vegetation varies with the nature of the bedrock. This particular example is characterized by a dry talus slope with typical indicator species including butternut, hophornbeam, American basswood, white ash, and red elderberry.	Located in West Haven along Great Ledge and Rattlesnake Ridge east of Route 22A .	Confirmed outside the study area during natural community field assessment. Will be avoided.
106.8	9	4952	Wet Clayplain Forest	S2	2008	Wet Clayplain Forests are a variant of Valley Clayplain Forests, which are dominated by clay and silt soils. This particular community is one of the largest clayplain patches in the area and is dominated by green ash. The microtopography and intermingling of forest types is characteristic of the clayplain forest. Soils are clay throughout, but in floodplain areas there may be some addition of silt. In the wettest areas, shallow peat has accumulated over the clay. Within the mesic forest areas, wet depressions host different herbs than the more level forest floor.	Along the Hubbardton River in the northeast corner of West Haven.	Confirmed outside the study area during natural community field assessment. Will be avoided.

Milepost	NR Map Number	EO ID	Name	State Rank	Date Observed	Community Characteristics	Location/Site Name	Survey Results/Impact Avoidance
107.8	10	7984	Mesic Clayplain Forest	S2	2005	Mesic Clayplain Forests are a variant of Valley Clayplain Forests, which are dominated by clay and silt soils. This community contains moderately well-drained to somewhat poorly drained soils with pools and wet hollows (Wet Clayplain Forest) scattered throughout. Vegetation is diverse and well developed. The species composition in this specific example is variable. In steeper areas, hemlock is dominant; other species include sugar maple, basswood , shagbark hickory, white ash, white oak, white pine, bitternut hickory , northern red oak , and sweet birch. Shrubs include maple-leaved viburnum, witch hazel, hop hornbeam, and leatherwood. Herbs are a mix of typical clayplain herbs and standard rich forest herbs: blue-stemmed goldenrod, woodland sunflower, calico aster, common maidenhair, hog peanut , and plantain-leaved sedge. Like many of the clayplain patches in this area, it occupies steep slopes along a stream, in this case the Poultney River and two of its tributaries. Generally speaking, the patch is bordered by agricultural land on the north and east, and forested land.	From Route 22 north of Fair Haven, west on Main Road and then south on Doran Road. The community is located to the south of the end of road.	Confirmed outside the study area during natural community field assessment. Will be avoided.
112	14	N/A - New Occurrence	Dry Oak-Hickory-Hophornbeam Forest	S3	2014	Deciduous Forest. May be significant natural community, would require further study to confirm. Transitional to Mesic Forest.	Green Dump Hills	No permanent tree removal proposed, limited temporary tree removal will occur at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor.
112.5	14	9691	Dry Oak Forest	S3	2012	Dry Oak Forests are found on rocky ridgetops of acidic or circumneutral bedrock at low elevations. Primary tree species found in this community include red and white oak, and white pine, but chestnut oak is common in southern regions. Heath shrubs and huckleberry dominate the understory. This particular community is dominated by northern red oak and pignut hickory. Red maple, shagbark hickory, eastern hemlock, and eastern white pine are also present at lower concentrations. The understory varies supports patchy heath shrubs, especially Vaccinium palidum and Vaccinium angustifolium. Black huckleberry, striped maple, hophornbeam, and maple-leaf viburnum also occur in the understory.	On dry slopes and summits, to the north, east, and south of Green Dump Hills Lake Bomoseen access parking lot and quarry.	Confirmed outside the study area during natural community field assessment. Will be avoided.
114.5	16	N/A - New Occurrence	Temperate Hemlock-Hardwood Forest	S4	2014	Mixed Forest. May be significant natural community, would require further study to confirm. Transitional to Mesic Forest.	Pine Pond (West)	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
114.9	16	6802	Red Maple-Black Ash Seepage Swamp	S4	2001	Represents one of the most common wetland types in Vermont. These swamps are closely associated with groundwater seepage and often serve as the headwaters for intermittent or small perennial streams. The majority of these swamps contain organic soils; however, mineral soils are present in shallow basins. Red maple and black ash are predominant, but other common tree species include yellow birch, American elm, hemlock, and white pine. Swamp white oak is present in some swamps in the Champlain Valley. Shrub and herbaceous layers of this community are dense and diverse. In this particular example, there is an open canopy of black ash and red maple . Other tree species include yellow birch and hemlock. Cattail is common as well as the exotic shrub glossy buckthorn.	North of Route 4, northeast of the intersection with Route 30.	Confirmed outside the study area during natural community field assessment. Will be avoided.
115	17	N/A - New Occurrence	Temperate Hemlock Forest	S4	2014	Conifer Forest. May be significant natural community, would require further study to confirm. Large forest to north, somewhat distubed along ROW	Pine Pond (East)	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
117	19	N/A - New Occurrence	Mesic Maple-Ash-Hickory-Oak Forest	S3	2014	Deciduous Forest. Likely significant natural community. Very nice forest, drier inclusions; larger to north.	Blueberry Hill	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.

Milepost	NR Map Number	EO ID	Name	State Rank	Date Observed	Community Characteristics	Location/Site Name	Survey Results/Impact Avoidance
119.3	21	N/A - New Occurrence	Mesic Maple-Ash-Hickory-Oak Forest	S3	2014	Deciduous Forest. Likely significant natural community. Very nice forest, some mature areas.	Mount Hanley West	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
120.4	22	N/A - New Occurrence	Mesic Maple-Ash-Hickory-Oak Forest	S3	2014	Deciduous Forest. Likely significant natural community. Nice mature forest.	Mount Hanley East	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
121	22	8321	Dry Oak Forest	S3	2009	Dry Oak Forests are found on rocky ridgetops of acidic or circumneutral bedrock at low elevations. Primary tree species found in this community include red and white oak, and white pine, but chestnut oak is common in southern regions. Heath shrubs and huckleberry dominate the understory. This particular community is a forest of red and white oak, sugar maple, red, and silver maples, yellow birch, which hazel, maple-leaf viburnum , saplings of white ash, beech, and chestnut oak, summer grape, wild sarsaparilla, and broadleaf sedge. At the northern end of community toward the open glades, the flank becomes enriched and steep, and phases into dry oak woodland.	The forest is located well below the Mt. Hanley south-facing glades on south flank of the mountain and also south slopes of Twin Mountain.	Confirmed outside the study area during natural community field assessment. Will be avoided.
121.3	22	N/A - New Occurrence	Mesic Maple-Ash-Hickory-Oak Forest	S3	2014	Deciduous Forest. Likely significant natural community. Very nice forest, some mature areas.	Twin Mountain	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
122.6	23	N/A - New Occurrence	Mesic Red Oak-Northern Hardwood Forest	S4	2014	Deciduous Forest. May be significant natural community, would require further study to confirm. Standard example of type.	Herrick Mountain NE	Limited tree removal proposed at margin of forest along Route 4. No adverse impacts to the community will occur from this limited tree removal along an existing highway corridor. No further studies or avoidance measures proposed.
135	35	N/A - New Occurrence	Sugar Maple-Ostrich Fern Riverine Floodplain Forest	S1	2014	Deciduous floodplain forest. Likely significant natural community.Its size and quality were not fully assessed as it primarily lies outside the railroad right-of-way/study area. It appears to be quite small.	Mill River, Railroad Option	Natural community will be avoided.
146.5	45	8334	Northern Hardwood Forest	S5	2009	Represents Vermont's most abundant forest. Northern Hardwood Forests are present at elevations below 2,700 feet on gentle to steep slopes. Common species within this community include beech, yellow birch, sugar maple, and red maple, and soils are loamy, cool and moist. In this particular community, the tree canopy is composed of the typical species for this community, including sugar maple, red maple, yellow birch, and white ash. Red spruce and white pine are occasionally present as well. This canopy ranges from 60 to 90 feet in height, and averages about 75% closure. Tree diameters (DBH) ranged from 4 to 6 to over 16 depending on the stand. A secondary canopy, with widely varying cover and height, is composed of similar species, with the addition of beech, and in a few locations, sweet birch. Shrubs ranged from 15 to 90% cover (average ~40%) and include most of the tree species, along with hobblebush, striped maple, hophornbeam, and a dogwood species (Cornus sp.). Over 40 different herb species were noted in this community.	Long ridge between Ludlow and Andover. South of Route 103.	Confirmed outside the study area during natural community field assessment, located south of railroad tracks. Will be avoided.

Milepost	NR Map Number	EO ID	Name	State Rank	Date Observed	Community Characteristics	Location/Site Name	Survey Results/Impact Avoidance
146.9	45	8364	Hemlock Forest	S4	2009	Eastern hemlock comprises 75 to 100 percent of the canopy. Other species that may appear within this community include beech, yellow birch, sugar maple, red spruce and white pine. Hemlock Forests generally cover small areas of steep-sided ravines, summits, and bedrock-controlled areas. Soils are derived from a variety of parent materials, including basal till, ablation till, outwash, bedrock, and lake-deposited sediments. This particular community occurs on steep and ledgy ground. The canopy is 50 to 60 feet tall, 90% closed, and is dominated by eastern hemlock, red spruce, and yellow birch. The shrub layer included red spruce, hemlock, and striped maple saplings. The ground is primarily leaf litter or bare rock.	Long ridge from Ludlow to Andover. North of Route 103.	Confirmed outside the study area during natural community field assessment, located south of railroad tracks. Will be avoided.
146.9	45	8365	Hemlock-Northern Hardwood Forest	S4	2009	These communities contain eastern hemlock, red and white pines, red spruce, red maple, and paper birch and are found in areas of shallow bedrock or sandy to gravelly outwash, where soils are well to excessively drained. Hardwood species comprise 25 to 75 percent of the canopy. This particular community is a mixed forest type which occurs primarily on Lyman-Rock Outcrop complexes and several different sandy loam soils. The tree canopy (approximately 60 feet tall, 80 to 90% cover) is composed of hemlock, red spruce, yellow birch, beech, and red maple. White ash and sugar maple are occasional, and red oak was observed but is uncommon in these patches. The shrub layer is variable; shrub species include the canopy tree species noted above, along with striped maple, witch hazel and hobblebush. Herb cover is around 25% and species include Canada mayflower , creeping snowberry, wintergreen, Christmas fern, intermediate wood fern, long beech fern, and bracken fern.	Long ridge between Ludlow and Andover. North of Route 103 within Hemlock Forest.	Confirmed outside the study area during natural community field assessment, located south of railroad tracks. Will be avoided.
147.1	45	8366	Red Maple-Sphagnum Acidic Basin Swamp	S3	2009	These swamps occur in poorly drained basins and contain deep, peaty organic soils. The tree canopy is generally dominated by red maple, but other common species include yellow birch, hemlock, white pine, and red spruce. The shrub layer is well developed and includes mountain holly, winterberry, highbush blueberry, wild raisin, black chokeberry, lowbush blueberry, sheep laurel, swamp dewberry, and speckled alder. Herbaceous cover is high with cinnamon fern dominating the layer. This particular swamp is located within an almost perfectly circular basin that lacks any apparent outlet. Red maple, American elm, yellow birch, red spruce, and white ash are dominant. Tall shrub cover was abundant (up to 90%) near the center of the swamp, and species include winterberry and mountain holly.	Long ridge extending between Andover and Ludlow. North of Route 103.	Confirmed outside the study area during natural community field assessment, located south of railroad tracks. Will be avoided.

Table A-4: Aquatic and Shoreline RTE Plant Element Occurrences within 0.25-mile of the Marine Cable Route

Closest MP	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
53.0	6590	*Taenidia integerrima*	Yellow Pimpernel	S2	ST	-	2002	Banks, buffs, and slopes adjacent to large waterbodies and rivers. Blooms from late spring to early summer.	Plant: perennial, herbaceous; Stems: green to reddish brown, each individual has one to a few; Leaf: basal and cauline leaves have 1 to 3 leaflets which are entire and discrete and have a sharp tip; Inflorescence: consists of 1 to 3 umbels with small yellow flowers.	In Charlotte, McNeil Cove Road.	Installation of submarine cable will not impact this terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
59.0	4947	*Physostegia virginiana*	Obedient Plant	S2	ST	-	1908	Shores of rivers and lakes, seeps, open moist areas including meadows and fields, and limestone glades. Flowers late summer to early fall.	Plant: perennial up to 4 feet tall and unbranched; Stem: 4-angled and hairless; Leaf: opposite, 5 inches long, sessile, and hairless with sharply-pointed widely-spaced teeth along the margins; Inflorescence: tall 10 inch spikes of white, lavender or purple densely packed flowers at the upper ends of the stems.	Lake shore, Fort Cassin, Ferrisburgh.	Installation of submarine cable will not impact this primarily terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
61.5	4992	*Taenidia integerrima*	Yellow Pimpernel	S2	ST	-	2009	Banks, buffs, and slopes adjacent to large waterbodies and rivers. Blooms from late spring to early summer.	Plant: perennial, herbaceous; Stems: green to reddish brown, each individual has one to a few; Leaf: basal and cauline leaves have 1 to 3 leaflets which are entire and discrete and have a sharp tip; Inflorescence: consists of 1 to 3 umbels with small yellow flowers.	Basin Harbor.	Installation of submarine cable will not impact this terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
79.0	6589	*Taenidia integerrima*	Yellow Pimpernel	S2	ST	-	1942	Banks, buffs, and slopes adjacent to large waterbodies and rivers. Blooms from late spring to early summer.	Plant: perennial, herbaceous; Stems: green to reddish brown, each individual has one to a few; Leaf: basal and cauline leaves have 1 to 3 leaflets which are entire and discrete and have a sharp tip; Inflorescence: consists of 1 to 3 umbels with small yellow flowers.	In dry clayey soil of high bank of Lake Champlain, Bridport.	Installation of submarine cable will not impact this terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
87.0	8011	*Ulmus thomasii*	Cork Elm	S1	ST	-	1976	Moist, loamy soils, rich woods, streambanks and floodplains, or dry uplands, especially rocky slopes, limestone outcrops, ridges and exposed ledges. Flowers bloom between March and mid-May. Fruit matures in May or June.	Plant/Form: medium-sized tree reaching heights of 70 to 80 feet with a narrower more upright crown; Leaf: alternate, simple, elliptical ovate, 2.5 to 4 inches long, doubly serrated, dark green and smooth above, paler and somewhat downy beneath. Flower: short, tight hanging clusters, reddish-green in color; Fruit: flattened, round samaras, notched at the top, and covered with soft hairs; Twig: slender, reddish brown with short hairs, ovate buds; Bark: deeply furrowed, flattened, spongy ridges, interlacing, grayish brown in color.	Shore of Lake Champlain at Larabee's Point.	Installation of submarine cable will not impact this primarily terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
88.0	5794	*Rorippa aquatica*	Lake-cress	S1	ST	-	1964	Shallow, still water including marly ponds and lakes, silty or rocky shores of larger lakes, and oxbows or river backwaters.	Plant: rooted perennial aquatic herb; Stem: emersed or erect stems may be 1.5 meters long; Leaf: weakly attached to the stem, submersed leaves are usually deeply dissected, whereas emergent leaves are generally entire with serrate or smooth margins; Flower: rarely seen, 4 white clawed petals that mature into elongate fruit, which are obovoid.	Beadle's Cove, Lake Champlain.	Installation of submarine cable will avoid documented habitat and species occurrence in Beadle's Cove. No survey recommended; ANR concurrence received.

Closest MP	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
90.0	1661	*Taenidia integerrima*	Yellow Pimpernel	S2	ST	-	1987	Banks, buffs, and slopes adjacent to large waterbodies and rivers. Blooms from late spring to early summer.	Plant: perennial, herbaceous; Stems: green to reddish brown, each individual has one to a few; Leaf: basal and cauline leaves have 1 to 3 leaflets which are entire and discrete and have a sharp tip; Inflorescence: consists of 1 to 3 umbels with small yellow flowers.	Mount Independence, Orwell.	Installation of submarine cable will not impact this terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
90.0	6117	*Amaranthus tuberculatus*	Water Hemp	S2	-	-	1999	Margins of rivers, ponds, lakes, streams, and marshes, and disturbed habitats such as agricultural fields, roadsides and railroads. Flowers from summer to fall.	Plant: annual, erect or drooping, up to 6 feet tall, forb with many branches; Leaf: 0.25 to 0.50 inches long, entire; Flower: red to brown, small, 0 to 5 parted, inflorescence of many densely-flowered, rounded, usually separated spikes from the leaf axils and at the end of the stem.	In cove of Catfish Bay just north of marina.	Installation of submarine cable will not impact this primarily terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.
90.0	4572	*Rorippa aquatica*	Lake-cress	S1	ST	-	1994	Shallow, still water including marly ponds and lakes, silty or rocky shores of larger lakes, and oxbows or river backwaters.	Plant: rooted perennial aquatic herb; Stem: emersed or erect stems may be 1.5 meters long; Leaf: weakly attached to the stem, submersed leaves are usually deeply dissected, whereas emergent leaves are generally entire with serrate or smooth margins; Flower: rarely seen, 4 white clawed petals that mature into elongate fruit, which are obovoid.	North side of shoreline of Catfish Bay.	Installation of submarine cable will avoid documented habitat and species occurrence in Catfish Bay. No survey recommended; ANR concurrence received.
95.0	3563	*Taenidia integerrima*	Yellow Pimpernel	S2	ST	-	2008	Banks, buffs, and slopes adjacent to large waterbodies and rivers. Blooms from late spring to early summer.	Plant: perennial, herbaceous; Stems: green to reddish brown, each individual has one to a few; Leaf: basal and cauline leaves have 1 to 3 leaflets which are entire and discrete and have a sharp tip; Inflorescence: consists of 1 to 3 umbels with small yellow flowers.	In Orwell, between White Ledge and Blue Ledge. North of Singing Cedars Road.	Installation of submarine cable will not impact this terrestrial plant or their preferred habitat. No survey recommended; ANR concurrence received.

Notes:

1 - State Rank
S1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors
S2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors
S3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors
S4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors
S5 - Common (Secure): widespread and abundant
B - Breeding

2 - State and Federal Threatened and Endangered Status
ST - Listed as Threatened in the State of Vermont
SE - Listed as Endangered in the State of Vermont
SSC - Listed as Special Concern in the State of Vermont
FT - Federally-listed as Threatened
FE - Federally-listed as Endangered

Table A-5: Aquatic RTE Animal Element Occurrences within 0.25-mile of the Marine Cable Route

Closest MP	Category	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
20.4	Vertebrate	19503	*Anas strepera*	Gadwall	S1B	-	-	Between 2003 and 2007	Breed in marshes, sloughs, ponds, and small lakes with grasslands in both fresh and brackish water. Generally avoid wetlands bordered by thick vegetation or woodlands. Winter in brackish water marshes with abundant leafy aquatic vegeation. Females nest in fields and meadows, and on islands and dikes in wetlands. Breeding occurs from May to mid-July.	Medium-sized ducks lacking bright coloration.Males are gray-brown with a white belly, black rump, slate-gray bill, and yellow legs and feet. Females are similar, but have a mottled brown appearance and a yellowish bill with dark spots.	Bixby Island	Installation of submarine cable not likely to impact species or suitable habitat. Species has the mobility to avoid disturbance and move further inshore near preferred habitat. No survey recommended; ANR concurrence received.
54.0	Vertebrate	18570	*Anguilla rostrata*	American Eel	S2	-	-	-	The American eel is a catadromous fish that spawns at sea, migrates to fresh or brackish water to mature, then returns to the sea to spawn. Eels are habitat generalists and occur in a wide variety of lakes, rivers, and streams where they remain close to the bottom substrate. They are more active at night when they feed on a variety of invertebrates and fish. They may inhabitat freshwater habitats for four to twenty years before maturing and migrating downstream to sea to spawn.	American eels (Anguilla rostrata) has a long, cylindrical body, with a long continuous fin that runs from dorsal around to pelvic area. they have a thick, slimy skin colored olive to brown above, yellowish on the sides, and lighter below.	Converse Bay, Lake Champlain.	HDD at shoreline approaches will avoid littoral zone habitat. Eels use a wide variety of habitat readily available, and they have the ability to move when disturbed. The use of jet plow in deeper water is not expected to affect eel populations and has only a small potential to adversely affect individuals. No survey recommended.No survey recommended; ANR concurrence received.
74.3	Invertebrate	8073	*Potamilus alatus*	Pink Heelsplitter	S2	SE	-	-	Inhabits slow to swiftly flowing rivers and adapts to shallow lake and river-lake habitats, typically are found nearly completely buried in a variety of substrates (clay, clay mixed with silt, sand, pea gravel and sand, and cobble/sand/silt). A long-term brooder, *P. alats,* is thought to spawn in the late summer and release glochidia (larvae) in late May to early July the following year. Host fish species has been identified as freshwater drum (*Aplodinotus grunniens*).	Adult shell size can be large, shell is sub-ovate with a prominent dorsal wing. Shell is thick, moderately compressed with a dark, nearly black outer shell color and distinctive purple inner shell color. Hinge teeth well-developed.	Crown Point Bridge: Crosses narrow constriction of Lake Champlain from Chimney Point in Addison, Vermont to Crown Point, New York.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, an 8-hr SCUBA survey was conducted along the northern edge of the bridge from the Vermont state boat ramp to the second pier. No live mussels of any species were found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
74.3	Invertebrate	8074	*Leptodea fragilis*	Fragile Papershell	S2	SE	-	-	A habitat generalist, this species is found in river habitat from small streams to large rivers and in lakes and reservoirs. It reaches greatest densities in shallow water with slow flow and firm substrates of sand, sand and gravel, and mud but can also occur in strong current with coarse gravel and sand substrates and often buries itself nearly completely within the substrate. It can occur at depths of up to 15 or 20 feet. A long-term brooder, *L. fragilis* is thought to spawn in the late summer and release glochidia (larvae) in June or July the following year. Host fish species has been identified as freshwater drum (Aplodinotus grunniens).	A moderate to large size species with a thin shell that is laterally compressed and with a prominent dorsal wing that is sometimes broken or worn down in older specimens. Shell shape is ovate to oblong and outer shell color is typically brownish yellow. Hinge teeth are weak and thin.	Crown Point Bridge: Crosses narrow constriction of Lake Champlain from Chimney Point in Addison, Vermont to Crown Point, New York.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, an 8-hr SCUBA surveywas conducted along the northern edge of the bridge from the Vermont state boat ramp to the second pier. No live mussels of any species were found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.

Closest MP	Category	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
74.3	Invertebrate	8076	*Lampsilis ovata*	Pocketbook	S2	SE	-	-	A habitat generalist, this species is found in river habitat from small streams to large rivers and in lakes and reservoirs. Preferred substrates include firmly packed sand or sand mixed with gravel or silt. It can occur at depths of up to 15 or 20 feet. L. ovata is thought to be a long-term brooder that releases glochidia (larvae) in July. Host fish species have been identified as smallmouth bass (*Micropterus dolomieu*), white crappie (*Pomoxis annularis*), laremouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), sauger (*Sander canadensis*), and yellow perch (*Perca flavescens*).	A moderate to large mussel with thick inflated shell of ovate to elliptical shape. Sexually dimorphic, females are more ovate to nearly round. Outer shell is shiny yellow to yellow-brown that may have several dark rays. Beak is wide and inflated, hinge teeth strong. Mantle is highly modified and pigmented with an eyespot in gravid females.	Crown Point Bridge: Crosses narrow constriction of Lake Champlain from Chimney Point in Addison, Vermont to Crown Point, New York.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, an 8-hr SCUBA surveywas conducted along the northern edge of the bridge from the Vermont state boat ramp to the second pier. No live mussels of any species were found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
74.5	Invertebrate	8072	*Pyganodon grandis*	Giant Floater	S2S3	ST	-	-	A habitat generalist, this species achieves greatest densities in pools, lakes and impoundments with fine substrates of sand, sand and gravel, silty sand and mud. It occurs at variable depths and is more tolerant of low oxygen levels than other unionid species. This is a long-term brooder that spawns in August and releases glochidia (larvae) the following May or June, and uses a wide variety of host fish species including many species of shiners , centrarchids, darters, and drum.	A thin-shelled mussel species of moderate size and ovate shape; outer shell is shiny yellow-brown, greenish, or greenish-brown in color, sometimes with fine green rays. Hinge teeth are absent. Beak is inflated above the hinge line and beak sculture has nodulous, double-looped bars.	Crown Point Bridge: Crosses narrow constriction of Lake Champlain from Chimney Point in Addison, Vermont to Crown Point, New York.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, an 8-hr SCUBA surveywas conducted along the northern edge of the bridge from the Vermont state boat ramp to the second pier. No live mussels of any species were found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
78.8	Vertebrate	9867	*Moxostoma macrolepidotum*	Shorthead Redhorse	S2	-	-	1863	A benthic feeder, preferred habitat is clean sand, gravel, and cobble substrate in small to large rivers and lakes. Spawning habitat consists of slow to moderate runs and pools with silt-free large gravel substrate, and occurs from early April to early July when water temperatures range from 11 to 21°C. Adults may migrate during spawning season to find optimal habitat.	A solid-bodied moderate sized fish reaching a maximum size of 18-25 inches with soft-rayed fins, protrusible ventral mouth with thick lips, and deeply forked caudal fin. The body has large smooth scales but the head is without scales. Coloring varies but back is typically gray, sides may be silvery, and fins may have reddish coloring.	Bridport, Lake Champlain.	HDD at shoreline approaches will avoid littoral zone habitat. The cable installation will not affect preferred spawning habitat of faster moving waters but has the potential to temporarily affect deeper water habitat. This is a mobile species that should be able to avoid the area during construction activities. No survey recommended; ANR concurrence received.
78.8	Vertebrate	9887	*Moxostoma anisurum*	Silver Redhorse	S2	SSC	-	1936	Inhabits silty to firm-bottomed pools and runs of small to large rivers; also in natural lakes and impoundments. Preferred habitat consists of deep pools or areas with slow flow and soft bottom substrates; often near undercut banks and protruding tree roots. Spawning occurs in faster water areas of streams and rivers in 1 to 3 feet of water over gravel to rubble bottoms from April to June when water temperatures range from 9 to 14.5°C.	A solid-bodied moderate sized fish reaching a maximum size of 16-20 inches with soft-rayed fins, protrusible ventral mouth with thick lips, and deeply forked caudal fin. The body has large smooth scales but the head is without scales. Coloring varies but back is typically gray, sides may be silvery, and with reddish fins.	Bridport, Lake Champlain.	HDD at shoreline approaches will avoid littoral zone habitat. The cable installation has the potential to temporarily affect deeper water habitat. This is a mobile species that should be able to avoid the area during construction activities. No survey recommended; ANR concurrence received.

Closest MP	Category	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
74-98	Vertebrate	18573	*Anguilla rostrata*	American Eel	S2	-	-	-	The American eel is a catadromous fish that spawns at sea, migrates to fresh or brackish water to mature, then returns to the sea to spawn. Eels are habitat generalists and occur in a wide variety of lakes, rivers, and streams where they remain close to the bottom substrate. They are more active at night when they feed on a variety of invertebrates and fish. They may inhabitat freshwater habitats for four to twenty years before maturing and migrating downstream to sea to spawn.	American eels (Anguilla rostrata) has a long, cylindrical body, with a long continuous fin that runs from dorsal around to pelvic area. they have a thick, slimy skin colored olive to brown above, yellowish on the sides, and lighter below.	Lake Champlain-South Bridport to West Haven.	HDD at shoreline approaches will avoid littoral zone habitat. Eels use a wide variety of habitat readily available, and they have the ability to move when disturbed. The use of jet plow in deeper water is not expected to affect eel populations and has only a small potential to adversely affect individuals. No survey recommended; ANR concurrence received.
87.5	Invertebrate	8078	*Leptodea fragilis*	Fragile Papershell	S2	SE	-	-	A habitat generalist, this species is found in river habitat from small streams to large rivers and in lakes and reservoirs. It reaches greatest densities in shallow water with slow flow and firm substrates of sand, sand and gravel, and mud but can also occur in strong current with coarse gravel and sand substrates and often buries itself nearly completely within the substrate. It can occur at depths of up to 15 or 20 feet. A long-term brooder, *L. fragilis* is thought to spawn in the late summer and release glochidia (larvae) in June or July the following year. Host fish species has been identified as freshwater drum (Aplodinotus grunniens).	A moderate to large size species with a thin shell that is laterally compressed and with a prominent dorsal wing that is sometimes broken or worn down in older specimens. Shell shape is ovate to oblong and outer shell color is typically brownish yellow. Hinge teeth are weak and thin.	Lake Champlain, Shoreham, Larrabee's Point.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, a SCUBA survey was conducted in a large area to the north of the cable ferry landing, to a depth of 14 feet. No live mussels of any species was found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
87.5	Invertebrate	7743	*Pyganodon grandis*	Giant Floater	S2S3	ST	-	1973	A habitat generalist, this species achieves greatest densities in pools, lakes and impoundments with fine substrates of sand, sand and gravel, silty sand and mud. It occurs at variable depths and is more tolerant of low oxygen levels than other unionid species. This is a long-term brooder that spawns in August and releases glochidia (larvae) the following May or June, and uses a wide variety of host fish species including many species of shiners , centrarchids, darters, and drum.	A thin-shelled mussel species of moderate size and ovate shape; outer shell is shiny yellow-brown, greenish, or greenish-brown in color, sometimes with fine green rays. Hinge teeth are absent. Beak is inflated above the hinge line and beak sculture has nodulous, double-looped bars.	Lake Champlain, Shoreham, Larrabee's Point.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, a SCUBA survey was conducted in a large area to the north of the cable ferry landing, to a depth of 14 feet. No live mussels of any species was found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
87.5	Invertebrate	8079	*Potamilus alatus*	Pink Heelsplitter	S2	SE	-	-	Inhabits slow to swiftly flowing rivers and adapts to shallow lake and river-lake habitats, typically are found nearly completely buried in a variety of substrates (clay, clay mixed with silt, sand, pea gravel and sand, and cobble/sand/silt). A long-term brooder, *P. alatu* s is thought to spawn in the late summer and release glochidia (larvae) in late May to early July the following year. Host fish species has been identified as freshwater drum (*Aplodinotus grunniens*).	Adult shell size can be large, shell is sub-ovate with a prominent dorsal wing. Shell is thick, moderately compressed with a dark, nearly black outer shell color and distinctive purple inner shell color. Hinge teeth well-developed.	Lake Champlain, Shoreham, Larrabee's Point.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, a SCUBA survey was conducted in a large area to the north of the cable ferry landing, to a depth of 14 feet. No live mussels of any species was found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.

Closest MP	Category	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance
87.5	Invertebrate	8080	*Lampsilis ovata*	Pocketbook	S2	SE	-	-	A habitat generalist, this species is found in river habitat from small streams to large rivers and in lakes and reservoirs. Preferred substrates include firmly packed sand or sand mixed with gravel or silt. It can occur at depths of up to 15 or 20 feet. L. ovata is thought to be a long-term brooder that releases glochidia (larvae) in July. Host fish species have been identified as smallmouth bass (*Micropterus dolomieu*), white crappie (*Pomoxis annularis*), laremouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), sauger (*Sander canadensis*), and yellow perch (*Perca flavescens*).	A moderate to large mussel with thick inflated shell of ovate to elliptical shape. Sexually dimorphic, females are more ovate to nearly round. Outer shell is shiny yellow to yellow-brown that may have several dark rays. Beak is wide and inflated, hinge teeth strong. Mantle is highly modified and pigmented with an eyespot in gravid females.	Lake Champlain, Shoreham, Larrabee's Point.	HDD at shoreline approaches will avoid preferred littoral zone habitat. In 2009, A two-hour SCUBA survey was conducted. No live mussels of any species was found, only shell material. Presence of zebra mussels in abundance has likely depressed native freshwater mussel populations that might occur here. Species is not likely to occur and no survey recommended in this area. ANR recommended and TDI completed freshwater mussel surveys in the northern ~ 12 miles of the Lake Champlain cable route from Alburgh, VT south to Fisk Point on Isle la Motte. No live RTE mussels observed. No further RTE mussel impact avoidance measures required; ANR concurrence received.
88.2	Vertebrate	13161	*Anguilla rostrata*	American Eel	S2	-	-	-	The American eel is a catadromous fish that spawns at sea, migrates to fresh or brackish water to mature, then returns to the sea to spawn. Eels are habitat generalists and occur in a wide variety of lakes, rivers, and streams where they remain close to the bottom substrate. They are more active at night when they feed on a variety of invertebrates and fish. They may inhabitat freshwater habitats for four to twenty years before maturing and migrating downstream to sea to spawn.	American eels (Anguilla rostrata) has a long, cylindrical body, with a long continuous fin that runs from dorsal around to pelvic area. they have a thick, slimy skin colored olive to brown above, yellowish on the sides, and lighter below.	Unnamed Stream at Beadle's Cove.	HDD at shoreline approaches will avoid littoral zone habitat. Eels use a wide variety of habitat readily available, and they have the ability to move when disturbed. The use of jet plow in deeper water is not expected to affect eel populations and has only a small potential to adversely affect individuals. No survey recommended; ANR concurrence received.
91	Invertebrate	8390	*Enallagma antennatum*	Rainbow Bluet	S2S3	-	-	2007	Larval aquatic lifestage (nymph) inhabitats slow streams and lakes near stream inlets or outlets.	-	Orwell, Lake Champlain, south of Mount Independence, at Carillon Dock.	The use of jet plow in deeper water is not expected to affect the documented occurrence and potential habitat closer to the lake shore / tributary.No survey recommended; ANR concurrence received.
92.2	Vertebrate	9797	*Notropis bifrenatus*	Bridle Shiner	S1?	SSC	-	1984	Adults occur in pond, lakes and sluggish mud-bottomed pools of creeks and small to medium rivers, and prefer clear water (visual feeders) areas near aquatic vegetation. They are weak swimmers and can be affected by changes in flow. They have a short life span of about two years. They typically spawn from late May to July in shallow open water areas near dense submerged aquatic vegetation. Adhesive eggs attach to vegetation where young juveniles will remain until joining older juveniles and adult schools.	A small minnow species with a distinct dark lateral band, large eye, and a pointed, slightly subterminal mouth. Side scales have distinct dark outlines. During spawning season, fins and side color of males becomes bright yellow.	Lake Champlain near Chipman's Point Road. Ferry landing at Chipman's Point.	HDD at shoreline approaches will avoid littoral zone habitat where the preferred habitat of submerged aquatic vegetation is likely to occur. No survey recommended; ANR concurrence received.
N/A	Vertebrate	N/A	*Acipenser fulvescens*	Lake sturgeon	S1	SE	-	N/A	Inhabits mud, sand, and gravel. Spawns in the spring from May to June in areas of clean, large rubble such as along windswept, rocky island shores and in rapids in streams. Deep holes near spawning areas are also important for staging.	Similar to all sturgeons, it has a torpedo-shaped body that is covered with rows of bony plates (scutes) in place of scales. The lake sturgeon has a sharp, cone-shaped snout with four smooth barbels on its underside and is typically dull grey in color. Mature adults average between 3 to 5 feet in length.	N/A	HDD at shoreline approaches will avoid potential spawning habitat. Species is mobile and not likely to be affected by the submarine installation in other areas. Impacts are not likely to occur. No survey recommended; ANR concurrence received.

Closest MP	Category	EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Date Observed	Habitat Characteristics/Life History	Identification	EO Record Location	Survey Recommendations/Impact Avoidance

Notes:

1 - State Rank

S1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors

S2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors

S3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors

S4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors

S5 - Common (Secure): widespread and abundant

B - Breeding

N - Nonbreeding

H - Possibly extinct/extirpated: Missing; known from only historical occurrences but still some hope of rediscovery

2 - State and Federal Threatened and Endangered Status

ST - Listed as Threatened in the State of Vermont

SE - Listed as Endangered in the State of Vermont

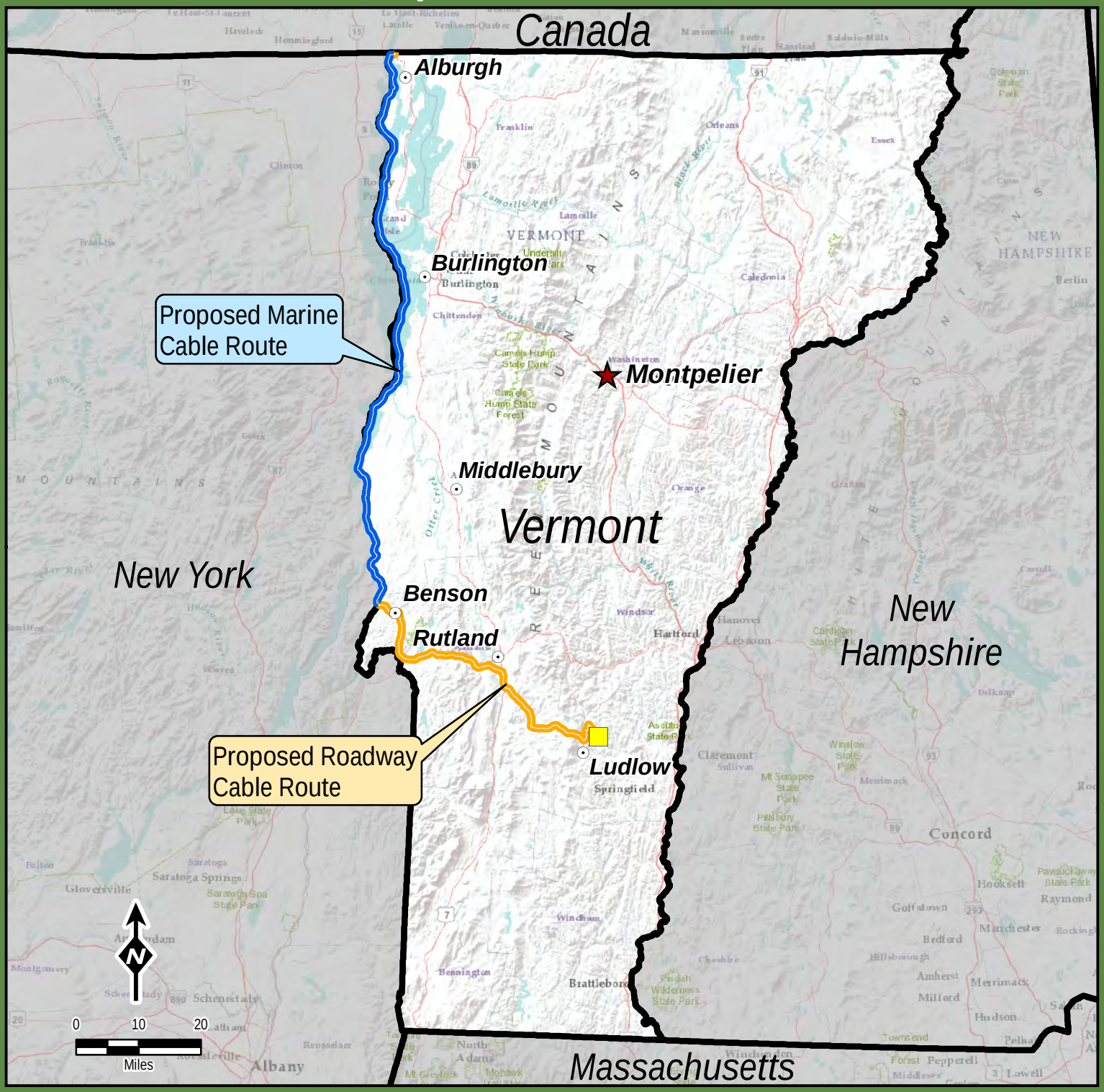
SSC - Listed as Special Concern in the State of Vermont

FT - Federally-listed as Threatened

FE - Federally-listed as Endangered

ATTACHMENT B

Proposed Route



Legend

- Ludlow Converter Site
- Proposed Marine Cable Route
- Proposed Roadway Cable Route
- State Boundary

Sources: ESRI, TRC, TDI New England

TDI New England
A Blackstone Portfolio Company

New England Clean Power Link

Proposed Route

Created: 5/21/2014

TRC
14 Gabriel Drive
Augusta, ME 04330

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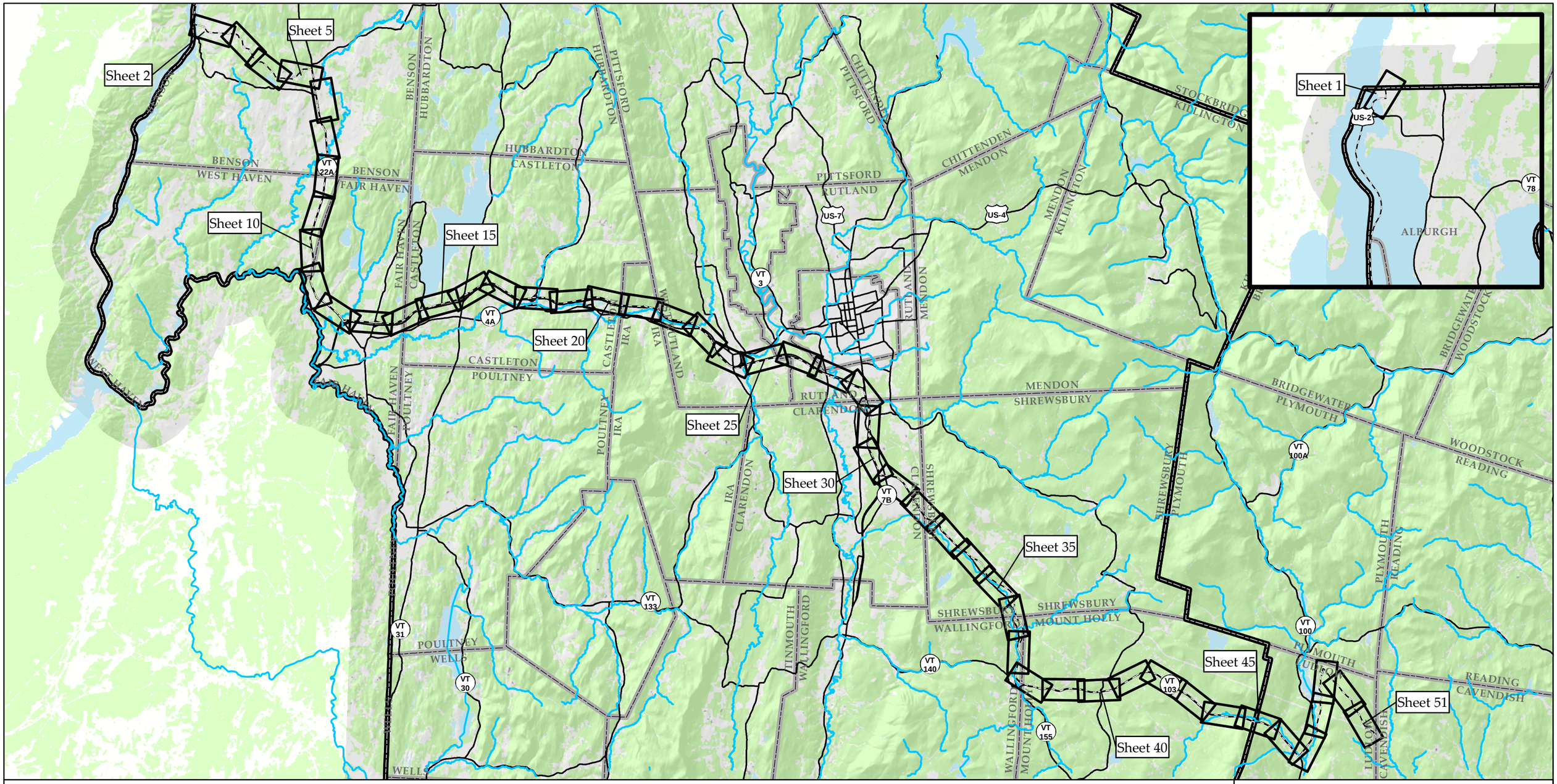

Sources: Land Use Land Cover & Hillshade provided by VCGI (2002); Statewide datasets provided by VCGI: Roads by VTrans (2013); NRCS Soils by NRCS (2008); Streams & Waterbodies by VHD (2010), County and Town Boundaries by VCGI (2012), Provided by TRC: Conceptual Project Alignment (2015)

- NECPL Proposed Alignment (TRC)
- Streams (VHD)
- Sheet Outline
- Waterbody (VHD)
- Roads
- Town Boundary (VCGI)
- County Boundary (VCGI)

N

2 1 0 2 Miles

TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series Index

December 2, 2014
Updated: July 31, 2015

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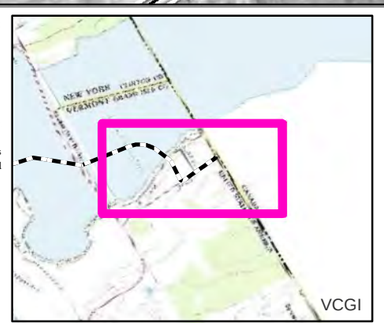
Sources: Provided by VCGI: Background Imagery (2007-2013); Roads by VTrans (2012); Streams & Waterbodies by VHD (2010), VSWI Wetlands by ANR (2013), Deer Wintering Area by ANR (2013), County and Town Boundaries by VCGI (2012); Bear Crossing & Feeding Data by VT Fish & Wildlife (2001). Provided by TRC: Contours (2014), Conceptual Project Alignment (2015), VTrans ROW (2014), Parcel Boundaries (2009-2013) 100-year flood & Floodway compiled by TRC from FEMA (2014), Wetland & Stream Delineations by TRC & VHB (2014); Bat tree, Natural Community and RTE data assessments completed by Arrowwood Environmental (2014); FEH provided by VTDEC (2014); River Corridors by VHB (2015)



NECPL Proposed Overland Alignment (TRC)
- Horizontal Directional Drilling (HDD); Lake HDD
- Jack and Bore
- Terrestrial Cable (Trenching)
- Project Parcel
- Parcel Boundary
- Study Area
- Approximate Study Area
- Sheet Outline

- Proposed Class II Wetland (TRC/VHB)
- Proposed Class III Wetland (TRC/VHB)
- Proposed 50' Class II Wetland Buffer (VHB)
- Approximate Stream (TRC/VHB)
- Delineated Stream (TRC/VHB)
- RTE Plants (AE)
- Natural Resource Buffer (VHB)
- Potential Bat Tree (AE)
- Natural Community (AE)
- Uncommon (S3) Plants (AE)
- Deer Wintering Area (AE)

NHI Element Occurrence (VTFW)
- RTEs
- Significant Natural Community
- Bear Crossing (VTFW)
- Bear Feeding (VTFW)
- Deer Wintering Area (ANR)
- VSWI Wetland (ANR)
- Named VHD Stream (VCGI)
- Unnamed VHD Stream (VCGI)

- Floodway (FEMA)
- 100 year floodplain (FEMA)
- FEH (VTDEC)
- River Corridor (VHB)
- Waterbody (VHD)
- Town Boundary (VCGI)
- Country Boundary (VCGI)
- Road (VTrans)
- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 1 of 51

December 2, 2014
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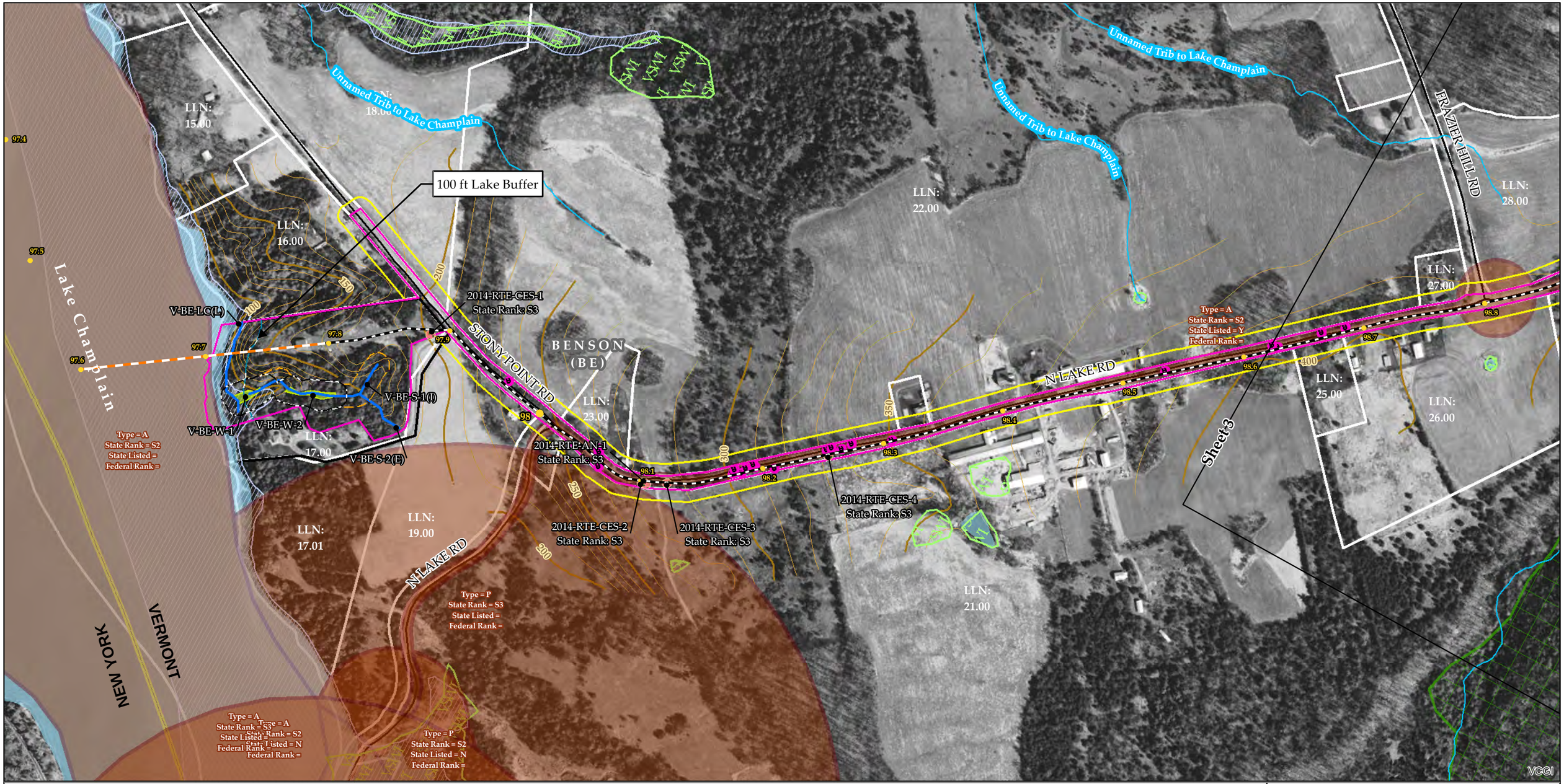
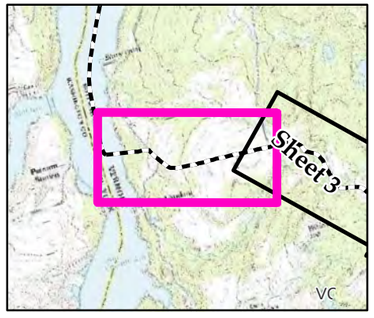


Sources: Provided by VCGI: Background Imagery (2007-2013); Roads by VTrans (2012); Streams & Waterbodies by VHD (2010), VSWI Wetlands by ANR (2013), Deer Wintering Area by ANR (2013), County and Town Boundaries by VCGI (2012); Bear Crossing & Feeding Data by VT Fish & Wildlife (2001). Provided by TRC: Contours (2014), Conceptual Project Alignment (2015), VTrans ROW (2014), Parcel Boundaries (2009-2013) 100-year flood & Floodway compiled by TRC from FEMA (2014), Wetland & Stream Delineations by TRC & VHB (2014); Bat tree, Natural Community and RTE data assessments completed by Arrowwood Environmental (2014); FEH provided by VTDEC (2014); River Corridors by VHB (2015)



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- Country Boundary (VCGI)
- Road (VTrans)
- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 2 of 51

December 2, 2014
Updated: July 31, 2015

400 200 0 400 Feet

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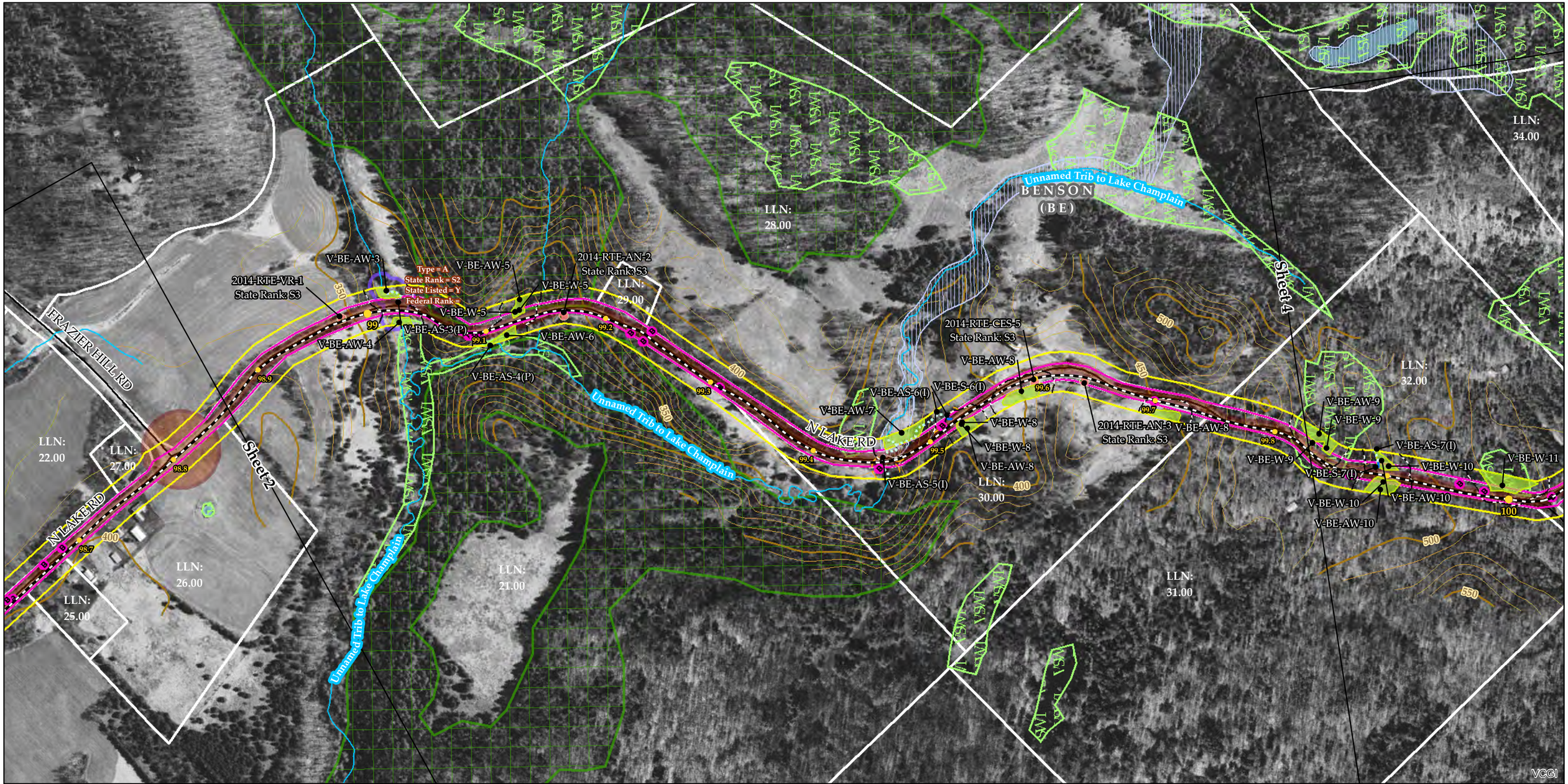

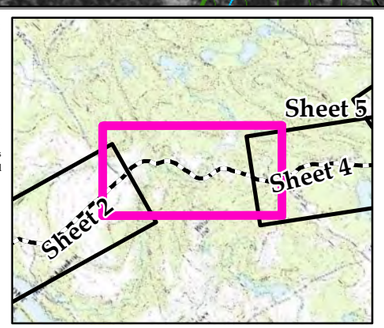

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vhb

TRC Results you can rely on

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 3 of 51

December 2, 2014
Updated: July 31, 2015

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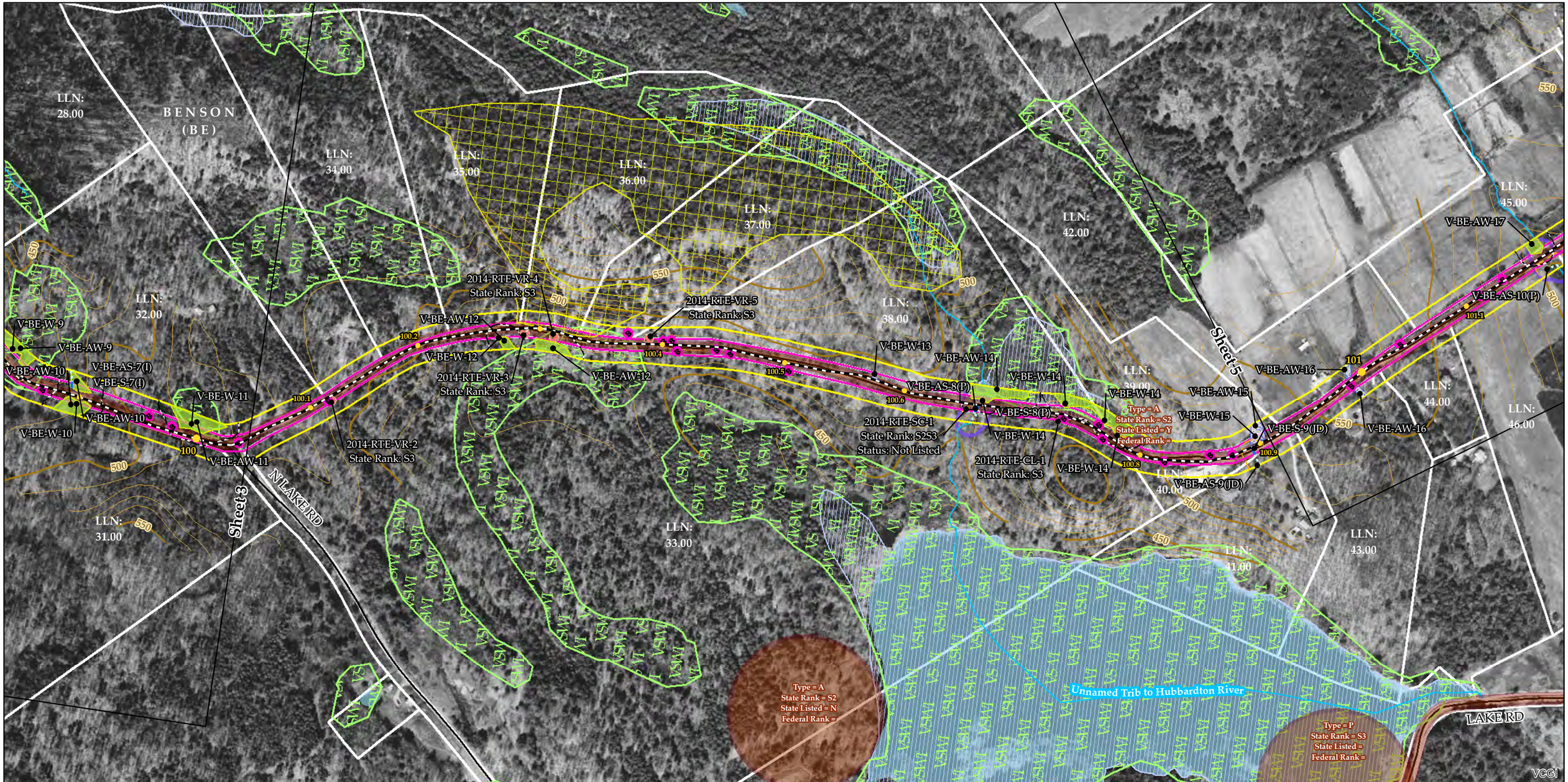

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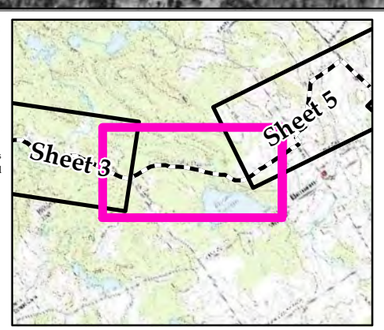

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Sheet Number 4 of 51

December 2, 2014
Updated: July 31, 2015

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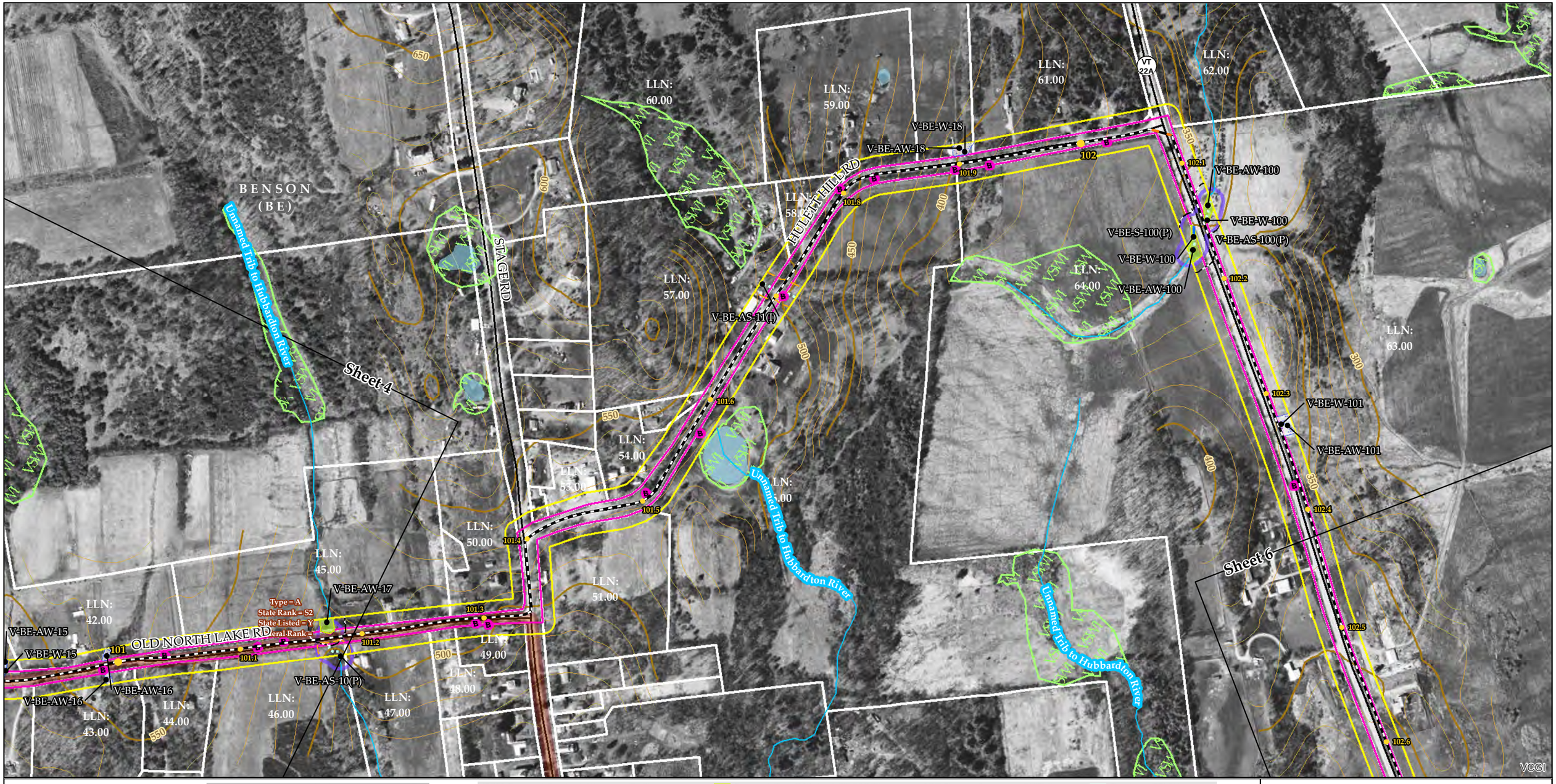

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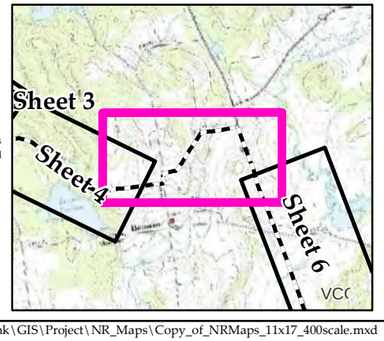

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December 2, 2014
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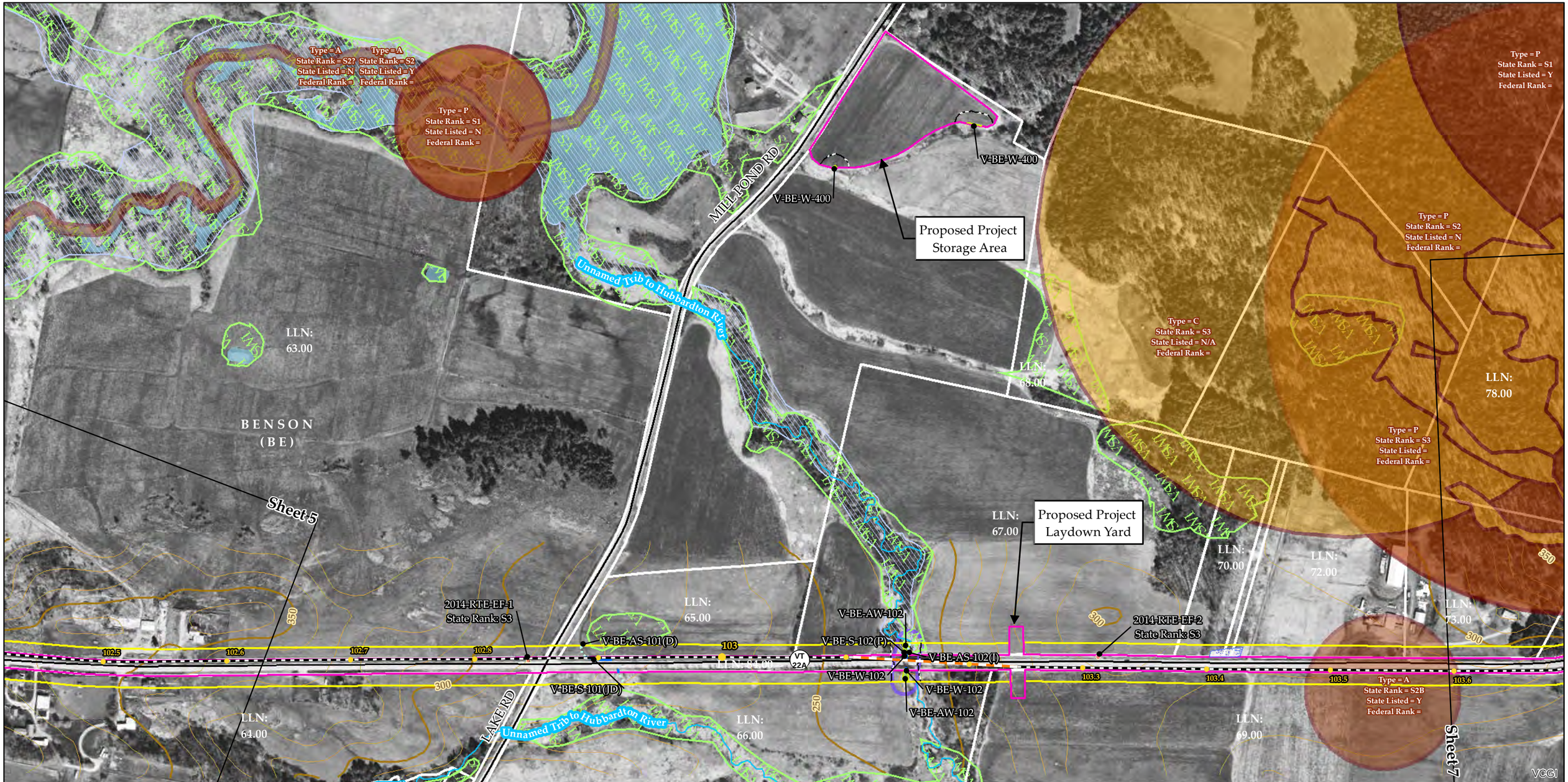

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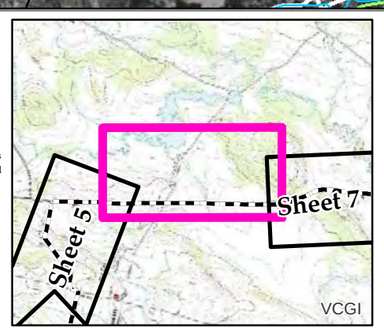

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
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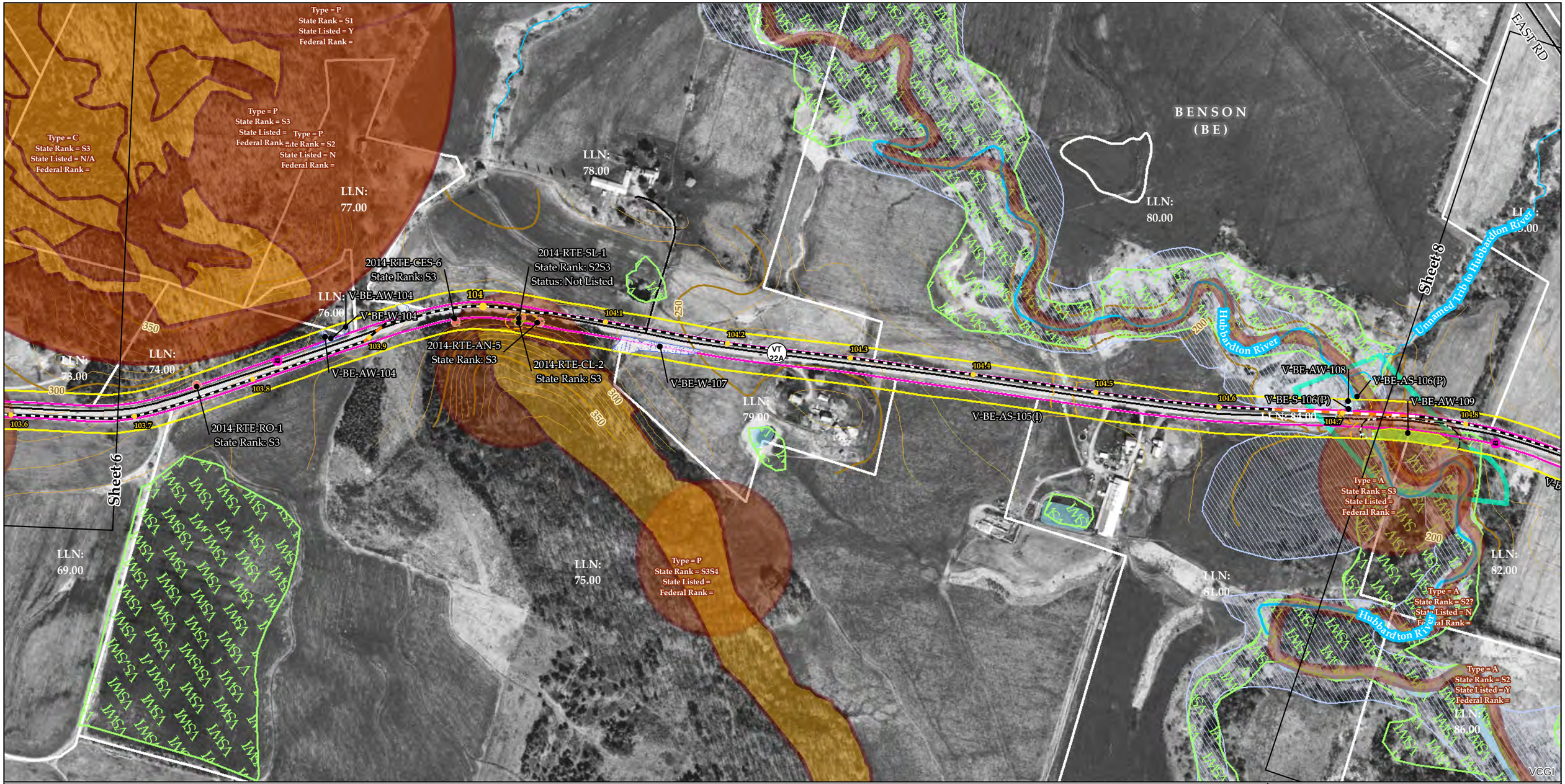

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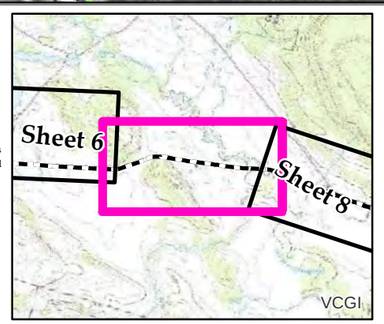

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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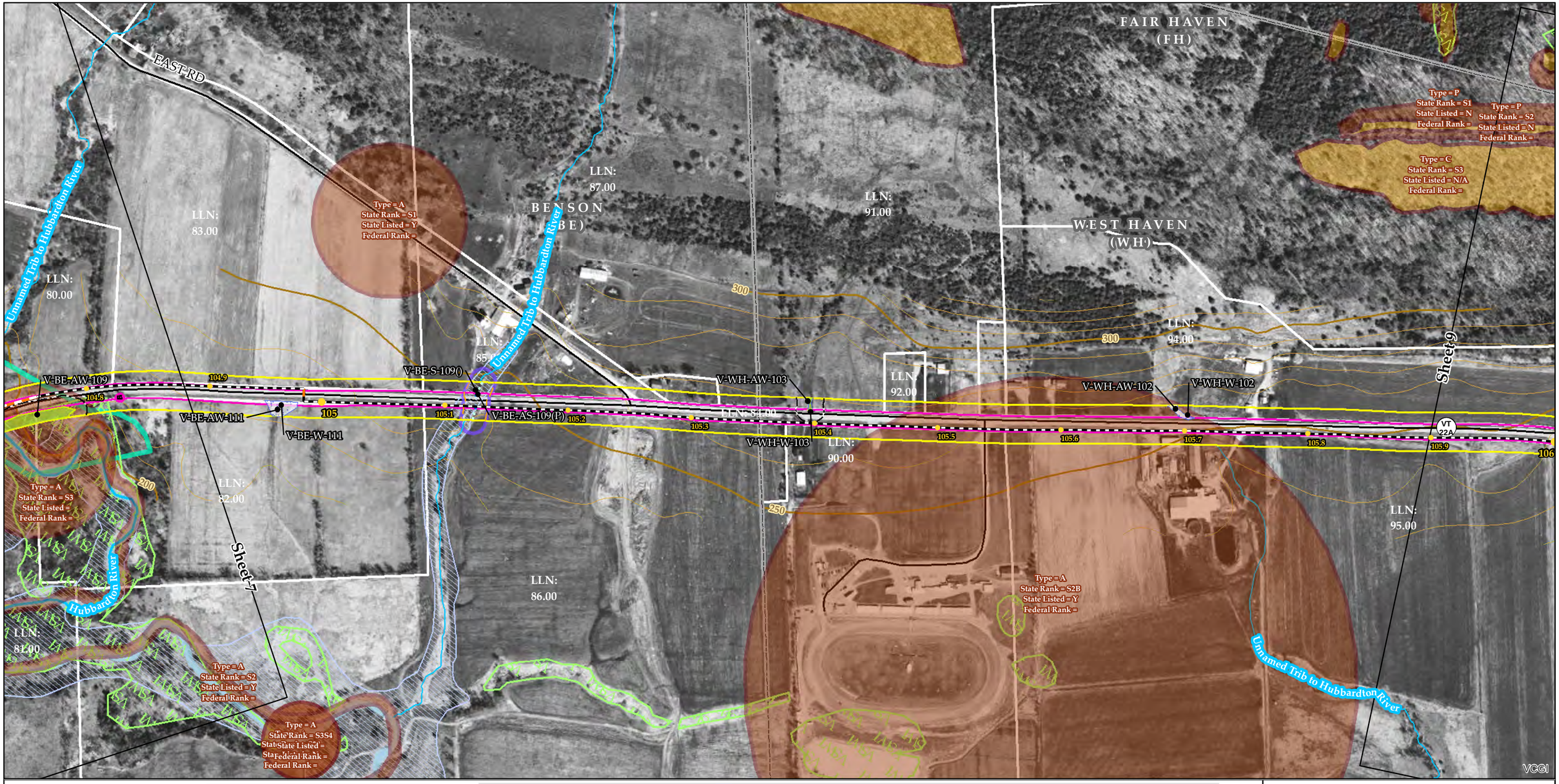

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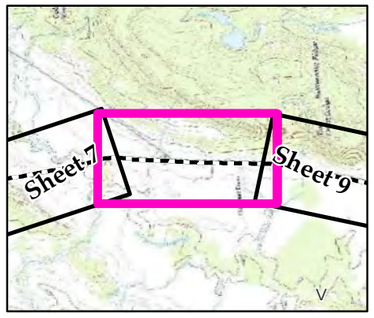

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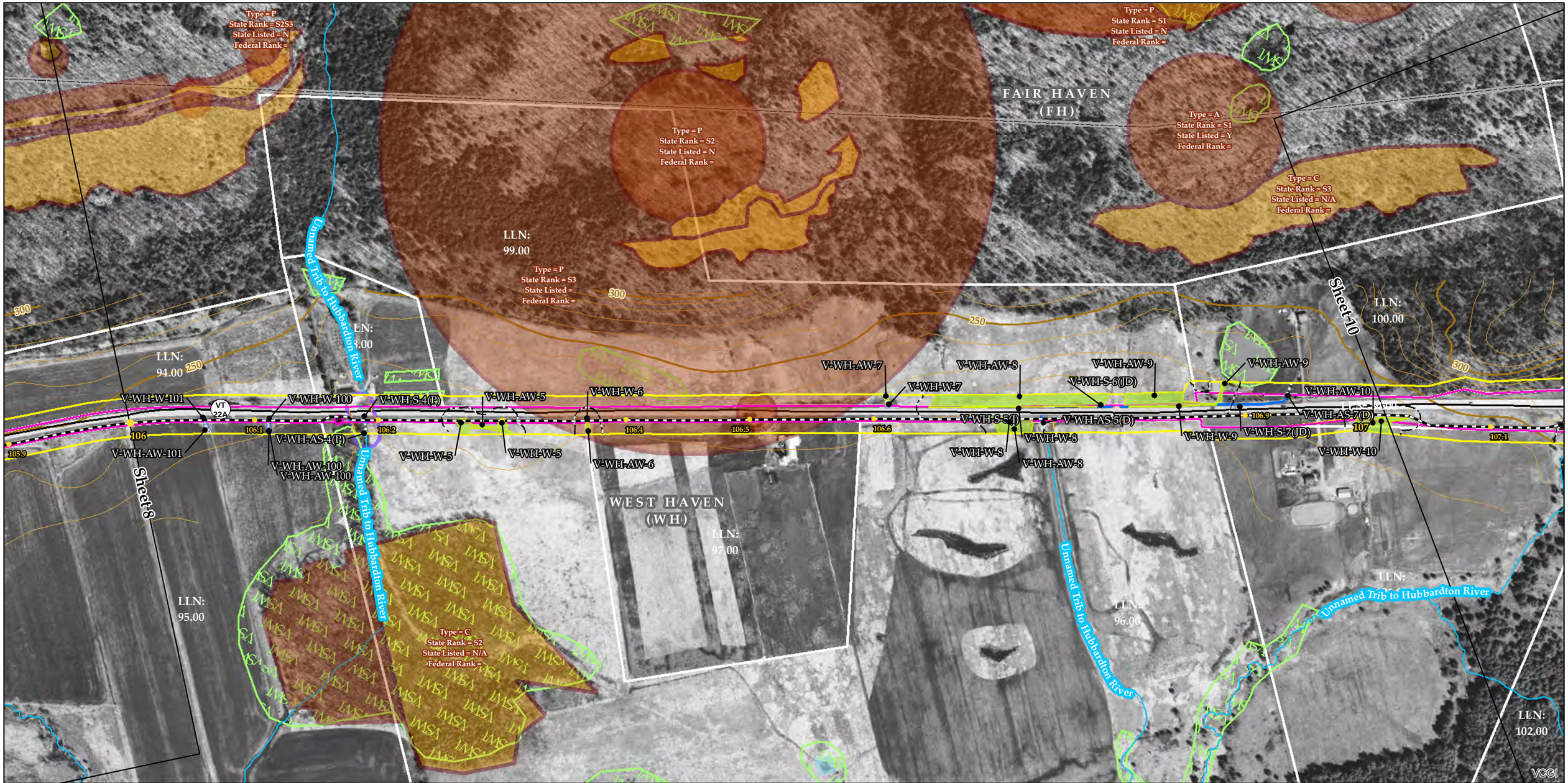

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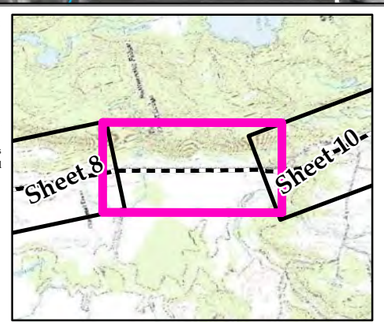

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December 2, 2014
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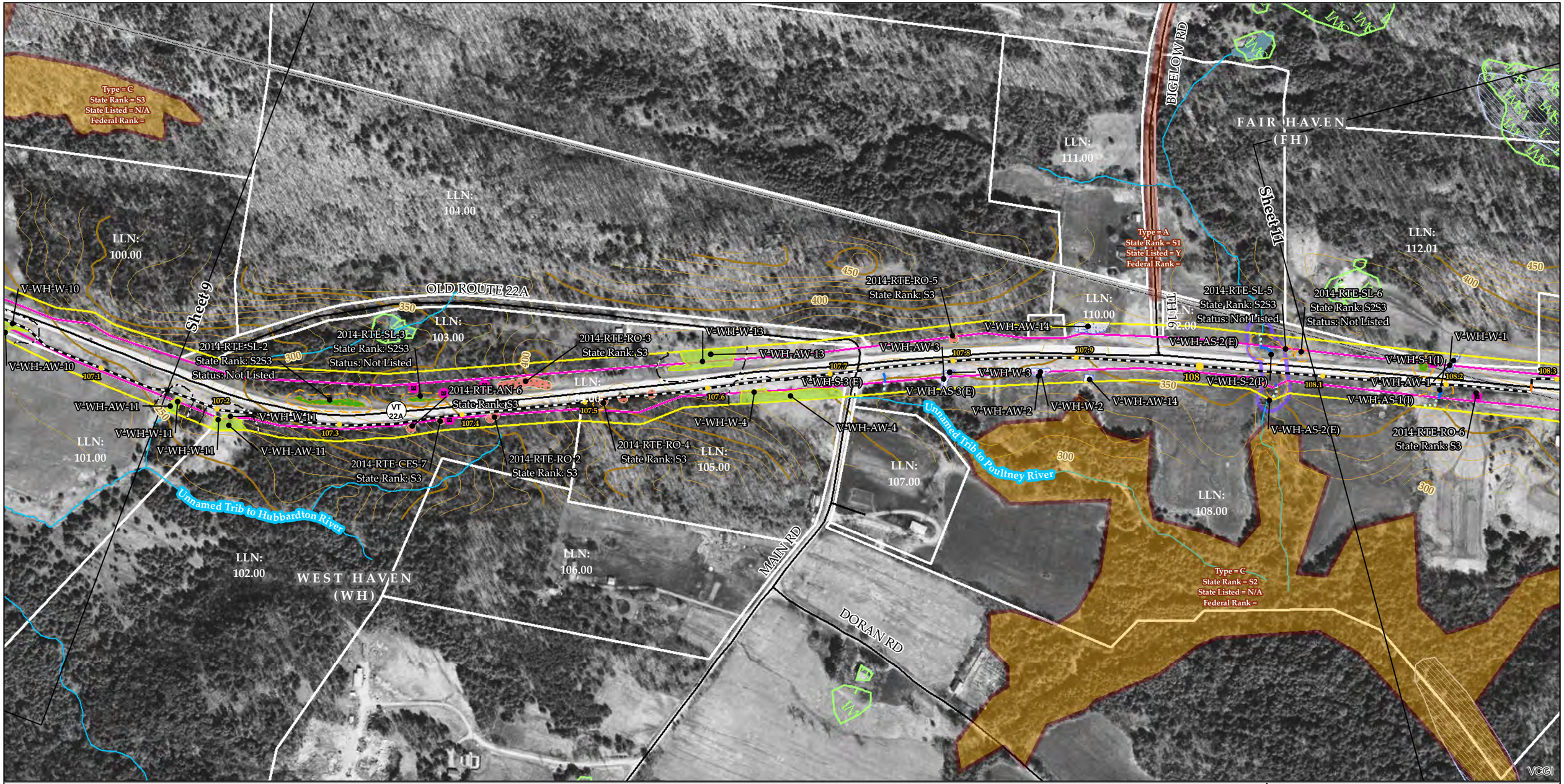

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TRC
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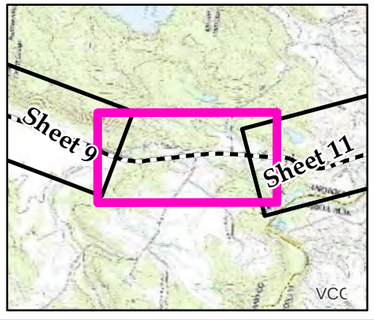

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December 2, 2014
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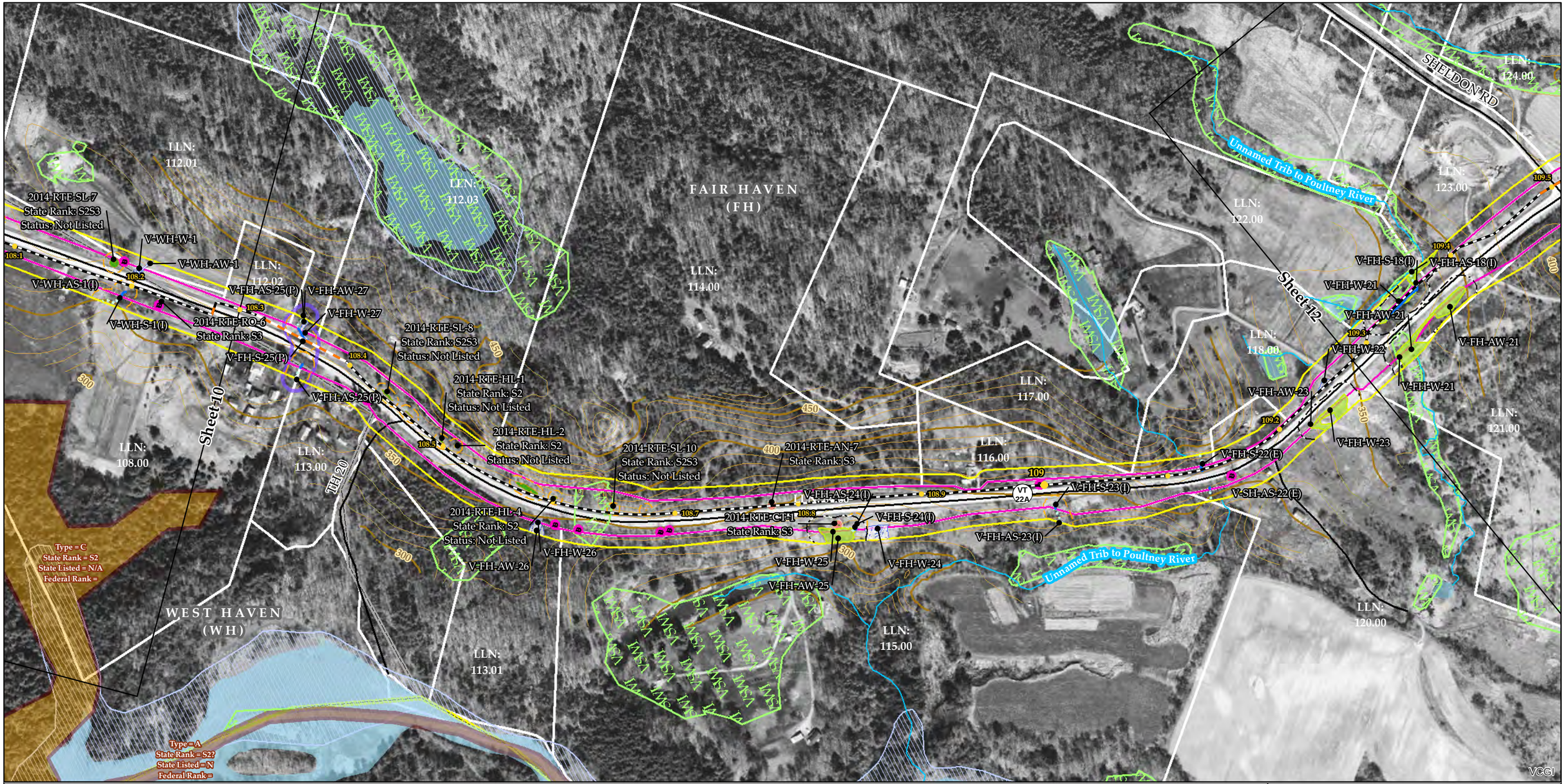

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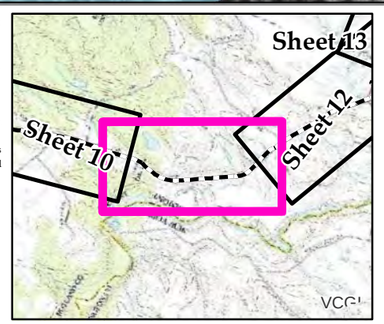

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- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 11 of 51

December 2, 2014
Updated: July 31, 2015

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Feet

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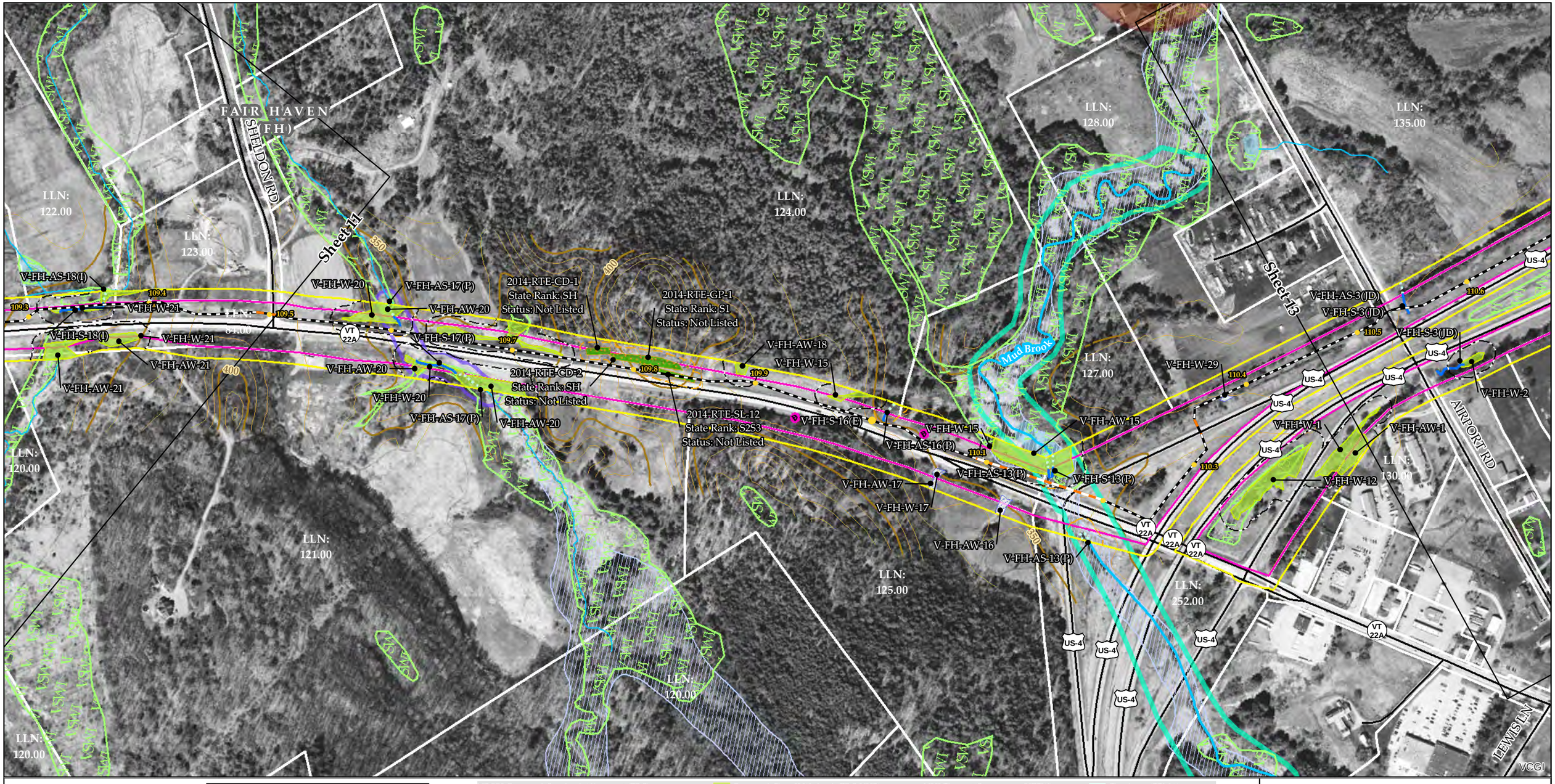

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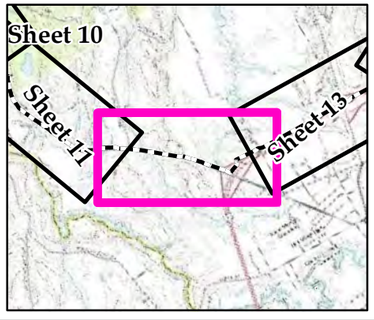
vhb

TRC Results you can rely on



NECPL Proposed Overland Alignment (TRC)
- Horizontal Directional Drilling (HDD); Lake HDD
- Jack and Bore
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- Project Parcel
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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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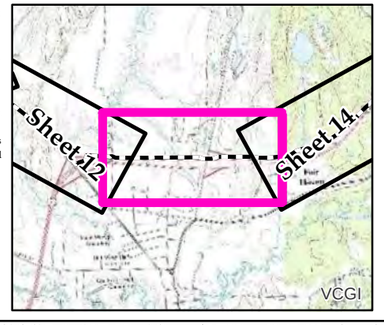

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TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 13 of 51

December 2, 2014
Updated: July 31, 2015

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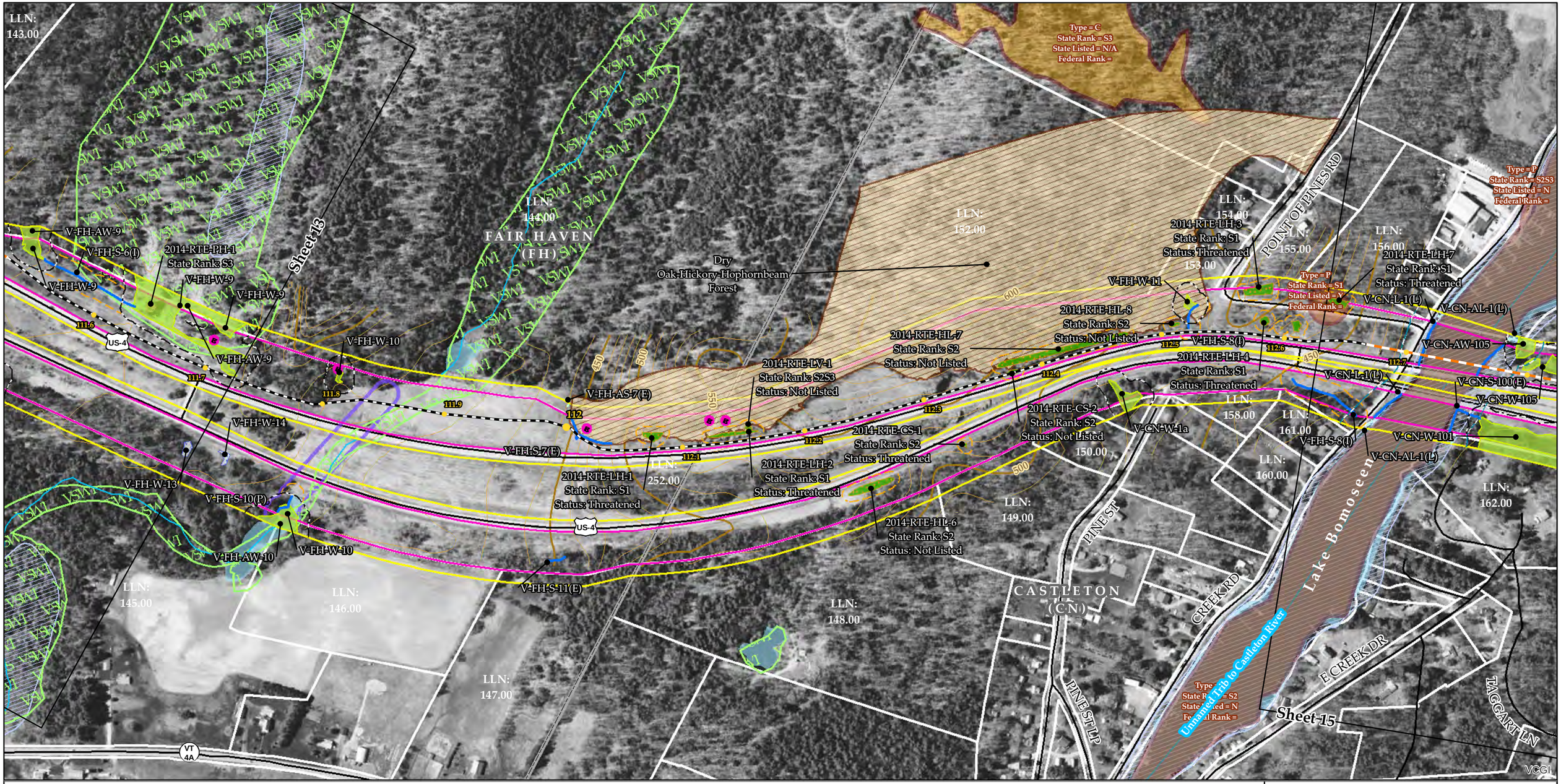

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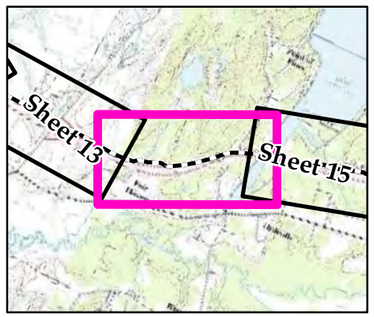

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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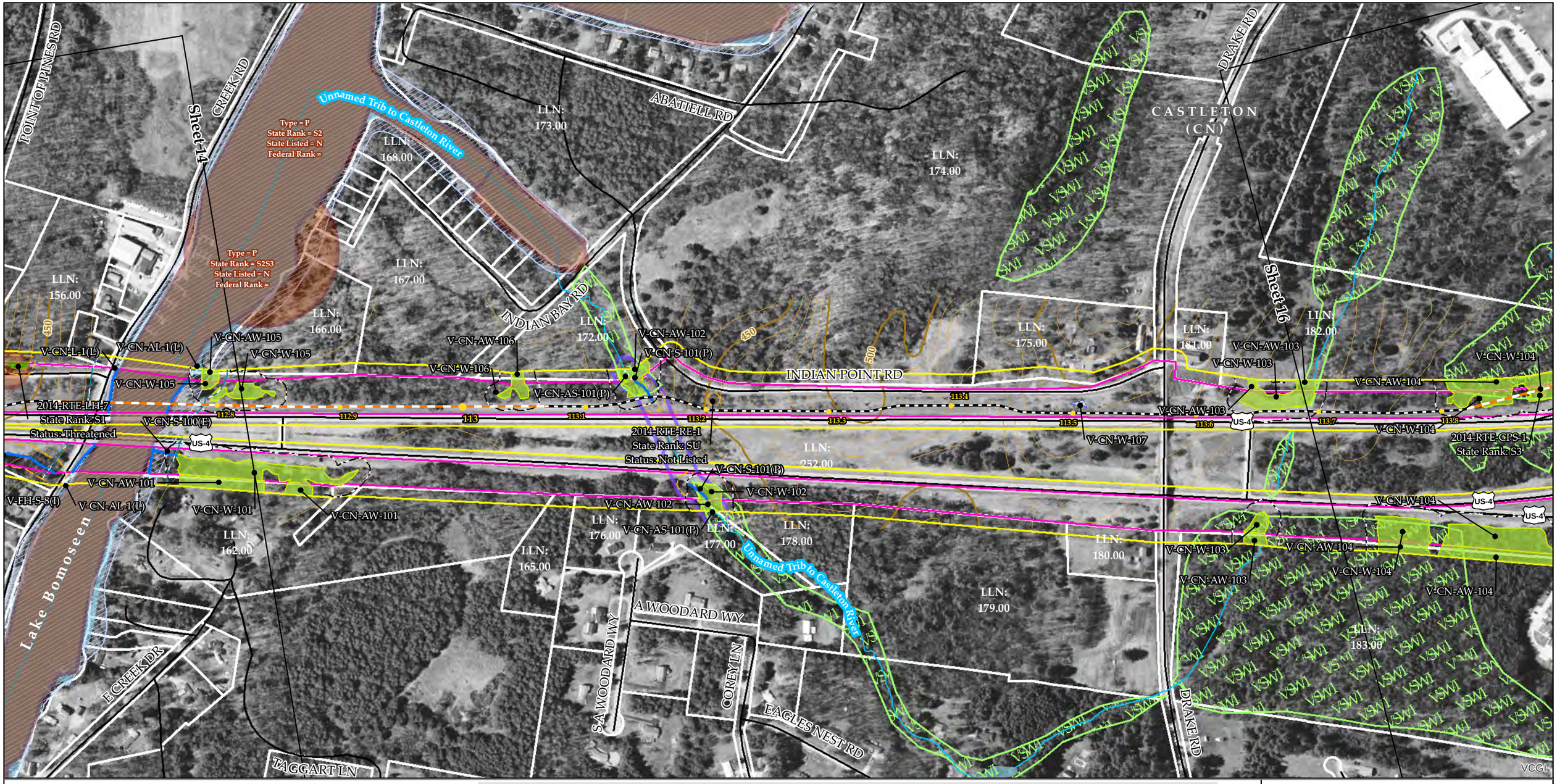

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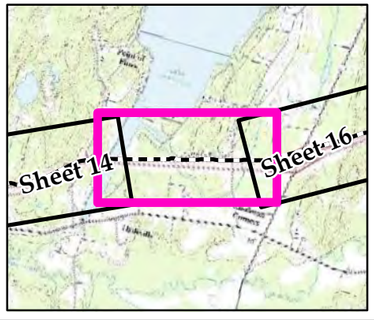

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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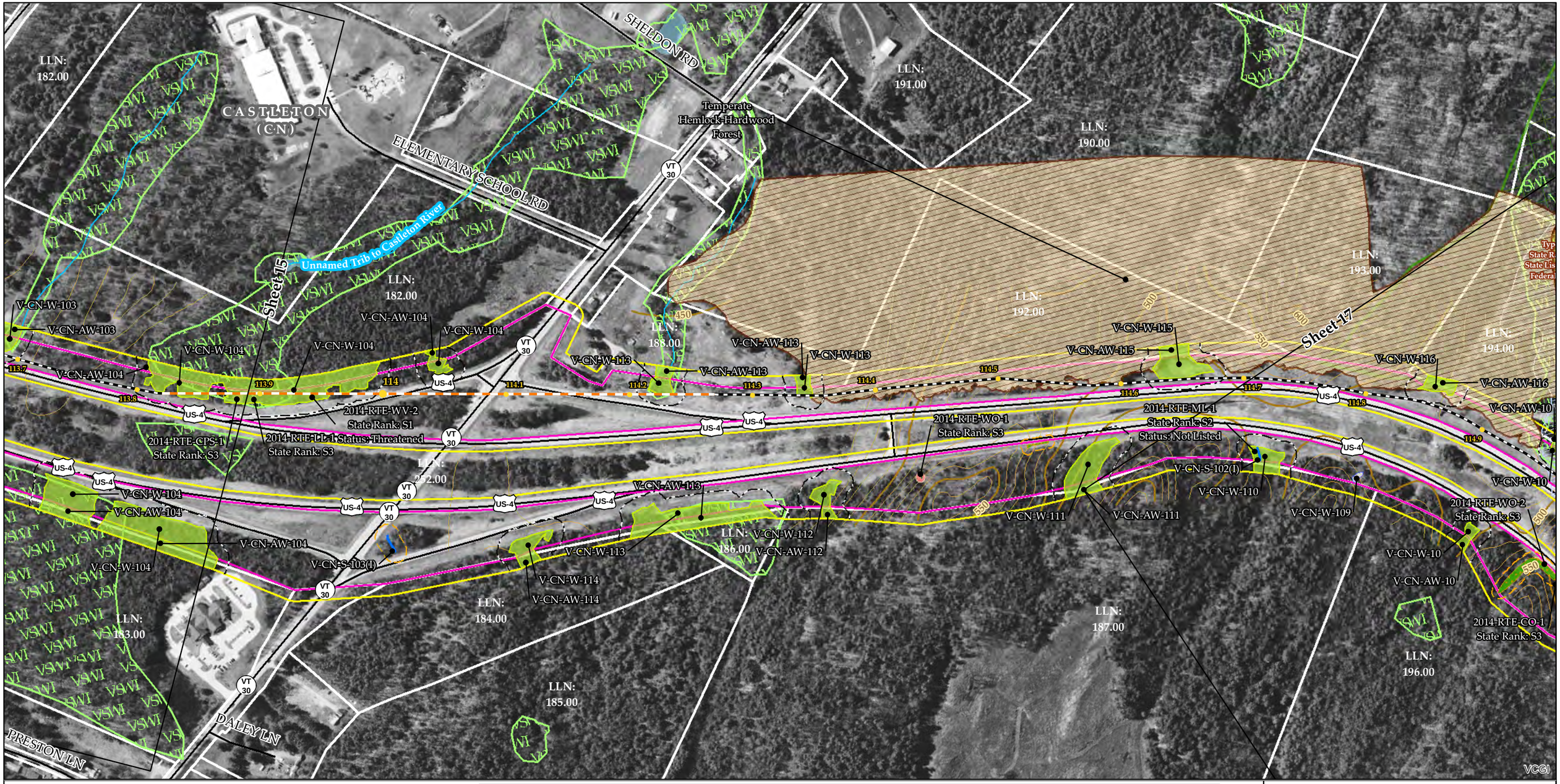

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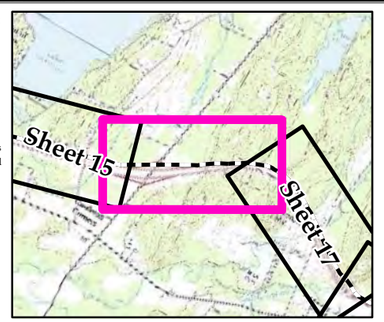

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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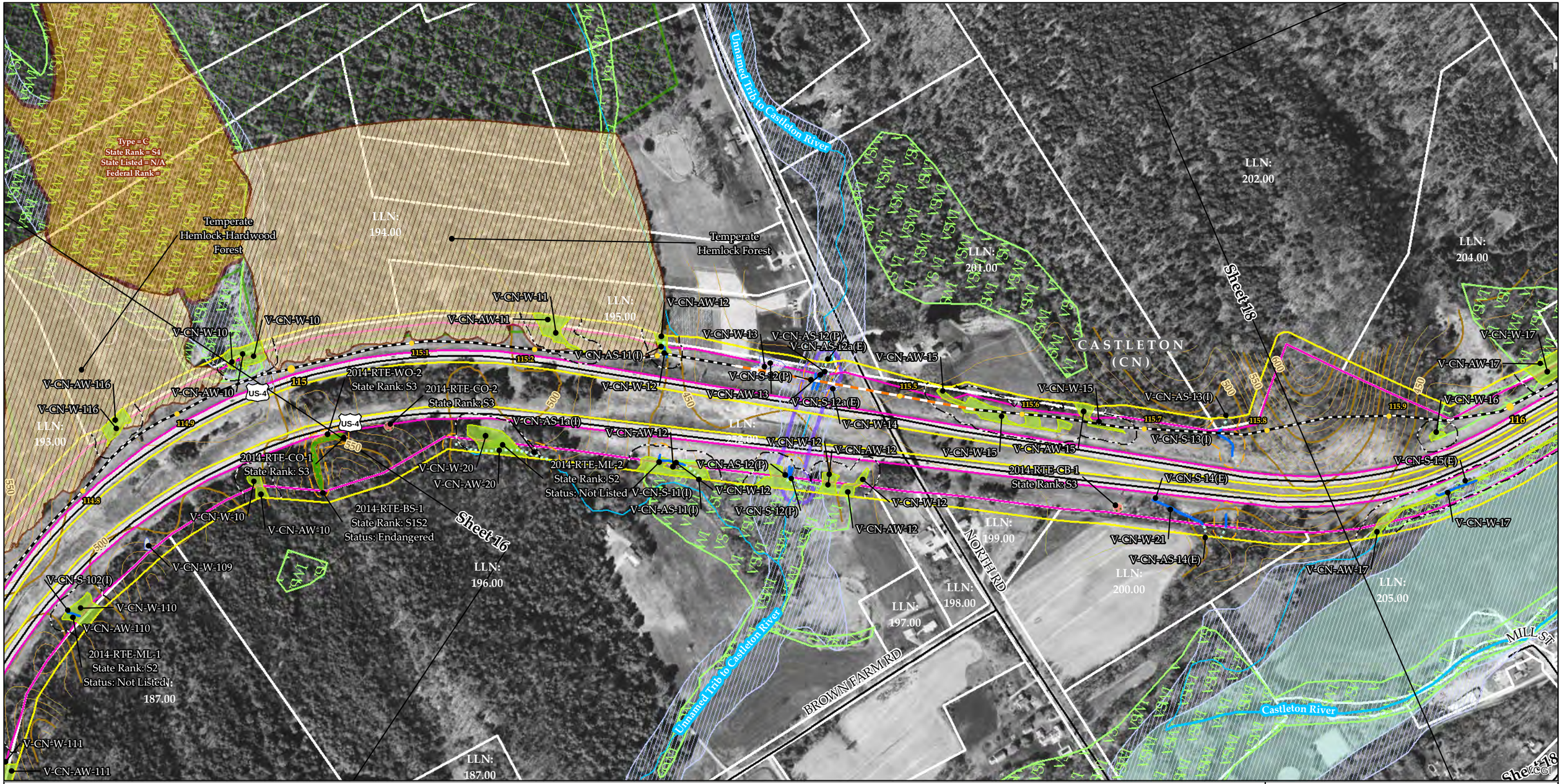

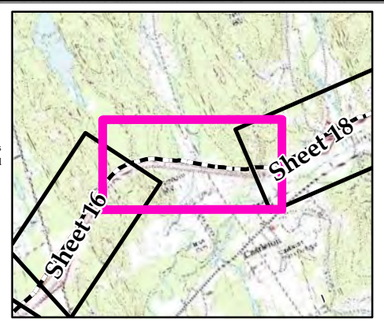

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vhb

TRC Results you can rely on

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
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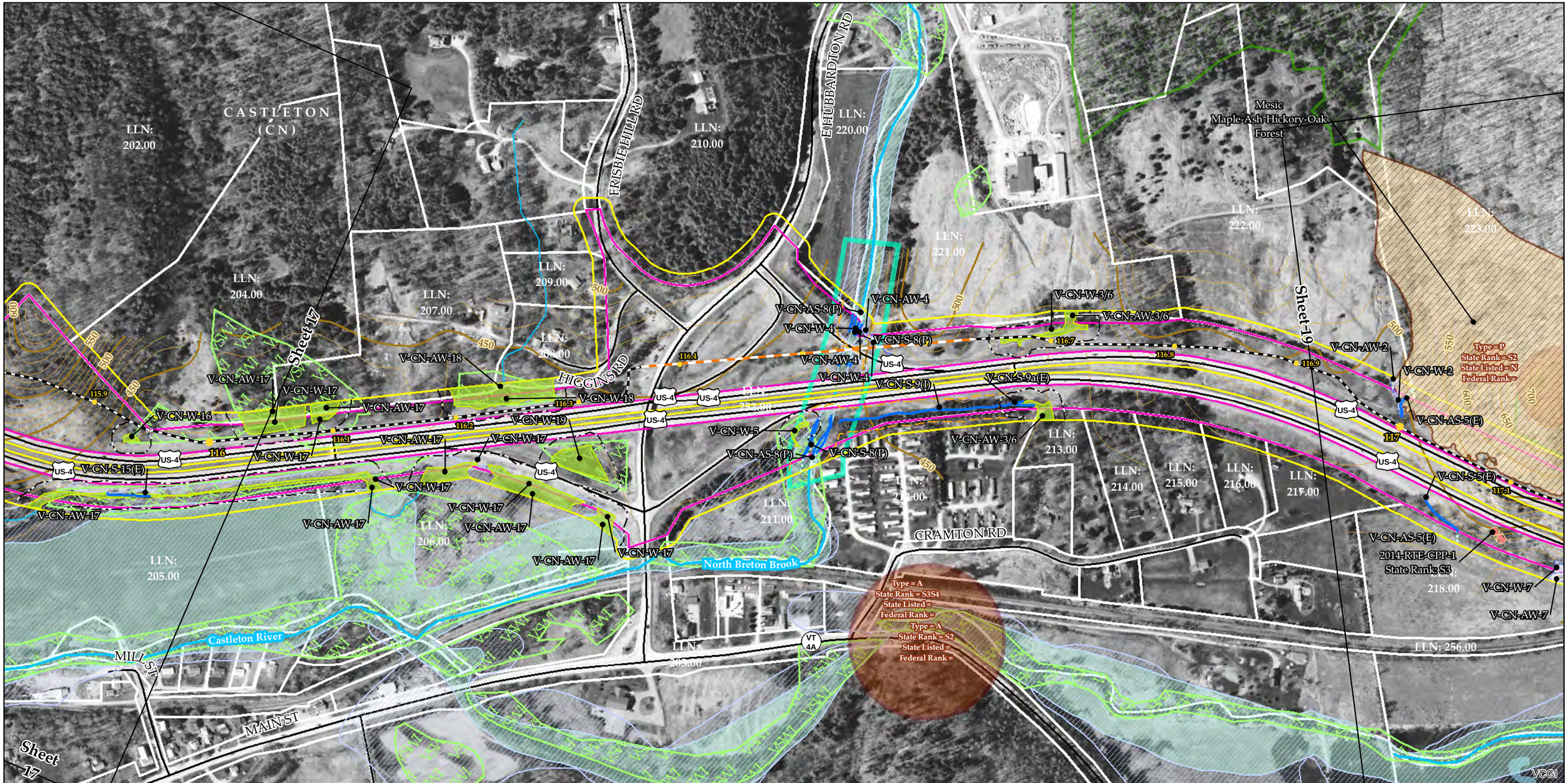

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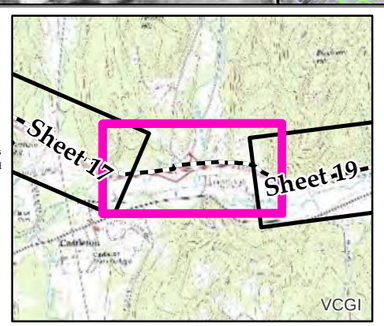

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December 2, 2014
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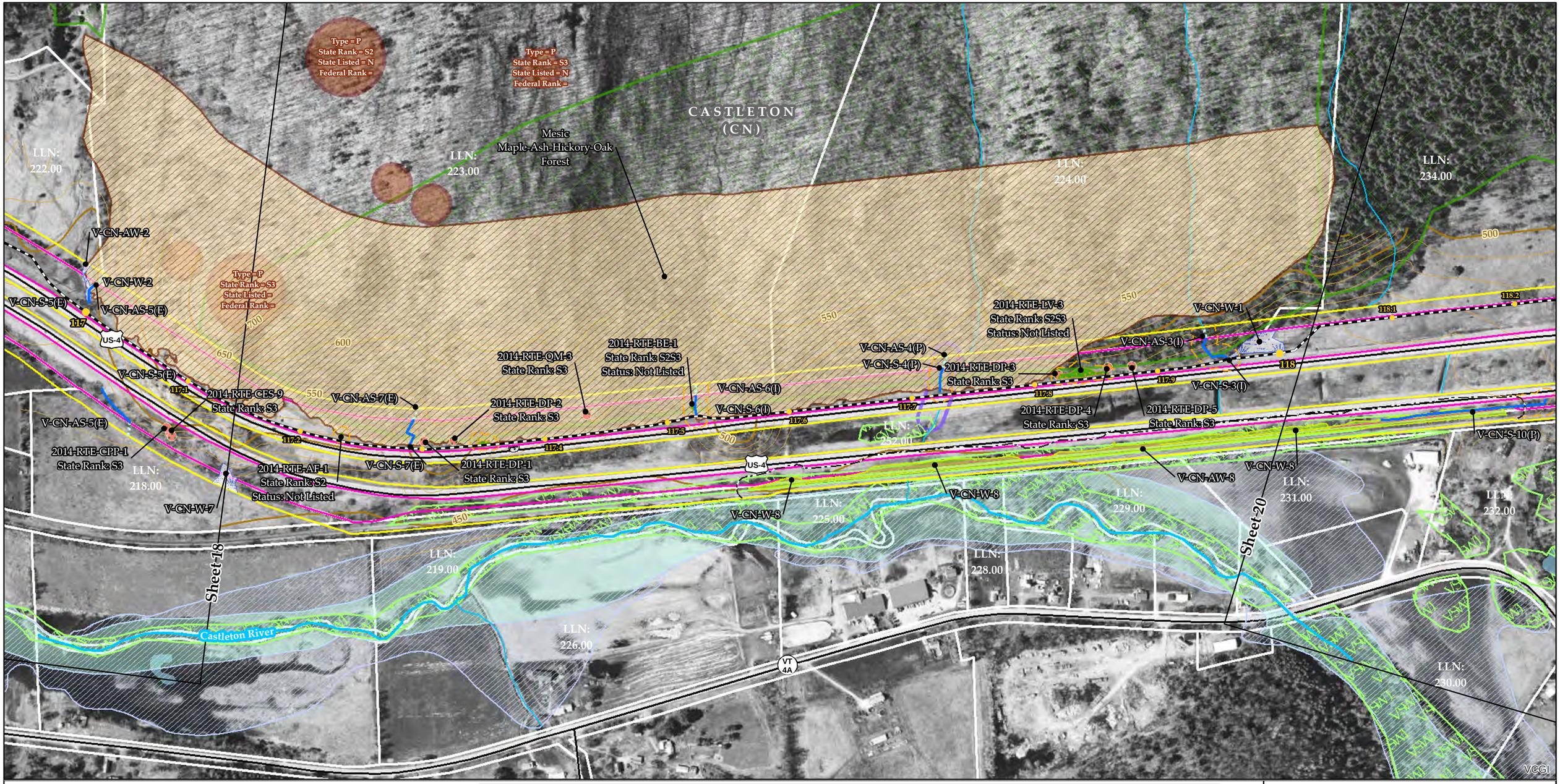

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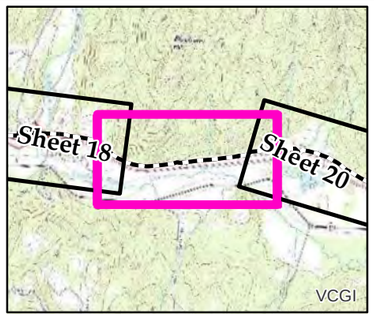

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December 2, 2014
Updated: July 31, 2015

N

400 200 0 400
Feet

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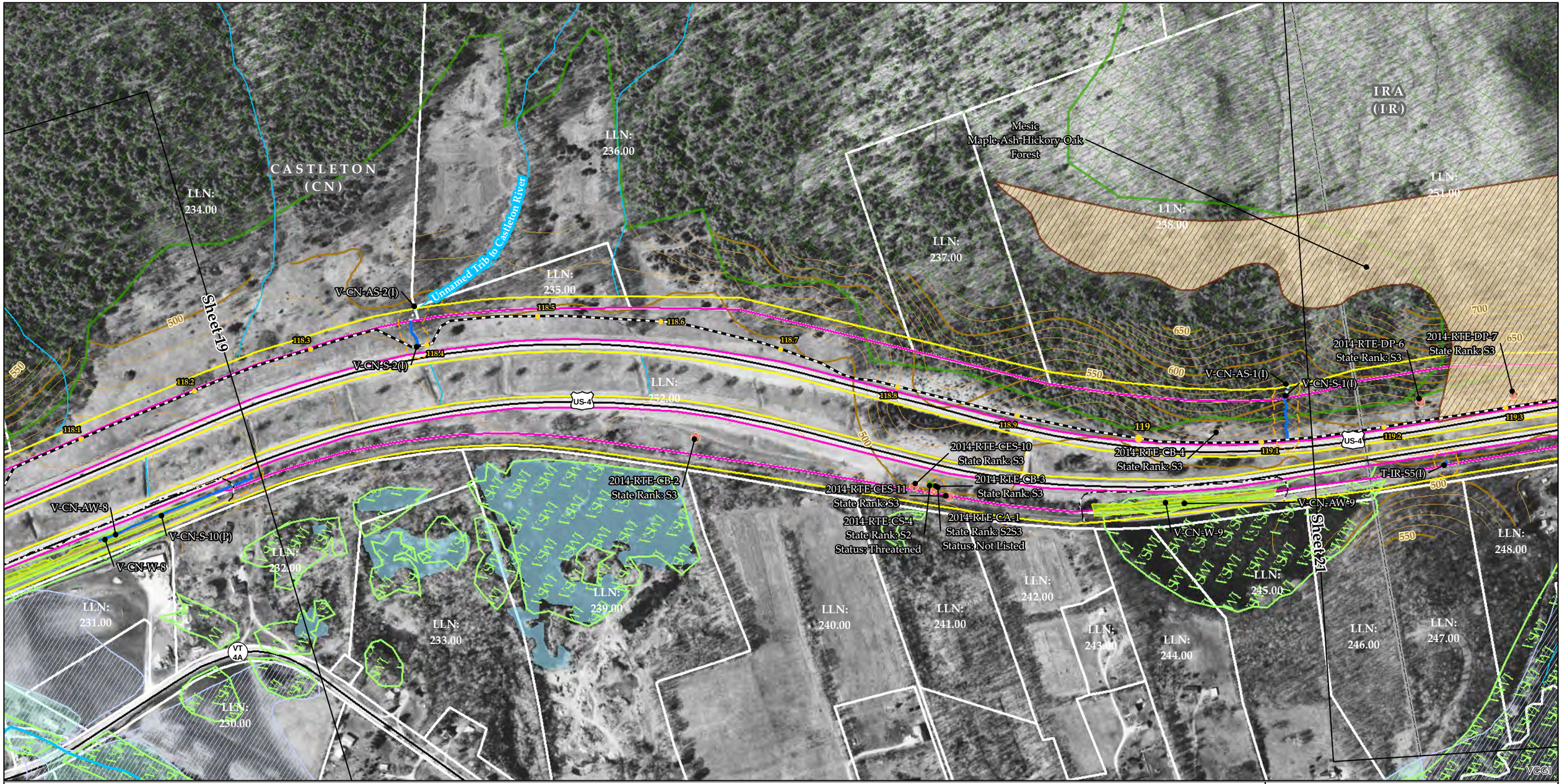

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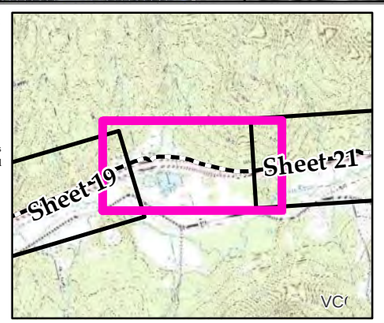

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TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 20 of 51

December 2, 2014
Updated: July 31, 2015

N

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Feet

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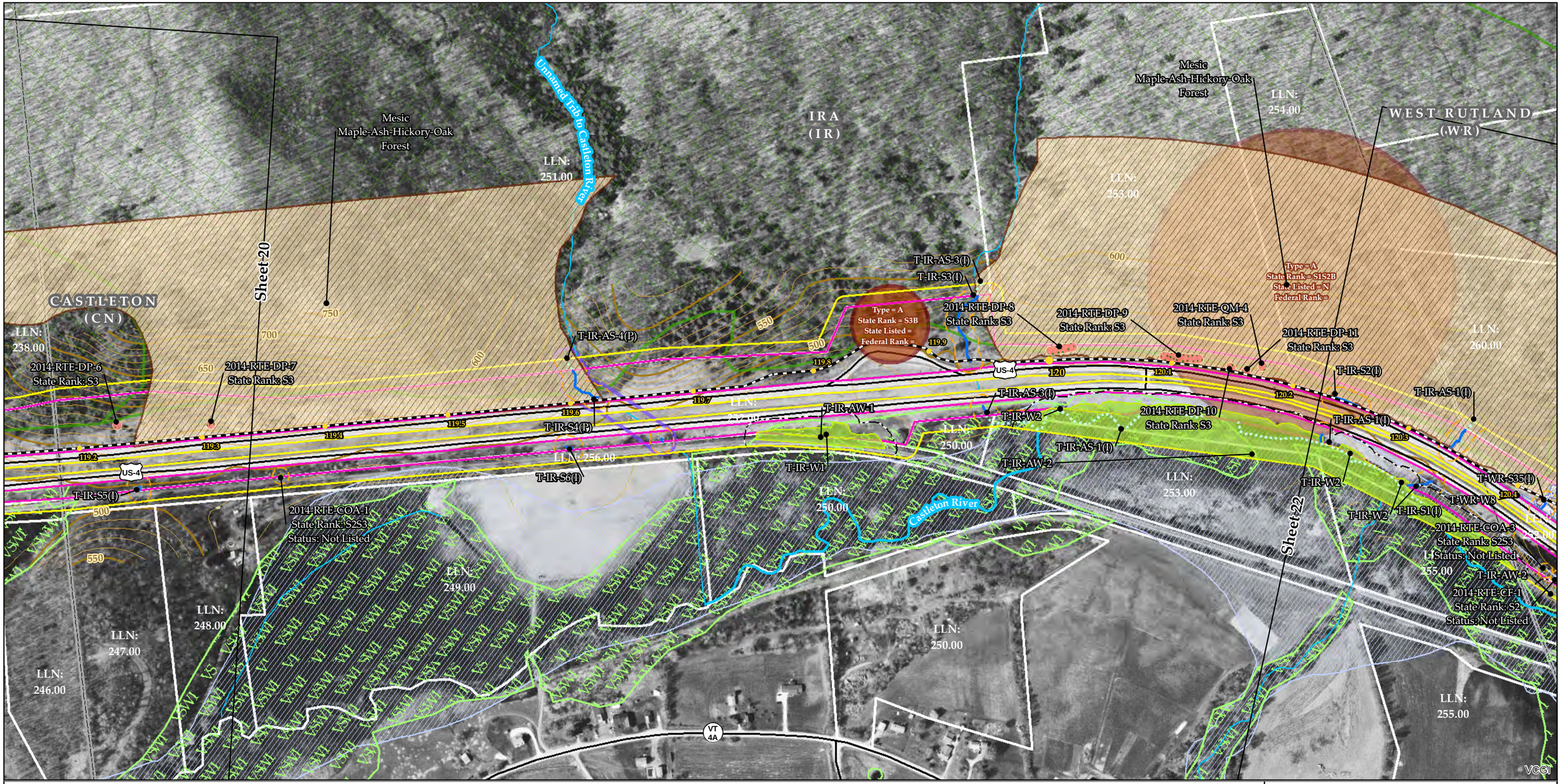

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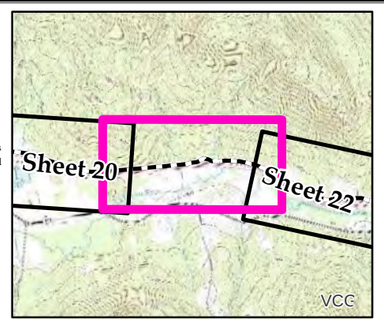
vhb

TRC Results you can rely on



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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 21 of 51

December 2, 2014
Updated: July 31, 2015

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Federal Rank =

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State Rank = S2
State Listed = N
Federal Rank =

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Federal Rank =

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Federal Rank =

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Mesic Maple-Ash-Hickory-Oak Forest
Mesic Maple-Ash-Hickory-Oak Forest

600
650
700
550
500

T-IR-S2(I)
T-IR-AS-1(I)
T-IR-S1(I)
T-IR-W2
T-IR-AS-1(I)
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T-IR-S1(I)
T-IR-AW-2
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T-WR-S30(I)
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T-WR-AW-10
T-WR-W10
T-WR-W11
T-WR-W11
T-WR-W11
T-WR-AW-11

120.3
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120.5
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120.8
120.9
121
121.1
121.2
121.3
121.4
121.5

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US-4
US-4
VT 4A

Castleton River

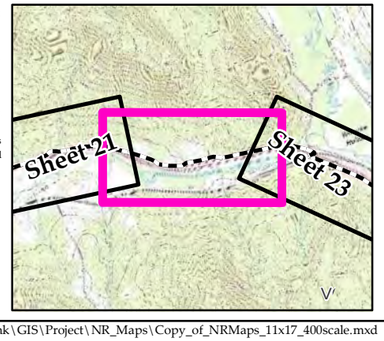
Sheet 21
Sheet 23

IRA (IR)
WEST RUTLAND (WR)

VCGI

Sources: Provided by VCGI: Background Imagery (2007-2013); Roads by VTrans (2012); Streams & Waterbodies by VHD (2010), VSWI Wetlands by ANR (2013), Deer Wintering Area by ANR (2013), County and Town Boundaries by VCGI (2012); Bear Crossing & Feeding Data by VT Fish & Wildlife (2001). Provided by TRC: Contours (2014), Conceptual Project Alignment (2015), VTrans ROW (2014), Parcel Boundaries (2009-2013) 100-year flood & Floodway compiled by TRC from FEMA (2014), Wetland & Stream Delineations by TRC & VHB (2014); Bat tree, Natural Community and RTE data assessments completed by Arrowwood Environmental (2014); FEH provided by VTDEC (2014); River Corridors by VHB (2015)

vhb
TRC
Results you can rely on



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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 22 of 51

December 2, 2014
Updated: July 31, 2015

N

400 200 0 400
Feet

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Mesic
Maple-Ash-Hickory-Oak
Forest

Type = P
State Rank = S2S3
State Listed = N
Federal Rank =

Type = P
State Rank = S2
State Listed = N
Federal Rank =

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State Listed =
Federal Rank =

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Federal Rank =

WHIPPLE HOLLOW RD

Castleton River

RAVIN LN

WEST RUTLAND
(WR)

Unnamed Trib to Castleton River

MARBLE ST

BARNES ST

SMITH ST

MAIN ST

LLN: 262.00

LLN: 278.00

LLN: 277.00

LLN: 284.00

LLN: 283.00

LLN: 282.00

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T-WR-W11

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State Rank: S3

T-WR-W5

T-WR-S19(I)

T-WR-S20(I)

T-WR-S21(I)

2014-RTE-QM-5
State Rank: S3

Mesic Red
Oak-Northern
Hardwood Forest

Sheet 22

Sheet 24

VT 4A

US-4

121.3 121.4 121.5 121.7 121.8 121.9 122 122.1 122.2 122.3 122.4 122.5 122.6 122.7

500 550 600 650 700

VCGI

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vhb

TRC
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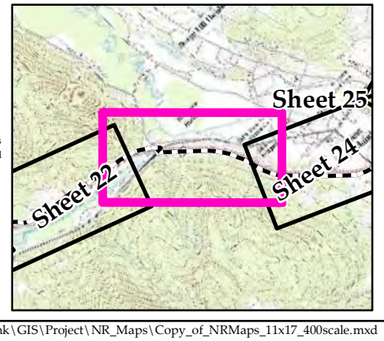

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Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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Feet

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vhb

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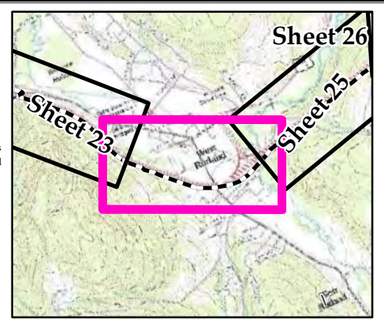

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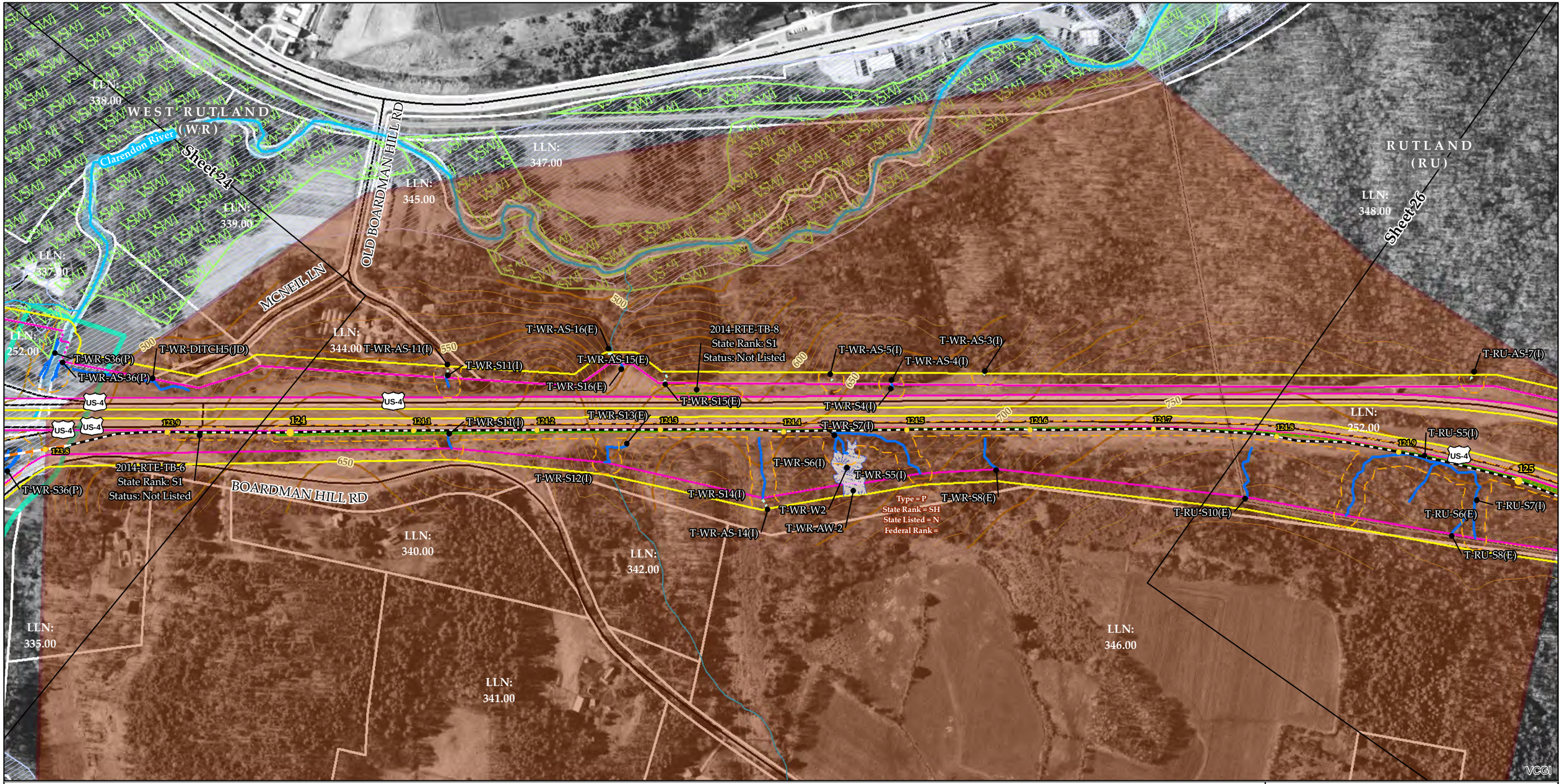

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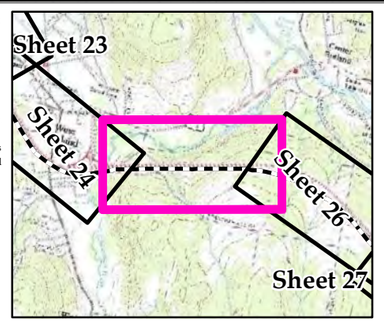

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Sheet Number 25 of 51

December 2, 2014
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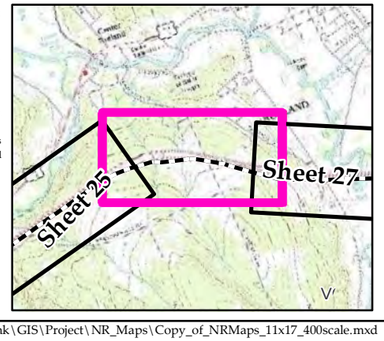

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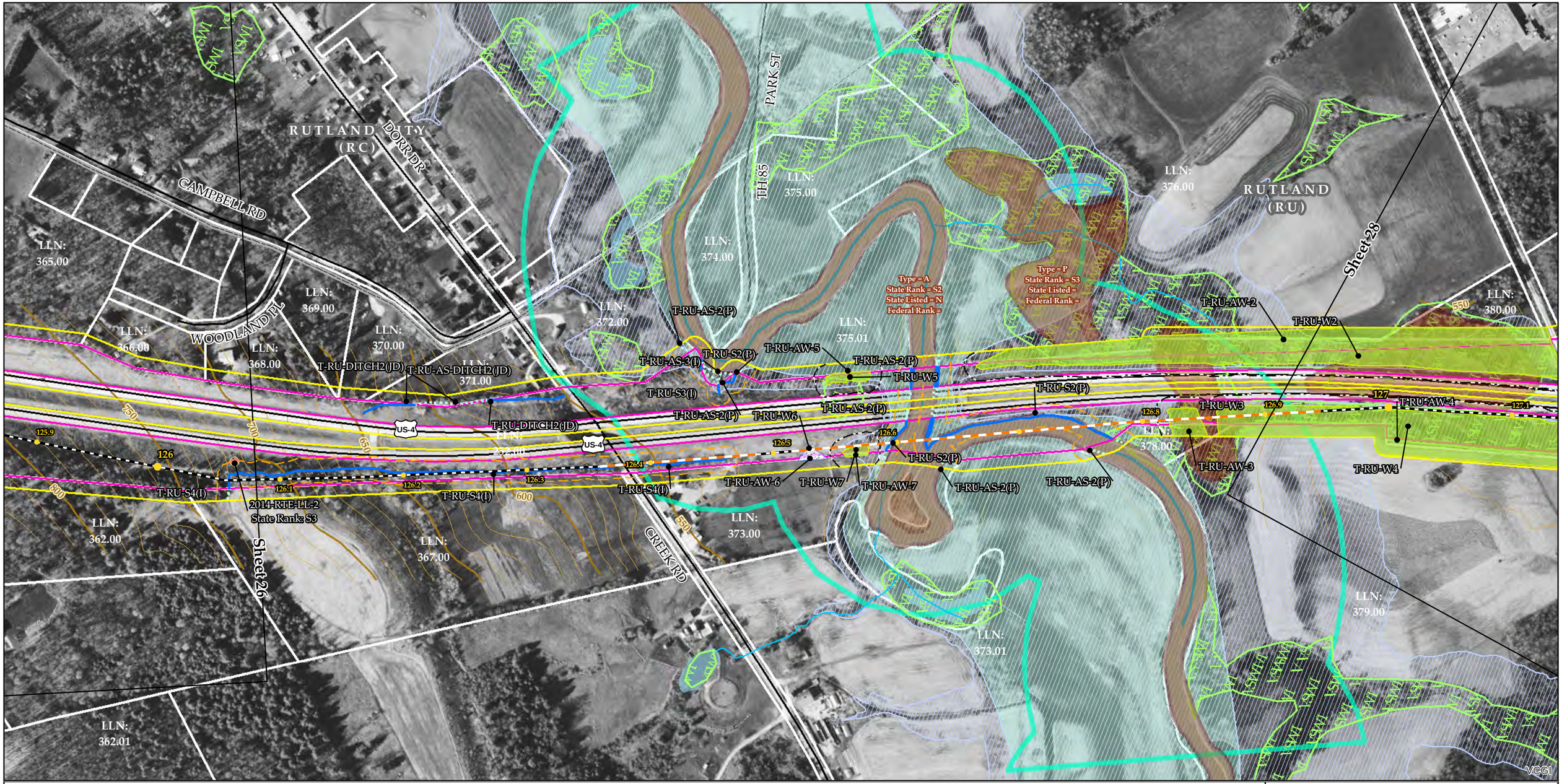

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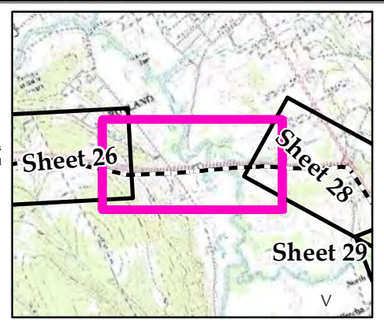

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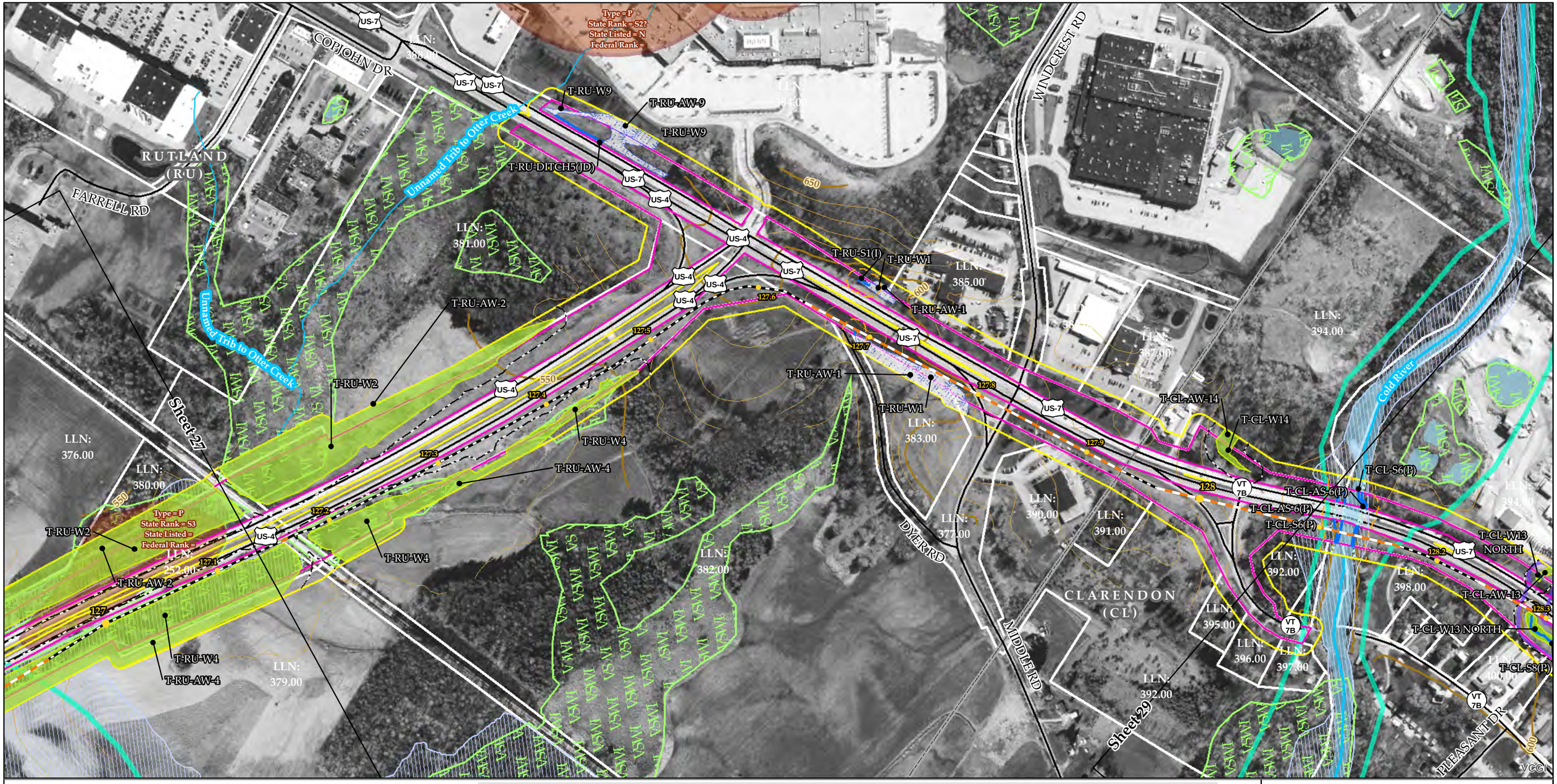

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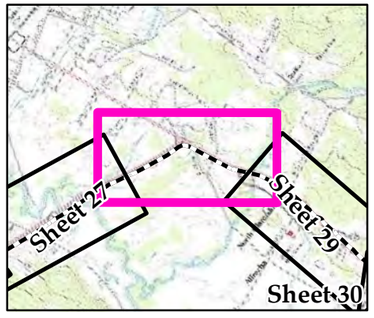

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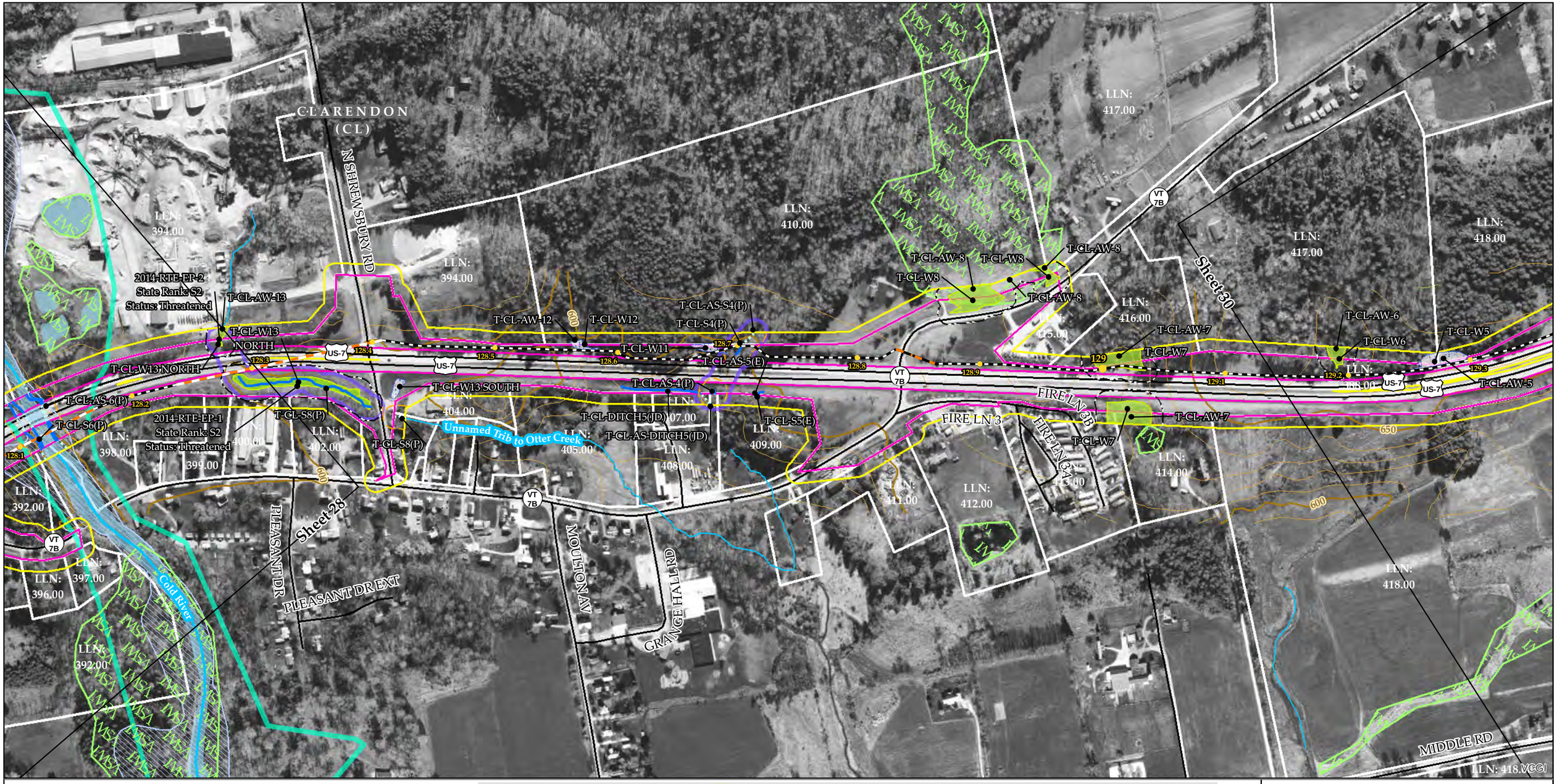

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vhb

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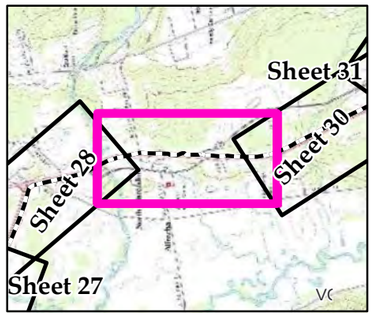

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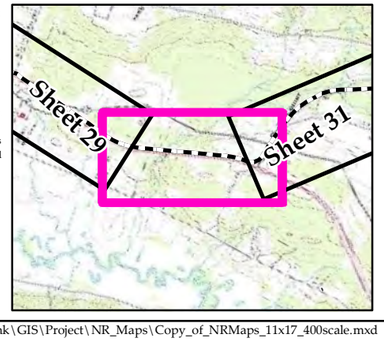

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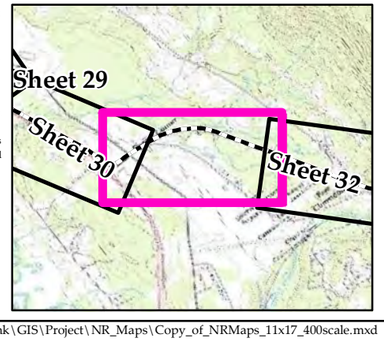

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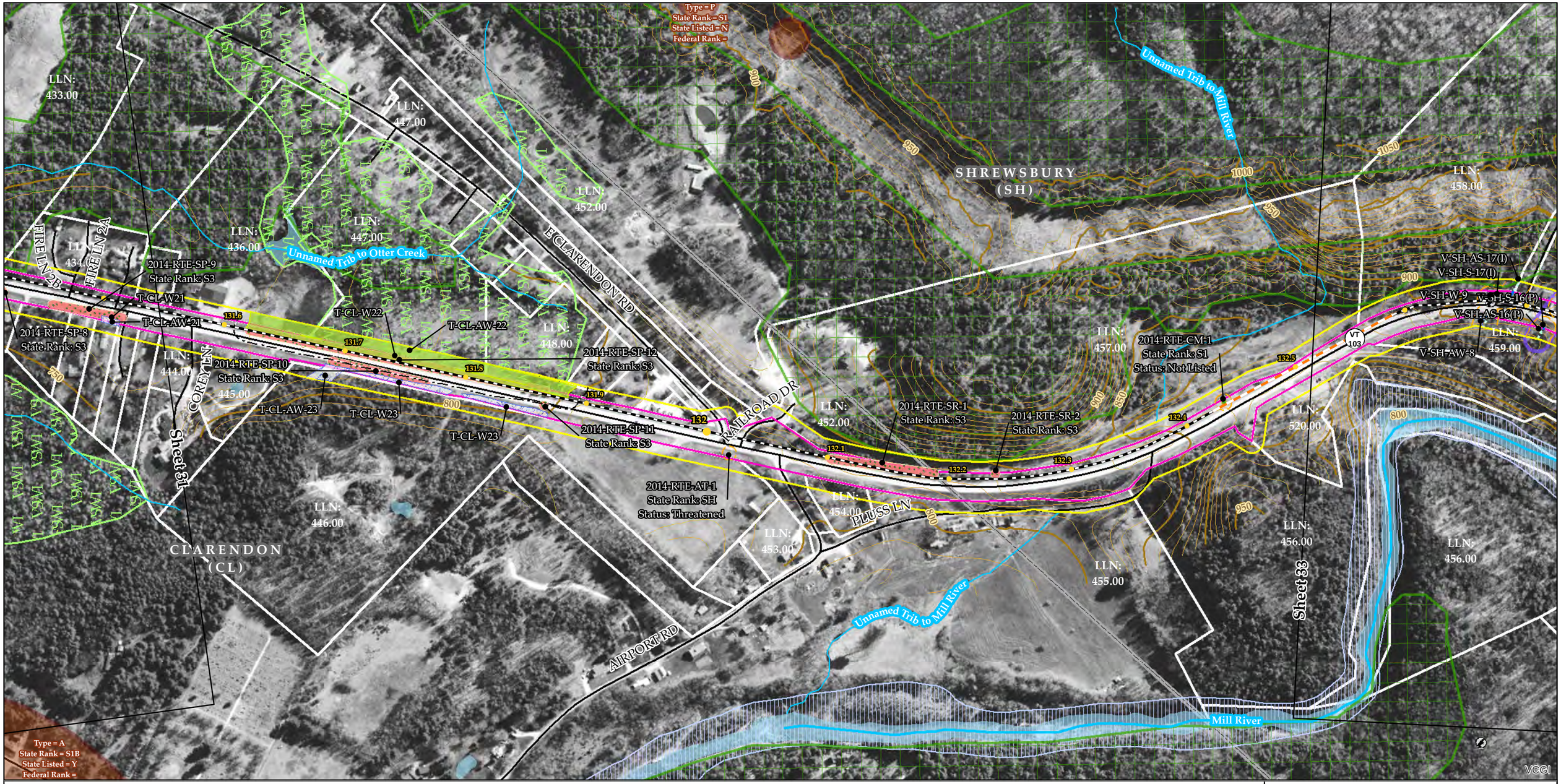

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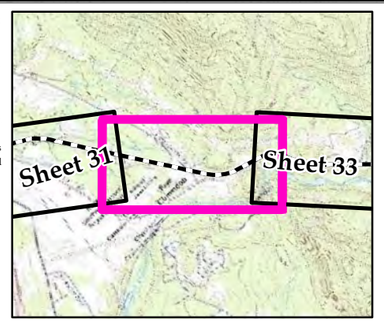

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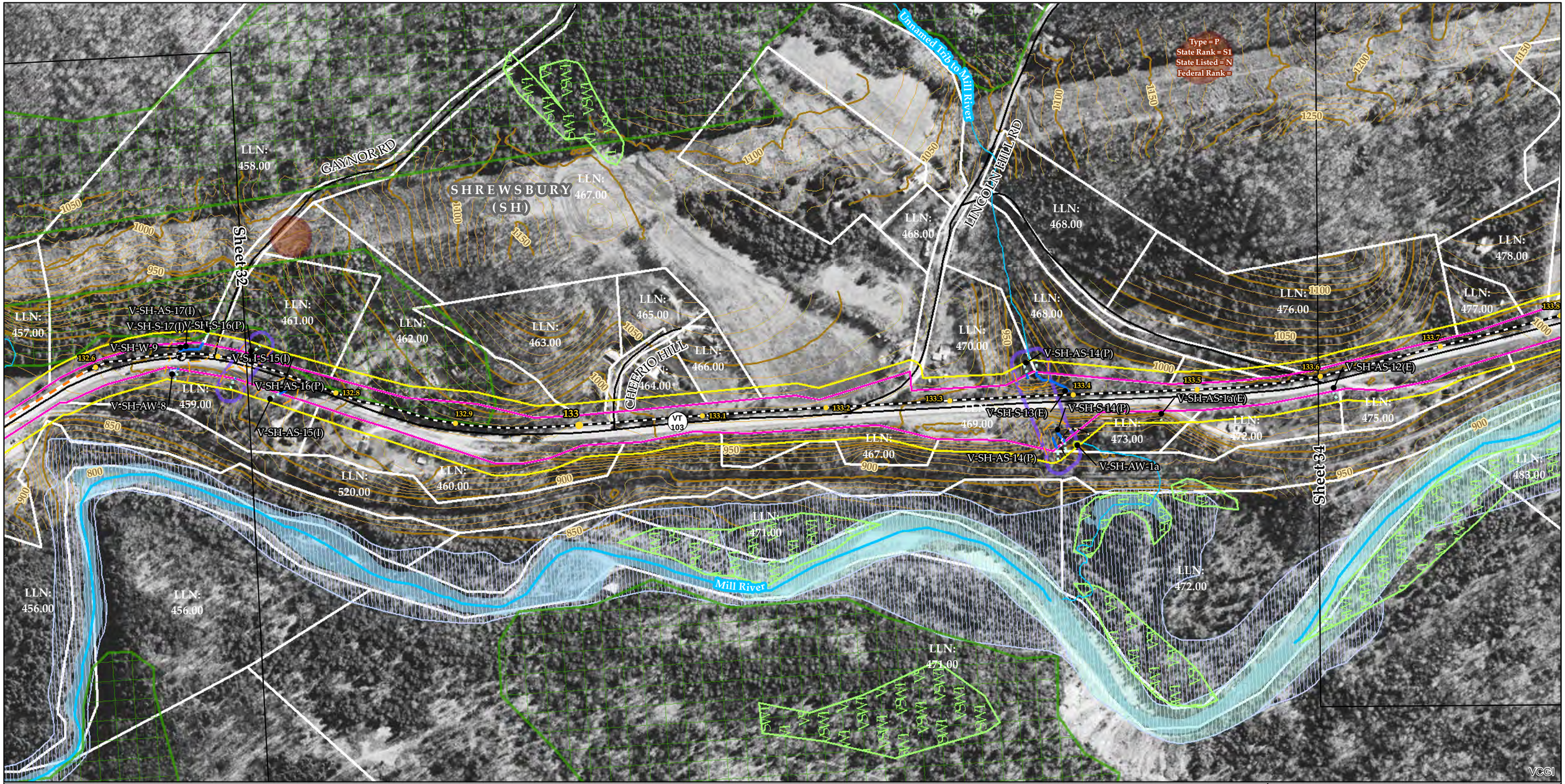

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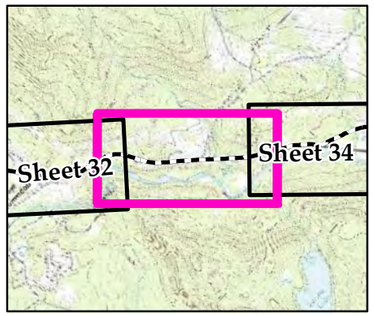

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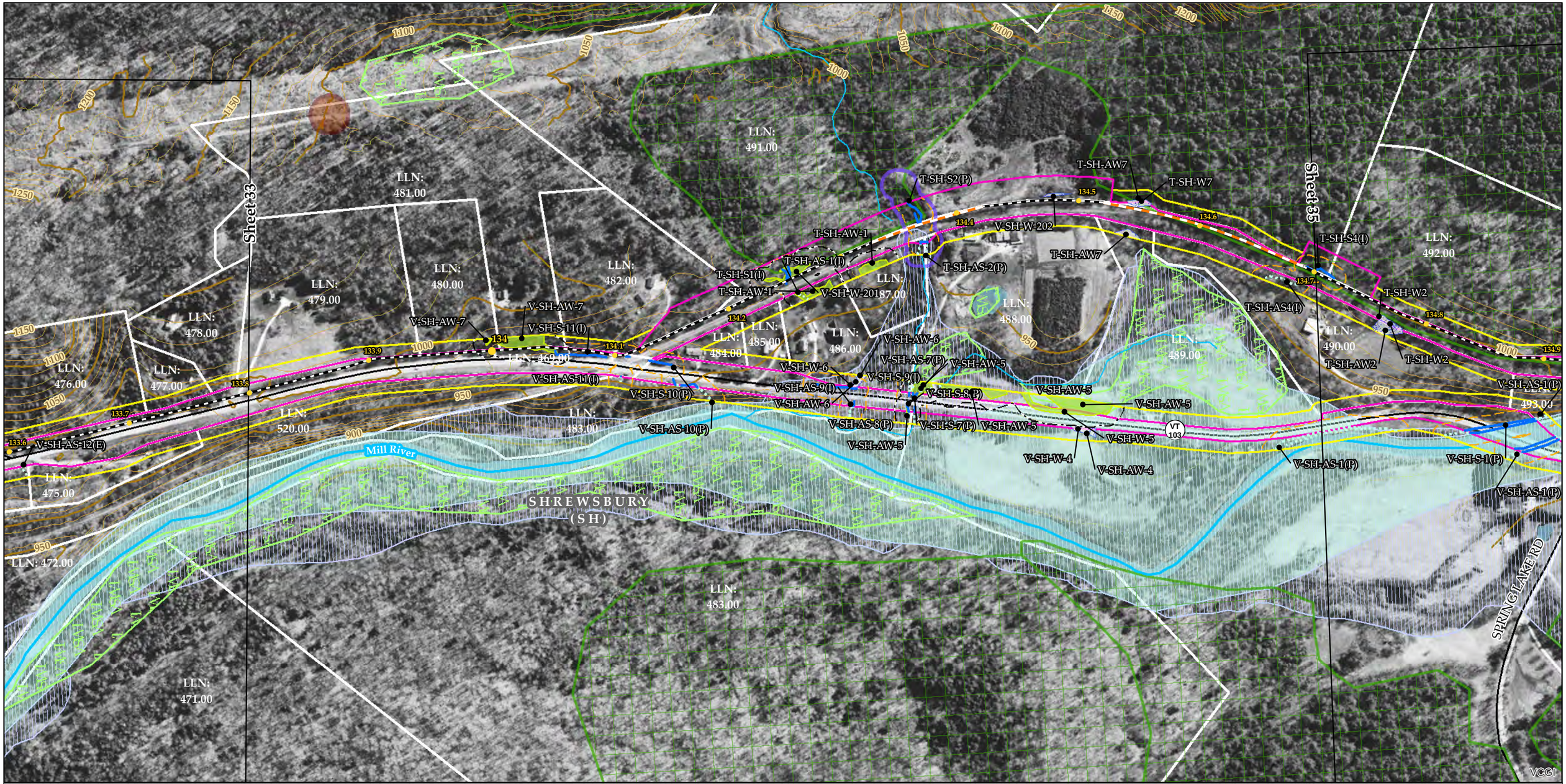

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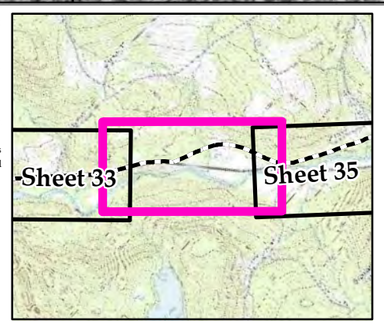

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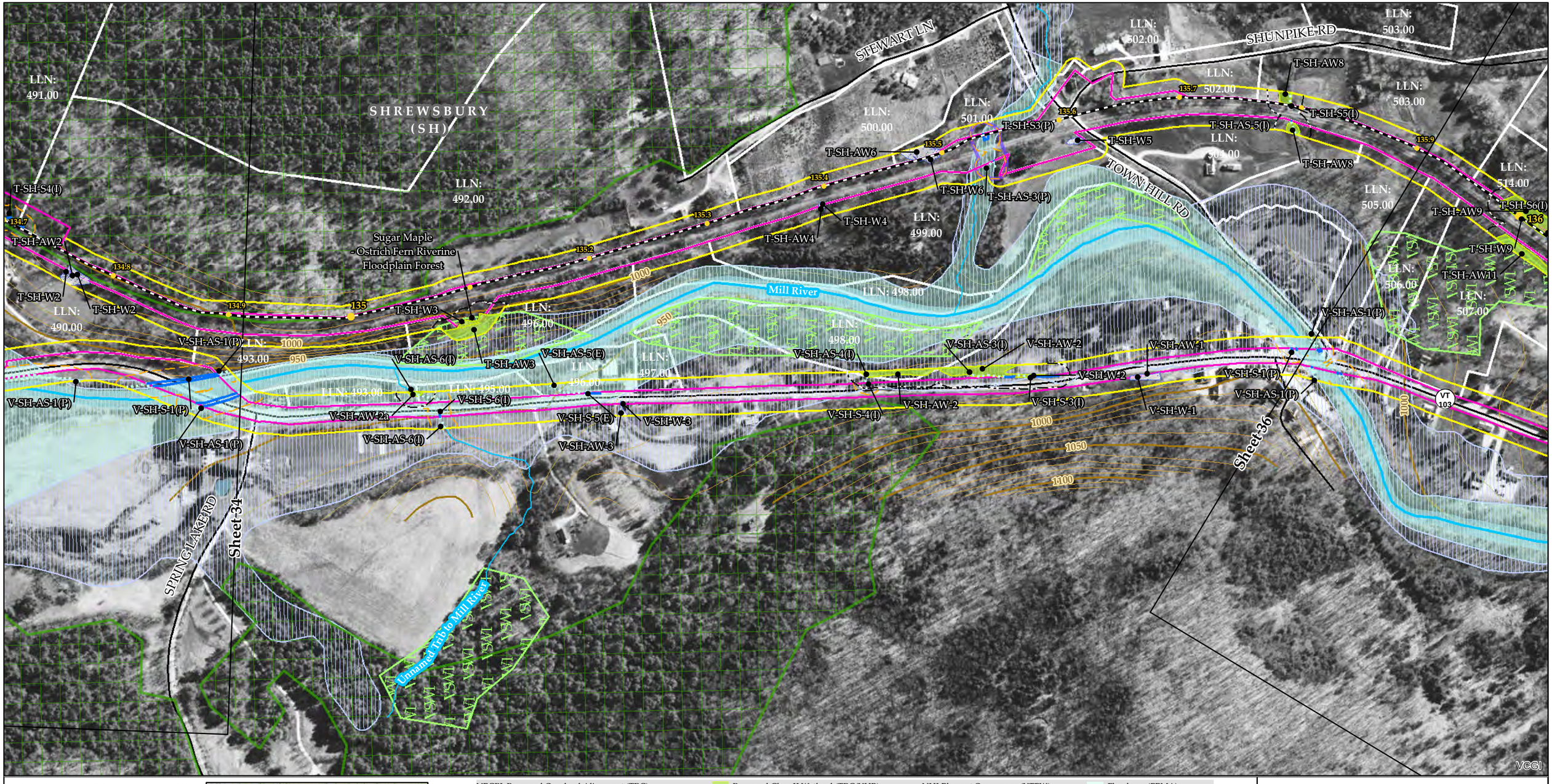

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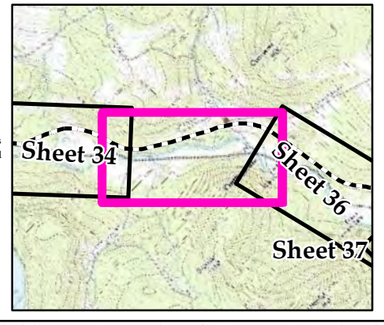

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- Country Boundary (VCGI)
- Road (VTrans)
- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 35 of 51

December 2, 2014
Updated: July 31, 2015

400 200 0 400
Feet

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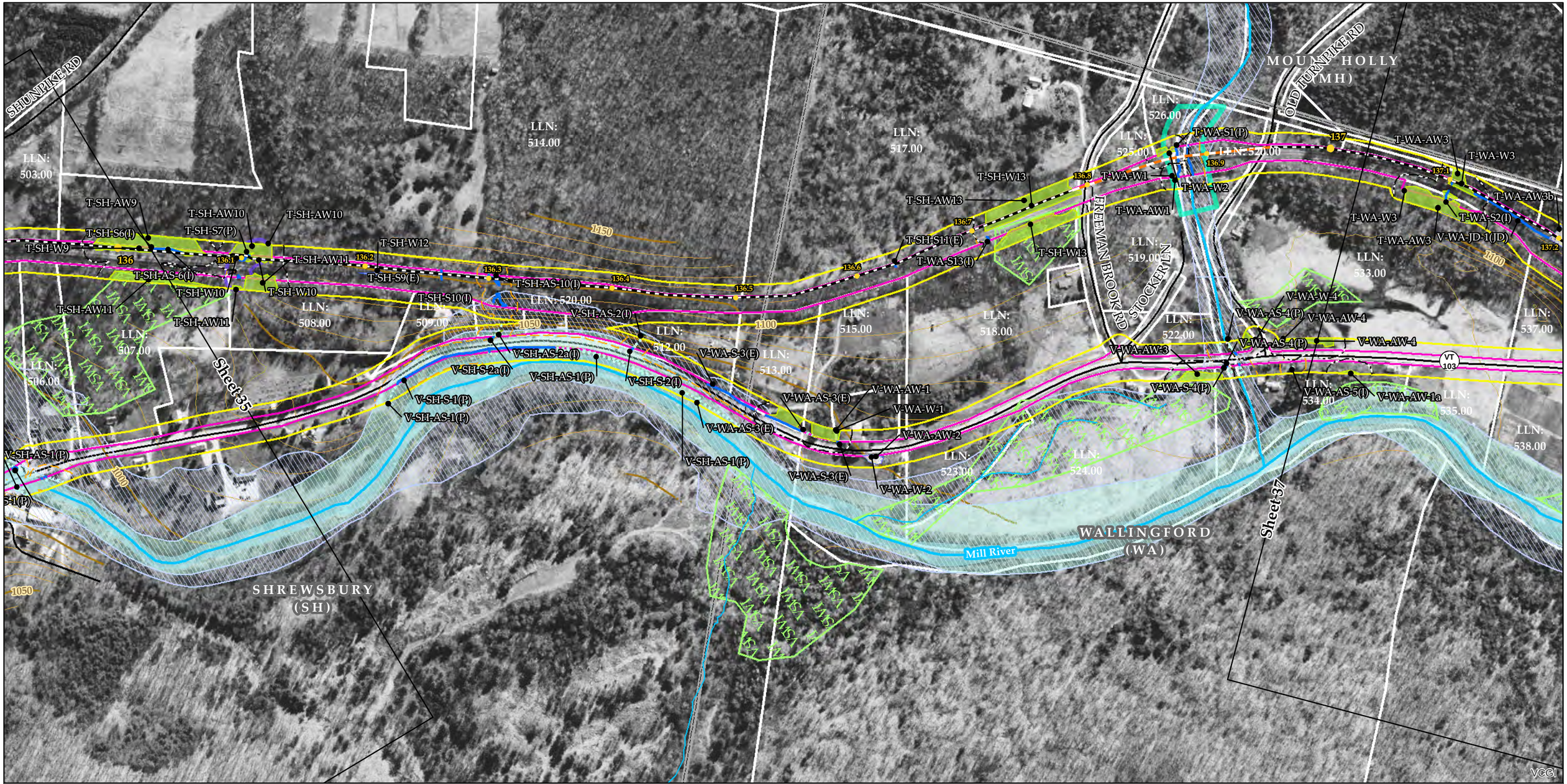

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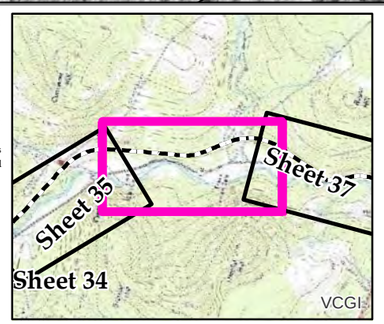

NECPL Proposed Overland Alignment (TRC)
- Horizontal Directional Drilling (HDD); Lake HDD
- Jack and Bore
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TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 36 of 51

December 2, 2014
Updated: July 31, 2015

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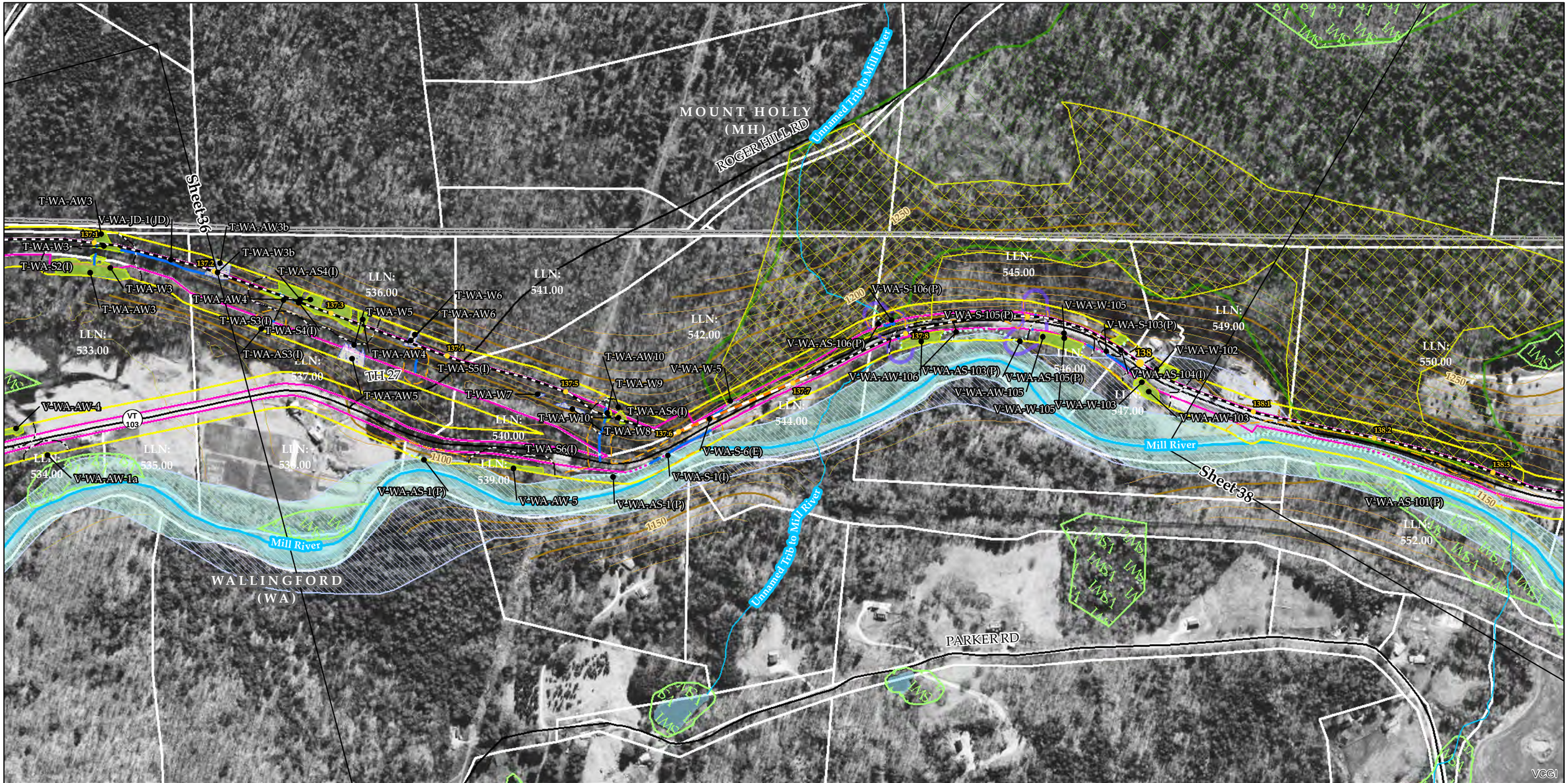

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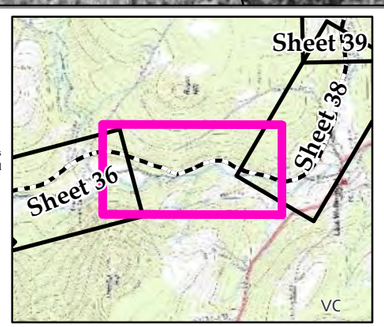

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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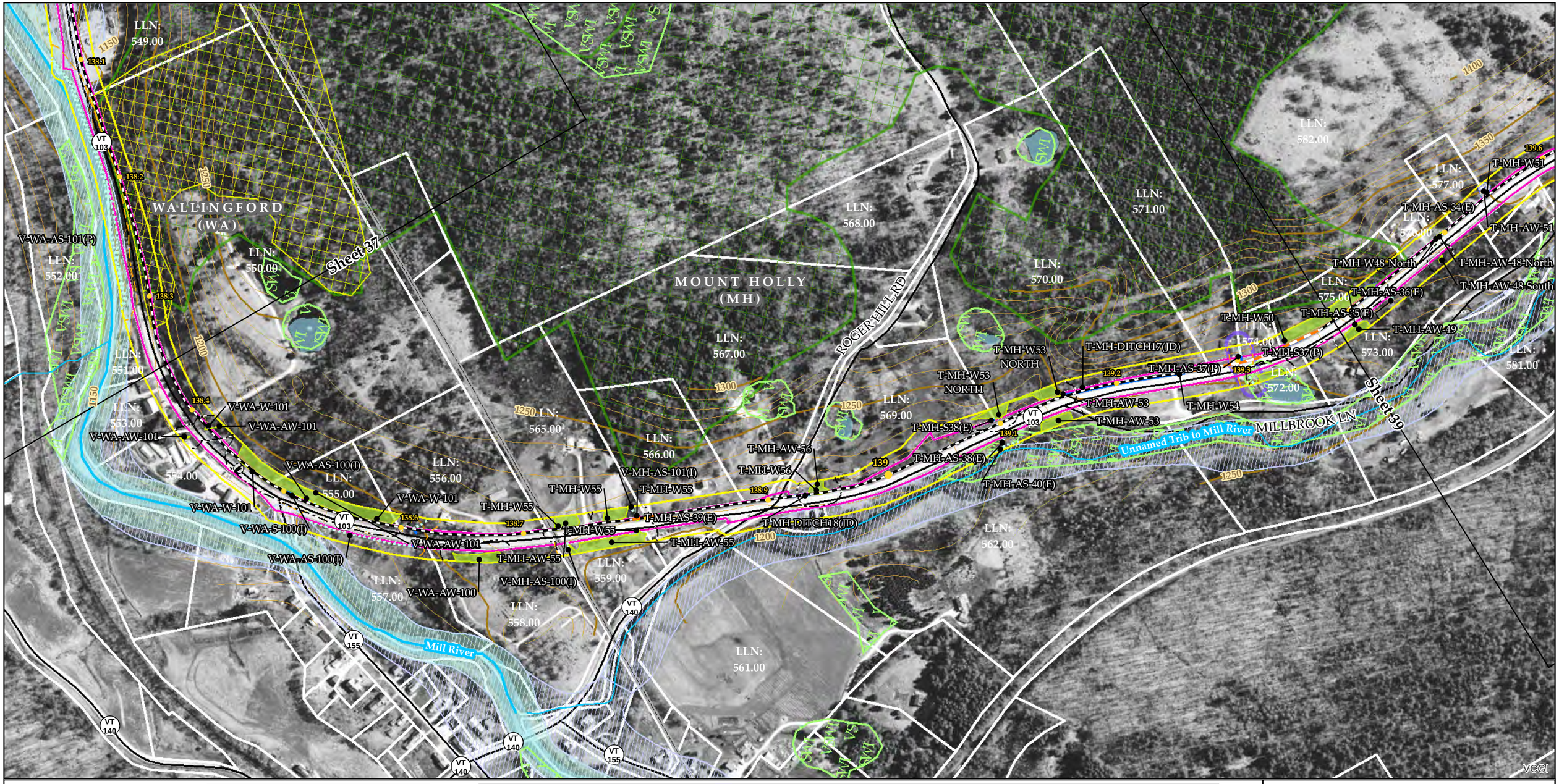

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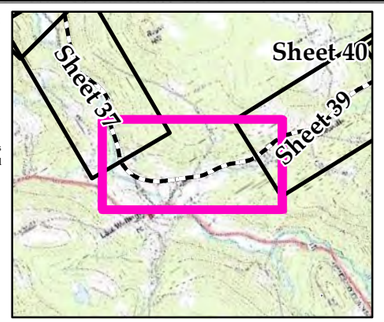

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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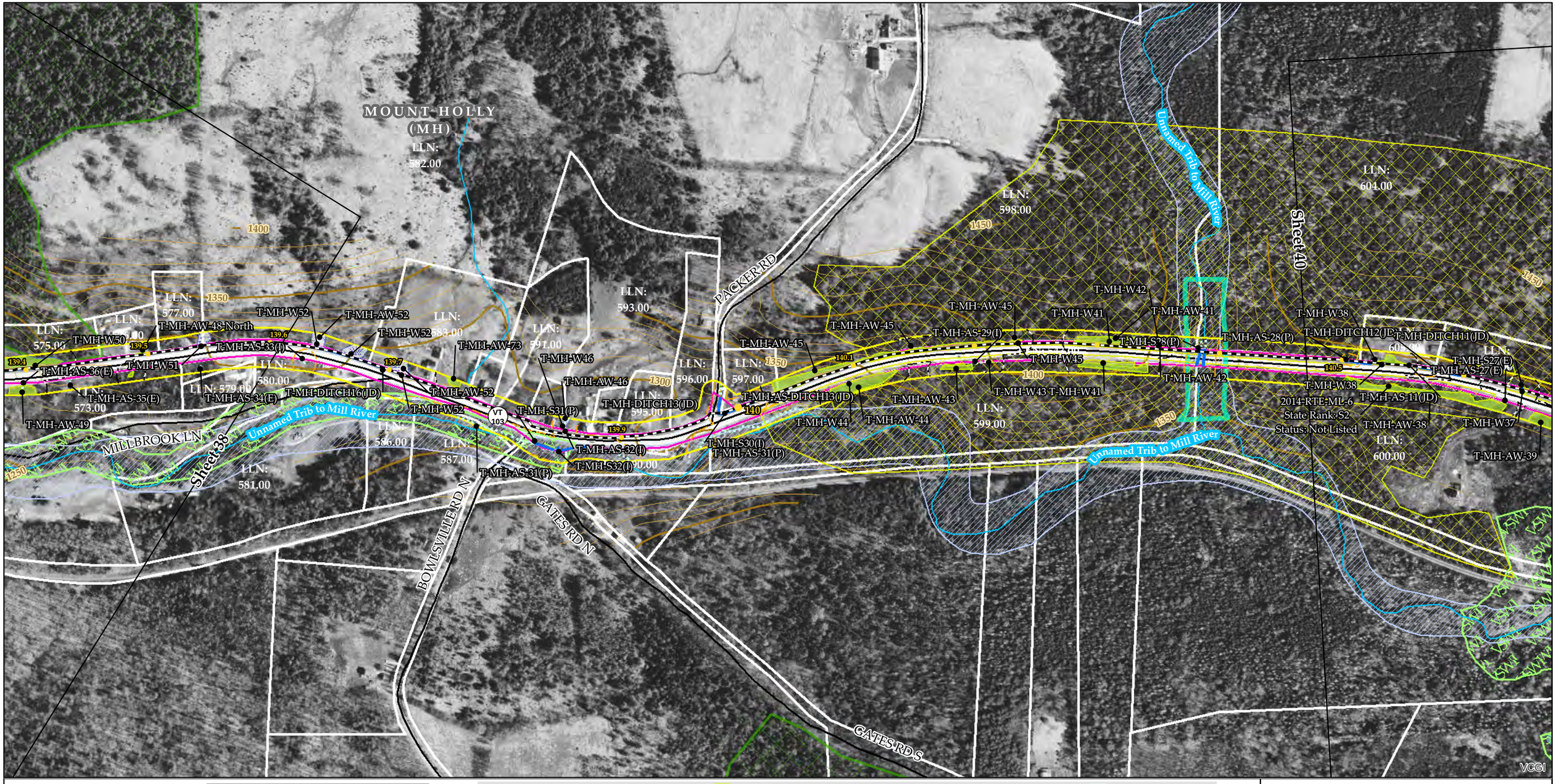

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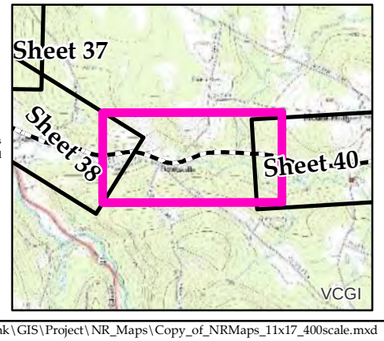
vhb

TRC Results you can rely on



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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
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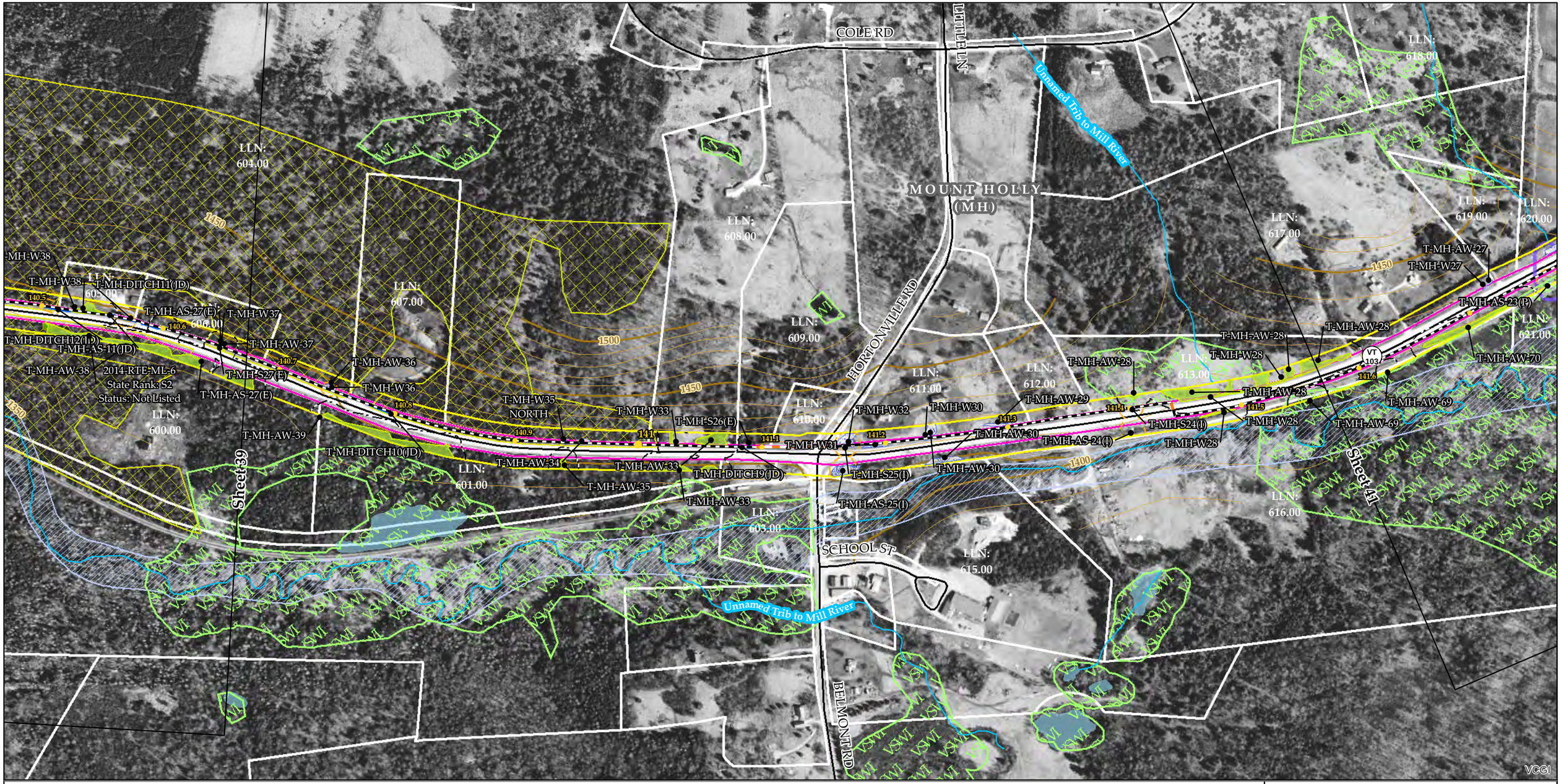

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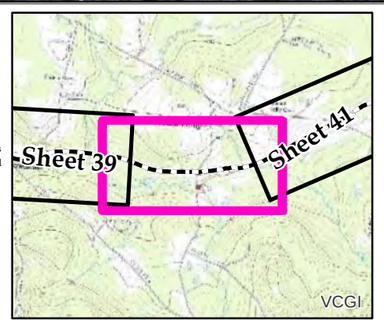
vhb

TRC Results you can rely on



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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
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N

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Feet

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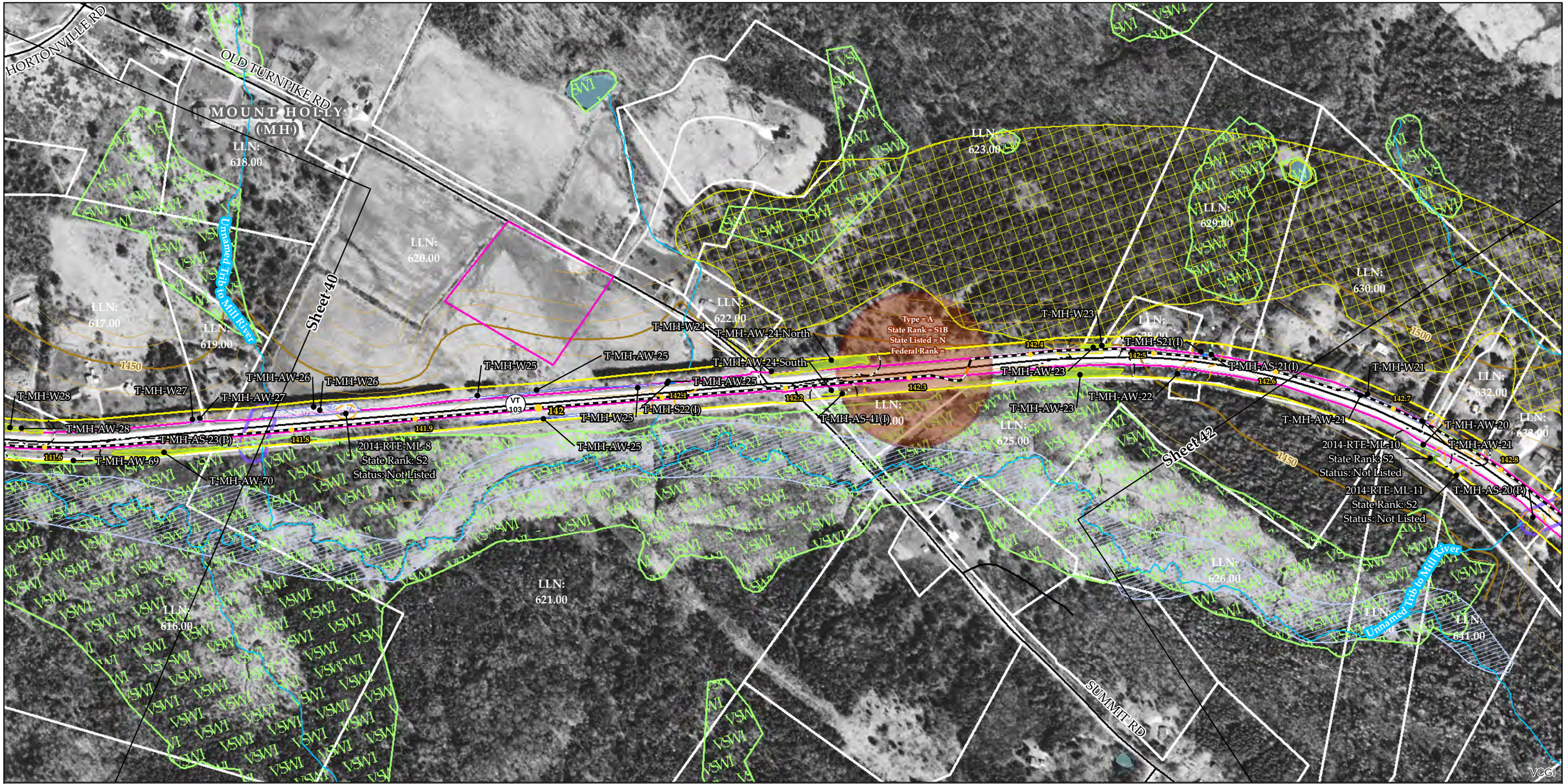

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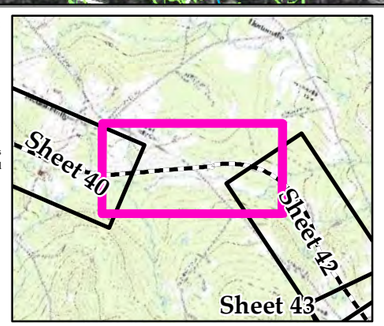

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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Updated: July 31, 2015

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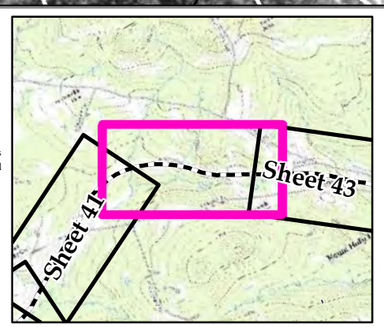

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TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

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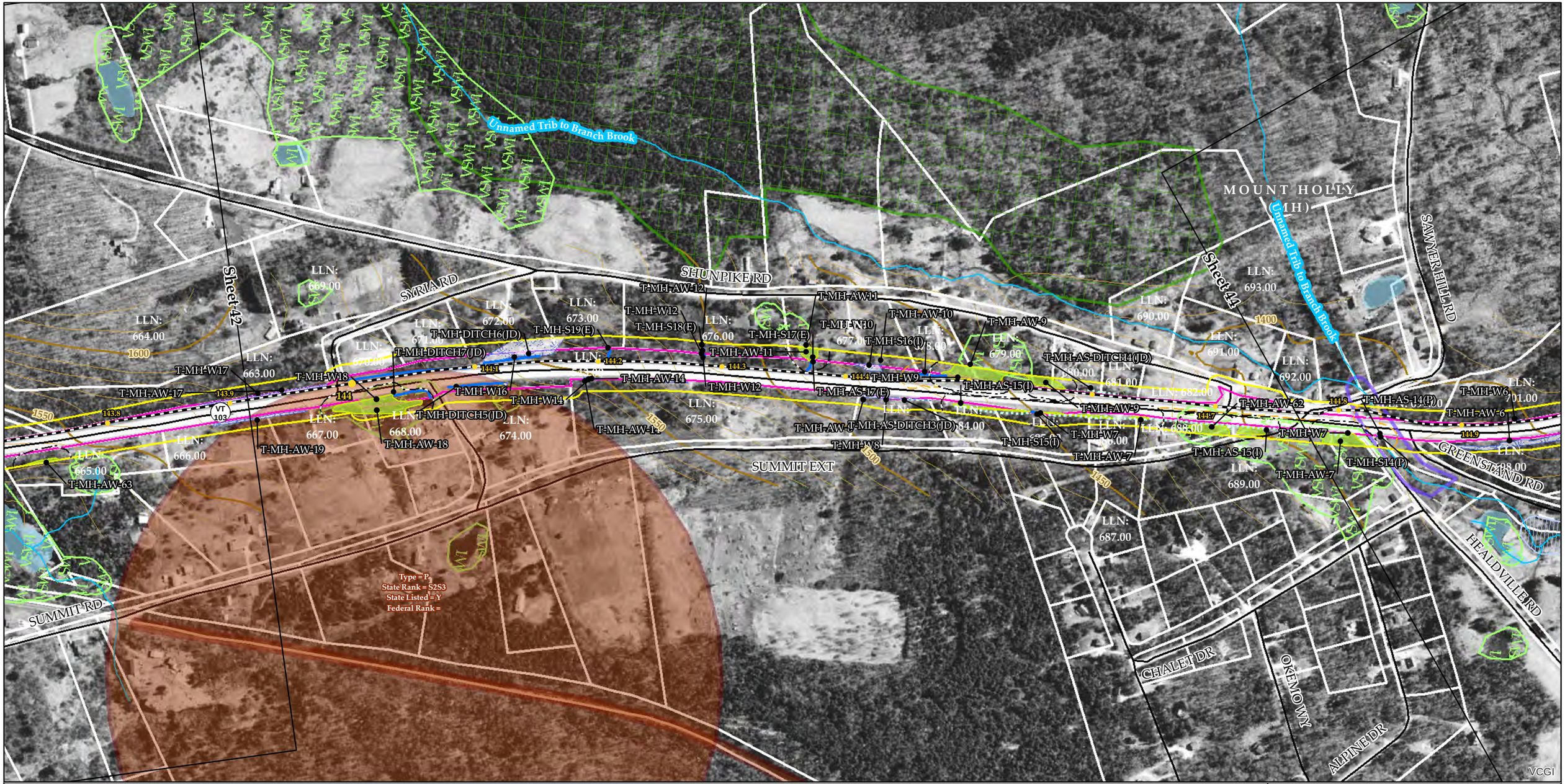

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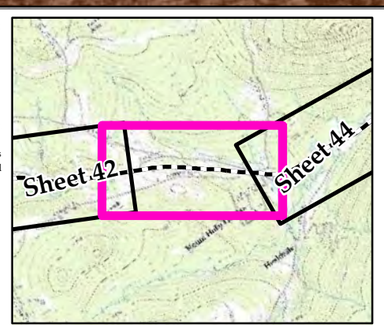

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TDI - NECPL Project
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400 200 0 400 Feet

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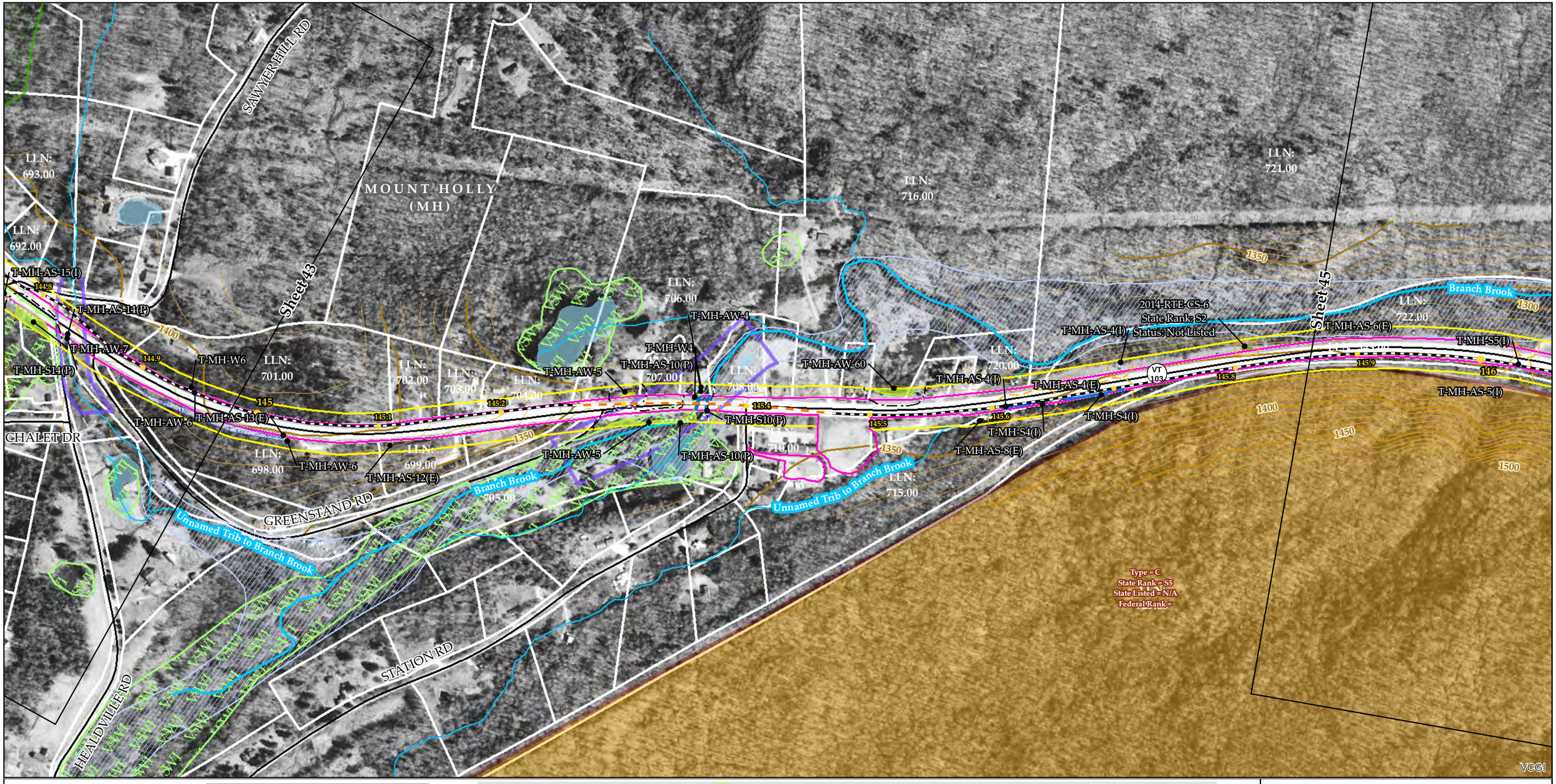

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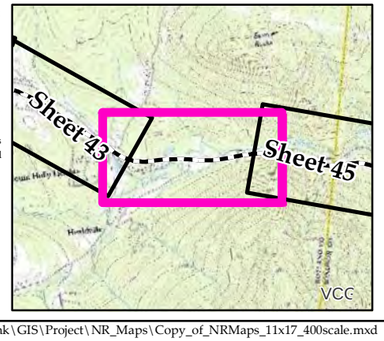

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- Country Boundary (VCGI)
- Road (VTrans)
- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

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December 2, 2014
Updated: July 31, 2015

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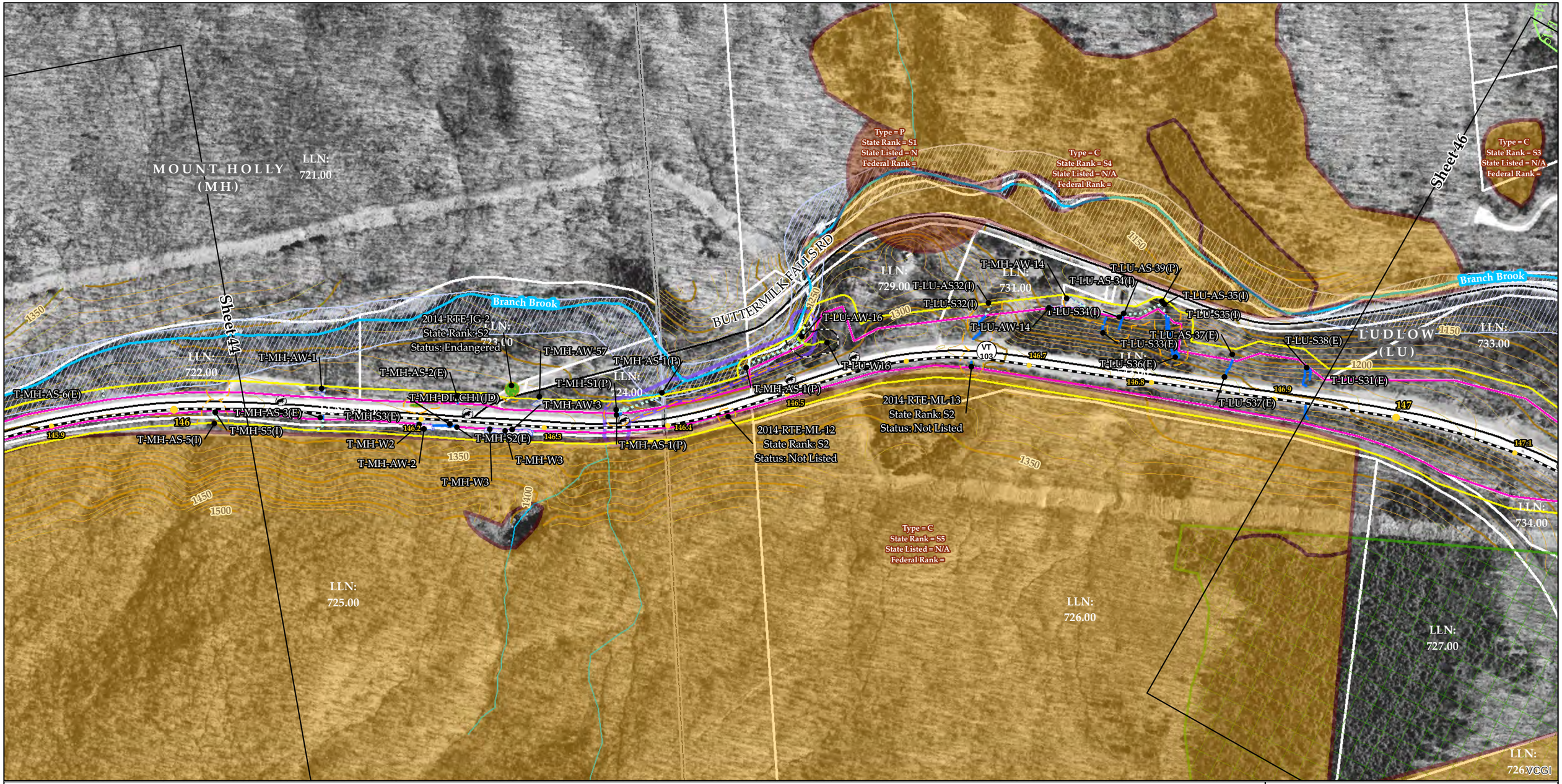

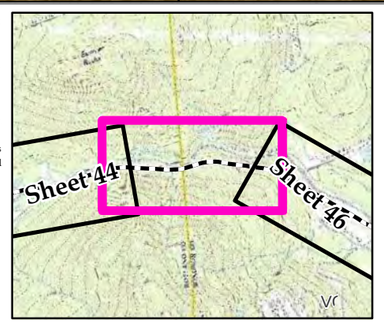

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vhb

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December 2, 2014
Updated: July 31, 2015

400 200 0 400
Feet

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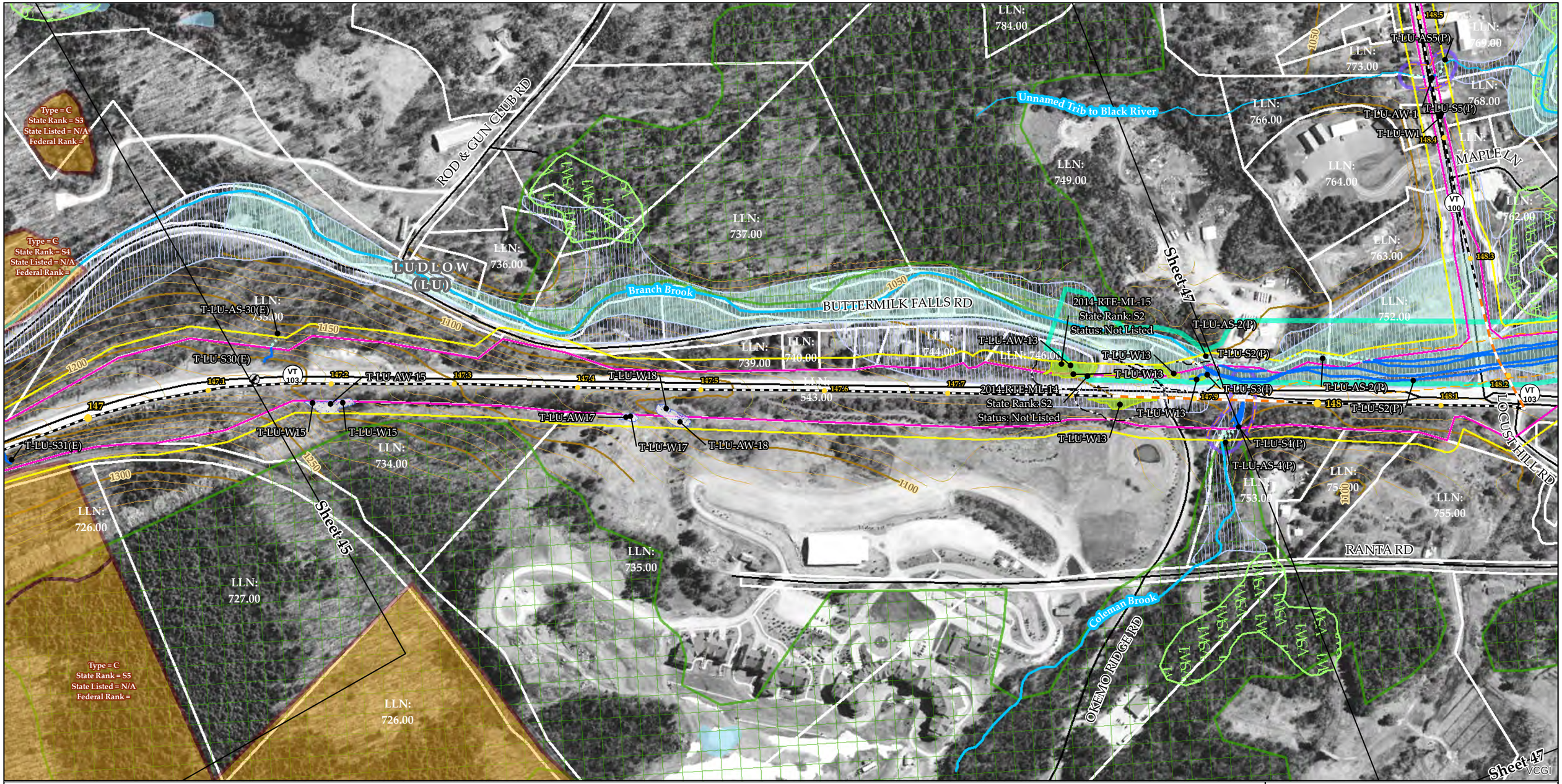

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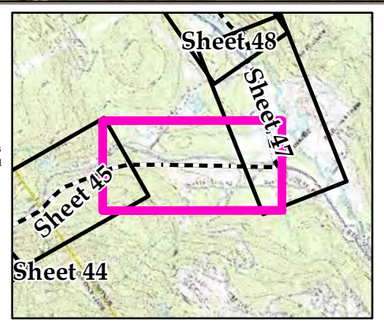

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TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 46 of 51

December 2, 2014
Updated: July 31, 2015

400 200 0 400 Feet

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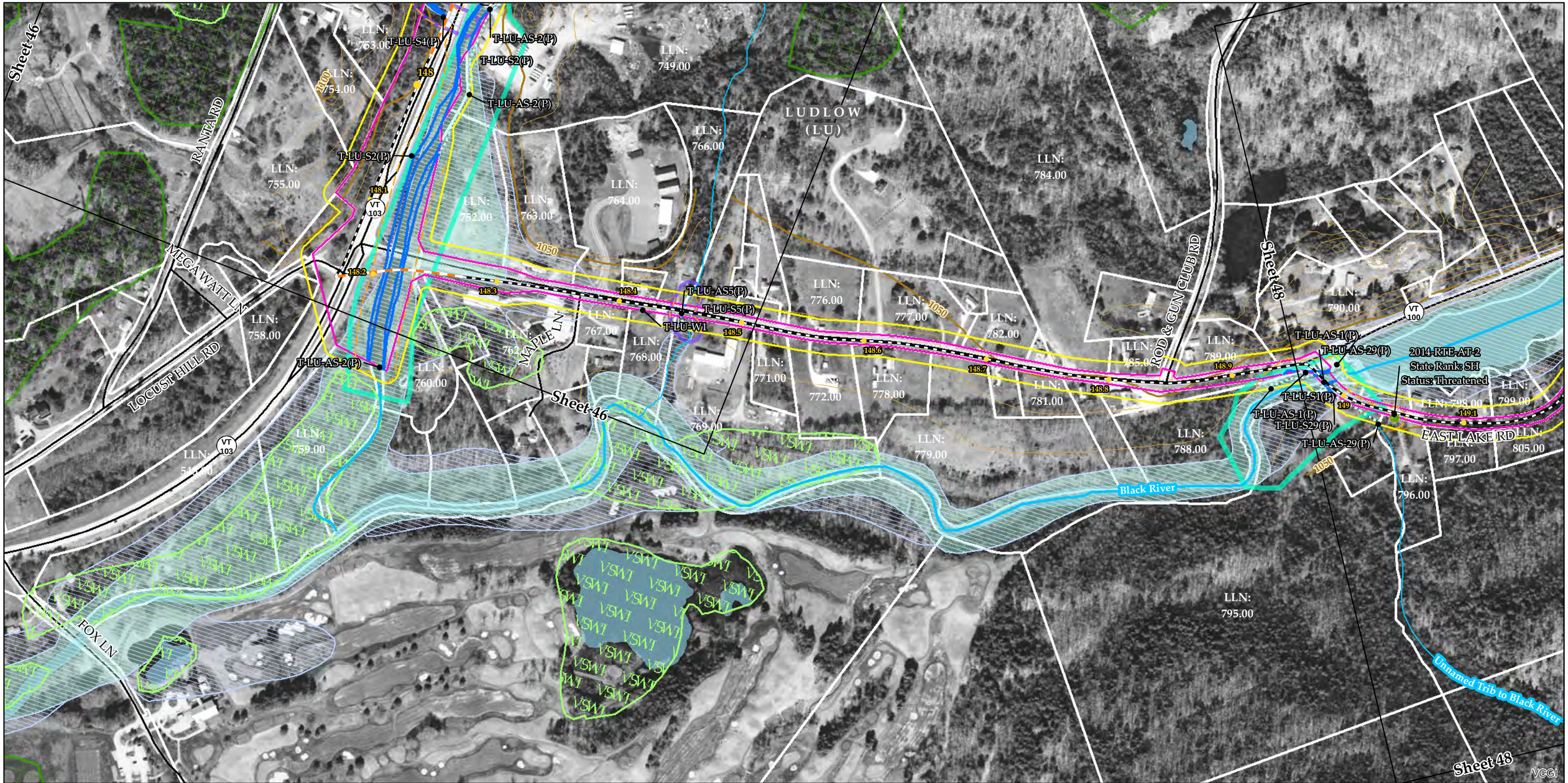

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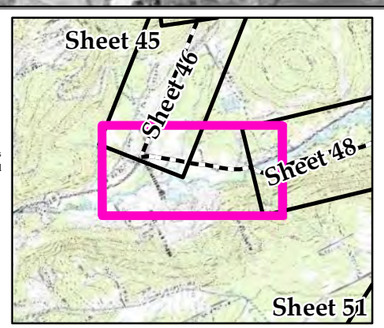

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TDI - NECPL Project Overland Component Grand Isle, Rutland, & Windsor Counties, VT Natural Resource Map Series

Sheet Number 47 of 51

December 2, 2014
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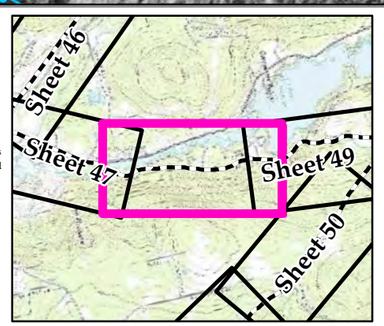

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Sheet Number 48 of 51

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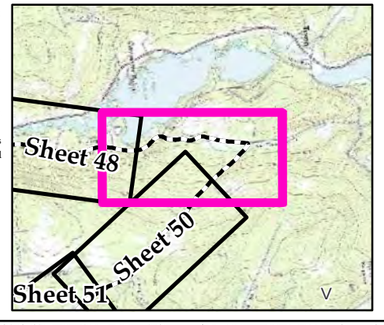
RED BRIDGE RD
SPRUCE LN
ELLISONS LAKE RD
EAST LAKE RD
LUDLOW (LU)
PLYMOUTH (PL)
Sheet 48
Sheet 50
Sheet 51
LLN: 837.00
LLN: 833.00
LLN: 839.00
LLN: 840.00
LLN: 852.00
LLN: 854.00
LLN: 857.00
LLN: 856.00
LLN: 859.00
LLN: 858.00
LLN: 860.00
LLN: 861.00
LLN: 863.00
LLN: 862.00
LLN: 864.00
LLN: 866.00
LLN: 865.00
LLN: 867.00
LLN: 868.00
T-LU-S23(E)
T-LU-AS-23(E)
T-LU-AS-22(I)
T-LU-S22(I)
T-LU-AS-21(P)
T-LU-S21(P)
T-LU-AS-20(P)
T-LU-S20(P)
T-LU-AS-19(I)
T-LU-AW-9
T-LU-W9
T-LU-W8
T-LU-AW-8
T-LU-AS-17(I)
T-LU-S17(I)
T-LU-AS-16(E)
T-LU-S16(E)
T-LU-W7
T-LU-AW-7
T-LU-AS-14(I)
T-LU-S15(P)
T-LU-S14(I)
T-LU-AS-15(P)
T-LU-S13(I)
T-LU-AS-13(I)
T-LU-AW-6
T-LU-W6
T-LU-S12(P)
T-LU-AS-12(P)
VSWI
VCGI

Sources: Provided by VCGI: Background Imagery (2007-2013); Roads by VTrans (2012); Streams & Waterbodies by VHD (2010), VSWI Wetlands by ANR (2013), Deer Wintering Area by ANR (2013), County and Town Boundaries by VCGI (2012); Bear Crossing & Feeding Data by VT Fish & Wildlife (2001). Provided by TRC: Contours (2014), Conceptual Project Alignment (2015), VTrans ROW (2014), Parcel Boundaries (2009-2013) 100-year flood & Floodway compiled by TRC from FEMA (2014), Wetland & Stream Delineations by TRC & VHB (2014); Bat tree, Natural Community and RTE data assessments completed by Arrowwood Environmental (2014); FEH provided by VTDEC (2014); River Corridors by VHB (2015)



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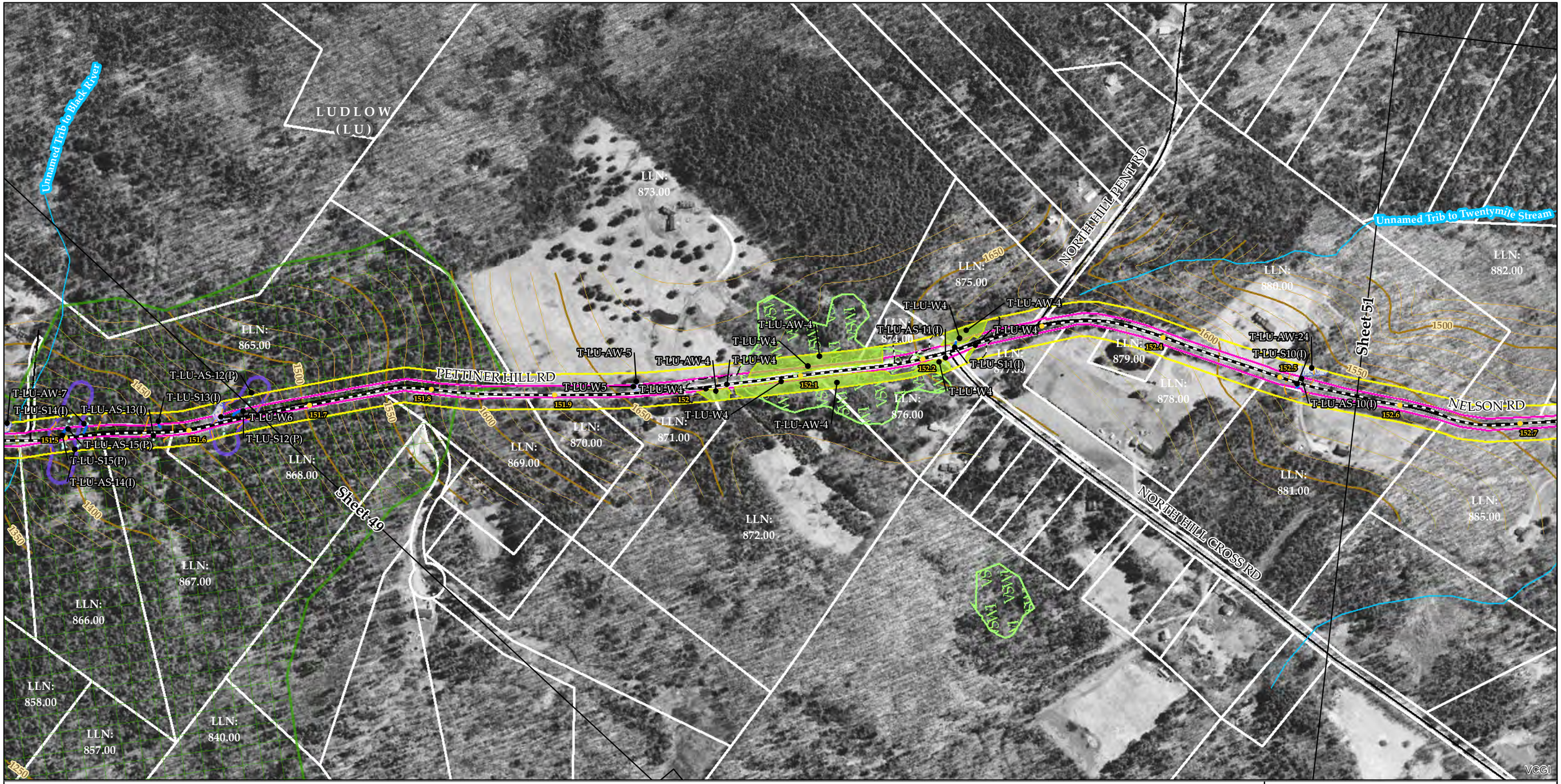

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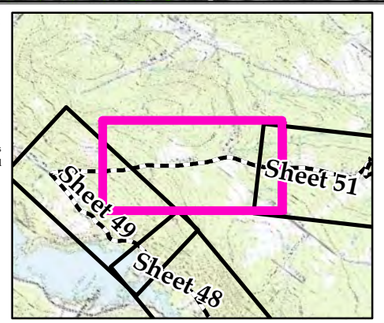

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Feet

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AC Transmission Cable

Proposed Converter Station

LUDLOW (LU)

CAVENDISH (CA)

NELSON RD

QUENT PHELAN RD

BARKER RD

NORTH HILL CROSS RD

Unnamed Trib to Twentymile Stream

Sheet 50

LLN: 880.00
LLN: 881.00
LLN: 882.00
LLN: 883.00
LLN: 884.00
LLN: 885.00
LLN: 886.00
LLN: 887.00
LLN: 888.00
LLN: 889.00
LLN: 890.00
LLN: 891.00
LLN: 892.00
LLN: 893.00
LLN: 894.00
LLN: 895.00
LLN: 896.00
LLN: 897.00
LLN: 898.00
LLN: 900.00
LLN: 901.00
LLN: 902.00
LLN: 903.00
LLN: 904.00

T-LU-AS-7(E)
T-LU-AS-7(I)
T-LU-AS-6(I)
T-LU-AW-3
T-LU-AW-2
T-LU-S9(E)
T-LU-AS-9(E)
T-LU-W3
T-LU-DITCH1(ID)
T-LU-AW-23
T-LU-AW-23
T-LU-W19
T-LU-AW-20
T-LU-AW-20

1350 1400 1450 1500 1550 1600 1300

152.6 152.7 152.8 152.9 153 153.1 153.3 153.4 153.5 153.6 153.7 153.8 153.9 154 154.1

VCGI

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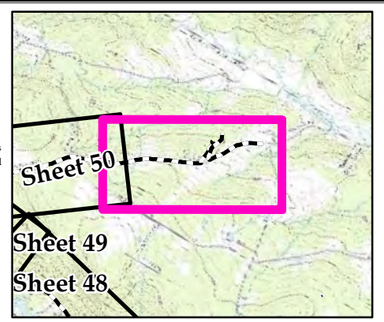

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- Uncommon (S3) Plants (AE)
- Deer Wintering Area (AE)

NHI Element Occurrence (VTFW)
- RTEs
- Significant Natural Community
- Bear Crossing (VTFW)
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- Road (VTrans)
- 50 Ft. Contour
- 10 Ft. Contour

TDI - NECPL Project
Overland Component
Grand Isle, Rutland, & Windsor Counties, VT
Natural Resource Map Series

Sheet Number 51 of 51

December 2, 2014
Updated: July 31, 2015

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ATTACHMENT C

Docket No. _____
Exh. TDI-GGM-4

RTE, Natural Community
& Critical Wildlife Habitat Inventory Report
New England Clean Power Link Project
October 23, 2014

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Attachments

Introduction

Arrowwood Environmental (AE) conducted the following surveys in connection with the terrestrial component of the NECPL Project: necessary wildlife habitat, special aquatic resources, rare, threatened, or endangered species habitat, and rare and irreplaceable natural areas. The surveys were conducted from May through Mid-August of 2014. This report details the methodology employed in conducting the surveys and survey results. Included with this report is a series of GIS shapefiles, as outlined in Attachment 7. AE has also conducted an Indian Bat habitat assessment and non-native invasive species inventory which shall be submitted under separate covers.

Study Area

The route of the study area is as follows:

1. Canadian Border down Bay Road to 55 Bay Road, Alburg
2. Exit Lake at 113 Stoney Point Road, Benson
3. Lake Road to Route 22A
4. Route 22 A to Route 4
5. Route 4 to Route 7
6. Route 7 to Route 103
7. Route 103 to Route 100
8. Route 100 to Town Roads in Ludlow
9. Town Roads in Ludlow

The width of the study area corridor is as follows:

1. Alburg: 50 foot total width, including existing roadway surface (Town ROW) and private parcel owned by project developers.

2. Town Roads in Benson: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs and private parcel owned by project developers.
3. VT Route 22A: Entire width of VTrans or Town of Fair Haven ROWs, ~ 66 feet.
4. US Route 4: Entire width of VTrans ROW on either side of paved roadway/shoulder (~125'), not including the median (North of westbound lands and South of eastbound lanes).
5. US Route 7: Entire width of VTrans ROW
6. VT Route 103: Entire width of VTrans ROW
7. VT Route 100: Entire width of VTrans ROW
8. Town Roads in Ludlow: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs.

Inventory

1: Necessary Wildlife Habitat Surveys

AE conducted surveys of deer wintering areas and bear feeding habitat within the study area. Each of these surveys is discussed in this section.

1a: Deer Wintering Areas

The white-tailed deer (*Odocoileous virginianus*) is near its northernmost range extension in Vermont. In order for the deer to thrive in Vermont, they must utilize particular habitats during periods of extended deep snow and cold temperatures during the winter months. Coniferous evergreen tree canopies provide the forest structure that both: 1) shed snows resulting in reduced snow depths; and, 2) provide overhead tree canopies shielding deer from excessive heat loss during

winter. Mixed hardwood and evergreen forested natural communities also can provide this biological function.

Preferred species of evergreen trees utilized by white-tailed deer include Northern white cedar (*Thuja occidentalis*) and Eastern Hemlock (*Tsuga canadensis*). Balsam fir (*Abies balsamea*) and red spruce (*Picea rubens*) stands can also serve this function, but generally to a lesser degree. White pine (*Pinus strobus*), can, at times be utilized by over-wintering deer but is of considerably lesser value in fulfilling deer over-wintering habitat requirements. These evergreen forest communities retain snow in the canopy resulting in shallower winter snow depths on the ground than nearby hardwood forests. They also provide a forest canopy shielding over-wintering deer from extreme heat loss to the upper atmosphere.

The forest conditions of the study area are generally characterized as cleared along the existing roadways and varying forest edge at the limit of the ROW. These areas have been previously disturbed and for the most part do not fulfill the necessary requirements to serve as over-wintering habitats for white-tailed deer. These road edges are frequently visited by people, their pets, and often receive relatively high amounts of light both from cars and human development. Perhaps most importantly, these road sides are subject to constant noise, primarily resulting from car and truck traffic. This was especially evident regarding the well-travelled roads such as Routes 22a, 4, 7, and 103. White-tailed deer in Vermont generally develop a fidelity to the use of winter forest habitats which provide a high degree of isolation from stress causing factors such as noise, and the presence of humans and their pets. The winter of 2013-2014 was a cold and snowy winter and deer in most regions in Vermont sought shelter within so called "deeryards" or deer wintering areas (DWA).

1a(i) DWA Methodology

The deer wintering area survey involved both a remote review of available digital databases and aerial imagery interpretation as well as field assessment of specific habitat features within the study area. The methodology employed and the results of the survey are discussed in this section.

1a(ii) DWA Remote Review

AE reviewed the existing State of Vermont Fish and Wildlife Department (Vt. F&W) Deer Wintering Area data layer. AE also remotely mapped all conifer and mixed conifer/hardwood forest stands within ¼ mile of the edge of potential disturbance for the proposed project. Stand mapping was conducted through aerial photo interpretation of the 2011-2012 Vt. Orthophotography Program false color-infrared photo series from Vermont Center for Geographic Information (VCGI). Stands with a continuous or near-continuous conifer canopy were digitized as conifer forest land-cover type, and stands with approximately 50% or more conifer canopy were digitized as mixed forest land-cover type. Stand mapping was conducted at a screen scale of 1:5000 or larger, and unit size was generally proportional to the study area size with a mean stand area of 23 acres. Stands were only mapped to edge of a ¼ mile buffer from the project area, and mapping was terminated at this boundary even if the conifer or mixed forest stand continued beyond this edge. All remotely mapped conifer and mixed-conifer stands were considered potential deer winter habitats.

As a result of the remote review approximately 162 potential deer winter habitats were identified of which approximately 78 forest stands intersected with the study area and were targeted for field review.

1a(iii) DWA Field Survey

Coniferous and mixed conifer/hardwood forest communities which fell within the study area were visited in the field. Meandering surveys were conducted within

these target communities in the study area. Each potential DWA site was assessed for the appropriateness of the forest structure, (i.e. percent coniferous tree canopy cover) and dominant canopy species; as well as for their utilization by over-wintering white-tailed deer. The presence and abundance of deer winter scat piles as well as the extent of winter woody plant browse by deer was noted.

1a(iv) DWA Results

Approximately 78 forest stands were assessed for deer overwinter use within the study area. Forest stands with a combination of the appropriate tree species as well as adequate forest structure within the study area were rare with only five stands having both features. The table below provides summary information for these five stands.

Table 1: Forest Stands With Potential DWA Cover Conditions

Potential DWA ID	Route Segment	Potential DWA Cover Conditions
593	Route 103-Mt Holly, Ludlow	White Pine/Balsam Fir 80% cover
604	Route 103-Mt Holly, Ludlow	Red Spruce/Balsam Fir 80% cover
1058	Old North Lake Road	Hemlock 65% cover
1128	Route 103-Wallingford	Hemlock 80% cover
1139	Route 103-Mt Holly, Ludlow	Red Spruce/Balsam Fir 75% cover

There were no field observations within the evaluated forest stands revealing white-tailed deer utilization (as an over-wintering habitat). No observations of white-tailed deer winter scat piles or winter woody browse were observed within any of the evaluated forest stands.

These results are not surprising given the excessive disturbance from people and vehicular traffic within and adjacent to the study area. Evaluations did not extend beyond what was visible within the study area.

1b: Necessary Habitat for Black Bear

AE conducted a remote review of available databases to identify potential necessary habitat for black bear within the project area. Databases included the Black Bear Habitat in Vermont Map (VT. F&W), the Vermont Biodiversity Project "Bear Points", and the 2006 Road Kill data.

Necessary wildlife habitat for black bears falls into one of three categories: (1) travel corridors; (2) spring feeding wetlands; and, (3) fall feeding habitat consisting of mast producing trees. Each of these habitat features is discussed in relation to the project area.

1b(i) Black Bear Travel Corridors

Travel corridors, also called connecting lands or connecting habitats, are land areas that serve to link other patches of important wildlife habitats together. The proposed project intersects one potential black bear travel corridor located on Rte 103 near the town line separating Mt. Holly and Ludlow. There are multiple road sighting occurrences in this area (as revealed by the digital bear points database). The area has been designated "Bear Production Habitat" by the State of Vermont on the Bear Habitat Map and there are relatively wild forestlands north and south of Route 103 in this location. In general, the designation of the area as bear production habitat suggests that quality of bear habitat in this region is sufficient to support the home ranges of breeding adult female bears.

This area appears to be part of a public and private conservation effort to facilitate bear crossing of Rte 103. Bear crossing signs were observed during the field survey effort for the project.

Within the project study area, being generally characterized as heavily disturbed by road traffic and human activity, biologically critical black bear habitat is limited or non-existent. The project study area is likely limited in function to its role as

part of a travel corridor wherein bears are moving quickly between the large uninterrupted forest blocks north and south of the roadway where more appropriate biologically critical habitat exists.

1b(ii) Black Bear Fall Feeding Habitat

AE reviewed the State of Vermont bear points database for presence of mast stands. There are no mapped fall feeding habitats, generally mast producing trees such as American beech (*Fagus grandifolia*), within 1/2 mile of the proposed project.

During a review of potentially significant natural communities, AE identified northern red oak (*Quercus rubra*) stands within ½ mile of the proposed project. Red oak is a mast-producing tree also used by fall-feeding black bears. Due to the existing and frequent disturbance associated with the roadways, bear use of any red oak trees within the project area is highly unlikely.

1b(iii) Black Bear Wetlands

Wetlands, especially forested or sheltered wetlands, are used heavily by black bear for feeding in the spring season when very little besides newly sprouting forbs and sedges are available to eat. These "Bear Wetlands" are considered critical habitat.

AE reviewed the bear points database for presence of bear wetlands. There are no bear wetlands within the study area and there are no known bear wetlands within 1/2 mile of the proposed project. As with mast trees, the existing and frequent disturbance associated with the roadways is likely to limit any bear use of wetlands close to the project study area.

2: Rare, Threatened and Endangered Plant Species Survey

A rare, threatened and endangered (RTE) plant species survey was conducted for the study area. The survey involved both a remote assessment of available digital databases and a detailed field survey. The methodology employed and the results of the survey are discussed in this section.

2(i) RTE Remote Review

The initial step in the RTE survey was a remote assessment of known rare plant Element Occurrences (EOs) in the vicinity of the study area. This information was obtained from the Vermont Non-Game and Natural Heritage Program (NNHP) and summarized by TRC Companies, Inc (TRC). TRC in turn, provided this summarized information to AE. All known occurrence data was imported into GPS units and used as an aid during the field surveys.

2(ii) RTE Plant Field Survey

As outlined by TRC in the document: *Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Community Survey Pro*gram (April 2014) the field inventory methodology had three related protocol: 1) Perform targeted RTE plant surveys within the survey area in the vicinity of known EOs; 2) Conduct a visual meander survey of the study area; and 3) Perform RTE plant habitat assessments within and directly adjacent to the survey area in the vicinity of known EOs for species that cannot be identified during the survey period.

The first two protocols were conducted concurrently during the field survey. The third protocol was deemed to be unnecessary. The timing of the RTE surveys (outlined below) was such that species which bloomed earlier in the season (e.g. *Boechera spp*.) were identifiable in seed. Later blooming species (e.g. *Symphyotrichum spp*., *Desmodium spp*. and *Lespedza spp.)* were coming into bloom during the survey period. In some cases, populations not in bloom during

the first part of the survey period were re-visited later in the survey period when blooms were present and a positive identification could be made.

The targeted surveys and the meander surveys (protocols 1 and 2) were conducted by three botanists: Michael Lew-Smith, Matt Peters and Art Gilman. The surveys commenced on July 17, 2014 and concluded on August 19, 2014. Project survey area boundaries were imported into field GPS units to identify the limits of the ROW during the field surveys. Nomenclature for the RTE plant inventory followed Flora of Vermont by Art Gilman (in press). Plant rarity ranks were based on the Vermont NNHP list dated 6-28-2014.

If a rare plant population was discovered, a location point was recorded using professional mapping-grade GPS units, with subsequent detailed mapping conducted by sub-meter grade GPS. In some cases, sub-meter GPS mapping of the population occurred at the time of discovery. In other cases, a botanist returned to the site at a later date to map the population location with sub-meter grade GPS. This was done for efficiency of field operations and in some cases, to accommodate conclusive identification of the species following collection. Sub-meter accuracy of the population boundaries was obtained using Trimble professional grade handheld GPS units. Population locations were collected as either a single point at the center of the population with notes on a radius distance from the center within which the plant is present, or as multiple points defining the boundary of a larger population. Field collected GPS points were recorded at settings recommended by the device manufacturer for sub-meter accuracy, with an average of at least 30 positions per point and were post-processed using Trimble software against Vt. Agency of Transportation CORS base station data published at: http://www.aot.state.vt.us/geodetic/default.htm.

Polygons were manually built from sub-meter GPS data following post-processing. Where a single point was collected at the center of a small population, a circle was constructed about the point at the radius indicated by the field botanist. When multiple points were collected for a population boundary, the appropriate points were connected to form a polygon. Each polygon was linked by reference to the original mapping grade GPS point to enable transfer of all initial species, population and other metrics collected. All polygons were reviewed for quality assurance and completeness by multiple AE personnel with geometry and associated attributes adjusted as deemed appropriate by the reviewers.

All species with an S-rank of S1, S2 and S2S3 were mapped to sub-meter accuracy. Uncommon species (S3 rank) were also documented and mapped during this inventory and are included in the summary tables. S3 populations were not mapped to sub-meter accuracy and no rare plant report forms were used. S3 populations were mapped from the original mapping-grade GPS point with a default 20' diameter circle software-generated around the point to represent the general area of occurrence.

For each rare plant population, a Rare Plant Occurrence Report Form (NNHP, Vermont Fish and Wildlife) was filled out with information about the population. Since spatial data is also being submitted, a somewhat abbreviated version of this form excluding location description was used for this project. One form was completed for each rare plant population. What comprised a population was based on distance between rare plant occurrences, plant biology, barriers to dispersal and professional judgment.

Copies of the Rare Plant Occurrence Report forms are provided as Attachment 1. The forms are linked to the digital spatial data and the data table provided as Attachment 2 by using the "Population Group" code.

2(iv) RTE Plant Results

Fifty-three different species of uncommon, rare, threatened or endangered plant species were identified during this survey. This includes 3 state endangered and 6 state threatened species.

Summary data for all uncommon, rare, threatened or endangered plant species is provided as Attachment 2. Each record in this table is linked to the polygon (location) data by the Polygon ID field**.** Records with the same "Population Group" entry are considered part of the same population. Population sizes listed for each record indicate the number of plants in each individual polygon. In some cases, there are multiple polygons for each population. In a few circumstances, the number of individuals for each polygon is not known; only the total population number is known. In these instances, "Unknown" is listed in the Population Size field, followed by total population size. The Polygon Group field is linked to the RTE forms, presented in the attachment.

A complete list of plant species recorded during the RTE plant survey is provided as Attachment 3.

3: Rare, Threatened and Endangered Animal Survey

AE conducted a Rare, Threatened and Endangered Animal species habitat survey for the project study area. The survey involved a remote review of available digital databases. RTE wildlife habitat assessments were conducted as needed and were based on existing species records within the proposed route and incidental sightings during the plant survey.

3(i) RTE Animal Remote Review

The initial step in the RTE animal survey was a remote assessment of known rare animal Element Occurrences (EOs) in the vicinity of the study area. This information was obtained from the Vermont Non-Game and Natural Heritage Program (NNHP) and summarized by TRC. TRC in turn, provided this summarized information to AE. All known occurrence data was imported into GPS units and used as an aid during the field surveys.

3(ii) RTE Animal Field Survey

As outlined by TRC in the document: *Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Community Survey Program* (April 2014), the field survey methodology consisted of conducting targeted RTE animal habitat assessments in the vicinity of known EOs in the study area. No *de novo* searches for RTE animals occurred during this inventory.

With the exception of Indiana Bat habitat work (report to be presented under separate cover), the RTE animal habitat inventory occurred concurrently with the RTE plant inventory and employed the same meander survey techniques. In the vicinity of existing EOs, notes were made on the habitat present with a focus on particular habitat features (such as hibernacula for snakes).

3(iii) RTE Animal Results

There are eighteen known EOs of RTE animals in the study area as recorded in the NNHP database. Field work has confirmed that, in most cases, general habitat features preferred by RTE animal species is present within the study area. However, no special habitat features such as hibernacula were discovered within the study area. The results of the RTE animal habitat assessments are provided as Attachment 4. The table below provides summary information about the recorded EOs in the project area.

Table 2: Summary Data Table for Recorded Animal EOs

Animal Species	S-Rank	# of EOs
Eastern Ribbonsnake	S2	2
Stinkpot (Eastern Musk Turtle)	S2	1
Eastern Ratsnake	S2	3
Upland Sandpiper	S2B	2
Fluted-Shell	S2	1
Silver Lamprey	S2	2
Timber Rattlesnake	S1	2
Cerulean Warbler	S1S2B	1
Pie-billed Grebe	S2S3B	1
Creek Heelsplitter	S2	1
Cape May Warbler	S1B	1
Indiana Bat	-	1

4: Rare and Irreplaceable Natural Areas Assessment

Rare or irreplaceable natural areas (RINA) are not defined in state statutes. A subset of significant natural communities may be considered to be RINA as well as State Natural Areas. Significance is assessed according to the *Guidelines for the Conservation and Protection of State-Significant Natural Communities* (ANR 2004). The focus of this assessment was to identify potentially significant natural communities that may be considered to be RINA. Methodology for conducting this assessment followed Section 6.1 in the TRC document: *Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Community Survey Program* (April 2014). A component of this evaluation is the mapping of non-native invasive species (NNIS), a report of which is submitted under separate cover. Complete evaluation of entire communities, as necessary to conclusively determine state significance, was outside the scope of this survey due to access constraints outside of the study area.

4(i) RINA Remote Review

The initial step in the assessment was to identify known significant community Element Occurrences (EOs) in the vicinity of the study area and the presence of State Natural Areas. This information was obtained from the NNHP database. In addition, AE remotely identified any potentially significant natural communities within ¼ mile of the study area by reviewing various orthophoto imagery, topographic maps, soil surveys and VSWI wetland maps. This process was conducted for both upland and wetland natural communities. All known occurrence data, State Natural Area locations, as well as potentially significant natural communities as remotely identified was imported into GPS units and used as an aid during the field surveys.

4(ii) RINA Field Survey

The focus of the field work was twofold: 1) to confirm or deny that any of the known significant communities were within the study area, and 2) to assess the remotely identified potentially significant communities within the study area. The significant natural community assessments were conducted concurrent with the RTE plant survey.

For the potentially significant natural communities identified in the study area, AE gathered field information about the community type and condition. This information included canopy cover, species composition, age, disturbance and community condition. After the field work was completed, a broader analysis of the sites was conducted to include overall community size and landscape position.

The digital data submitted with this report includes a polygon shapefile of potentially significant natural communities. This submittal includes only those sites that are considered potentially significant AND occur within the study area. In addition, these natural community boundaries are clipped within ¼ mile of the study area.

4(iii) RINA Results

As mentioned previously, sites on the list of State Natural Areas can be considered to be RINA. There are no sites within the study area that are on the list of State Natural Areas. In addition, known significant natural community occurrences (as recorded in the NNHP database) may be considered to be RINA. Fourteen different known significant natural communities occur in the vicinity of the study area. Summary data for these sites, along with results of the field survey work, are provided as Attachment 5. Fieldwork confirmed that none of these fourteen natural communities occur within the study area.

An assessment of new significant natural community occurrences was conducted for both wetlands and uplands. There were no potentially significant wetland communities identified in the study area. Given the narrow, linear nature of the study area and the proximity of existing roads, very few undisturbed wetlands were present. In some cases, large state significant wetlands were in the vicinity of the study area, but did not enter into the study area and were therefore not assessed during the field work or included in this report.

The analysis of upland natural community occurrences resulted in the identification of eight potentially significant upland natural communities. Summary data for these sites are provided in Table 3 and briefly described below. In all cases, further field work would need to be conducted outside of the study area to determine the full nature and extent of the communities and draw any definitive conclusions regarding significance.

Table 3: Summary Data for Potentially Significant Upland Natural Communities

Natural Community	Mile Marker	Comments	Site Name	Rank Comments
Mesic Red Oak-Northern Hardwood Forest	122.2 to 123.0	Standard example of type	Herrick Mountain NE	Potentially Significant Natural Community
Mesic Maple-Ash-Hickory-Oak Forest	120.2 to 120.7	Nice mature forest	Mount Hanley East	Likely Significant Natural Community
Mesic Maple-Ash-Hickory-Oak Forest	119.5 to 119.9	Very nice forest, some mature areas	Mount Hanley West	Likely Significant Natural Community
Mesic Maple-Ash-Hickory-Oak Forest	121.2 to 121.8	Very nice forest, some mature areas	Twin Mountain	Likely Significant Natural Community
Mesic Maple-Ash-Hickory-Oak Forest	117.3 to 118.1	Very nice forest, drier	Blueberry Hill	Likely significant natural community

Natural Community	Mile Marker	Comments	Site Name	Rank Comments
		inclusions; larger to north		
Temperate Hemlock Forest	115.3 to 115.6	Large forest to north, somewhat disturbed along ROW	Pine Pond	Potentially Significant Natural Community
Temperate Hemlock-Hardwood Forest	114.7 to 115.2	Large mixed forest to north	Pine Pond	Potentially Significant Natural Community
Dry Oak-Hickory-Hophornbeam Forest	112.4 to 112.8	Transitional to Mesic Forest	Green Dump Hills	Potentially Significant Natural Community

Herrick Mountain NE

This Mesic Red Oak-Northern Hardwood Forest is dominated by northern red oak, American ash (*Fraxinus americana*), American beech, black birch (*Betula lenta*), and white pine. The understory consists of witch hazel (*Hamamelis virginiana*), maple-leaved viburnum (*Viburnum acerifolium*) and various canopy saplings. This appears to be a fairly young forest, with DBHs averaging around 10-12". Despite the age, the forest appears to be in good condition. This is a fairly common community type, and would be a significant natural community only if the rest of the forest to the south is in very good condition.

Mount Hanley East, Mount Hanley West, Blueberry Hill and Twin Mountain

This series of four forest communities all sit at the base of a series of dry hills in West Rutland, Ira and Castleton. They all are examples of the Mesic Maple-Ash-Hickory-Oak Forest community. They are dominated by northern red oak,

shagbark hickory (*Carya ovata*), bitternut hickory (*Carya cordiformis*), American hop hornbeam (*Ostrya virginiana*) and American ash. The understory consists of canopy species as well as maple-leaved viburnum, witch hazel, Pennsylvania sedge (*Carex pensylvanica*), wood anemone (*Anemone quinquefolia*) and blue-stemmed goldenrod (*Solidago caesia*). There are some inclusions of Dry Oak-Hickory-Hophornbeam Forest where the soils are well-drained.

While there are a few areas of more recent disturbance, most of these forests in the study area are mature and in very good condition. Given the condition, community type and size of these forests, it is likely that these communities would be considered state significant.

Pine Pond

These two forests consist of a Temperate Hemlock-Hardwood Forest and a Temperate Hemlock Forest. The canopy in the mixed forest is dominated by Eastern hemlock, red maple (*Acer rubrum*), American beech, and northern red oak. The sparse understory consists of canopy species as well as rock polypody (*Polypodium virginianum*) and evergreen woodfern (*Dryopteris intermedia*). The Hemlock Forest contains less hardwood and also includes white pine. Within the ROW, some sections of these forests are somewhat disturbed and early successional. Nevertheless, they are part of very large forests outside of the ROW to the north. Further analysis of the forests outside of the study area would need to be conducted to determine if these are significant natural communities.

Green Dump Hills

The forest at this location is best described as a Dry Oak-Hickory-Hophornbeam Forest community, though it may be transitional to the Mesic Maple-Ash-Hickory-Oak Forest. The canopy is dominated by northern red oak, American ash, white pine and American hop hornbeam. The understory is dominated by

Pennsylvania sedge. The forest continues to the north where it is interspersed with numerous state significant examples of the Dry Oak Forest community. Given its size, condition and community type, this forest is likely a state significant natural community.

5: Special Aquatic Sites and Special Wetlands

Special Aquatic Sites (SAS) are a U.S. Army Corps of Engineers designation which affords protection to certain types of wetlands. These wetland types are outlined in the Vermont Wetland General Permit under General Condition 27 (Department of Army Vermont General Permit, 12/11/2012). SAS include mudflats, vegetated shallows, and riffle and pool complexes. In addition, Special Wetlands are also afforded additional protection. Special Wetlands are bogs, fens, vernal pools and wetlands that provide habitat for state threatened or endangered species.

5(i) SAS Methodology

Wetland survey data forms for the project study area were provided to AE by TRC. These data forms were used by AE to determine if any SAS or Special Wetlands were delineated based on the Cowardin Classification. Field surveys for SAS and Special Wetlands were conducted concurrently with the RTE plant surveys and survey for significant wetland natural communities. Wetlands within the study area were visited during these inventories with the intention that any SAS or Special wetland types would be identified.

5(ii) SAS Results

The field inventory for SAS found no examples of mudflats or riffle and pool complexes within the study area. One site that is considered a vegetated shallow is wetland V-CN-W-105. This wetland sits on the margins of Lake Bomoseen, is permanently inundated and supports rooted aquatic vegetation. Therefore, wetland V-CN-W-105 is considered a Special Aquatic Site.

The field inventory of Special Wetlands found no examples of bogs, fens or vernal pools within the survey area. The field inventory did identify two wetlands which provide habitat for threatened plant species. Wetland V-CN-W-105 provides habitat for the threatened species Virginia chain fern (*Woodwardia virginica*). Wetland T-CL-W 13 NORTH provides habitat for the threatened marsh horsetail

(*Equisetum palustre*). Therefore, wetlands V-CN-W-105 and T-CL-W-13 North are considered Special Wetlands.

6: References

Argentine, C.C. 2008. Vermont Act 250 Handbook. Putney Press, Brattleboro, VT.

Thompson, E.H., E.S. Sorenson. 2005. Wetland, Woodland, Wildland: A guide to the natural communities of Vermont. Vermont Department of Fish and Wildlife and the Nature Conservancy. Hanover, NH.

U.S. Army Corps of Engineers, 12/11/2012. Reissuance of the Department of the Army Vermont General Permit (GP).

Vermont Agency of Natural Resources (ANR) 2004. Guidelines for the Conservation and Protection of State-Significant Natural Communities: October 21, 2004 version.

Vermont Department of Fish and Wildlife. Webpage, see http://www.vtfishandwildlife.com.

Attachment 1.

RTE Rare Plant Occurrence Reporting Forms

(Excluded from Exhibit due to confidential information)

Attachment 2.

RTE Plant Survey Summary Data

RTE Plant Survey Summary Data

Polygon ID	NRI LINK	Species Name	S Rank	S Rank Description	Threatened/Endangered Staus	Population Size	Population Group	Habitat	Notes
7	PYVE-130.198	Pycnanthemum verticillatum var. verticillatum	S2S3	Uncommon to Rare	Not Listed	4 plants	Pycver1	Roadside	Roadside opening under powerline; mowed
8	PYVE-130.198	Pycnanthemum verticillatum var. verticillatum	S2S3	Uncommon to Rare	Not Listed	13 plants	Pycver1	Roadside	Roadside opening under powerline; mowed
10	EQPA-128.518	Equisetum palustre	S2	Rare	Threatened	appx 100 plants	Equpal1	Marsh wetland	Good-sized population in small wetland along stream
11	EQPA-128.502	Equisetum palustre	S2	Rare	Threatened	4 plants	Equpal1	Marsh wetland	Only 4 plants in this polygon, most of population on other side of road
12	ASTU-132.235	Asclepias tuberosa	SH	Historical	Threatened	1 plant	Asctub1	Old pasture	Probably an escape from cultivation
13	WOVI-114.259	Woodwardia virginica	S1	Very rare	Threatened	5-10 plants	Woovir1	Wetland	Hardwood swamp, population likely extends out of ROW and is much larger
14	WOVI-114.284	Woodwardia virginica	S1	Very rare	Threatened	5-10 plants	Woovir1	Wetland	Hardwood swamp, population likely extends out of ROW and is much larger
15	LILO-114.241	Liparis loeselii	S3	Uncommon	Not Listed	Unknown	Liploe1	Wet roadside	Plants scattered over area with 15' radius
17	GAOB-113.136	Galium obtusum	S2S3	Uncommon to Rare	Not Listed	15-20 ramets; 5-10 genets	Galobt1	Wetland along roadside	Small backwater wetland
18	PEVI-113.135	Peltandra virginica	S2S3	Uncommon to Rare	Not Listed	2 plants	Pelvir1	Wetland	Marsh in bay of Lake Bomoseen; more plants north of ROW
19	RUEN-113.557	Rubus enslenii	SU	Status Unknown	Not Listed	Unknown	Rubens1	Roadside	One small patch occupying 5' x 5' area
20	LEHI-112.99	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Leshir2	Under powerline and dry outcrop above road	Large population in multiple patches north of road
21	LEHI-112.933	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Leshir2	Under powerline and dry outcrop above road	Large population in multiple patches north of road
22	LEHI-112.96	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Leshir2	Under powerline and dry outcrop above road	Large population in multiple patches north of road
23	LEHI-112.96	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Leshir2	Under powerline and dry outcrop above road	Large population in multiple patches north of road
24	LEHI-112.96	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	Unknown; Pop. total appx 200-300 ramets; 100-150 genets	Leshir2	Under powerline and dry outcrop above road	Large population in multiple patches north of road
25	HOLO-112.858	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 1000 plants	Houlon1	Dry summit and ledge outcrop	Series of metapopulations totalling > 1000 plants
26	HOLO-112.858	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 1000 plants	Houlon1	Dry summit and ledge outcrop	Series of metapopulations totalling > 1000 plants
27	LEHI-112.432	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	appx 160 ramets; 80 genets	Leshir1	Dry outcrop	Two patches in this sub-population totalling appx 100 plants
28	HOLO-112.47	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 1000 plants	Houlon1	Dry summit and ledge outcrop	Series of metapopulations totalling > 1000 plants
29	LEVI-112.505	Lespedeza violacea	S2S3	Uncommon to Rare	Not Listed	50-75 plants	Lesvio2	Dry outcrop	Small population on dry ledge above road
30	LEHI-112.506	Lespedeza hirta ssp. hirta	S1	Very rare	Threatened	appx 20 plants	Leshir1	Dry outcrop	Two patches in this sub-population totalling appx 100 plants
31	CASI-112.724	Calystegia silvatica ssp. fraterniflora	S2	Rare	Not Listed	10 ramets; 1 genet	Calsil1	Roadside	Plants stressed and mowed
32	HOLO-112.59	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 1000 plants	Houlon1	Dry summit and ledge outcrop	Series of metapopulations totalling > 1000 plants
33	CASP-112.67	Calystegia spithamaea ssp. spithamaea	S2	Rare	Threatened	30 ramets; 1 genet	Calspi2	Dry open outcrop	Small habitat patch
35	SYLA-110.264	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	> 100 plants	Symlae1	Roadside and dry outcrop	Large population on margin of fields and dry outcrops
37	CRDO-110.253	Crataegus dodgei	SH	Historical	Not Listed	Unknown; Pop. total 15-20 plants	Cradod1	Dry outcrop	15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years
38	GAPI-110.197	Galium pilosum	S1	Very rare	Not Listed	>1000 ramets; > 500 genets	Galpil1	Dry outrcop	One of only 2 extant populations in the state
40	SYLA-109.093	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	4 plants	Symlae1	Roadside	A few plants scattered in area
41	SYLA-109.093	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	4 plants	Symlae1	Roadside	Four plants along roadside
42	HOLO-108.992	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 200 plants	Houlon2	Dry outcrop	Series of metapopulations totalling > 200 plants
43	HOLO-108.992	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 200 plants	Houlon2	Dry outcrop	Series of metapopulations totalling > 200 plants
44	HOLO-108.992	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 200 plants	Houlon2	Dry outcrop	Series of metapopulations totalling > 200 plants
46	HOLO-108.992	Houstonia longifolia	S2	Rare	Not Listed	Unknown; Pop. total > 200 plants	Houlon2	Dry outcrop	Series of metapopulations totalling > 200 plants
47	SYLA-108.604	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	Unknown	Symlae1	Dry roadside embankment	Small population occupying 2% cover within polygon
48	SYLA-108.604	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	Unknown	Symlae1	Dry roadside embankment	Small population occupying 1% cover within polygon
49	SYLA-108.604	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	2 plants	Symlae1	Roadside	Small population along roadside
50	SYLA-108.604	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	2 Plants	Symlae1	Roadside	Two plants along roadside
51	SYLA-108.604	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	10 plants	Symlae1	Roadside	Small population along roadside
52	RHAR-108.652	Rhus aromatica	S3	Uncommon	Not Listed	Unknown	NA	Roadside	A 10' x 20' area with 90% cover of plants in open roadside
53	HEAU-alb	Helenium autumnale	S1	Very rare	Not Listed	appx 300 plants	Helaut1	Wetland on shore of Lake Champlain	Large population in shoreline wetland
55	SACA-101.104	Sanicula canadensis var. canadensis	S2S3	Uncommon to Rare	Not Listed	6 plants	Sancan1	Forest	2 flowering plants and 4 vegetative rosettes in dry, rich forest edge
57	SYLA-104.465	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	82 plants	Symlae2	Forest edge	Edge of dry oak forest, vigorous plants, healthy population
58	SYLA-107.748	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	50 plants	Symlae4	Roadside	Moderate sized population on dry embankment
59	SYLA-107.785	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	200 plants	Symlae4	Roadside	Moderate sized population on dry embankment
60	SYLA-107.93	Symphyotrichum laeve var. laeve	S2S3	Uncommon to Rare	Not Listed	1 plant	Symlae3	Dry outcrop	Single plant at top of roadcut
61	CASI-114.874	Calystegia silvatica ssp. fraterniflora	S2	Rare	Not Listed	20 ramets; 2 genets	Calsil2	Roadside	Scatterd along base of cliff
62	MYLA-115.059	Myosotis laxa	S2	Rare	Not Listed	500-1000 plants	Myolax8	Wetland	Large population in natural wetland below road
63	BOST-115.324	Boechera stricta	S1S2	Rare to Very rare	Endangered	59 plants	Boestr1	Cliff face	Good population in crevices and ledges of natural cliff and roadcut
65	WOOB-115.347	Woodsia obtusa ssp. obtusa	S3	Uncommon	Not Listed	11 genets	NA	Cliff face	Moist, shaded cliff, some fertil fronds
66	CLOC-115.37	Clematis occidentalis ssp. occidentalis	S3	Uncommon	Not Listed	1 plant	NA	Base of cliff	Recently mowed
67	MYLA-115.514	Myosotis laxa	S2	Rare	Not Listed	appx 300 plants	Myolax7	Wetland	Nice population in natural wetland below road
68	AUFL-117.559	Aureolaria flava var. flava	S2	Rare	Not Listed	58 plants	Aurfla1	Open south facing slope	In flower
69	AUFL-117.675	Aureolaria flava var. flava	S2	Rare	Not Listed	223 plants	Aurfla2	Dry open outcrop	Nice, healthy population, plants in flower
70	LEVI-117.643	Lespedeza violacea	S2S3	Uncommon to Rare	Not Listed	27 plants	Lesvio1	Dry outcrop on edge of woods	Small population on dry ledge
71	DERO-117.688	Desmodium rotundifolia	S1	Very rare	Threatened	8 ramets; 3 genets	Desrot1	Dry south-facing outcrop	Plants in bloom
72	DERO-117.688	Desmodium rotundifolia	S1	Very rare	Threatened	8 ramets; 4 genets	Desrot1	Dry south-facing outcrop	Plants in bloom
74	SYLE-117.784	Symphyotrichum leave var. laeve	S2S3	Uncommon to Rare	Not Listed	15 plants	Symlae5	Dry open outcrop	Small population on edge of woods on open outcrop
78	BRER-117.852	Brachyelytrum erectum	S2S3	Uncommon to Rare	Not Listed	appx 200 plants	Braere1	Rich Forest	Small population on forest edge
79	LEVI-118.18	Lespedeza violacea	S2S3	Uncommon to Rare	Not Listed	> 500 plants	Lesvio3	Dry outcrop	Large population, dense cover of plants on dry ledge above road
80	CASP-119.136	Calystegia spithamaea ssp. spithamaea	S2	Rare	Threatened	200 plants	Calspi1	Roadside	Mostly vegetative, in un-mowed roadside

Polygon ID	NRI LINK	Species Name	S Rank	S Rank Description	Threatened/Endangered Staus	Population Size	Population Group	Habitat	Notes
81	CAAR-119.137	Carex argyrantha	S2S3	Uncommon to Rare	Not Listed	10 ramets; 2 genets	Carargl	Dry roadside embankment	Small population in dry, open habitat
82	CABR-119.36	Carex cf brevior	S3	Uncommon	Not Listed	15 plants	NA	Roadside	Plants in 4' diameter area
85	COAM-119.655	Corylus americana	S2S3	Uncommon to Rare	Not Listed	13 ramets; 2 genets	Corame1	Roadside	In roadside at edge of ROW
86	COAM-120.694	Corylus americana	S2S3	Uncommon to Rare	Not Listed	50 ramets; 1 genet	Corame1	Roadside	Very large shrub, to 18ft tall
87	COAM-120.736	Corylus americana	S2S3	Uncommon to Rare	Not Listed	4 ramets; 1 genet	Corame1	Roadside	Vegetative
88	CACF-120.749	Carex cf foena	S2	Rare	Endangered	11 plants	Carfoe1	Disturbed mesic forest edge	6 plants in fruit
89	COAM-120.76	Corylus americana	S2S3	Uncommon to Rare	Not Listed	6 ramets; 1 genet	Corame1	Roadside	A few fruits
90	COAM-120.773	Corylus americana	S2S3	Uncommon to Rare	Not Listed	25 ramets; 1 genet	Corame1	Shrubby berm	Fruiting heavily
91	COAM-120.789	Corylus americana	S2S3	Uncommon to Rare	Not Listed	6 ramets; 1 genet	Corame1	Roadside	Vegetative
92	COAM-121.012	Corylus americana	S2S3	Uncommon to Rare	Not Listed	10 ramets; 1 genet	Corame1	Roadside	In dense shrubs
93	COAM-121.151	Corylus americana	S2S3	Uncommon to Rare	Not Listed	2 genets	Corame1	Roadside	4' tall at mowed edge
94	COAM-121.151	Corylus americana	S2S3	Uncommon to Rare	Not Listed	2 genets	Corame1	Roadside	4' tall at mowed edge
95	COAM-121.171	Corylus americana	S2S3	Uncommon to Rare	Not Listed	1 plant	Corame1	Roadside	A few fruits
96	COAM-121.764	Corylus americana	S2S3	Uncommon to Rare	Not Listed	2 genets	Corame1	Roadside	Two plants at edge of ROW along fence
97	CASI-122.951	Calystegia silvatica ssp. fraterniflora	S2	Rare	Not Listed	> 100 plants	Calsil3	Roadside	Plants mowed, none in flower
98	TRBR-123.523	Trichostema brachiatum	S1	Very rare	Not Listed	1 plant	Tribra1	Roadside	Single plant in bloom beneath guardrail
100	TRBR-123.539	Trichostema brachiatum	S1	Very rare	Not Listed	1 plant	Tribra1	Roadside	Single plant in bloom beneath guardrail
101	TRBR-123.65	Trichostema brachiatum	S1	Very rare	Not Listed	appx 125 plants	Tribra1	Roadside	On edge of pavement in road shoulder
102	TRBR-123.787	Trichostema brachiatum	S1	Very rare	Not Listed	100s of plants	Tribra1	Roadside	On edge of pavement in road shoulder
103	TRBR-123.789	Trichostema brachiatum	S1	Very rare	Not Listed	100s of plants	Tribra1	Roadside	Hundreds of plants in road shoulder
104	TRBR-123.789	Trichostema brachiatum	S1	Very rare	Not Listed	1000s of plants	Tribra1	Roadside	Thousands of plants on road shoulder near pavement; largest population in the state
105	CAME-132.756	Carex merritt-fernaldii	S1	Very rare	Not Listed	8 plants	Carmer1	Dry sandy roadside	Small population on dry open roadside
106	STAL-136.375	Stellaria alsine	S2	Rare	Not Listed	100-200 plants	Steals1	Roadside wetland and ditch	Nice population in roadside seepage, stream and ditch
107	MYLA-140.08	Myosotis laxa	S2	Rare	Not Listed	500-1000 plants	Myolax9	Roadside ditch	Large population in roadside ditch
108	MYLA-140.547	Myosotis laxa	S2	Rare	Not Listed	30 plants	Myolax2	Roadside ditch	Small population in roadside ditch
109	MYLA-140.548	Myosotis laxa	S2	Rare	Not Listed	20 plants	Myolax1	Wetland along roadside	Small population in wetland along drainage
110	MYLA-140.582	Myosotis laxa	S2	Rare	Not Listed	4 plants	Myolax1	Wetland along roadside	Small population in wetland along drainage
111	MYLA-140.622	Myosotis laxa	S2	Rare	Not Listed	100-200 plants	Myolax2	Roadside ditch	Population in roadside dtich and wet lawn
112	CALE-140.779	Carex lenticularis	S2S3	Uncommon to Rare	Not Listed	4 plants	Carlen1	Roadside ditch	Four plants in roadside ditch
113	MYLA-141.878	Myosotis laxa	S2	Rare	Not Listed	50 plants	Myolax10	Roadside ditch	Small population in seepy roadside ditch
116	MYLA-142.806	Myosotis laxa	S2	Rare	Not Listed	150 plants	Myolax3	Wetlands along roadside	Disturbed roadside wetlands and ditch
117	MYLA-142.77	Myosotis laxa	S2	Rare	Not Listed	25 plants	Myolax3	Wetlands along roadside	Disturbed roadside wetlands and ditch
118	MYLA-142.804	Myosotis laxa	S2	Rare	Not Listed	100-200 plants	Myolax3	Wetlands along roadside	Disturbed roadside wetlands and ditch
119	CASI-145.835	Calystegia silvatica ssp. fraterniflora	S2	Rare	Not Listed	75 plants	Calsil4	Roadside	Plants mowed, 1 in flower
120	JUGR-146.233	Juncus greenei	S2	Rare	Endangered	390 ramets; 39 genets	Jungre1	Dry sandy roadside	New location in roadside, mowed
121	MYLA-146.475	Myosotis laxa	S2	Rare	Not Listed	30 plants	Myolax4	Roadside ditch	Small population in ditch at confluence with small stream
122	MYLA-146.68	Myosotis laxa	S2	Rare	Not Listed	45 plants	Myolax5	Roadside ditch	Small population in ditch and along stream
123	MYLA-147.847	Myosotis laxa	S2	Rare	Not Listed	50 plants	Myolax6	Roadside ditch	Small population in ditch by culvert
124	MYLA-147.847	Myosotis laxa	S2	Rare	Not Listed	> 100 plants	Myolax6	Wetland	Nice population in natural wetland, mostly out of ROW
125	JUGR-149.721	Juncus greenei	S2	Rare	Endangered	1230 ramets; 123 genets	Jungre2	Power line clearing	Expansion of known population, more frequent along ATV trail
126	JUGR-149.721	Juncus greenei	S2	Rare	Endangered	appx 70 ramets; 7 genets	Jungre2	Power line clearing	Expansion of known population, group of plants below main population
189	SOPA-129.858	Solidago patula	S3	Uncommon	Not Listed	5 plants	NA	Roadside ditch	2 plants flowering, 5m radius patch
190	SOPA-131.029	Solidago patula	S3	Uncommon	Not Listed	60+ plants	NA	Roadside ditch	Moderate sized population in roadside ditch
191	SOPA-131.279	Solidago patula	S3	Uncommon	Not Listed	20 plants	NA	Roadside ditch	Along small stream in 30' x 90' area
192	SOPA-131.337	Solidago patula	S3	Uncommon	Not Listed	30+ plants	NA	Roadside ditch	Three-quarters of plants with flowering stalks
193	SOPA-131.447	Solidago patula	S3	Uncommon	Not Listed	12 plants	NA	Roadside ditch	Small population in roadside ditch
194	SOPA-131.538	Solidago patula	S3	Uncommon	Not Listed	2 plants	NA	Roadside ditch	A few plants in roadside ditch
195	SOPA-131.635	Solidago patula	S3	Uncommon	Not Listed	2 plants	NA	Roadside ditch	A few plants in roadside ditch
196	SOPA-131.677	Solidago patula	S3	Uncommon	Not Listed	appx 100 plants	NA	Roadside ditch	Large population in roadside ditch
199	SOPA-131.908	Solidago patula	S3	Uncommon	Not Listed	30 plants	NA	Roadside ditch	Moderate sized population in roadside ditch
200	SOPA-132.083	Solidago patula	S3	Uncommon	Not Listed	30 plants	NA	Roadside ditch	Small population in roadside ditch
201	SERU-132.455	Selaginella rupestris	S3	Uncommon	Not Listed	38 genets	NA	Roadside	Large population on dry, exposed embankment
202	SERU-132.404	Selaginella rupestris	S3	Uncommon	Not Listed	1000s of plants	NA	Roadside	Large population on dry, exposed embankment
204	SOPA-132.081	Solidago patula	S3	Uncommon	Not Listed	100s of plants	NA	Roadside ditch	Fairly large population in roadside ditch
206	SOPA-131.422	Solidago patula	S3	Uncommon	Not Listed	10 plants	NA	Roadside ditch	Small patch 15' long in area
207	LILO-126.248	Liparis loeselii	S3	Uncommon	Not Listed	8 plants	Liploe2	Wet sloping roadside	Plants in fruit at time of visit
208	CESC-121.696	Celastrus scandens	S3	Uncommon	Not Listed	9 plants	NA	Roadside	Vegetative, short stems
209	CESC-121.538	Celastrus scandens	S3	Uncommon	Not Listed	5 plants	NA	Roadside	Vegetative, short stems
210	CESC-121.21	Celastrus scandens	S3	Uncommon	Not Listed	1 plant	NA	Roadside	2m tall, in fruit
211	CESC-121.148	Celastrus scandens	S3	Uncommon	Not Listed	9 plants	NA	Thin forest canopy	Vegetative, short stems
212	CESC-119.155	Celastrus scandens	S3	Uncommon	Not Listed	3 plants	NA	Roadside	Vegetative, short stems
213	CABR-119.141	Carex brevior	S3	Uncommon	Not Listed	2 ramets; 1 genet	NA	Roadside	Dry shrubby area
214	CESC-119.125	Celastrus scandens	S3	Uncommon	Not Listed	1 plant	NA	Roadside	Vegetative, short stems
215	CABR-118.935	Carex brevior	S3	Uncommon	Not Listed	9 plants	NA	Roadside	Most in fruit
216	CESC-117.434	Celastrus scandens	S3	Uncommon	Not Listed	5 plants	NA	Forest edge	Vegetative, short stems
217	SCLA-117.436	Scrophularia lanceolata	S3	Uncommon	Not Listed	32 ramets; 5 genets	NA	Forest edge	Plants in bloom or fruit in edge of rich forest
218	CYPA-117.429	Cypripedium parviflorum var. pubescens	S3	Uncommon	Not Listed	43 ramets; 5 genets	NA	Open edge of rich woods	1 genet mowed; 1 genet in flower
219	CABR-116.023	Carex brevior	S3	Uncommon	Not Listed	1 ramet; 1 genet	NA	Roadside	Flat, open area
220	CLOC-115.413	Clematis occidentalis ssp. occidentalis	S3	Uncommon	Not Listed	10 plants	NA	Moist cliff face	Vigorous plants in fruit covering 20'X20' vertical rock face
223	QUMU-120.454	Quercus muehlenbergii	S3	Uncommon	Not Listed	6 plants	NA	Forest	1 tree and 5 saplings in dry, rich woods
224	DEPA-120.443	Desmodium paniculatum	S3	Uncommon	Not Listed	10 plants	NA	Dry south-facing outcrop	10'x10' area, plants in bud; some browsed
225	DEPA-120.43	Desmodium paniculatum	S3	Uncommon	Not Listed	20 plants	NA	Dry south-facing outcrop	Plants within 10' x 20' area
226	DEPA-120.403	Desmodium paniculatum	S3	Uncommon	Not Listed	100's of plants	NA	Dry south-facing outcrop	Nice, large population, many plants in bud
228	DEPA-120.303	Desmodium paniculatum	S3	Uncommon	Not Listed	44 plants	NA	Dry south-facing outcrop	Nice population, plants in bud
230	DEPA-119.602	Desmodium paniculatum	S3	Uncommon	Not Listed	80 plants	NA	Dry south-facing outcrop	Nice population along appx 50' of road
231	DEPA-119.528	Desmodium paniculatum	S3	Uncommon	Not Listed	5 plants	NA	Dry south-facing outcrop	Plants within 15square foot area
232	DEPA-118.207	Desmodium paniculatum	S3	Uncommon	Not Listed	35 plants	NA	Dry south-facing outcrop	Plants in bud
233	DEPA-118.187	Desmodium paniculatum	S3	Uncommon	Not Listed	appx 50 plants	NA	Dry south-facing outcrop	8' x 6' area 100% cover
234	DEPA-118.147	Desmodium paniculatum	S3	Uncommon	Not Listed	appx 50 plants	NA	Dry south-facing outcrop	8' x5' area 100% cover
235	QUMU-117.764	Quercus muehlenbergii	S3	Uncommon	Not Listed	7 trees	NA	Forest	Large trees, co-dominant in dry, rich woods
237	DEPA-117.654	Desmodium paniculatum	S3	Uncommon	Not Listed	12 plants	NA	Dry south-facing outcrop	Plants in bud
239	DEPA-117.629	Desmodium paniculatum	S3	Uncommon	Not Listed	15 plants	NA	Dry south-facing outcrop	Plants within a 30' x 50' area

Polygon ID	NRI LINK	Species Name	S Rank	S Rank Description	Threatened/Endangered Staus	Population Size	Population Group	Habitat	Notes
243	CAPS-114.326	Carex pseudocyperus	S3	Uncommon	Not Listed	5 plants	NA	Wetland along roadside	Five plants in roadside wetland
244	PEHY-111.987	Persicaria hydropiperoides	S3	Uncommon	Not Listed	Unknown	NA	Wetland	Plants occupy and area 40' x 70' at 80% cover
246	NATR-111.184	Nabalus trifoliolatus	S3	Uncommon	Not Listed	4 plants	NA	Rich woods	A few plants in woods in ROW
247	CATR-109.245	Carex trichocarpa	S3	Uncommon	Not Listed	Unavailable	NA	Slope along roadside	200'x20' area
248	ACNI-109.193	Acer nigrum	S3	Uncommon	Not Listed	2 plants	NA	Under powerline and dry outcrop above road	Two plants under powerline
249	RHAR-108.225	Rhus aromatica	S3	Uncommon	Not Listed	Unknown	NA	Roadside	200 square feet occupied by plants in open roadside
251	QUMU-122.735	Quercus muehlenbergii	S3	Uncommon	Not Listed	1 tree	NA	Forest	Single tree, 3" DBH in dry rich woods
252	WOOB-114.782	Woodsia obtusa ssp. obtusa	S3	Uncommon	Not Listed	4 genets	NA	Cliff face	Moist, shaded cliff, some fertil fronds
253	RHAR-123.567	Rhus aromatica	S3	Uncommon	Not Listed	Hundreds	NA	Roadside embankment	Planted, dense stand of shrubs
254	CESC-104.415	Celastrus scandens	S3	Uncommon	Not Listed	6 plants	NA	Roadside	1 large vine in fruit, edge of small roadcut
255	ACNI-104.471	Acer nigrum	S3	Uncommon	Not Listed	1 sapling	NA	Forest edge	One sapling on edge of rich woods
256	CALA-104.469	Carex laxiculmis	S3	Uncommon	Not Listed	1 plant	NA	Dry rich woods edge	On clay soil
257	ACNI-104.487	Acer nigrum	S3	Uncommon	Not Listed	3 saplings	NA	Forest edge	On edge of woods; saplings to 8 ft tall
258	ACNI-107.781	Acer nigrum	S3	Uncommon	Not Listed	1 sapling	NA	Forest edge	Sapling 3' tall
259	CESC-107.806	Celastrus scandens	S3	Uncommon	Not Listed	8 plants	NA	Forest edge	Vegetative, short stems
260	CESC-107.846	Celastrus scandens	S3	Uncommon	Not Listed	20 plants	NA	Roadside	1 stem in fruit
261	RHAR-107.85	Rhus aromatica	S3	Uncommon	Not Listed	25-40 ramets; 1 genet	NA	Forest edge	On edge of forest near road cut
262	RHAR-107.938	Rhus aromatica	S3	Uncommon	Not Listed	12 ramets; 1 genet	NA	Forest edge	On top of road cut on edge of woods; 4 stems in fruit
263	QUMU-107.954	Quercus muehlenbergii	S3	Uncommon	Not Listed	2 saplings	NA	Forest	Saplings in dry, rich woods
264	QUMU-107.978	Quercus muehlenbergii	S3	Uncommon	Not Listed	1 sapling	NA	Forest	Sapling in dry, rich woods
265	CESC-98.541	Celastrus scandens	S3	Uncommon	Not Listed	9 plants	NA	Roadside	Plants all vegetative
266	ACNI-98.545	Acer nigrum	S3	Uncommon	Not Listed	1 tree	NA	Roadside	Large tree, 2' DBH
267	CESC-98.562	Celastrus scandens	S3	Uncommon	Not Listed	1 plant	NA	Forest edge	In fruit along hedgerow
268	CESC-98.694	Celastrus scandens	S3	Uncommon	Not Listed	2 plants	NA	Roadside	Two small plants in roadside
269	ACNI-99.608	Acer nigrum	S3	Uncommon	Not Listed	1 tree	NA	Roadside	Single tree; 4" DBH
270	CESC-100.042	Celastrus scandens	S3	Uncommon	Not Listed	1 plant	NA	Roadside	Large vine in cottonwood tree
271	ACNI-100.089	Acer nigrum	S3	Uncommon	Not Listed	1 sapling	NA	Roadside	Single sapling, 3' tall
272	VIRA-100.568	Viburnum rafinesquianum var. rafinesquianum	S3	Uncommon	Not Listed	4 shrubs	NA	Roadside	Forested edge, some plants mowed
273	VIRA-100.74	Viburnum rafinesquianum var. rafinesquianum	S3	Uncommon	Not Listed	2 shrubs	NA	Forest	Two small shrubs in rich woods
274	VIRA-100.764	Viburnum rafinesquianum var. rafinesquianum	S3	Uncommon	Not Listed	5 shrubs	NA	Forest	In rich woods and forest edge
275	CALA-101.169	Carex laxiculmis	S3	Uncommon	Not Listed	12 plants	NA	Dry rich knoll	Plants in fruit
276	CESC-98.326	Celastrus scandens	S3	Uncommon	Not Listed	4 plants	NA	Scrubby thicket edge	Four small plants in thicket
277	RHAR-107.858	Rhus aromatica	S3	Uncommon	Not Listed	appx 150 plants	NA	Roadside and rock outcrop	Large population, likely contiues out of ROW
280	RHAR-104.198	Rhus aromatica	S3	Uncommon	Not Listed	Unknown	NA	Roadside and woods edge	Dense stand in 20' x 30' area on edge of woods; partly mowed
281	VIRA-100.84	Viburnum rafinesquianum var. rafinesquianum	S3	Uncommon	Not Listed	3 shrubs	NA	Forest edge	A few plants in ROW, likely many more in forest
282	VIRA-99.421	Viburnum rafinesquianum var. rafinesquianum	S3	Uncommon	Not Listed	2 shrubs	NA	Roadside	Two short shrubs along roadside
283	JUGR-146.299	Juncus greenei	S2	Rare	Endangered	20 ramets; 2 genets	Jungre1	Dry sandy roadside	New location in roadside, mowed
284	CAPA-146.222	Carex panicea	SU	Status Unknown	Not Listed	100 ramets; 2 genets	NA	Roadside	New record for state; not native; 100's in fruit
289	TRBR-124.481	Trichostema brachiatum	S1	Very rare	Not Listed	3 plants	Tribra1	Roadside	A few stems on north shoulder with guardrail
294	TRBR-124.075	Trichostema brachiatum	S1	Very rare	Not Listed	3 plants	Tribra1	Roadside	A few plants in this location
296	ERFR-103.857	Eragrostis frankii	S3	Uncommon	Not Listed	appx 30 plants	Erafra1	Roadside	Disturbed area along road
297	ERFR-103.397	Eragrostis frankii	S3	Uncommon	Not Listed	5 plants	Erafra1	Roadside	Disturbed area along road
298	CRDO-110.253	Crataegus dodgei	SH	Historical	Not Listed	Unknown; Pop. total 15-20 plants	Cradod1	Dry outcrop	15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years
299	CRDO-110.253	Crataegus dodgei	SH	Historical	Not Listed	Unknown; Pop. total 15-20 plants	Cradod1	Dry outcrop	15-20 plants in entire population; 80% confidence in ID; first siting in state in 25 years
300	ASTU-149.03	Asclepias tuberosa	SH	Historical	Threatened	1 plant	NA	Garden	Clearly planted at end of driveway

Attachment 3.

Complete List of Plant Species Recorded During the RTE Plant Survey

Appendix 3

Complete List of Plant Species Recorded During the RTE Plant Survey

Abies balsamea
Abies concolor
Acer negundo
Acer nigrum
Acer pensylvanicum
Acer platanoides
Acer rubrum
Acer saccharinum
Acer saccharum
Acer spicatum
Achillea millefolium
Aconitum napellus
Acorus calamus
Actaea pachypoda
Actaea rubra
Adiantum pedatum
Aegopodium podagraria
Ageratina altissima
Agrimonia gryposepala
Agrimonia striata
Agrostis capillaris
Agrostis gigantea
Agrostis perennans
Agrostis stolonifera
Alisma subcordatum
Allium tricoccum
Alnus incana
Ambrosia artemisiifolia
Amelanchier laevis
Amorpha fruticosa
Amphicarpaea bracteata
Andropogon gerardii

Anemone canadensis
Anemone quinquefolia
Anemone virginiana
Anetennaria neglecta
Anetennaria plantaginifolia
Angelica atropurpurea
Anthoxanthum nitens
Anthoxanthum odoratum
Anthriscus sylvestris
Apios americana
Apocynum androsaemifolium
Apocynum cannabinum
Aquilegia canadensis
Aralia nudicaulis
Aralia racemosa
Arctium minus
Argentina anserina
Arisaema triphyllum
Aronia melanocarpa
Artemisia vulgaris
Asarum canadense
Asclepias incarnata
Asclepias syriaca
Asclepias tuberosa
Asparagus officinalis
Asplenium platyneuron
Asplenium trichomanes
Atriplex patula
Aureolaria flava
Barbarea vulgaris
Berberis thunbergii
Berberis vulgaris

Berteroa incana
Betula alleghaniensis
Betula lenta
Betula papyrifera
Betula populifolia
Bidens connata
Bidens frondosa
Boechera stricta
Boehmeria cylindrica
Bolboschoenus fluviatilis
Brachyelytrum aristosum
Brachyelytrum erectum
Brassica nigra
Bromus inermis
Bromus pubescens
Butomus umbellatus
Calamagrostis canadensis
Caltha palustris
Calystegia fraterniflora
Calystegia sepium
Calystegia spithamaea
Campanula aparinoides
Campanula rapunculoides
Campanula trachelium
Cannabis sativa
Cardamine pratensis
Carex albursina
Carex annectens
Carex appalachica
Carex arctata
Carex argyrantha
Carex aurea
Carex baileyi

Carex blanda
Carex brevior
Carex bromoides
Carex brunnescens
Carex cephalophora
Carex cf foenea
Carex cf diandra
Carex comosa
Carex conoidea
Carex cf cristatella
Carex debilis
Carex deflexa
Carex deweyana
Carex digitalis
Carex eburnea
Carex echinata
Carex flava
Carex gracillima
Carex granularis
Carex grisea
Carex gynandra
Carex hystericina
Carex interior
Carex intumescens
Carex lacustris
Carex laxiculmis
Carex laxiflora
Carex lenticularis
Carex leptalea
Carex lupulina
Carex lurida
Carex merritt-fernaldii
Carex pallescens

Carex panicea
Carex pedunculata
Carex pellita
Carex pensylvanica
Carex plantaginea
Carex platyphylla
Carex prasina
Carex projecta
Carex pseudocyperus
Carex radiata
Carex retrorsa
Carex rosea
Carex scoparia
Carex sparganioides
Carex spicata
Carex sprengelii
Carex stipata
Carex stricta
Carex swanii
Carex tonsa
Carex torta
Carex tribuloides
Carex trichocarpa
Carex utriculata
Carex vesicaria
Carex virescens
Carex vulpinoidea
Carpinus caroliniana
Carya cordiformis
Carya ovata
Caulophyllum thalictroides
Ceanothus herbaceus
Celastrus orbiculatus

Celastrus scandens
Celtis occidentalis
Centaurea ×moncktonii
Centaurea jacea
Centaurea stoebe
Centaurium pulchellum
Cephalanthus occidentalis
Cerastium arvense
Cerastium fontanum
Chaenorhinum minus
Chamaenerion angustifolium
Chelidonium majus
Chelone glabra
Chimaphila umbellata
Cichorium intybus
Cicuta bulbifera
Cicuta maculata
Cinna latifolia
Circaea alpina
Circaea canadensis
Cirsium arvense
Cirsium pumilum
Cirsium vulgare
Clematis occidentalis
Clematis virginiana
Clinopodium vulgare
Comandra umbellata
Comptonia peregrina
Convallaria majalis
Coreopsis lanceolata
Cornus alternifolia
Cornus amomum
Cornus canadensis

Cornus racemosa
Cornus rugosa
Cornus sericea
Corylus americana
Corylus cornuta
Crataegus dodgei
Crataegus egglestonii
Crataegus punctata
Crataegus sp.
Crataegus submollis
Cynanchum louiseae
Cynoglossum officinale
Cyperus lupulinus
Cypripedium acaule
Cypripedium pubescens
Cystopteris bulbifera
Cystopteris fragilis
Cystopteris tenuis
Dactylis glomerata
Danthonia compressa
Danthonia spicata
Daphne mezereum
Dasiphora floribunda
Dasiphora fruticosa
Daucus carota
Dendrolycopodium dendroideum
Dennstaedtia punctilobula
Deparia acrostichoides
Desmodium paniculatum
Desmodium rotundifolium
Dianthus armeria
Dichanthelium acuminatum

Dichanthelium clandestinum
Diervilla lonicera
Digitaria cognata
Digitaria sanguinalis
Dipsacus fullonum
Dirca palustris
Doellingeria umbellata
Drosera rotundifolia
Dryopteris carthusiana
Dryopteris cristata
Dryopteris intermedia
Dryopteris marginalis
Echinochloa crus-galli
Echinochloa SP.
Echinocystis lobata
Echium vulgare
Elaeagnus umbellata
Eleocharis cf elliptica
Eleocharis erythropoda
Eleocharis obtusa
Eleocharis palustris
Eleocharis tenuis
Elodea canadensis
Elymus canadensis
Elymus hystrix
Elymus repens
Elymus virginicus
Epifagus virginiana
Epilobium ciliatum
Epilobium coloratum
Epilobium hirsutum
Epilobium leptophyllum
Epipactis helleborine

Equisetum arvense
Equisetum fluviatile
Equisetum hyemale
Equisetum palustre
Equisetum sylvaticum
Equisetum variegatum
Eragrostis frankii
Eragrostis pectinacea
Eragrostis spectabilis
Erechtites hieraciifolius
Erigeron canadensis
Erigeron philadelphicus
Erigeron strigosus
Euonymus alatus
Euonymus europaeus
Eupatorium perfoliatum
Euphorbia cyparissias
Eurybia divaricata
Eurybia macrophylla
Eutrochium maculatum
Fagus grandifolia
Fallopia cilinodis
Fallopia japonica
Fragaria virginiana
Frangula alnus
Fraxinus americana
Fraxinus nigra
Galeopsis tetrahit
Galium aparine
Galium asprellum
Galium circaezans
Galium mollugo
Galium obtusum

Galium palustre
Galium pilosum
Galium triflorum
Galium verum
Gaultheria procumbens
Gaylussacia baccata
Geranium maculatum
Geranium molle
Geranium robertianum
Geum aleppicum
Geum canadense
Geum fragarioides
Geum laciniatum
Geum rivale
Glechoma hederacea
Gleditsia triacanthos
Glyceria canadensis
Glyceria grandis
Glyceria melicaria
Glyceria striata
Gnaphalium uliginosum
Gymnocarpium dryopteris
Hackelia americana
Hackelia virginiana
Hamamelis virginiana
Hedeoma hispida
Hedeoma pulegioides
Helenium autumnale
Helianthus decapetalus
Helianthus divaricatus
Heracleum maximum
Hesperis matronalis
Heteranthera dubia

Holcus lanatus
Houstonia longifolia
Hydrocotyle americana
Hydrophyllum canadense
Hylodesmum glutinosum
Hypericum canadense
Hypericum perforatum
Hypericum punctatum
Hypopitys lanuginosa
Impatiens capensis
Impatiens pallida
Inula helenium
Iris pseudacorus
Iris versicolor
Juglans cinerea
Juglans nigra
Juncus articulatus
Juncus brevicaudatus
Juncus bufonius
Juncus compressus
Juncus dudleyi
Juncus effusus
Juncus filiformis
Juncus greenei
Juncus nodosus
Juncus tenuis
Juniperus communis
Juniperus virginiana
Lapsana communis
Larix laricina
Leersia oryzoides
Leersia virginica
Lemna minor

Leonurus cardiaca
Lepidium densiflorum
Lespedeza hirta
Lespedeza violacea
Linaria vulgaris
Liparis loeselii
Liriodendron tulipifera
Lithospermum officinale
Lobelia inflata
Lobelia spicata
Lolium perenne
Lonicera dioica
Lonicera maackii
Lonicera morrowii
Lonicera tatarica
Lotus corniculatus
Ludwigia palustris
Lupinus polyphyllus
Luzula acuminata
Lycopodium clavatum
Lycopus americanus
Lycopus uniflorus
Lysimachia ciliata
Lysimachia nummularia
Lysimachia quadrifolia
Lysimachia terrestris
Lysimachia thyrsiflorus
Lythrum salicaria
Maianthemum canadense
Maianthemum racemosum
Maianthemum stellatum
Malus baccata
Malus pumila

Matricaria chamomilla
Matricaria discoidea
Matteuccia struthiopteris
Medicago lupulina
Medicago sativa
Melilotus albus
Melilotus officinalis
Menispermum canadense
Mentha ×piperita
Mentha arvensis
Mentha spicata
Milium effusum
Mimulus ringens
Mitchella repens
Mitella nuda
Monarda didyma
Monarda fistulosa
Moneses uniflora
Monotropa uniflora
Morus alba
Muhlenbergia glomerata
Myosotis arvensis
Myosotis laxa
Myosotis scorpioides
Myrica gale
Nabalus altissimus
Nabalus trifoliolatus
Nepeta cataria
Nuphar variegata
Oclemena acuminata
Oenothera biennis
Oenothera perennis
Onoclea sensibilis

Origanum vulgare
Oryzopsis asperifolia
Osmunda claytoniana
Osmunda regalis
Osmundastrum cinnamomeum
Ostrya virginiana
Oxalis montana
Oxalis stricta
Packera aurea
Panax trifolium
Parathelypteris noveboracensis
Parthenocissus quinquefolia
Pastinaca officinalis
Pedicularis canadensis
Penstemon digitalis
Penthorum sedoides
Persicaria hydropiperoides
Persicaria sagittata
Persicaria virginiana
Phalaris arundinacea
Phegopteris connectilis
Philadelphus coronarius
Phleum pratense
Phryma leptostachya
Physalis heterophylla
Physocarpus opulifolius
Phytolacca americana
Picea glauca
Picea abies
Picea rubens
Pilea pumila
Pilosella aurantiaca

Pilosella caespitosa
Pinus resinosa
Pinus strobus
Pinus sylvestris
Piptatherum racemosum
Plantago lanceolata
Plantago major
Platanthera lacera
Platanthera psycodes
Platanus occidentalis
Poa annua
Poa compressa
Poa palustris
Poa pratensis
Polygaloides paucifolia
Polygonatum pubescens
Polygonum aviculare
Polypodium virginianum
Polystichum acrostichoides
Populus balsamifera
Populus deltoides
Populus grandidentata
Populus tremuloides
Potentilla argentea
Potentilla norvegica
Potentilla recta
Potentilla simplex
Prunella vulgaris
Prunus nigra
Prunus pensylvanica
Prunus serotina
Prunus virginiana
Pteridium aquilinum

Pycnanthemum tenuifolium
Pycnanthemum verticillatum
Pycnanthemum virginianum
Pyrola americana
Pyrola elliptica
Pyrus communis
Quercus alba
Quercus coccinea
Quercus macrocarpa
Quercus muehlenbergii
Quercus rubra
Quercus velutina
Ranunculus abortivus
Ranunculus acris
Ranunculus alleghaniensis
Ranunculus caricetorum
Ranunculus cf sceleratus
Ranunculus recurvatus
Ranunculus repens
Rhamnus cathartica
Rheum rhabarbarum
Rhinanthus minor
Rhododendron prinophyllum
Rhus aromatica
Rhus copallina
Rhus typhina
Ribes americanum
Ribes cynosbati
Ribes hirtellum
Ribes lacustre
Ribes sativum
Robinia pseudo-acacia
Rosa multiflora

Rosa blanda
Rosa carolina
Rosa rugosa
Rubus occidentalis
Rubus alleghaniensis
Rubus dalibarda
Rubus enslenii
Rubus hispidus
Rubus idaeus
Rubus odoratus
Rubus pubescens
Rudbeckia hirta
Rudbeckia laciniata
Rumex acetosella
Rumex crispus
Rumex obtusifolius
Rumex verticillatus
Sagittaria latifolia
Salix lucida
Salix ×fragilis
Salix ×sepulcralis
Salix alba
Salix bebbiana
Salix discolor
Salix eriocephala
Salix humilis
Salix nigra
Salix petiolaris
Salix sericea
Sambucus canadensis
Sanguinaria canadensis
Sanicula canadensis
Saponaria officinalis

Saxifraga oppositifolia
Schedonorus arundinaceus
Schedonorus pratensis
Schizachne purpurascens
Schizachyrium scoparium
Schoenoplectus pungens
Schoenoplectus tabernaemontana
Scirpus atrocinctus
Scirpus atrovirens
Scirpus cyperinus
Scirpus microcarpus
Scirpus pendulus
Scrophularia lanceolata
Scutellaria galericulata
Scutellaria lateriflora
Securigera varia
Sedum acre
Selaginella rupestris
Setaria sp.
Setaria viridis
Silene antirrhina
Silene vulgaris
Silphium perfoliatum
Sisyrinchium montanum
Smilax herbacea
Solanum dulcamara
Solidago altissima
Solidago bicolor
Solidago caesia
Solidago canadensis
Solidago cf hispida
Solidago flexicaulis

Solidago gigantea
Solidago juncea
Solidago nemoralis
Solidago patula
Solidago rugosa
Sonchus asper
Sorbus americana
Sparganium emersum
Spartina pectinata
Spinulum annotinum
Spiraea alba
Spiraea tomentosa
Spiranthes sp.
Sporobolus cryptandrus
Sporobolus vaginiflorus
Stachys hispida
Stachys palustris
Stellaria graminea
Streptopus lanceolatus
Symphoricarpos laevigatus
Symphyotrichum cordifolium
Symphyotrichum ericoides
Symphyotrichum laeve
Symphyotrichum novae-angliae
Symphyotrichum puniceum
Symphyotrichum undulatum
Symplocarpus foetidus
Syringa vulgaris
Tanacetum vulgare
Taraxacum officinale
Taxus canadensis
Teucrium canadense

Thalictrum dioicum
Thalictrum pubescens
Thelypteris palustris
Thuja occidentalis
Tiarella cordata
Tilia americana
Tilia cordata
Toxicodendron radicans
Tragopogon dubius
Tragopogon pratensis
Triadenum fraseri
Trichostema brachiatum
Trichostema dichotomum
Trifolium arvense
Trifolium aureum
Trifolium hybridum
Trifolium pratense
Trifolium repens
Trillium erectum
Tsuga canadensis
Turritis glabra
Tussilago farfara
Typha angustifolia
Typha latifolia
Ulmus americana
Ulmus rubra
Urtica dioica
Utricularia macrorrhiza
Uvularia sessilifolia
Vaccinium angustifolium
Vaccinium corymbosum
Vaccinium myrtilloides
Vaccinium pallidum

Valeriana officinalis
Veratrum viride
Verbascum blattaria
Verbascum thapsus
Verbena hastata
Verbena urticifolia
Veronica americana
Veronica chamaedrys
Viburnum acerifolium
Viburnum cassinoides
Viburnum dentatum
Viburnum lentago
Viburnum opulus
Viburnum rafinesquianum

Vicia cracca
Vicia tetrasperma
Vinca minor
Viola adunca
Viola rotundifolia
Viola sagittata
Vitis aestivalis
Vitis riparia
Woodsia ilvensis
Woodsia obtusa
Woodwardia virginica
Zanthoxylum americanum
Zizia aurea

Attachment 4.

Survey Summary for Recorded RTE Animal EOs

Attachment 4

Survey Summary for Recorded RTE Animal Eos

EO ID	Scientific Name	Common Name	State Rank	State Threatened or Endangered Status	Federal Threatened or Endangered Status	Habitat Characteristics	AE Habitat Survey Results
7911	*Thamnophis sauritus*	Eastern Ribbonsnake	S2	SSC	-	Wetland edges with sunny exposed basking sites in warm, low-elevation, largely undeveloped areas. The presence of nearby rocky woodlands and talus increases the likelihood of their occurrence in these areas.	EO record location is approximately 1200' from the study area. Appropriate general habitat present in the study area. No obvious hibernacula identified.
5418	*Sternotherus odoratus*	Stinkpot (Eastern Musk Turtle)	S2	SSC	-	Shallow, heavily vegetated waters of slow moving creeks, or in ponds.	EO record location is approximately 2000' south of the study area. The shoreline at the Lake in the study area is rocky substrate. No surveys conducted.
7565	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	Old buildings, old fields, and edges of woods near rocky areas and ledges.	Appropriate general habitat present. No hibernacula present within the study area.
10349	*Thamnophis sauritus*	Eastern Ribbonsnake	S2	SSC	-	Wetland edges with sunny exposed basking sites in warm, low-elevation, largely undeveloped areas. The presence of nearby rocky woodlands and talus increases the likelihood of their occurrence in these areas.	EO record location is approximately 1200' from the study area. Appopriate habitat present in the study area. No obvious hibernacula identified.
3223	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	Old buildings, old fields, and edges of woods near rocky areas and ledges.	Appropriate general habitat present. No hibernacula present within the study area.
3874	*Bartramia longicauda*	Upland Sandpiper	S2B	SE	-	Large areas of grasslands, fallow fields, and meadows	Extensive potentially appropriate habitat throughout the area.
9727	*Lasmigona costata*	Fluted-shell	S2	SE	-	Sand, mud, or fine gravel in medium to large rivers with slow to moderate flow.	No surveys conducted
6848	*Ichthyomyzon unicuspis*	Silver Lamprey	S2?	SSC	-	Large streams and lakes	No surveys conducted
4546	*Bartramia longicauda*	Upland Sandpiper	S2B	SE	-	Large areas of grasslands, fallow fields, and meadows	Historic site of Devil' Bowl Speedway has short mowed lawn, no longer good habitat. Extensive potentially appropriate habitat throughout the area.
5540	*Crotalus horridus*	Timber Rattlesnake	S1	SE	-	Forested rocky hills. Hibernating dens can be found in crevices in rocky, south-facing cliffs or piles of large boulders.	The Great Ledge and Rattlesnake Ridge are not within the study area. Appropriate general habitat within the study area. No hibernacula present within the study area.
5869	*Pantherophis alleghaniensis*	Eastern Ratsnake	S2	ST	-	Old buildings, old fields, and edges of woods near rocky areas and ledges.	The Great Ledge and Rattlesnake Ridge are not within the study area. Appropriate adjacent general habitat present. No hibernacula present within the study area.
1873	*Crotalus horridus*	Timber Rattlesnake	S1	SE	-	Forested rocky hills. Hibernating dens can be found in crevices in rocky, south-facing cliffs or piles of large boulders.	Appropriate general habitat present in the study area. No hibernacula present within study area.
6871	*Ichthyomyzon unicuspis*	Silver Lamprey	S2?	SSC	-	Large streams and lakes	No surveys conducted
8483	*Setophaga cerulea*	Cerulean Warbler	S1S2B	SSC	-	Mature forested areas with large and tall trees of broad-leaved, deciduous species and relatively little undergrowth.	No surveys conducted
2357	*Podilymbus podiceps*	Pied-billed Grebe	S2S3B	SSC	-	Streams, ponds, lake and freshwater marshes.	Appropriate habitat in wetlands along the Castleton River and West Rutland Marsh. No surveys conducted
6106	*Lasmigona compressa*	Creek Heelsplitter	S2	-	-	Rivers and streams of various sizes. Substrates of gravel, sand, or mud.	No surveys conducted
5882	*Setophaga tigrina*	Cape May Warbler	S1B	-	-	Coniferous woodland	No surveys conducted
-	*Myotis sodalis*	Indiana Bat	-	SE	FE	Wooded areas where they roost under loose tree bark on dead or dying trees.	Survey conducted, report under separate cover

1 - State Rank S1 - Very rare (Critically imperiled): At very high risk of extinction or extirpation due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors S2 - Rare (Imperiled): At high risk of extinction or extirpation due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors S3 - Uncommon (Vulnerable): At moderate risk of extinction or extirpation due to restricted range, relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors S4 - Common to uncommon (Apparently secure): locally common or widely scattered to uncommon, but not rare; some cause for long-term concern due to declines or other factors; or stable over many decades and not threatened but of restricted distribution or other factors S5 - Common (Secure): widespread and abundant B - Breeding N - Nonbreeding H - Possibly extinct/extirpated: Missing; known from only historical occurrences but still some hope of rediscovery						
2 - State and Federal Threatened and Endangered Status						
ST - Listed as Threatened in the State of Vermont SE - Listed as Endangered in the State of Vermont SSC - Listed as Special Concern in the State of Vermont FT - Federally-listed as Threatened FE - Federally-listed as Endangered						

Attachment 5.

Survey Summary for Recorded Natural Community EOs

Attachment 5

Survey Summary for Recorded Natural Community EOs

EO ID	Name	State Rank	AE Survey Results
4347	Vernal Pool	S3	Confirmed outside of study area
661	Dry Oak-Hickory-Hophornbeam Forest	S3	Confirmed outside of study area. Forest at this location is disturbed White Pine-Northern Hardwood Forest
3473	Transition Hardwood Talus Woodland	S3	Confirmed outside of study area. Forest at this location is small example of Mesic Maple-Ash-Hickory-Oak forest with planted red and white pine. Not a significant community.
4952	Wet Clayplain Forest	S2	Wet Clayplain Forest does not occur anywhere within the study area
2774	Temperate Calcareous Outcrop	S3	Confirmed outside of study area
3080	Transition Hardwood Talus Woodland	S3	Confirmed outside of study area
7984	Mesic Clayplain Forest	S2	Confirmed outside of study area
9691	Dry Oak Forest	S3	Confirmed outside of study area
6802	Red Maple-Black Ash Seepage Swamp	S4	Confirmed outside of study area
8321	Dry Oak Forest	S3	Confirmed outside of study area
8334	Northern Hardwood Forest	S5	Confirmed outside of study area. South of Railroad tracks.
8364	Hemlock Forest	S4	Confirmed outside of study area
8365	Hemlock-Northern Hardwood Forest	S4	Confirmed outside of study area
8366	Red Maple-Sphagnum Acidic Basin Swamp	S3	Confirmed outside of study area

Attachment 6.

Natural Community Survey Forms

VERMONT NATURAL COMMUNITY SURVEY FORM rev. Apr. 2009
Nongame and Natural Heritage Program
Vermont Fish & Wildlife Department

Survey Site: Green Dump Hills Is this an update? ☐ EO# (if known): _____

Community Type: Dry Oak-Hickory-Hophornbeam Forest
(For vernal pools, please use the Vernal Pool Survey Form on our website)

Community Variant Name (if applicable): _____

Association Name (NVC type) (office): _____

Surveyor(s): Michael Lew-Smith Contact Info: mlewsmith@arrowwoodvt.com

Survey Date(s): 8-3-2014 Town: Castleton County: Rutland

Unusual data sensitivity issues? ☐ If so, explain: _____

LANDOWNER(S) / CONTACT(S) (**Name**, **Telephone, Address, Email**—if not in a Site Summary Form) Permission?
Unknown ☐
_____ ☐

GENERAL DESCRIPTION of SITE

Describe *Site* and its range and variability (give a word picture of natural and man-made features, including: general topography, elevation, exposure, community types, geologic substrata, evidence of disturbance, exotics, etc.):

Variable topography. Southern end of larger forests to north. Shallow sandy loam soils.

NATURAL COMMUNITY INFORMATION

Describe *Natural Community* occurrence (include canopy cover, dominant species by stratum, soils, physical environment, & evidence of disturbance):

The forest at this location is best described as a Dry Oak-Hickory-Hophornbeam Forest community, though it may be transitional to the Mesic Maple-Ash-Hickory-Oak Forest. The canopy is dominated by northern red oak (Quercus rubra), American ash (Fraxinus americana), white pine (Pinus strobus) and hop hornbeam (Ostrya virginiana). The understory is dominated by Pennsylvania sedge (Carex pensylvanica). The forest continues to the north where it is interspersed with numerous state significant examples of the Dry Oak Forest community. Given its size, condition and community type, this forest is likely a state significant community as well.

Aspect: mostly south Slope (degrees): variable Elevation (with units): minimum 500+ maximum ?

Bedrock geologic type (Doll et al. 1961 or more recent):
Bull Formation

Soil type or description (NRCS):
Taconic-Hubbarton Complex

COMMUNITY OCCURRENCE RANKING: a range of ranks may be used (e.g. AB)
Using **VT NNHP ranking specifications** (if available)*: ☐ OR Using **Generic ranking specifications** (provided below): ☐

	Rank:	Comments:
Current Condition:		Further work on rest of forest needs to be conducted.
Landscape Context:		
Size:		Community size (acres) and how determined:
Overall Rank:		

* Available for some natural communities at www.vtfishandwildlife.com/wildlife_nongame.cfm. Use to fill in the grid above.

Generic ranking specifications:

Use the following guidelines to fill in the grid above if VT NNHP Natural Community ranking specifications are unavailable

Current Condition:
A: mature example of the community type (forests with trees generally >150 years old); natural processes intact; no exotics
B: some minor alteration of vegetation structure and composition, such as by selective logging; minor alterations in ecological processes; exotics species present in low abundance
C: significant alteration of vegetation structure and composition, such as by heavy logging; alteration of ecological processes are significant, but community recovery/restoration is likely; exotic species are abundant and control will take significant effort
D: ecological processes significantly altered to the point where vegetation composition and structure are very different from A-ranked condition and restoration/recovery is unlikely; exotic species are abundant or control will be difficult

Landscape Context:
A: highly connected; area around EO (>1,000acres) is largely intact natural vegetation, with species interactions and natural processes occurring across communities; surrounding matrix forest meets at least B specifications for Condition.
B: moderately connected; area around EO (>1,000acres) is moderately intact natural vegetation, with species interactions and some natural processes occurring across many communities, although temporary disturbances such as logging have reduced condition of the landscape; surrounding matrix forest meets at least C specifications for Condition
C: moderately fragmented; area around EO is largely a combination of cultural and natural vegetation with barriers to species interactions and natural processes across communities; surrounding land is a mix of fragmented forest, agriculture, and rural development
D: highly fragmented; area around EO is entirely, or almost entirely, surrounded by agriculture or urban development

Size:
No Generic ranking applicable. Please provide size of community in grid above.

Overall Rank (based on best judgment)**:**
A: excellent estimated viability
B: good estimated viability
C: fair estimated viability
D: poor estimated viability

MANAGEMENT/PROTECTION RECOMMENDATIONS for NATURAL COMMUNITY

ADDITIONAL INFORMATION
☐ Plot form(s) attached. Plot Code: _____
☐ Animal list attached
☐ Plant list attached (in addition to plot forms)
☐ Map of route taken and observation points—or include with Natural Community map.
☐ Photographs

Comments that do not fit in another field:
Further work needs to be conducted on larger forest to make final significance determination. Forest only assessed in the Route 4 right-of-way.

MAPPING

Attach a digital or paper map of the natural community boundary mapped as polygons (required): ☐
Shapefile attached (encouraged): ☒ File must be NAD83 State Plane: ☐ File name: _____

Estimated % of mapped polygon occupied by this community: >95%☐; 80-95%☐; 20-80%☐; 0-20%☐; Unknown☐
Explain if <95%: _____

Base Map Used to delineate occurrence:	Confident that full extent is known: ☐
1:24,000 USGS Quad: ☐	Uncertain if full extent is known: ☐
1:25,000 USGS Quad: ☐	Confident that full extent is *not* known: ☐
1:5000 Ortho Photo: ☐	Additional inventory needed? ☐ If so, explain:
GPS: ☐ Accuracy: _____	
Other: ☐ Specify:	

Please send completed forms to Eric Sorenson: Eric.Sorenson [at] state.vt.us / Nongame & Natural Heritage Program, Vermont Fish & Wildlife Dept., 103 South Main Street, Building 10 South, Waterbury, VT 05671-0501 / (802)-241-3714

VERMONT NATURAL COMMUNITY SURVEY FORM rev. Apr. 2009
Nongame and Natural Heritage Program
Vermont Fish & Wildlife Department

Survey Site: Herrick Mountain NE Is this an update? ☐ EO# (if known): _____

Community Type: Mesic Red Oak-Northern Hardwood Forest
(For vernal pools, please use the Vernal Pool Survey Form on our website)

Community Variant Name (if applicable): _____

Association Name (NVC type) (office): _____

Surveyor(s): Michael Lew-Smith Contact Info: mlewsmith@arrowwoodvt.com

Survey Date(s): 8-4-14 Town: West Rutland County: Rutland

Unusual data sensitivity issues? ☐ If so, explain: _____

LANDOWNER(S) / CONTACT(S) (**Name**, **Telephone, Address, Email**—if not in a Site Summary Form) Permission?
Unknown ☐
_____ ☐

GENERAL DESCRIPTION of SITE

Describe *Site* and its range and variability (give a word picture of natural and man-made features, including: general topography, elevation, exposure, community types, geologic substrata, evidence of disturbance, exotics, etc.):

Variable topography. Northeasten corner of large RONH forest. Loam and sandy loam soils. Some surficial rock.

NATURAL COMMUNITY INFORMATION

Describe *Natural Community* occurrence (include canopy cover, dominant species by stratum, soils, physical environment, & evidence of disturbance):

This Mesic Red Oak-Northern Hardwood Forest is dominated by northern red oak (Quercus rubra), American ash (Fraxinus americana), American beech (Fagus grandifolia), black birch (Betula lenta), and white pine (Pinus strobus). The understory consists of witch hazel (Hamamelis virginiana), maple-leaved viburnum (Viburnum acerifolium) and various canopy saplings. This appears to be a fairly young forest, with DBHs averaging around 10-12". Despite the age, the forest appears to be in good condition. This is a fairly common community type, and would be a significant natural community only if the rest of the forest to the south is in very good condition.

Aspect: variable Slope (degrees): variable Elevation (with units): minimum 500+ maximum ?

Bedrock geologic type (Doll et al. 1961 or more recent):

Bull Formation

Soil type or description (NRCS):

Macomber-Taconic Complex

COMMUNITY OCCURRENCE RANKING: a range of ranks may be used (e.g. AB)
Using **VT NNHP ranking specifications** (if available)*: ☐ OR Using **Generic ranking specifications** (provided below): ☐

	Rank:	Comments:
Current Condition:		Further work on rest of forest needs to be conducted.
Landscape Context:		
Size:		Community size (acres) and how determined:
Overall Rank:		

* Available for some natural communities at www.vtfishandwildlife.com/wildlife_nongame.cfm. Use to fill in the grid above.

Generic ranking specifications:

Use the following guidelines to fill in the grid above if VT NNHP Natural Community ranking specifications are unavailable

Current Condition:
A: mature example of the community type (forests with trees generally >150 years old); natural processes intact; no exotics
B: some minor alteration of vegetation structure and composition, such as by selective logging; minor alterations in ecological processes; exotics species present in low abundance
C: significant alteration of vegetation structure and composition, such as by heavy logging; alteration of ecological processes are significant, but community recovery/restoration is likely; exotic species are abundant and control will take significant effort
D: ecological processes significantly altered to the point where vegetation composition and structure are very different from A-ranked condition and restoration/recovery is unlikely; exotic species are abundant or control will be difficult

Landscape Context:
A: highly connected; area around EO (>1,000acres) is largely intact natural vegetation, with species interactions and natural processes occurring across communities; surrounding matrix forest meets at least B specifications for Condition.
B: moderately connected; area around EO (>1,000acres) is moderately intact natural vegetation, with species interactions and some natural processes occurring across many communities, although temporary disturbances such as logging have reduced condition of the landscape; surrounding matrix forest meets at least C specifications for Condition
C: moderately fragmented; area around EO is largely a combination of cultural and natural vegetation with barriers to species interactions and natural processes across communities; surrounding land is a mix of fragmented forest, agriculture, and rural development
D: highly fragmented; area around EO is entirely, or almost entirely, surrounded by agriculture or urban development

Size:
No Generic ranking applicable. Please provide size of community in grid above.

Overall Rank (based on best judgment)**:**
A: excellent estimated viability
B: good estimated viability
C: fair estimated viability
D: poor estimated viability

MANAGEMENT/PROTECTION RECOMMENDATIONS for NATURAL COMMUNITY

ADDITIONAL INFORMATION
☐ Plot form(s) attached. Plot Code: _____
☐ Animal list attached
☐ Plant list attached (in addition to plot forms)
☐ Map of route taken and observation points—or include with Natural Community map.
☐ Photographs

Comments that do not fit in another field:
Further work needs to be conducted on larger forest to make final significance determination. Forest only assessed in the Route 4 right-of-way.

MAPPING

Attach a digital or paper map of the natural community boundary mapped as polygons (required): ☐
Shapefile attached (encouraged): ☒ File must be NAD83 State Plane: ☐ File name: _____

Estimated % of mapped polygon occupied by this community: >95%☐; 80-95%☐; 20-80%☐; 0-20%☐; Unknown☐
Explain if <95%: _____

Base Map Used to delineate occurrence:	Confident that full extent is known: ☐
1:24,000 USGS Quad: ☐	Uncertain if full extent is known: ☐
1:25,000 USGS Quad: ☐	Confident that full extent is *not* known: ☐
1:5000 Ortho Photo: ☐	Additional inventory needed? ☐ If so, explain:
GPS: ☐ Accuracy: _____	
Other: ☐ Specify:	

Please send completed forms to Eric Sorenson: Eric.Sorenson [at] state.vt.us / Nongame & Natural Heritage Program, Vermont Fish & Wildlife Dept., 103 South Main Street, Building 10 South, Waterbury, VT 05671-0501 / (802)-241-3714

VERMONT NATURAL COMMUNITY SURVEY FORM
Nongame and Natural Heritage Program
Vermont Fish & Wildlife Department

rev. Apr. 2009

Survey Site: Pine Pond Is this an update? ☐ EO# (if known): _____

Community Type: Temperate Hemlock Forest and Temperage Hemlock-Hardwood Forest
(For vernal pools, please use the Vernal Pool Survey Form on our website)

Community Variant Name (if applicable): _____

Association Name (NVC type) (office): _____

Surveyor(s): Michael Lew-Smith Contact Info: lewsmith@arrowwoodvt.com

Survey Date(s): 7-26-14 Town: Castleton County: Rutland

Unusual data sensitivity issues? ☐ If so, explain: _____

LANDOWNER(S) / CONTACT(S) (**Name**, **Telephone, Address, Email**—if not in a Site Summary Form) Permission?
Unknown ☐
☐

GENERAL DESCRIPTION of SITE

Describe *Site* and its range and variability (give a word picture of natural and man-made features, including: general topography, elevation, exposure, community types, geologic substrata, evidence of disturbance, exotics, etc.):

Variable topography. Southern end of larger forests to north. Silt loam soils, bedrock outcrops common.

NATURAL COMMUNITY INFORMATION

Describe *Natural Community* occurrence (include canopy cover, dominant species by stratum, soils, physical environment, & evidence of disturbance):

These two forests consist of a Temperate Hemlock-Hardwood Forest and a Temperate Hemlock Forest. The canopy in the mixed forest is dominated by hemlock (Tsuga canadensis), red maple (Acer rubrum), American beech (Fagus grandifolia), and northern red oak (Quercus rubra). The sparse understory consists of canopy species as well as rock polypody (Polypodium virginianum) and evergreen woodfern (Dryopteris intermedia). The Hemlock forest contains less hardwood and also includes white pine (Pinus strobus). Within the ROW, some sections of these forests are somewhat disturbed and early successional. Nevertheless, they are part of very large forests outside of the ROW to the north. Further analysis of the forests outside of the study area needs to be conducted to determine if these are significant natural communities.

Aspect: variable Slope (degrees): variable Elevation (with units): minimum 500+ maximum ?

Bedrock geologic type (Doll et al. 1961 or more recent):
West Castleton Formation

Soil type or description (NRCS):
Taconic-Hubbarton Complex

COMMUNITY OCCURRENCE RANKING: a range of ranks may be used (e.g. AB)
Using **VT NNHP ranking specifications** (if available)*: ☐ OR Using **Generic ranking specifications** (provided below): ☐

	Rank:	Comments:
Current Condition:		Further work on rest of forest needs to be conducted.
Landscape Context:		
Size:		Community size (acres) and how determined:
Overall Rank:		

* Available for some natural communities at www.vtfishandwildlife.com/wildlife_nongame.cfm. Use to fill in the grid above.

Generic ranking specifications:

Use the following guidelines to fill in the grid above if VT NNHP Natural Community ranking specifications are unavailable

Current Condition:
A: mature example of the community type (forests with trees generally >150 years old); natural processes intact; no exotics
B: some minor alteration of vegetation structure and composition, such as by selective logging; minor alterations in ecological processes; exotics species present in low abundance
C: significant alteration of vegetation structure and composition, such as by heavy logging; alteration of ecological processes are significant, but community recovery/restoration is likely; exotic species are abundant and control will take significant effort
D: ecological processes significantly altered to the point where vegetation composition and structure are very different from A-ranked condition and restoration/recovery is unlikely; exotic species are abundant or control will be difficult

Landscape Context:
A: highly connected; area around EO (>1,000acres) is largely intact natural vegetation, with species interactions and natural processes occurring across communities; surrounding matrix forest meets at least B specifications for Condition.
B: moderately connected; area around EO (>1,000acres) is moderately intact natural vegetation, with species interactions and some natural processes occurring across many communities, although temporary disturbances such as logging have reduced condition of the landscape; surrounding matrix forest meets at least C specifications for Condition
C: moderately fragmented; area around EO is largely a combination of cultural and natural vegetation with barriers to species interactions and natural processes across communities; surrounding land is a mix of fragmented forest, agriculture, and rural development
D: highly fragmented; area around EO is entirely, or almost entirely, surrounded by agriculture or urban development

Size:
No Generic ranking applicable. Please provide size of community in grid above.

Overall Rank (based on best judgment)**:**
A: excellent estimated viability
B: good estimated viability
C: fair estimated viability
D: poor estimated viability

MANAGEMENT/PROTECTION RECOMMENDATIONS for NATURAL COMMUNITY

ADDITIONAL INFORMATION
☐ Plot form(s) attached. Plot Code: _____
☐ Animal list attached
☐ Plant list attached (in addition to plot forms)
☐ Map of route taken and observation points—or include with Natural Community map.
☐ Photographs

Comments that do not fit in another field:
Further work needs to be conducted on larger forest to make final significance determination. Forest only assessed in the Route 4 right-of-way.

MAPPING

Attach a digital or paper map of the natural community boundary mapped as polygons (required): ☐
Shapefile attached (encouraged): ☒ File must be NAD83 State Plane: ☐ File name: _____

Estimated % of mapped polygon occupied by this community: >95%☐; 80-95%☐; 20-80%☐; 0-20%☐; Unknown☐
Explain if <95%: _____

Base Map Used to delineate occurrence:	Confident that full extent is known: ☐
1:24,000 USGS Quad: ☐	Uncertain if full extent is known: ☐
1:25,000 USGS Quad: ☐	Confident that full extent is *not* known: ☐
1:5000 Ortho Photo: ☐	Additional inventory needed? ☐ If so, explain:
GPS: ☐ Accuracy: _____	
Other: ☐ Specify:	

Please send completed forms to Eric Sorenson: Eric.Sorenson [at] state.vt.us / Nongame & Natural Heritage Program, Vermont Fish & Wildlife Dept., 103 South Main Street, Building 10 South, Waterbury, VT 05671-0501 / (802)-241-3714

VERMONT NATURAL COMMUNITY SURVEY FORM rev. Apr. 2009
Nongame and Natural Heritage Program
Vermont Fish & Wildlife Department

Survey Site: Mount Hanley East, Mount Hanley West, Blueberry Hill and Twin Mountain Is this an update? ☐ EO# (if known):

Community Type: Mesic Maple-Ash-Hickory-Oak Forest
(For vernal pools, please use the Vernal Pool Survey Form on our website)

Community Variant Name (if applicable):

Association Name (NVC type) (office):

Surveyor(s): Michael Lew-Smith Contact Info: mlewsmith@arrowwoodvt.com

Survey Date(s): 7-24-14 Town: West Rutland, Ira, Castleton County: Rutland

Unusual data sensitivity issues? ☐ If so, explain:

LANDOWNER(S) / CONTACT(S) (**Name**, **Telephone, Address, Email**—if not in a Site Summary Form) Permission?
Unknown ☐
☐

GENERAL DESCRIPTION of SITE

Describe *Site* and its range and variability (give a word picture of natural and man-made features, including: general topography, elevation, exposure, community types, geologic substrata, evidence of disturbance, exotics, etc.):

Variable topography, mostly south facing, Southern end of large MAHO forests to north. Loam and sandy loam soils. Some surficial rock. Some bedrock outcrops

NATURAL COMMUNITY INFORMATION

Describe *Natural Community* occurrence (include canopy cover, dominant species by stratum, soils, physical environment, & evidence of disturbance):

This series of four forest communities all sit at the base of a series of dry hills in West Rutland, Ira and Castleton. They all are examples of Mesic Maple-Ash-Hickory-Oak Forest community. They are dominated by northern red oak (Quercus rubra), shagbark hickory (Carya ovata), bitternut hickory (Carya cordiformis), hop hornbeam (Ostrya virginiana) and american ash (Fraxinus americana). The understory consists of canopy species as well as maple-leaved viburnum (Viburnum acerifolium), witch hazel (Hamamelis virginiana), Pennsylvania sedge (Carex pensylvanica), wood anemone (Anemone quinquefolia) and blue-stemmed goldenrod (Solidago caesia). There are some inclusions of Dry Oak-Hickory-Hophornbeam Forest where the soils are well-drained.

While there are a few areas of more recent disturbance, most of these forests in the study area are mature and in very good condition. Given the condition, community type and size of these forests, it is likely that these communities would be considered state significant.

Aspect: mostly southern Slope (degrees): variable Elevation (with units): minimum 500+ maximum ?

Bedrock geologic type (Doll et al. 1961 or more recent):
Mostly the Bull Formation

Soil type or description (NRCS):
Mostly Macomber-Taconic Complex

COMMUNITY OCCURRENCE RANKING: a range of ranks may be used (e.g. AB)
Using **VT NNHP ranking specifications** (if available)*: ☐ OR Using **Generic ranking specifications** (provided below): ☐

	Rank:	Comments:
Current Condition:		Further work on rest of forest needs to be conducted.
Landscape Context:		
Size:		Community size (acres) and how determined:
Overall Rank:		

* Available for some natural communities at www.vtfishandwildlife.com/wildlife_nongame.cfm. Use to fill in the grid above.

Generic ranking specifications:

Use the following guidelines to fill in the grid above if VT NNHP Natural Community ranking specifications are unavailable

Current Condition:
A: mature example of the community type (forests with trees generally >150 years old); natural processes intact; no exotics
B: some minor alteration of vegetation structure and composition, such as by selective logging; minor alterations in ecological processes; exotics species present in low abundance
C: significant alteration of vegetation structure and composition, such as by heavy logging; alteration of ecological processes are significant, but community recovery/restoration is likely; exotic species are abundant and control will take significant effort
D: ecological processes significantly altered to the point where vegetation composition and structure are very different from A-ranked condition and restoration/recovery is unlikely; exotic species are abundant or control will be difficult

Landscape Context:
A: highly connected; area around EO (>1,000acres) is largely intact natural vegetation, with species interactions and natural processes occurring across communities; surrounding matrix forest meets at least B specifications for Condition.
B: moderately connected; area around EO (>1,000acres) is moderately intact natural vegetation, with species interactions and some natural processes occurring across many communities, although temporary disturbances such as logging have reduced condition of the landscape; surrounding matrix forest meets at least C specifications for Condition
C: moderately fragmented; area around EO is largely a combination of cultural and natural vegetation with barriers to species interactions and natural processes across communities; surrounding land is a mix of fragmented forest, agriculture, and rural development
D: highly fragmented; area around EO is entirely, or almost entirely, surrounded by agriculture or urban development

Size:
No Generic ranking applicable. Please provide size of community in grid above.

Overall Rank (based on best judgment)**:**
A: excellent estimated viability
B: good estimated viability
C: fair estimated viability
D: poor estimated viability

MANAGEMENT/PROTECTION RECOMMENDATIONS for NATURAL COMMUNITY

ADDITIONAL INFORMATION

☐ Plot form(s) attached. Plot Code: _____
☐ Animal list attached
☐ Plant list attached (in addition to plot forms)
☐ Map of route taken and observation points—or include with Natural Community map.
☐ Photographs

Comments that do not fit in another field:
Further work needs to be conducted on larger forest to make final significance determination. Forest only assessed in the Route 4 right-of-way.

MAPPING

Attach a digital or paper map of the natural community boundary mapped as polygons (required): ☐
Shapefile attached (encouraged): ☒ File must be NAD83 State Plane: ☐ File name: _____

Estimated % of mapped polygon occupied by this community: >95%☐; 80-95%☐; 20-80%☐; 0-20%☐; Unknown☐
Explain if <95%: _____

Base Map Used to delineate occurrence:	Confident that full extent is known: ☐
1:24,000 USGS Quad: ☐	Uncertain if full extent is known: ☐
1:25,000 USGS Quad: ☐	Confident that full extent is *not* known: ☐
1:5000 Ortho Photo: ☐	Additional inventory needed? ☐ If so, explain:
GPS: ☐ Accuracy: _____	
Other: ☐ Specify:	

Please send completed forms to Eric Sorenson: Eric.Sorenson [at] state.vt.us / Nongame & Natural Heritage Program, Vermont Fish & Wildlife Dept., 103 South Main Street, Building 10 South, Waterbury, VT 05671-0501 / (802)-241-3714

Attachment 7.

GIS Data Deliverables Description

Attachment 7

GIS Data Deliverables Descriptions

File Name	Geometry Type	Description	Source	Accuracy	Notes
Invasive_LocalPts.shp	Point	Local (small or isolated) populations of invasive species	Field collected GPS Data	assumed +/- 30'	Locations as collected by field ecologists
Invasive_LinearPts.shp	Point	Start and End points of linear (extensive) populations of invasive species	Field collected GPS Data	assumed +/- 30'	Locations as collected by field ecologists
Invasive_LinearLines.shp	Line	Linear representation of extensive invasive species populations	Auto and manually processed from Invasive_LinearPts.shp	None- this data is representative of population length and general area only.	This data is provided to facilitate visualization and approximate quatification of the field data provided in Invasive_LinearPts.shp. This dataset does not purport to accurately represent exact locations of populations or plant locations within the study area, but only to indicate the general linear position and extent ALONG and parallel to the study area. The data may be used to determine approximate lengths of invasive infestations. The lines are offset a predetermined amount from the road centerline. In addition, to facilitate visualization, each species is offset slightly to avoid overlaps and enable cartographic visualization.
NatComm_Significant.shp	Polygon	Approximate boundaries of potentially significant natural communities within 1/4 mile of the proposed project	screen digitized	None- derived from remote analysis and aerial photo interpretation. Boundaries are not field verified.	This data is a subset of remotely mapped potentially significant natural communities mapped within ~1/4 mile of the project study area. These polygons represent communities within which landscape characteristics supported confirmation of natural community type and condition as evaluated from within the project study area.
DWA_Potential.shp	Polygon	Approximate boundaries of potential deer winter habitats within 1/4 mile of the proposed project	screen digitized	None- derived from remote analysis and aerial photo interpretation. Boundaries are not field verified.	This data is a subset of remotely mapped conifer and mixed conifer/hardwood forest stands mapped within ~1/4 mile of the project study area. These polygons represent stands within which forest conditions were found favorable for deer winter use when evaluated only within the project study area.
RTE.shp	Polygon	Boundaries of RTE plant populations and Approximate locations of Uncommon (S3) plant populations	Field collected GPS Data	Sub-meter grade GPS (S1-S2) and assumed +/- 30' (S3)	Locations as collected by field ecologists

ATTACHMENT D

Docket No. _____
Exh. TDI-GGM-5a

Gilman & Briggs Environmental
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MEMORANDUM

To: Galen Guerrero-Murphy
From: Art Gilman
Date: 22 October 2014
Re: NECPL Project Surveys (Shrewsbury – Wallingford Railroad & Ludlow Converter Site)

This memorandum recaps surveys for rare, threatened or endangered species undertaken in two areas:

1) Along a section of proposed conduit corridor within the right-of-way of the Green Mountain Railroad (VTrans) in the towns of Shrewsbury and Wallingford, east of Vt. Rte. 103 and generally bypassing the village of Cuttingsville, a distance of approximately 3.5 miles, and
2) At the site of the proposed converter station on Nelson Road in Ludlow, a parcel of land of some 30 acres.

Shrewsbury-Wallingford Railroad Option

Searches were undertaken on foot within the railroad right-of-way on 3-4-5 September 2014, with a follow-up visit to one location on 9 October 2014. The railroad is located from Mileposts 134.1 to 137.6. Both sides of the railbed were inspected to the limits of the right-of-way for the presence of significant natural communities, necessary wildlife habitat, rare, threatened or endangered plants, and for the presence of any rare fauna or habitat for rare fauna, as listed under federal and Vermont statute (threatened or endangered), or as listed by the Vermont Department of Fish and Wildlife, Wildlife Diversity Program (rare). A complete list of plants observed was taken (Table 1).

No rare, threatened, or endangered plant species was observed. Rare species are those ranked by the Vermont Natural Heritage Inventory as S1 (very rare, generally 1–5 sites in Vermont) or S2 (rare, generally 5–20 sites in Vermont). Threatened or endangered species are those listed as such in Vermont's endangered species statute. In my opinion, the presence of any such species in the disturbed lands of the railroad right of way, especially in this location in the Green Mountains, would be unlikely.

For the most part, no natural communities were observed. Most of the corridor is bordered by sloping northern hardwood deciduous forests, common to the region. A small patch of a "sugar maple–ostrich fern riverine floodplain forest" or a variant thereof, was observed at one location where the Mill River is near the bottom of the railroad embankment. This community is ranked S1 (very rare) in Vermont; however, its size and quality were not fully assessed as it primarily lies outside the railroad right of way. It appears to be quite small.

Additional to searches for rare plants in this area, non-native invasive species (NNIS) of plants were also mapped. These species are quarantined by the Vermont Agency of Agriculture, Food, and Markets and are listed as Class A or Class B noxious weeds. NNIS observed included: Morrow's Asian honeysuckle, Asian round-leaved bittersweet, winged euonymous, and garlic mustard. In general, most populations were confined to the northern portion of this corridor segment, between Vt. Rte.103 and Town Hill Road. South of that segment, only a couple minor infestations were noted.

Additionally, no rare fauna, nor habitat sufficient to support any such species was observed. This section of Vermont is outside the breeding range of Indiana bat, a species of concern elsewhere on the project. It would be unlikely to find this species or other species of bat along the railway corridor.

Much of the forest on the eastern (uphill) side of the corridor from near Rte. 103 south for approximately one mile is mapped as deer wintering area by the Vermont Fish and Wildlife Department (Vermont Natural Resources Atlas). This area does not have dense coniferous cover along the railroad itself and is not topographically sheltered, being generally west-sloping and likely exposed to prevailing winds (funneled up the Mill River Valley). Here as elsewhere the forest community near the railroad consists primarily of second or third growth deciduous hardwood forests, with admixtures of conifers. The lack of cover and food resources adjacent to the railroad (i.e. the ballasted side-slopes) make the corridor itself unsuitable for deer wintering.

Ludlow Converter Station Site

Searches for rare, threatened, or endangered species and significant natural communities were undertaken at the proposed Ludlow converter site just east of Nelson Road on 11 August 2014. A wander search was undertaken around the perimeter and through the center of the parcel. A complete list of plant species was taken (Table 2).

This site is a typical forest lot, on old farmland, dominated by a mixture of conifers, mostly white pine, and upland hardwood deciduous trees, primarily birch, beech, and maple. It has apparently developed on old field and has been partially harvested at some point in the recent past. This type of community is very common throughout Vermont, and, here being located in the central part of the Green Mountains at mid-elevation (ca. 1400'), is not one likely to support any rare, threatened, or endangered species of plant or animal, except as transient individuals, and none were observed. Additionally, no significant natural communities are present.

The current level of conifer canopy approaches 50% in parts of the site. It is not mapped as a deer wintering area by the Vermont Department of Fish and Wildlife, and evidence of use by overwintering deer was not apparent (e.g., no extensive pellet groups or browse was observed).

Additional to searches for rare plants in this area, non-native invasive species (NNIS) of plants were also mapped. These species are quarantined by the Vermont Agency of Agriculture, Food, and Markets and are listed as Class A or Class B noxious weeds. NNIS observed included: Oriental Bittersweet. Two large clumps were observed adjacent to North Hill Road and southeast of the driveway to the house located on the TDI-NE owned parcel.

TABLE 1. Plants of the NECPL, Shrewsbury/Wallingford Railroad, September 2014

Trees, shrubs, and woody vines: Total 24

Scientific Name	Common Name
Abies balsamifera	Balsam fir
Alnus incana ssp. rugosa	Speckled alder
Berberis thunbergii	Japanese barberry (NNIS)
Berberis vulgaris	Common barberry (NNIS)
Betula populifolia	Gray birch
Cornus alterniflora	Alternate-leaved dogwood
Cornus sericea	Red-osier dogwood
Corylus cornuta	Beaked hazel
Crataegus punctata	Dotted haw
Diervilla lonicera	Bush-honeysuckle
Euonymus alatus	Winged euonymus (NNIS)
Fallopia japonica	Japanese knotweed
Fraxinus americana	White ash
Larix laricina	Tamarack
Lonicera morrowii	Morrow's honeysuckle (NNIS)
Malus pumila	Apple
Pinus strobus	White pine
Populus balsamifera	Balsam poplar
Populus tremuloides	Quaking aspen
Rhamnus cathartica	European buckthorn (NNIS)
Rosa multiflora	Multiflora rose
Rubus idaeus	Red raspberry
Sambucus pubens	Red elder
Spiraea alba var. *latifolia*	Meadowsweet

Fern and Fern Allies: Total: 12

Scientific Name	Common Name
Athyrium filix-femina	Lady fern
Dryopteris carthusiana	Spinulose woodfern
Dryopteris cristata	Crested fern
Dryopteris intermedia	Evergreen woodfern
Lycopodium clavatum	Running clubmoss
Lycopodium lagopus	One-cone clubmoss
Onoclea sensibilis	Sensitive fern
Osmunda claytoniana	Interrupted fern
Parathelypteris noveboracensis	New York fern
Pteridium aquilinum	Bracken fern
Spinulum annotiunum	Northern interrupted clubmoss
Thelypteris palustris	Marsh fern

Grasses, sedges, and rushes ("Graminoids"): Total 31

Scientific Name	Common Name
Agrostis gigantea	Redtop
Agrostis stolonifera	Creeping bentgrass
Agrostis tenuis	Rough bentgrass
Anthoxanthum odoratum	Sweet vernal grass
Bromus ciliatus	Fringed brome
Calamagrosits canadensis	Bluejoint
Carex arctata	Drooping woodland sedge
Carex communis	Common sedge
Carex flava	Yellow-green sedge
Carex intumescens	Bladder sedge
Carex tenera	Delicate quill sedge
Danthonia spicata	Oat grass
Dichanthelium boreale	Boreal panic grass
Eleocharis sp.	Spikerush
Juncus effusus	Common rush
Glyceria striata	Manna grass
Juncus tenuis	Path rush
Muhlenbergia glomerata	Spike muhly
Muhlenbergia mexicana	Mexican muhly
Panicum capillare	Witch panic grass
Poa palustris	Fowl bluegrass
Poa pratensis	Kentucky bluegrass
Scirpus atrovirens	Dark-green bulrush
Scirpus cyperinus	Common woolgrass
Scirpus microcarpus	Barber pole bulrush
Typha latifolia	Broad-leaved cattail

Herbs and forbs: Total 53

Scientific Name	Common Name
Achillea millefolium	Common yarrow
Anaphalis margaritacea	Pearly everlasting
Arctium lappa	Great burdock
Cirsium vulgare	Common thistle
Doellingeria umbellata	Tall white aster
Epilobium sp.	Willow-herb
Epipactis helleborine	Helleborine
Erechtites hieraciifolia	Fireweed
Erigeron strigosus	Daisy fleabane
Fragaria virginiana	Common strawberry
Galium triflorum	Fragrant bedstraw
Geum aleppicum	Yellow avens
Geum rivale	Water avens
Hypericum perfoliatum	Common St. John's-wort
Lactuca canadensis	Tall lettuce
Leontodon autumnalis	Fall-dandelion
Leucanthemum vulgare	Ox-eye daisy

Linnaea borealis	Twinflower
Lobelia inflate	Indian-tobacco
Lysimachia quadrifolia	Four-leaved loosestrife
Mitchella repens	Partridge-berry
Oclemena acumanata	Whorled wood aster
Oenothera biennis	Evening primrose
Packeria schweinitziana	Robbin's ragwort
Pilosella officinarum	Mouse-ear hawkweed
Plantago rugelii	Plantain
Potentilla norvegica	Rough cinquefoil
Potentilla simplex	Old field cinquefoil
Prunella vulgaris	Common selfheal
Pyrola eliptica	Shinleaf
Ranunculus acris	Tall buttercup
Rudbeckia hirta	Black-eyed Susan
Rumex acetosa	Common dock
Solidago canadensis	Canada goldenrod
Solidago nemoralis	Gray goldenrod
Solidago puberula	Downy goldenrod
Solidago rugosa	Rough-leaved goldenrod
Solidago uliginosa	Bog goldenrod
Symphyotrichum lanceolatum	Lance-leaved aster
Symphyotrichum lateriflorum	Calico aster
Taraxacum officinale	Dandelion
Tussilago farfara	Colt's-foot
Valeriana officinalis	Common valerian
Verbascum thapsus	Common mullein
Veronica officinalis	Common speedwell

Table 2: Plants observed on the proposed NECLP Converter Station site, Ludlow

Scientific Names	**Common Names**	
Trees and Shrubs		
Acer pensylvanicum	Striped maple	
Acer rubrum	Red maple	
Acer saccharum	Sugar maple	Common
Betula alleghaniensis	Yellow birch	
Betula papyrifera	Paper birch	
Fagus americana	Beech	Common
Fraxinus americana	White ash	Common
Juglans cinerea	Butternut	Sapling
Malus pumila	Apple	Lawn area
Picea rubens	Red spruce	
Pinus resinosa	Red pine	1 tree, among white pine
Pinus strobus	White pine	Common
Populus tremuloides	Quaking aspen	Lawn
Prunus virginiana	Choke cherry	
Prunus serotina	Black cherry	
Quercus rubra	Red oak	
Rubus allaeghaniensis	Blackberry	
Rubus canadensis	Canada blackberry	
Rubus hispidus	Dewberry	
Rubus idaeus	Red raspberry	
Rubus occidentalis	Black raspberry	
Salix bebbiana	Bebb's willow	
Salix sericea	Silky willow	
Spiraea alba var. latifolia	Hardhack	
Spiraea tomentosa	Steeplebush	
Tsuga canadensis	Hemlock	1 small tree
Ulmus americana	American elm	
Vaccinium angustifolium	Blueberry	Few

Ferns & Fern Allies		
Athyrium filix-femina	Lady fern	
Dendrolycopodium dendroideum	Pincess pine	
Dennstaedtia punctilobula	Hay-scented fern	
Dryopteris campyloptera	Mountain woodfern	
Dryopteris carthusiana	Spinulose woodfern	
Dyopteris intermedia	Intermediate woodfern	
Onoclea sensibilis	Sensitive fern	
Osmunda claytoniana	Interrupted fern	
Osmundastrum cinnamomeum	Cinnamon fern	
Pteridium aquilinum	Bracken	
Parathelypteris noveboracensis	New York fern	

Grasses, sedges, and rushes		
Agrostis gigantea	Red-top	Co-dominant in field
Agrostis perennans	Perennial bent grass	Trails in forest
Anthoxanthum odoratum	Sweet vernal grass	Co-dominant in field
Carex gynandra	Fringed sedge	Logging roads
Carex lurida	Lurid sedge	Few, logging road
Cinna latifolia	Wood reed	Occasional in forest
Danthonia compressa	Poverty grass	Dominant along logging roads
Danthonia spicata	Poverty grass	Common, field and along edges
Juncus tenuis	Path rush	
Poa palustris	Swamp bluegrass	Few
Schizachne purpurascens	Purple false oat	Few, forest
Scirpus hattorianus	Blackish bulrush	

Herbs & Forbs		
Achillea millefolium	Yarrow	Field
Anemone quinquefolia	Wild anemone	
Apocynum androsaemifolium	Spreading dogbane	
Aralia nudicaulis	Wild sarsarparilla	
Asclepias syriaca	Milkweed	Field
Bidens frondosa	Beggar's-ticks	
Coptis trifolia	Goldthread	
Daucus carota	Queen Anne's lace	
Doellingeria umbellata	Tall white aster	
Epilobium coloratum	Willow-herb	
Erigeron strigosus	Daisy fleabane	Field
Fragaria virginiana	Wild strawberry	
Galium mollugo	Bedstraw	Field
Galium triflorum	Bedstraw	Forest
Hieracium scabrum	Hawkweed	
Hydrocotyle americana	Pennywort	
Hypericum maculatum	Dotted St. John's-wort	
Impatiens capensis	Jewelweed	
Lactuca canadensis	Canada wild lettuce	
Leucanthemum vulgare	Ox-eye daisy	
Lobelia inflata	Indian tobacco	
Lycopus uniflorus	Water horehound	
Medeola virginiana	Indian cucumber	
Monotropa uniflora	Indian pipes	Few
Oclemena acuminata	Whorled wood aster	Forest
Oxalis stricta	Wood-sorrel	
Persicaria hydropiper	Water-pepper	
Persicaria sagittata	Tearthumb	
Pilosella officinalis	Mouse-ear chickweed	
Plantago lanceolata	English plantain	Field
Plantago major	Plantain	
Potentilla norvegica	Rough cinquefoil	
Potentilla recta	Sulphur cinquefoil	Field
Prunella vulgaris	Self-heal	

Solidago canadensis	Canada goldenrod	
Solidago juncea	Early goldenrod	Field
Solidago nemoralis	Ashy goldenrod	Field
Solidago rugosa	Roughl-leaved goldenrod	
Symphyotrichum lanceolatum	Lance-leaved aster	
Symphyotrichum lateriflorum	Calico aster	Field margin
Trifolium aureum	Yellow hop-clover	
Trifolium pratense	Red clover	Field
Tussilago farfara	Colt's-foot	
Uvularia sessilifolia	Wild-oats	
Veronica officinalis	Speedwell	
Viola cucullata	Blue violet	

VERMONT SITE SUMMARY FORM
Natural Heritage Inventory (NHI)

rev. Nov. 2013

Survey Site (or project name): _____ **Town**(s)**:** Shrewsbury

Surveyor(s): Arthur V. Gilman Reason for visit: _____

Survey Date(s): 3 September 2014 Report Date: 20 November 2014

Unusual data sensitivity issues? ☐ If so, explain: None

General directions to site:

On E side of Mill River, ca. 1200' S of the Rte. 103 bridge across the MIll River, slightly N of the village of the village of Cuttingsville. Note, only the portion lying within lands of the Vermont Railway System's (Green Mountain Railroad) property was inspected and the site was accessed from the railroad bed.

Ownership:

Owners/Contacts	**Phone, Address, Email. Indicate local address if different**	Owner Comments	Permission obtained?
1)Vermont Railway System			☒
2)			☐
3)			☐
4)			☐

List rare & uncommon species and significant natural communities found during the survey date

Species or Natural Community Name	EO# (office)	Separate survey form?	Found ?	Biological Data, Comments, Collection #s, Owners (can denote as 1, 2, 3, 4 from above)	EO Rank
Sugar maple – ostrich fern floodplain forest			Y	See next page	C

Describe site and its range and variability (give a word picture of natural and man-made features including topography, elevation, exposure, community types, geologic substrata, woody debris abundance, disturbance evidence, exotics, etc.):

This occurs on a somewhat level terrace (steep sided upslope) along the Mill River - some damage evident - woody debris from Tropical Storm Irene. Trees are sugar maple and white ash. Ground layer has abundant ostrich fern. Other woody species noted were: Malus pumila, Crataegus punctata, Carpinus caroliniana, with herbs Tiarella cordifolia, Ranunculus recurvatus, Zizia aurea, Onoclea sensibilis, Lysimachia nummularia, Arisaema triphyllum and Elymus wiegandii. There were also some patches of the non-native invasive species (NNIS) Fallopia japonica

Threats to site and elements:

Biggest threat is likely increase of NNIS Fallopia japonica

Management/Protection recommendations:

Additional comments:

Rank is provisional until the entire site can be inspected - it appears to be a small example along a relatively high-gradient river;

Attached Files:

☐ **Map(s)* (required—all others are optional)**
☐ Species list
☐ Plot Form (identify location with GPS or on map)
☐ Rapid Community Assessment Form
☐ Associated GIS shapefile. Must be in *NAD83 State Plane*: ☐ File name: _____
☐ Printout of GPS coordinates
☐ Sketch of local topography cross-section around EO locations, including scale and direction

* Show site with element locations. Consider mapping route taken and observation points.

In Word 2007/2010, to unlock the form to draw a diagram or insert pictures or maps, click on the padlock in the "Review" or "Developer" tab/ribbon, select "Restrict Formatting and Editing," then click the "Stop Protection" button. When finished, click, "Yes, Start Enforcing Protection," then click "OK."

Please send with natural community or rare species forms to the appropriate person, or send completed forms to Eric Sorenson: Everett.Marshall [at] state.vt.us / Natural Heritage Inventory, Vermont Fish & Wildlife Department, 1 National Life Dr., Davis 2, Montpelier, VT 05641 / 802-371-7333

Docket No. _____
Exh. TDI-GGM-5b

Gilman & Briggs Environmental
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Ph: (802) 479-7480; FAX: (802) 476-7018
gbenvironmental@earthlink.net

MEMORANDUM

To: Galen Guerrero-Murphy
From: Art Gilman
Date: 19 November 2014
Re: NEPCL Project Survey — Temporary Off-ROW Work Areas

This memorandum recaps surveys for rare, threatened or endangered species, significant natural areas, non-native invasive plant species and necessary wildlife habitat undertaken at seven locations:
I inspected parcels 1 and 2 on 18 November 2014, and parcels 3 – 7 on 31 October 2014, at the end of the growing season. On both dates, weather was dry and cold/seasonable, with no unusual conditions. Therefore, although late in the season, I was able to identify all plants observed and believe that the searches were thorough. Lists of plants observed at each location were taken and are available upon request.

No rare species, rare species habitat, significant natural areas, or necessary wildlife habitat were observed on any parcel. Non-native invasive species (NNIS) were observed on two parcels. Criteria applied were as follows:

***Rare species*:** Rare species are those ranked by the Vermont Natural Heritage Inventory as S1 (very rare, generally 1–5 sites in Vermont) or S2 (rare, generally 5–20 sites in Vermont). Threatened or endangered species are those listed as such in Vermont's endangered species statute or by the US Fish and Wildlife Service under the federal Endangered Species Act.

***Natural Communities*:** Significant natural communities are communities that might be considered "rare and irreplaceable areas" as defined in Vermont's Act 250. They vary by nature, but are generally characterized by an unusual association of plant species and community structure (e.g., forest, swamp, marsh, etc.). As generally considered, they are either rare on a statewide basis, or if not rare, then outstanding examples by virtue of their size, quality, and state of naturalness.

***Necessary wildlife habitat*:** Necessary wildlife habitat is habitat critical to the survival of the species at any stage in its life cycle (e.g., deer wintering areas, bat roosting trees or hibernacula, et cetera).

***Non-native invasive species* (NNIS):** These species are quarantined by the Vermont Agency of Agriculture, Food, and Markets and are listed as Class A or Class B noxious weeds.

Additional information about each site is given here:

1) A proposed laydown/storage area on the west side of Mill Pond Road in Benson (near MP 103.1). This area is a mowed hayfield, with upland conditions dominant in the study polygon. No rare plants were observed, and none likely to occur in this field. The town of Benson is within the summer breeding range of Indiana bat, a protected species, but I observed no trees suitable for roost trees within the study area, the only trees being small ashes and maples along Mill Pond Road. A few non-native invasive species, primarily purple loosestrife and common buckthorn were mapped around the perimeter of the field and at the existing field entrance.

2) Additional areas for jack-and-bore pits near Vt. Rte. 22 at MP 103.2.
These two sites, on opposite sides of the road, are cornfields, with no plants observed other than corn stubble.

3) Along a section of proposed conduit corridor adjacent to the right–of–way of the Green Mountain Railroad (VTrans) in the town of Shrewsbury, just east of Vt. Rte.103 at MP 134.1 –134.5. This land is mostly forested, with a typical "northern hardwoods – mixed conifer association, and is used in part as a sugaring operation; a portion of it is wetland. There is a deeply incised stream valley with some rock outcrops in the forested area, but the outcrops are not large enough to be considered significant natural communities. Another portion of this site is an old field with numerous wildlife plantings (e.g. apple trees).

   In regard to rare species, I did not observe any rare plants. This (and the remainder of the other sites) are located in towns outside the breeding range of Indiana bat. It would be unlikely to find that species or other species of bats at these sites other than as transients. In particular, I did not observe any large, decaying or dead trees with shedding bark, nor any shagbark hickories, common locust, or other trees noted for having crevices or crannies that bats might use for day roosts.

   In regard to wildlife issues the non-field portion of the site is mapped by the Vermont Fish and Wildlife Service as deer wintering area. As currently managed, the amount of coniferous cover did not appear adequate for winter shelter, however.

   Two NNIS species were observed: Morrow's Asian honeysuckle and common barberry. The infestation of Morrow's Asian honeysuckle is extensive but not dense and is only scattered in the shaded forest understory.

4) Slightly south of the previous site, also adjacent to the railroad in the town of Shrewsbury at MP 134.7. This site is forested with mixed forest. This site is also within the polygon of mapped deer wintering area, but the land is quite steep and is not topographically sheltered, so it is not likely used by wintering deer.

5) Slightly south of this location, also adjacent to the railroad in the Wallingford, at MP 136.9. This site is a mowed lawn.

6) Near the railroad and also adjacent to Vt. Rte. 103 near MP137.3. This site is a deciduous forest with a northern hardwood association.

7) At the site of a proposed laydown/storage area on the south side of Vt. Rte. 103 in the town of Mount Holly at MP 145.8. This site is a mowed field and parking area.

ATTACHMENT E

Docket No. _____
Exh. TDI-GGM-6

Indiana Bat Habitat Assessment Report

New England Clean Power Link

October 23, 2014

ARROWWOOD ENVIRONMENTAL
950 BERT WHITE ROAD
HUNTINGTON, VT 05462
(802 434-7276 FAX: (802) 329-2259

Table of Contents

Introduction

Arrowwood Environmental (AE) conducted a survey for Indiana Bat (*Myotis sodalist*) habitat in connection with the terrestrial component of the NECPL Project. The survey was conducted in August and September 2014. This report details the methodology employed in conducting the survey and survey findings.

Study Area

The terrestrial corridor within the towns of Benson, West Haven and Fair Haven was searched for the presence of potential bat roosting tree species as described below. The study area was established per recommendation of Scott Darling (VT. F&W and Susi van Oettingen (USFWS)) as communicated by Galen Guerrero-Murphy of TRC Companies, Inc.

The search area covered 14.25 miles between project mile markers 98.2 and 112.45. Within this search area, it was assumed that there exists a maximum 50'-66' accessible ROW along North Lake Road, Old North Lake Road, Hulett Road and Route 22A. In areas with a wider ROW along Route 4, only the northern ROW area of the northern roadway was surveyed. Survey work only occurred within ROW limits.

Indiana Bat Background Information

The Indiana Bat is listed as an Endangered Species under both the United States Endangered Species Act (P.L. 93-205) and Vermont's Endangered Species Law (10 V.S.A., Chapter 123). In Vermont, Indiana Bats are limited in distribution to areas

within the southern Champlain Valley, Taconic and Vermont Valley biophysical regions.

Adult female Indiana Bats both give birth and along with their young utilize day-roosting trees during the summer months in Vermont. This resting or roosting behavior can be as a single bat or in colonies of up to 30 bats in one location. Bats may change roosting trees every few days or remain in the same location for long periods. Often a "primary roosting tree" becomes the main roosting area serving as a staging area for feeding at night, while secondary trees are utilized when wet or especially warm temperatures are encountered by the bat. These secondary trees are usually found within a few hundred meters of the primary tree.

Both shagbark hickory (*Carya ovate*) and black locust (*Robinia pseudoacacia*) are preferred species for roosting. Shagbark hickory bark often exfoliates into long strips that pull away from the tree bole providing excellent cover and shade for the roosting bat. The deeply furrowed bark of the black locust also can provide the necessary cover for day use by the bat.

Larger specimens of other trees can also provide roosting habitat for the bat. These larger specimens often have furrowed bark, and or exfoliating or peeling bark, often associated with diseased or dead limbs utilized by roosting bats. Generally, coniferous forests are not utilized as roosting habitat by the Indiana Bat.

Typically roosting behavior occurs within the forest or forest edge and single isolated trees are not utilized to the same degree. However, bats require warm temperatures during their roosting behavior and trees that receive direct sunlight are sought out for that reason and utilized. Most often bats roost in areas where

a cluster or grouping of appropriate trees are found in close proximity to each other.

Methodology

The Study Area was investigated for the presence of potential summer daytime bat roosting trees.

Per recommendation of Scott Darling (Vt. F&W), only shagbark hickory and black locust trees with a diameter at breast height (DBH) greater than 10" and other species with a DBH greater than 12" were evaluated for Indiana bat roosting characteristics.

The ROW was searched for the presence of trees that met the following criteria which is based on consultation with Scott Darling (Vt. F&W) as communicated by Galen Guerrero-Murphy of TRC.

- Shagbark Hickory >10" DBH
- Black Locust >10" DBH
- Any Spp. >12" DBH, dead or alive, with:
    - Large crevices or cavities
    - Deeply furrowed bark
    - Exfoliating bark

Once a potential roosting tree was located, as much of the tree as possible (given the constraints of being on the ground) was investigated for holes, crevices, the degree of bark furrowing, and the degree of exfoliating bark. If specific tree and site conditions warranted, a pair of 10 x42 binoculars was used to aid in the identification of bark and cavity characteristics. A standardized form was developed and filled out at each tree that met these criteria. At each tree the following information was recorded:

- Date
- Investigator

- Tree species
- Diameter at breast height (DBH)
- Tree cavities (relative size and number of cavities)
- Tree crevices
- Relative degree of bark exfoliation
- Photo ID
- Location ID

A photograph was taken of each tree and a point location was taken with a mapping grade GPS (assumed 20 ' +/- accuracy) at each tree.

Multiple tree groups:

A single GPS point location was recorded when more than 1 tree of the same species, with similar DBH and bark condition, were in close proximity to each other and generally not found in a linear row such as hedgerow. When multiple trees of the same species, with similar DBH and bark conditions were extended along a linear row a point location was recorded at each end of the row of trees and later coalesced into a single point representing the approximate mid-point location of the group. A single form describing the range in conditions of the trees found within the group was completed.

Isolated Trees:

Although trees that are isolated from surrounding forest patches, i.e. "yard trees", are not typically utilized by roosting Indiana bat (Scott Darling, Vt. F&W, personal communication), isolated trees meeting the criteria were none-the-less identified in the course of this survey. Trees possessing the physical characteristics of potential bat roost trees that were isolated from surrounding forest patches are indicated as "isolated".

Results

116 trees were identified as potential day-roosting Indiana bat trees in the Study Area. Approximate locations (as recorded in the field by mapping grade GPS) of identified trees are contained within the attached GIS data. Shagbark hickories were the most common tree, followed by red maples (*Acer rubrum*), black locust and sugar maple (*Acer saccharum*). Table 1 below displays the numbers of trees of each species, and species percentage of the overall total. An Indiana Bat Tree Data Table is included as Appendix 1.

Table 1.Survey Data Summary

Tree Species	Count	% of Total
Shagbark Hickory	44	38%
Black Locust	22	19%
Red Maple	16	14%
Sugar Maple	13	11%
White Pine	6	5%
White Oak	3	3%
Red Oak	3	3%
Ash spp.	2	2%
Basswood	1	0.9%
Cottonwood	1	0.9%
Unknown	1	0.9%
Bitternut Hickory	1	0.9%
Black Birch	1	0.9%
Elm	1	0.9%
Spruce Spp.	1	0.9%
Grand Total	**116**	**100%**

Data Deliverables

Data collected is presented in two formats. A spreadsheet includes metrics recorded on all trees identified within the Study Area. A GIS point shapefile

identifies the approximate spatial location of each tree. Additional spatial characteristics are included in the GIS data file, including approximate project mile-marker location and reporting road segment location. In addition, the tree metrics from the spreadsheet have been incorporated into the GIS data for a comprehensive compendium of collected data. Photos are included as stand-alone jpg format files, accessible via hyperlink from both the spreadsheet and GIS data provided relative file paths are maintained. The collected metrics are described in the following table:

Table 2.Data Collection Metrics

Column Name	Description
GPS_ID	Unique Identifier tied to spatial location collected via GPS
SppCode	Field code used to identify tree species
Species	Tree species common name- derived from SppCode using lookup table
MinDBH	Minimum DBH when multiple trees recorded at a single location
MaxDBH	Tree DBH, or Maximum DBH when multiple trees recorded at a single location
Photo1	Photo ID
View	Hyperlink to open photo directly from spreadsheet
CavitySz	None/Small/Medium/Large designation for cavities present
CavityCnt	None/Few/Many designation for numbers of cavities present
Furrowing	None/Shallow/Moderate/Deep designation for bark furrowing
Exfoliation	None/Low/Moderate/High designation for bark exfoliation
Snag	Indicated Yes if the tree was a dead or nearly dead standing snag
TreeCnt	Number of trees when multiple trees recorded at a single location or along a linear hedgerow
GroupLenFt	Approximate linear length of grouped trees when multiple trees recorded along a linear hedgerow
Isolated	Yes indicated if tree exists in isolation from forested areas
Comments	Additional comments by surveyor

Note, mile marker references are included in the data table; however the markers refer to the April 2014 project mile posts. Project route, reference points and associated mile markers have since been updated.

Phase 2

Recommended next steps in evaluating potential bat roosting trees within the project area:

1. Identify route locations where tree cutting is likely or preferred.
2. Overlay bat tree locations to identify trees for further assessment.
3. Conduct detailed mapping and identify specific potential bat roosting trees slated for removal based on project requirements.
4. Conduct visual and/or acoustic bat exit surveys of trees identified for removal. Exit surveys should be conducted mid-June to mid-August.
5. Assess surrounding area for potential to provide appropriate alternative roosting sites.

References

A Landowner's Guide to Indiana Bat Habitat Stewardship (VT F&W Department) http://www.vtfishandwildlife.com/library/factsheets/nongame_and_Natural_Heritage/Landowner's_Guide_to_Indiana_Bat_Habitat.pdf

Indiana Bat (US F&WS Fact Sheet) http://www.fws.gov/midwest/Endangered/mammals/inba/inbafctsht.html

K. Waltrous, Predicting Minimum Habitat Characteristics of the Indiana Bat in the Champlain Valley of Vermont and New York) 2005 UVM Dissertation

Appendices

Appendix 1

Indiana Bat Tree Data Table

Appendix 1: Indiana Bat Tree Data Table

GPS ID	Species	Min DBH	Max DBH	Photo	Cavity Size	Cavity Count	Furrowing	Exfoliation	Snag	Tree Count	Group Length (ft)	Isolated	Comments
1	Red Maple		32	3285	None	None	M	None		1			
2	Black Locust		12	0118	None	None	D	None		1			
3	Black Locust		20	0117	None	None	D	None		1			multi stem
6	Shagbark Hickory		20	3289	None	None	None	L		1			
7	Red Maple		40	3290	S	Mult.	M	None		1			
8	Red Maple		44	3291	S	Mult.	M	None		1			
9	Shagbark Hickory		24	3292	None	None	None	M		1			
10	Red Maple	36	40	3293	None	None	M	None		1			
11	Red Maple		40	3294	None	None	M	None		1			
11b	Shagbark Hickory		20	3314	None	None	None	M-H		1			also collected as 33
1213	Black Locust	12	20	3295	None	None	M	None		9	175		
14	Shagbark Hickory		14	3296	None	None	None	M-H		1			
16	Sugar Maple		32	3298	None	None	M	None		1			
17	Black Locust		16	3299	None	None	M	None		1			
1819	Black Locust	12	20	3300	None	None	D	None		5	70		
20	Sugar Maple		36	3301	M	Mult.	M	None		1			
21	Red Maple	22	38	3302	L	Mult.	M	M		2			
22	Shagbark Hickory		12	3304	None	None	None	M		1			
2324	Black Locust	22	26	3305	M	Mult.	D	None		3	55		
25	Shagbark Hickory		12	3306	None	None	None	M-H		1			
27	Sugar Maple		34	3307	M-L	Mult.	D	None		1			
28	Shagbark Hickory		14	3308	None	None	S	L		1			
29	Red Oak		22	3309	M-L	Mult.	M	None		1			
29b	Shagbark Hickory		12	3310	None	None	None	M		1			
30	Sugar Maple		18	3311	M	Mult.	M	None		1			
32	Shagbark Hickory		17	3313	None	None	None	H		1			
34	Red Maple		45	3315	M	Mult.	None	M		1			
35	Red Maple		38	3316	M	Mult.	None	M		1			
36b	Shagbark Hickory		16	0119	None	None	None	L-M		1			
37	Black Locust	13	20	3319	None	None	M	None		2			
41	Sugar Maple		28	3326	None	None	None	M		1			
52	Black Birch		14	3338	S	Mult.	None	M	Y	1			
53	Sugar Maple		15	3339	S	Mult.	None	L	Y	1			
54	Shagbark Hickory		17	3340	None	None	None	M	Y	1			
55	Shagbark Hickory		14	3341	None	None	None	M-H		1			
56	Shagbark Hickory		13	3342	None	None	None	M		1			
57	Basswood		26	3345	M-L	Mult.	D	None		1			
58	Shagbark Hickory		17	3346	None	None	None	M		1			
59	Red Maple		54	3347	S-M	Mult.	None	L		1			
60	Red Maple		23	3348	S	Mult.	None	M-H		1			
61	Red Maple		42	3349	M	Mult.	None	M		1			
62	Shagbark Hickory		12	3350	None	None	None	M		1			
64	Shagbark Hickory	18	20	3352	None	None	S	M-H		2			
65	White Oak		26	3353	None	None	None	H		1			
67	Red Maple		38	3354	M-L	Mult.	None	M-H		1			
68	Shagbark Hickory		12	3357	None	None	None	M-H		1			
69	Shagbark Hickory		14	3358	None	None	None	M		1			
70	Red Maple		48	3359	M-L	Mult.	S	L		1			
71	Shagbark Hickory		11	3360	None	None	None	L-M		1			
72	Shagbark Hickory		12	3361	None	None	None	H		1			
73	Shagbark Hickory		20	3362	None	None	None	H		1			
74	Shagbark Hickory		13	3363	None	None	None	L-M		1			
75	Ash spp.		36	3364	M	Mult.	M	None	Y	1			spp not clearly id-able
76	Red Oak		45	3365	M-L	Mult.	D	None	Y	1			
78	Red Oak		26	3367	M-L	Mult.	None	M-H		1			
79	Shagbark Hickory		14	3368	S	Mult.	None	H		1			
80	Shagbark Hickory		12	3369	None	None	None	M		1			
81	Shagbark Hickory		14	3371	None	None	None	H		1			
81b	Unknown		15	3372	M	Mult.	S	L	Y	1			
82	Shagbark Hickory	15	16	3373	None	None	None	H	Y	2			

GPS ID	Species	Min DBH	Max DBH	Photo	Cavity Size	Cavity Count	Furrowing	Exfoliation	Snag	Tree Count	Group Length (ft)	Isolated	Comments
82b	Bitternut Hickory		16	0011	S	Mult.	None	H		1			
83b	White Oak		25	0012	None	None	D	None		1			
84	Sugar Maple	36	52	3375	M-L	Mult.	None	M-H		2			
85c	Sugar Maple		30	0122	M-L	Mult.	S	I		1			
87	Elm		17	0130	S	Mult.	None	H		1			
88	Shagbark Hickory		11	0017	None	None	None	M	Y	1			outside of row
88b	Spruce Spp.		15	0132	L	Mult.	None	M	Y	1			only 15 ft high
90	Shagbark Hickory	10	12	0019	None	None	None	M-H		4			
91	Shagbark Hickory		11	0020	None	None	None	M		1			
92	Shagbark Hickory		19	0022	None	None	None	H		1			
93	Shagbark Hickory		18	0021	None	None	None	M-H		1			multi stem
94	Cottonwood		32	0023	M	Mult.	D	None		1			multi stem
95	Shagbark Hickory		12	0133	None	None	None	L-M		1			
96	Ash spp.		16	0131	S	Mult.	M	L	Y	1			
96b	Shagbark Hickory		11	0003	None	None	None	L-M		1			
97	Shagbark Hickory		28	0004	L	Mult.	None	H		1			
98	Shagbark Hickory		32	0005	M	Mult.	None	H		1			
99	Red Maple		20	0008	None	None	None	M		1			
101	Shagbark Hickory		35	0016	None	None	None	H		1			
103	White Oak		21	0135	None	None	D	None		1			
105	White Pine		22	0136	S	Mult.	D	None	Y	1			
106	Shagbark Hickory		15	0032	None	None	None	H		1			
107	Shagbark Hickory		11	0033	None	None	None	H	Y	1			
108	Shagbark Hickory		18	0034	S	Mult.	None	M-H		1			
109	White Pine		19	0035	S	Mult.	None	M-H		1			
110	Sugar Maple		12	0036	S	Mult.	None	H	Y	1			
111	White Pine		20	0137	S-M	Mult.	None	M	Y	1			
115	White Pine		18	0041	M	Mult.	D	None	Y	1			
116	White Pine		31	0042	M	Mult.	D	None	Y	1			
118	Red Maple		45	0043	L	Mult.	D	None	Y	1			
119	White Pine		38	0044	M	Mult.	M	None	Y	1			
201	Sugar Maple		34	0127	M	Mult.	D	None		1			others away from ROW
502	Sugar Maple		40	0125	S-L	Mult.	None	L-M		1			
503	Sugar Maple		36	0126	S-L	Mult.	M	None		1			

ATTACHMENT F

Docket No. _____
Exh. TDI-GGM-7

Non-Native Invasive Species
Inventory Report
New England Clean Power Link Project
October 23, 2014

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Table of Contents

Introduction

Arrowwood Environmental (AE) conducted an inventory of Non-Native Invasive Species (NNIS) in connection with the terrestrial component of the NECPL Project. This inventory was conducted concurrently with a rare, threatened and endangered (RTE) plant species inventory. The report for the RTE inventory is being submitted under separate cover.

Study Area

The route of the study area is as follows:

1. Canadian Border down Bay Road to 55 Bay Road, Alburg
2. Exit Lake at 113 Stoney Point Road, Benson
3. Lake Road to Route 22A
4. Route 22 A to Route 4
5. Route 4 to Route 7
6. Route 7 to Route 103
7. Route 103 to Route 100
8. Route 100 to Town Roads in Ludlow
9. Town Roads in Ludlow

The width of the study area corridor is as follows:

1. Alburg: 50 foot total width, including existing roadway surface (Town ROW) and private parcel owned by project developer.
2. Town Roads in Benson: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs and private parcel owned by project developer.
3. VT Route 22A: Entire width of VTrans or Town of Fair Haven ROWs, ~ 66 feet.

4. US Route 4: Entire width of VTrans ROW on either side of paved roadway/shoulder (~125'), not including the median (North of westbound lands and South of eastbound lanes).
5. US Route 7: Entire width of VTrans ROW
6. VT Route 103: Entire width of VTrans ROW
7. VT Route 100: Entire width of VTrans ROW
8. Town Roads in Ludlow: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs.

Methodology

The NNIS general survey methodology is outlined in Section 6.1 of the *Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Community Survey Pro*gram (TRC Companies, Inc, April 2014).

Non-Native Invasive Species (NNIS) are plant species that are not native to Vermont and can become aggressive invaders of native plant communities. The list of species that are considered NNIS is based on the Class A and B Noxious Weeds in the Vermont Noxious Weed Quarantine Rule (2002).

There are 4 different species of invasive honeysuckles (*Lonicera spp*.) on this list. During the field inventory, it was not always possible to distinguish between the species (especially on vegetative specimens). For this reason, all of the honeysuckles were mapped as *Lonicera sp*..

The NNIS surveys were conducted by three botanists: Michael Lew-Smith, Matt Peters and Art Gilman. The surveys commenced on July 17, 2014 and concluded on August 19, 2014. Meander surveys were conducted throughout the Project

survey area. Project survey area boundaries were imported into field GPS units to identify the limits of the study area during the field surveys.

Locations of NNIS species were recorded using GPS point locations. Two different types of points were employed based on the nature of the NNIS population, "Local" points and "Continuous" points. "Local" points recorded NNIS species that occurred either at that point location or in a local area. If the plants occurred in a local area, the dimensions of that area were recorded in square feet. In either case, either the number of plants or the percent cover of the NNIS was also recorded.

"Continuous" points were developed after the first week of field survey based on the widespread and abundant nature of NNIS along Route 4. This wide ROW corridor has many species of NNIS that are often scattered over long distances. It was impractical to record each individual occurrence under these circumstances. Instead, the "Continuous" points record the beginning and end of infestations for each NNIS species present. In post-processing, the continuous points were converted into linear features showing the extent of each infestation. Linear representations of these continuous occurrences were developed through manual and automated processing in a GIS environment parallel to the survey area at a fixed offset distance varied by species. In general, the lines begin parallel to points flagged as infestation start points and terminate parallel to points flagged as end points. The lines are not intended to represent the actual location of the infestation within the study area, rather are suggestive of the length and general position of each extensive infestation area along the study area. Attempts were made to determine the appropriate side of the road for each set of start/end points and lines are positioned to convey road-side. Lines are offset at predetermined fixed distances based on species to facilitate visual distinction of overlapping species occurrences. Due to the variability of the

source data, errors or omissions may exist. Both start/end points and linear representations of continuous occurrences are included in the spatial data deliverables.

For both the local and continuous points, data on the phenology of the plants was taken. One of the three categories, Flowering, Fruiting, or Vegetative was selected for each population. If plants exhibited more than one phenology, the dominant phenology type was chosen.

The data accompanying this report includes three GIS spatial data files. First, the local point data ("Invasive_LocalPts") which provides information on NNIS species, phenology, size of infestation and abundance. Second, the continuous point data ("Invasive_LinearPts") which provides the "start and end" point data that the linear infestations data was derived from and also includes information on species, phenology and abundance. Third, the linear infestation data ("Invasive_LinearLines") which provides a line file that is meant to represent the area occupied by continuous populations in between the start and end points.

Results

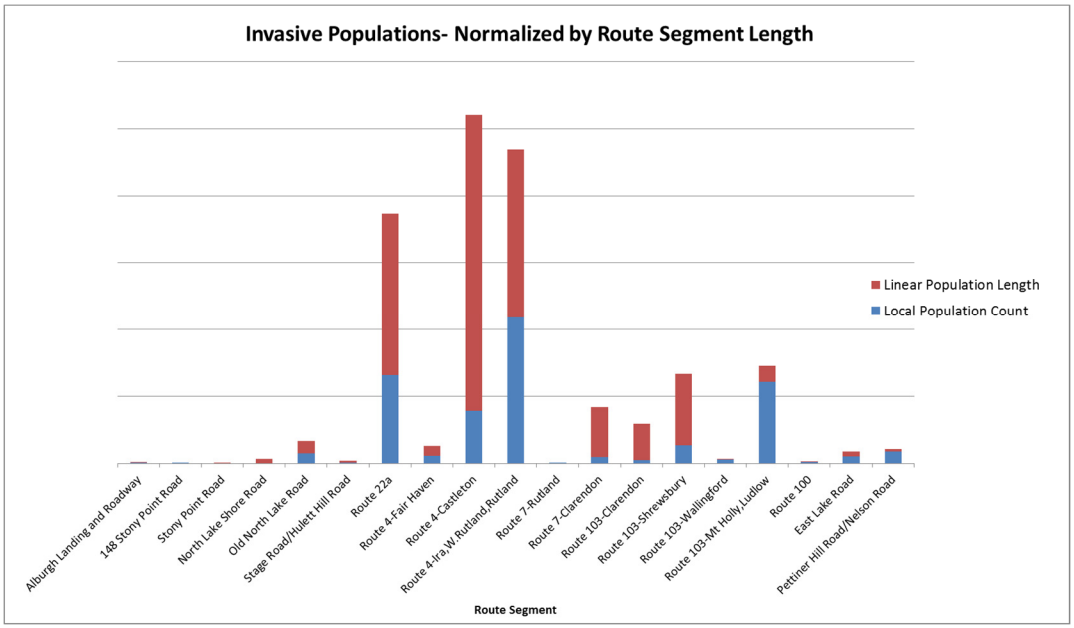
A total of 10 different NNIS species were documented throughout the study area. Table 1 shows the total number of localized infestations as well as the linear miles of infestation for each species. The data for the localized infestations was taken from the "Local" point dataset, while the linear infestation data was derived from the "Continuous" dataset. Summary data for the NNIS infestations is provided in the table below.

Table 1. Summary Data for NNIS Infestations

Latin Name	Common Name	# Localized Infestations	Miles of Linear Infestation
Aegopodium podagraria	Goutweed	27	0.3
Alliaria petiolata	Garlic Mustard	46	3.7
Butomus umbellatus	Flowering Rush	1	0
Celastrus orbiculatus	Oriental Bittersweet	17	0
Lonicera sp.	Honeysuckle	154	42.3
Lythrum salicaria	Purple Loosestrife	151	35.1
Phragmites australis	Phragmites	93	3.6
Polygonum cuspidatum	Japanese Knotweed	49	0.4
Rhamnus cathartica	Common Buckthorn	54	38.4
Rhamnus frangula	European Buckthorn	31	12.0
Vincetoxicum nigrum	Black Swallowwort	12	1.0

As can be seen from this table, the three most common NNIS species are the honeysuckle, purple loosestrife and common buckthorn. These species are present throughout the study area, though most abundant along Route 4. Black swallowwort appears to be most abundant in the towns of Benson and Fair Haven and absent east of Rutland. Japanese knotweed is most common along

Rte 103 in Shrewsbury and Wallingford where it appears to colonize the roadsides from infestations along the Mill River. The only location for flowering rush was on the shores of Lake Champlain at the far western end of the study area. For the flowering rush and Oriental bittersweet, no continuous populations were recorded so the miles of linear infestation is listed as zero.



Note: Y axis represents population length and count, graph displays relative population distributions only.

Figure 1. NNIS Distribution Graph

Figure 1 shows the relative distribution of NNIS populations by route segment, normalized by length. The Y axis represents both length of population (inclusive of both sides of the roadway) and population count. This figure illustrates that, even normalized by route segment length, NNIS species are most abundant along Route 4. The wide disturbance created and maintained by the road has provided abundant habitat for NNIS species. Town roads such as those in Benson and Ludlow had the least amount of NNIS due to their small size and relatively less disturbed ROWs.