

Draft: Arms Forest Ecological Mapping Report

August 27, 2018



Burlington Wildways Arms Forest Working Group:

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Arms Forest and the adjacent privately-held lands of Rock Point, include over 200 acres of forest, which comprises the largest contiguous forest in the City of Burlington. The underlying matrix of bedrock and soils and suite of natural communities that characterize Arms Forest forms an ecologically functional landscape that includes several state and locally significant natural features. Arms Forest is a keystone landscape bridging between the lakeshore communities and the extensive riparian habitats along the Winooski River. Maintaining and enhancing ecological function across Arms Forest is fundamental to conserving local and regional biological diversity.

This Arms Forest report relies on data collected by local scientists and naturalists and will serve as a template for evaluating other Burlington natural areas. We created this report based on the coarse filter conservation approach outlined in Vermont Conservation Design: Summary Report for Landscapes, Natural Communities, Habitats and Species. Wherever possible, we incorporated their language. Vermont Conservation Design (VCD) is a science-based state-wide conservation plan researched and developed by Vermont Agency of Natural Resources (ANR). This plan provides a scientific benchmark for long term conservation success in Vermont.

VCD identifies Arms Forest as a highest priority landscape block for conserving a state-wide ecologically functional landscape, for its physical landscape features, connectivity with nearby high quality natural areas, its interior forest character of uncommon natural communities and plant species. (*Vermont Conservation Design: Summary Report for Landscapes, Natural Communities, Habitats, and Species.*) [Map 1: Arms Forest Location Map.]

Conservation Targets:

I. Landscape Features maintain ecological function by supporting the greatest diversity of species and key ecological processes over time.

- **Interior Forest Block:** Arms Forest includes a mosaic of forest community types and ages within Arms Forest and adjacent lands, where natural processes such as forest succession can occur, that is characterized by combinations of ecological conditions that accommodate the needs of diverse biota. Habitat for interior forest wildlife species (i.e. Scarlet Tanagers) requires larger unfragmented blocks of forest habitat. VCD identifies Arms Forest as a Priority Interior Forest Block. [Map 2: Priority Interior Forest Blocks of Northern Burlington.]
- **Physical Landscape:** The unique matrix of landscape-level physical features of Arms Forest includes calcium rich outcrops and sandy, delta soils and the associated mosaic of state significant natural communities. VCD identifies Arms Forest as a Highest Priority Physical Landscape and a Rare Physical Landscape. [Map 3: Physical Landscape.]

- **Connectivity Block:** Wildlife travel corridors through Arms Forest facilitate movement and dispersal of wide-ranging animals between the lake and the Intervale and Winooski River. Arms Forest also enables plant and animal species to colonize new and appropriate habitat as climate and land uses change. VCD identifies Arms Forest as a Highest Priority Connectivity Block. [Map 4a: VCD Highest Priority Connectivity Blocks. Map 4b: Wildlife Corridors. ****Map 4c Or Addendum/Appendix page?:** Burlington Vermont Mammal Records. Data provided by Sophie Mazowita]
- **Surface Waters and Riparian Areas:** The stream and associated riparian zone in the ravine on the southwest edge of Arms Forest provides a crucial element of connectivity between the lake and the upland forest. VCD identifies this corridor as a High Priority Surface Waters and Riparian Area. [Map 5: VCD Highest Priority and Priority Surface Water and Riparian Areas.]

II. Priority Habitats and Natural Communities are finer scale features that – when conserved in conjunction with the landscape features – are necessary to maintain and enhance an ecologically functional landscape in Vermont.

- **Natural Communities:** VCD identifies two Uncommon Natural Communities in Arms Forest: Mesic Maple-Ash-Oak-Hickory Forest and Transition Hardwood Limestone Forest. These two communities are recognized as Significant Natural Communities by ANR. Two state-listed rare plants are shown on Map 2a: Stout Goldenrod, *Solidago squarrosa*, and Yellow Ladyslipper, *Cypripedium parviflorum*. Burlington Vermont Master Naturalists' plant records illustrate the rich diversity of the spring wildflowers found in these natural communities, 5/19/18. [Map 6a: VCD's Rare and Uncommon Natural Communities; Map 6b: Uncommon and Rare Species. Map 6c: LIDAR map with Arms Forest Natural Communities]
- **Wetlands:** Arms Forest includes a vernal pool, small wetlands and seeps. Plans to map the vernal pool are underway. The vernal pool has been studied by UVM students since the 1990's. Most recently Burlington Vermont Master Naturalists documented adults and egg masses of Spotted Salamanders and Wood Frogs on April 26, 2018. [Map 7: Arms Forest Vernal Pool and Upland Forest Buffer Zone. Based on Army Corps of Engineers guidelines.]

Conservation Target Descriptions

Interior Forest Block

The 200-plus acres of upland forest canopy in Arms Forest and adjacent lands comprises the largest contiguous forest in the City of Burlington. The forest matrix includes a variety of smaller natural communities and habitats, such as wetlands, ponds, and cliffs. Some species are “edge sensitive” and require Interior Forest Blocks to survive. For forest interior species, such as the Scarlet Tanager observed in Arms Forest in June 2018, edges increase nest predation, brood parasitism, competition and reduced reproductive success.

Physical Landscape

Arms Forest is characterized by a unique combination of physical features that includes a repeating pattern of raised calcium-rich bedrock outcrops, draped with deltaic sand. The juxtaposition of these distinct physical landscapes creates, among other factors, a mosaic of soils with pH values ranging from acid to neutral and a unique set of natural communities. The stream on the southwest edge of the property exists where surface water has eroded through thick delta sand and silt layers to the underlying impervious clay layer. This surficial geology pattern of eroding sand over underlying clay along the stream can be seen from the bike path.

Connectivity Block

Arms Forest provides wildlife habitat and a wildlife travel corridor for many of the large mammals that live in Burlington including mink, coyotes, red and gray fox, fisher and deer. These six large mammal species have all been documented in Arms Forest in the last two years, where they hunt and browse, seek shelter and mates, and migrate between Rock Point and the lake shore through Arms Forest and across North Avenue to and from the Intervale.

Surface Waters and Riparian Areas

The stream and associated riparian zone in the ravine on the southwest edge of Arms Forest provides a crucial element of connectivity between the lake and the upland forest. Mink have been tracked along this riparian corridor, which also provides habitat for a variety of other mammals and herp species.

Natural Communities

Two state significant natural communities, Mesic Maple Ash Oak Hickory Forest and Transition Hardwood Limestone Forest comprise the forest canopy. Distinct assemblages of plant species characterize these natural communities and intermix where these forest communities meet. Protection of Arms Forest conserves current habitat conditions for plants and animals and may help prevent the disappearance of vulnerable species.

Wetlands: Vernal Pools

Arms Forest includes a vernal pool and other scattered small wetlands. Vernal pools are small ephemeral pools within upland forests that provide breeding habitat for Spotted Salamanders, Wood Frogs and other species. Vernal pool breeding species may travel more than 1,000 feet within the surrounding forest to and from the pool. For over ten months of the year, these species live in the forest under rotting logs, loose rocks and leaf litter, and require a mostly closed forest canopy, abundant coarse woody

debris, and a lack of artificial barriers to salamander movement. During this period of their life cycle, they are vulnerable to trampling and disturbance from off trail activity.

Summary:

The Arms Forest Ecological Mapping Report assembles and maps the known scientific data about the ecological significance of Arms Forest. For over 25 years, ecologists have recognized Arms Forest as one of the most outstanding natural areas in Burlington. Now we know why. With the publication of the Vermont Conservation Design Report (2018) developed with ANR's BioFinder mapping, we now have the tools to evaluate Burlington's natural areas within a statewide ecological framework.

VCD identifies Arms Forest as a ***highest priority landscape block*** for conserving a state-wide ecologically functional landscape, for its physical landscape features, connectivity with nearby high quality natural areas, its interior forest character of uncommon natural communities and plant species.

Arms Grant deed history included here? Goals of the family?

By identifying the significant ecological functions of Arms Forest, this Report will assist BPRW and other land managers in protecting these features for future generations. As a work of science, this report does not address the spiritual, recreational, and educational values of Arms Forest. Yet the value of this report lies in its ability to guide human uses of the Forest and illuminate for visitors the special nature of the place.

Thanks to and references:

Brian Carlson:
VCD

May 19, 2018

Arms Park Area Trails
Burlington, VT

Legend

- Easy Hike/Bike/Ski Main Trails
- Easy Hike/Bike/Ski Side Trails
- Moderate Hike/Bike Trails
- Advanced Hike/Bike Trails
- Hiking Only Trails
- Proposed Re-Routes
- Trails to Close
- Bike Path
- 20' Contour Lines
- Existing Boardwalks
- Rock Point Ropes Course
- Wetlands

Trail Work Types

- New Boardwalks
- Drainages
- Rock/Tread Work
- Imported Fill
- Tread Benching
- Wood Stairs
- Corridor Clearing
- Machine Grading

Geographical Features and Roads:

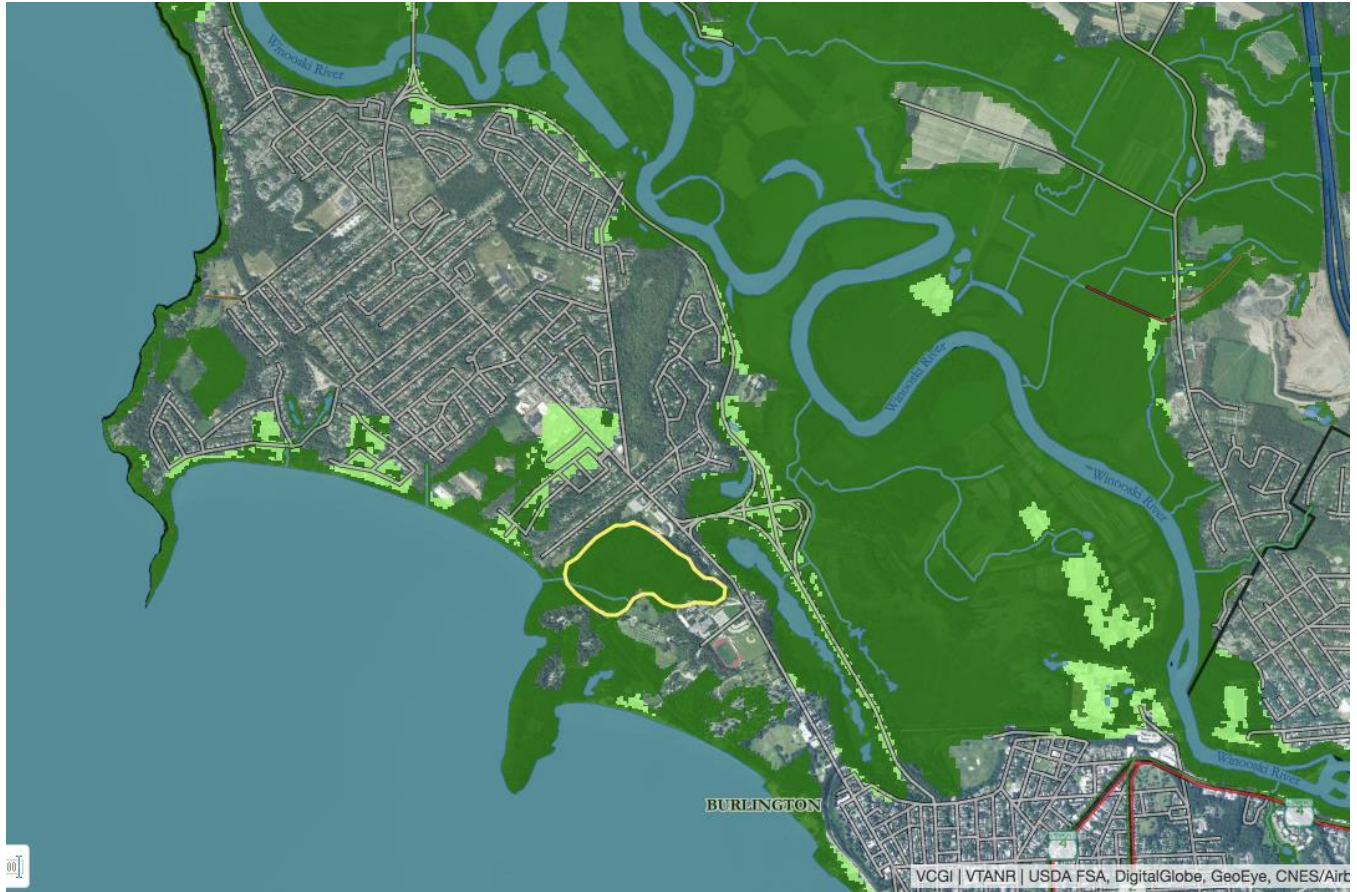
- Lake Champlain
- BACKGUEST DR
- CHAMBERLAIN DR
- UTTER EAGLE WAY
- FLANNERY DR
- Bike Loop Access
- Hiker Trail
- Clerch Spur
- X-C Course
- Northern Singletree
- High Point
- Outlook Spur
- Bike Path Access
- Boardwalk
- Rock Point Access
- Rock Point Loop
- North End Neighborhood
- Northern Singletree
- East Side Singletree
- Wetlands
- INSTITUTE RD
- NORTH AV

Scale and Orientation:

- Scale: 0 to 1,000 Feet
- North Arrow
- Source: Sinusoidal, LLC June 28, 2013

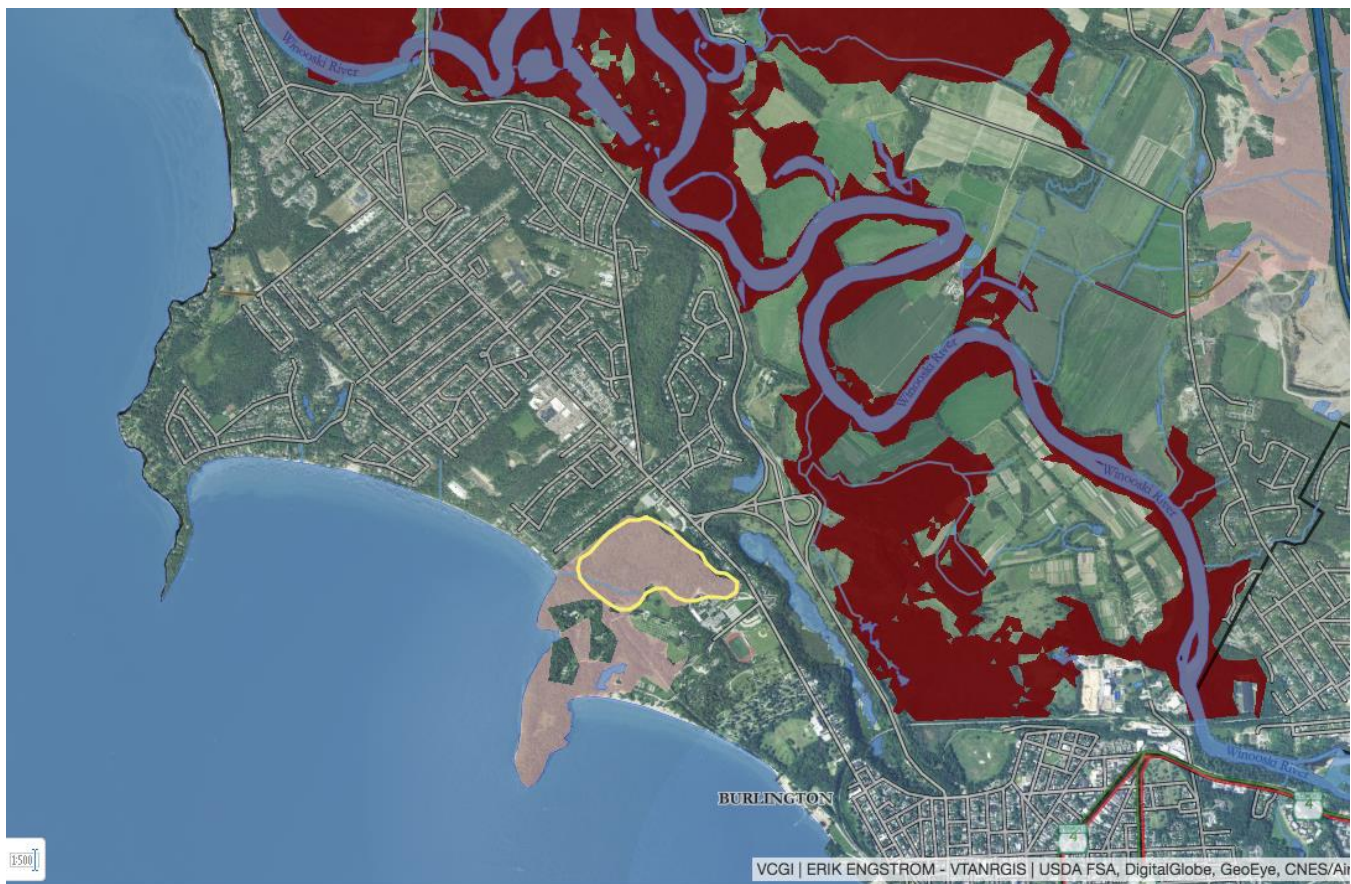
Handwritten Notes:

- Woodland Wildflower Way
- 92



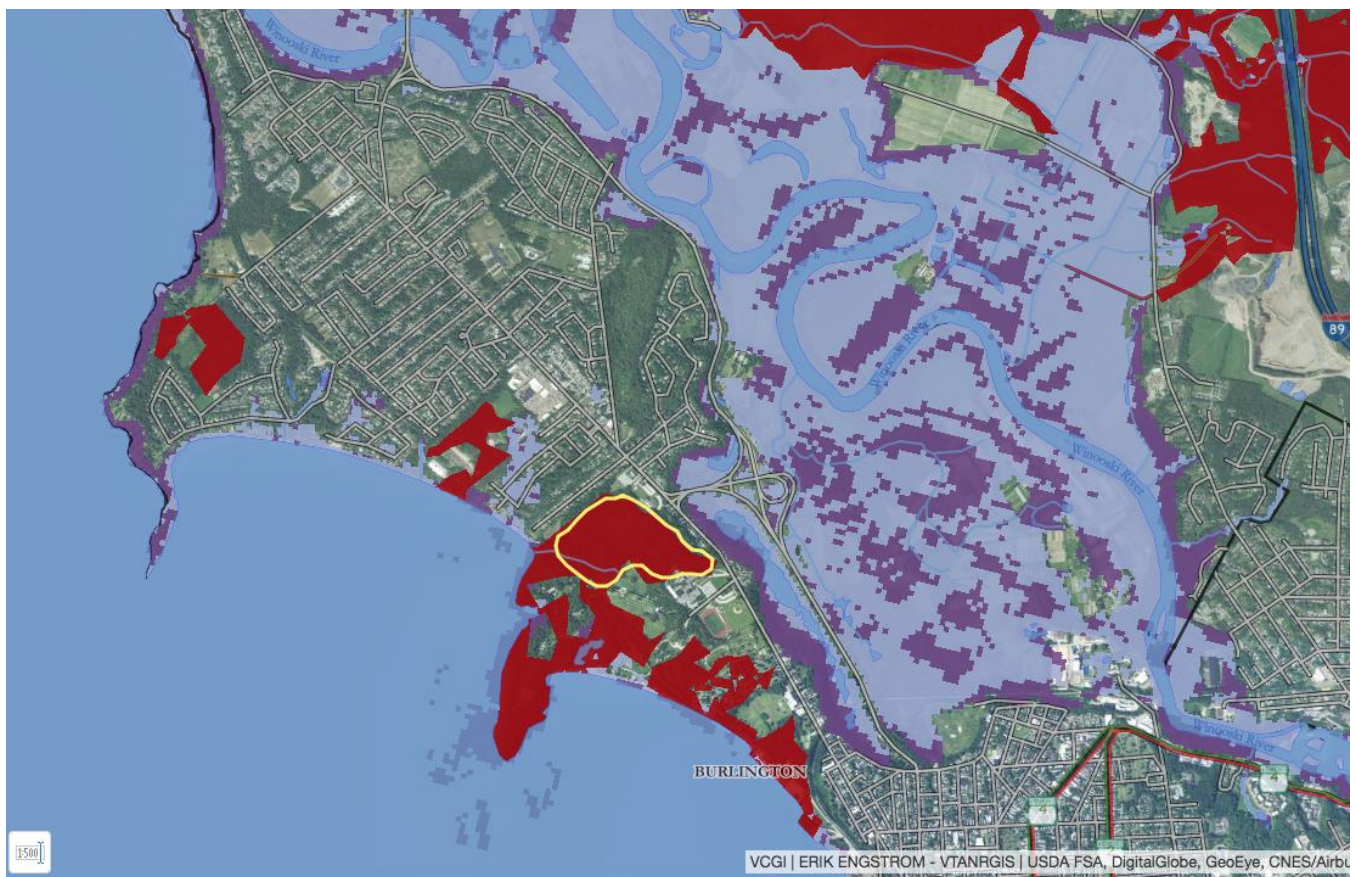
Map 1: Arms Forest Location

This map shows Arms Forest in the context of Burlington's open space in greens.



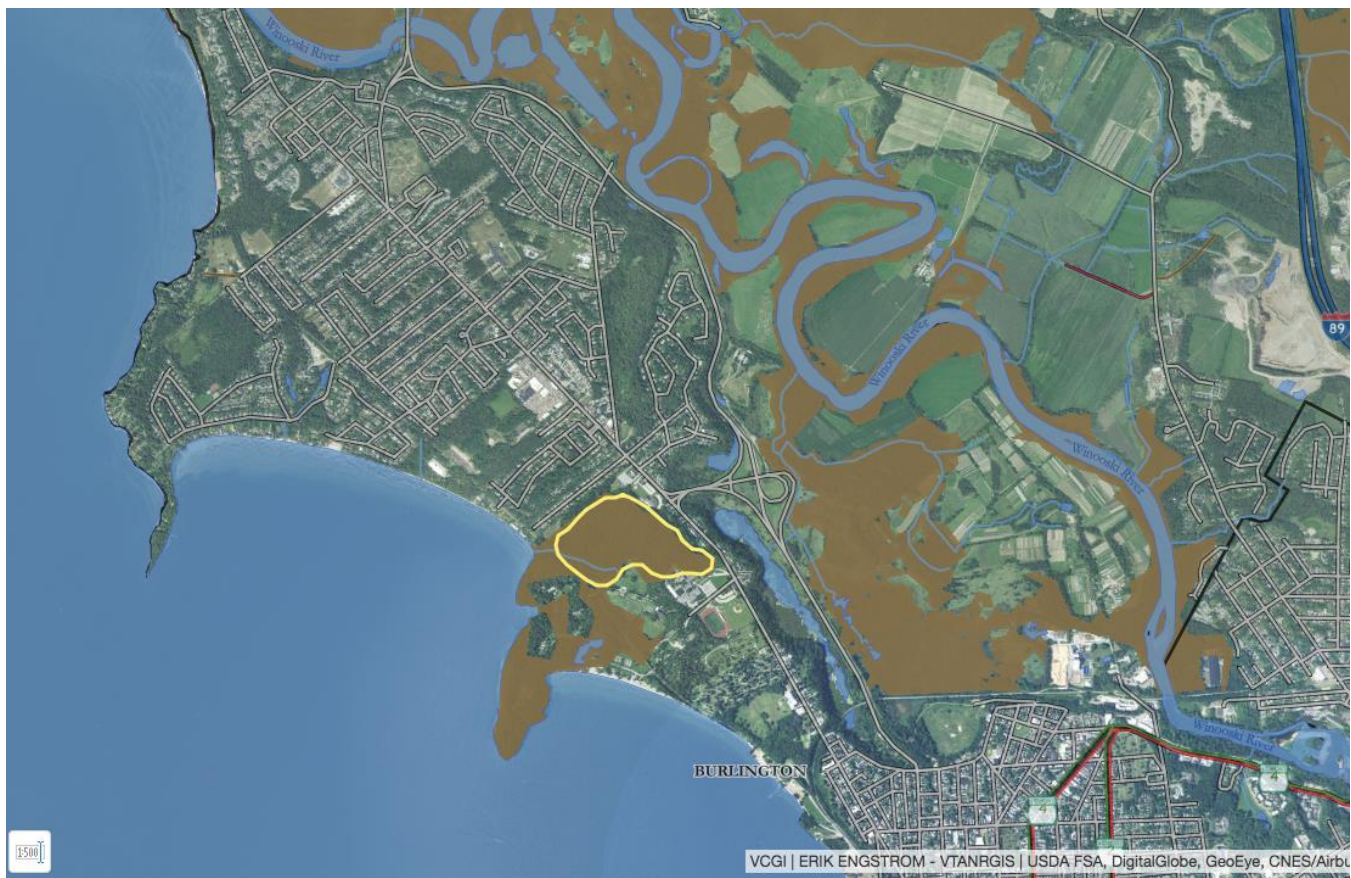
Map 2: Priority Forest Blocks of Northern Burlington

Pink color denotes Priority Interior Forest Blocks. Red color denotes High Priority Interior Forest Blocks



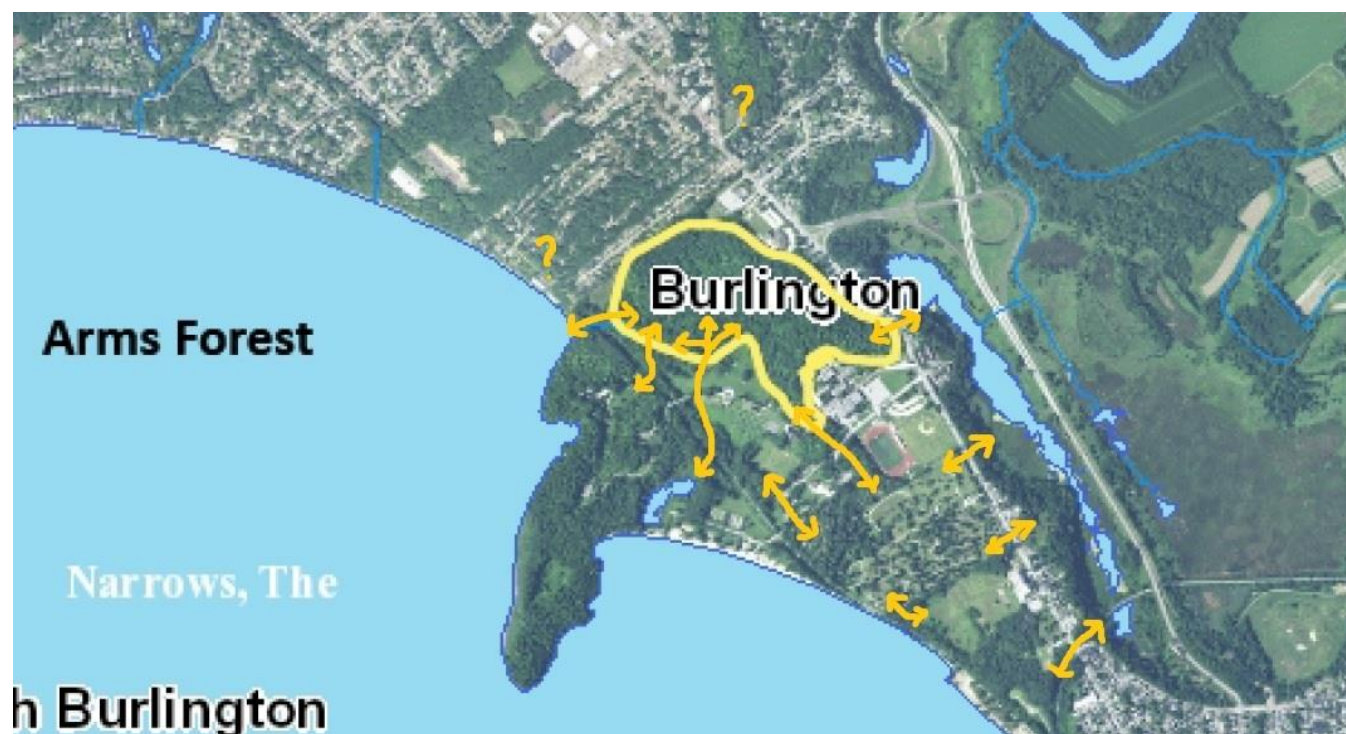
Map 3: Physical Landscape

Red indicates Rare Physical Landscapes, lavender indicates for Representative Physical Landscapes, purple for Responsibility.



Map 4a: Highest Priority Connectivity Blocks in northern Burlington

Brown indicates Highest Priority Connectivity Blocks



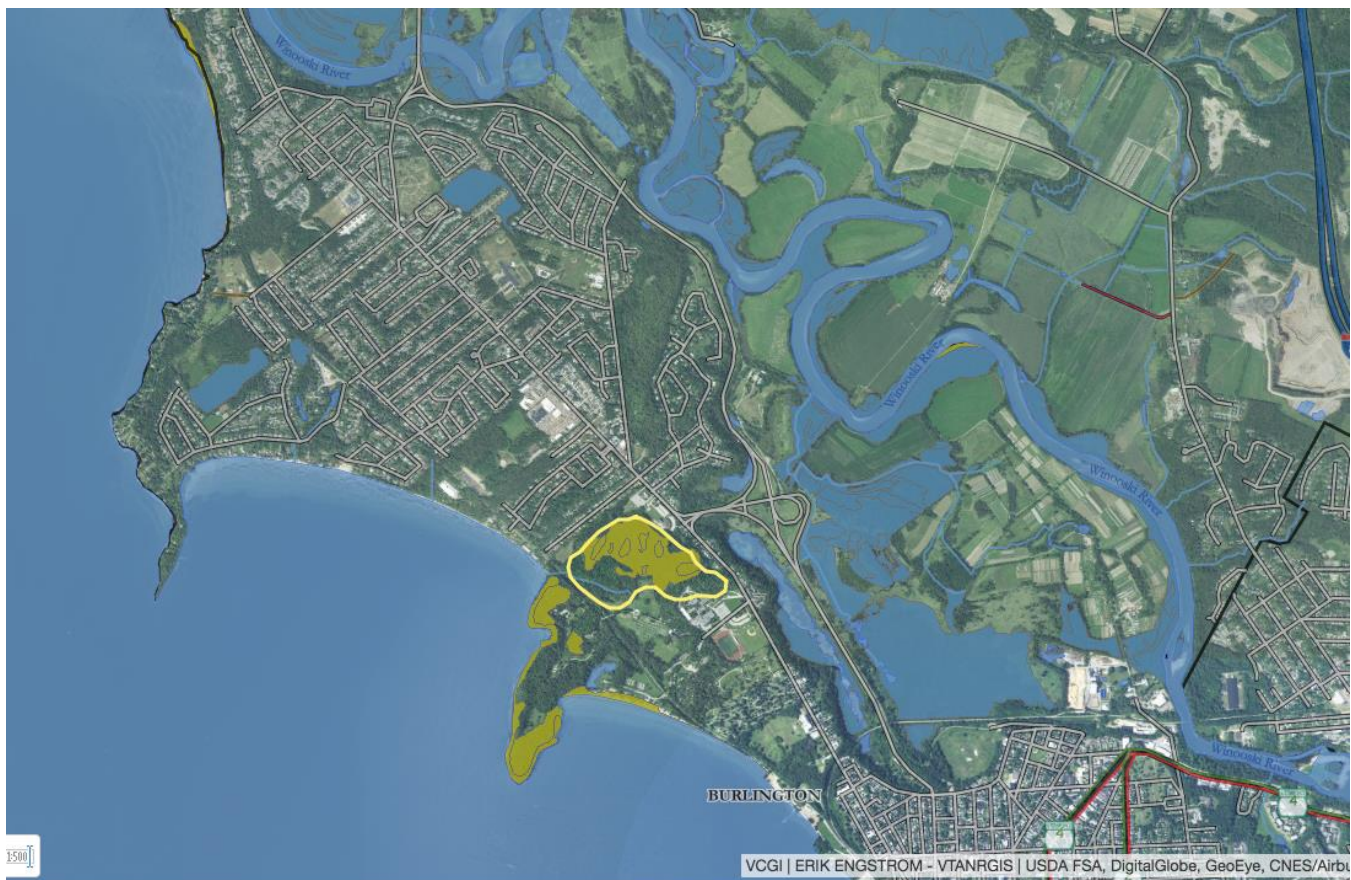
Map 4b: Wildlife Corridors recorded by the Burlington Mammal Project.

Thanks to Sophie Mazowita.



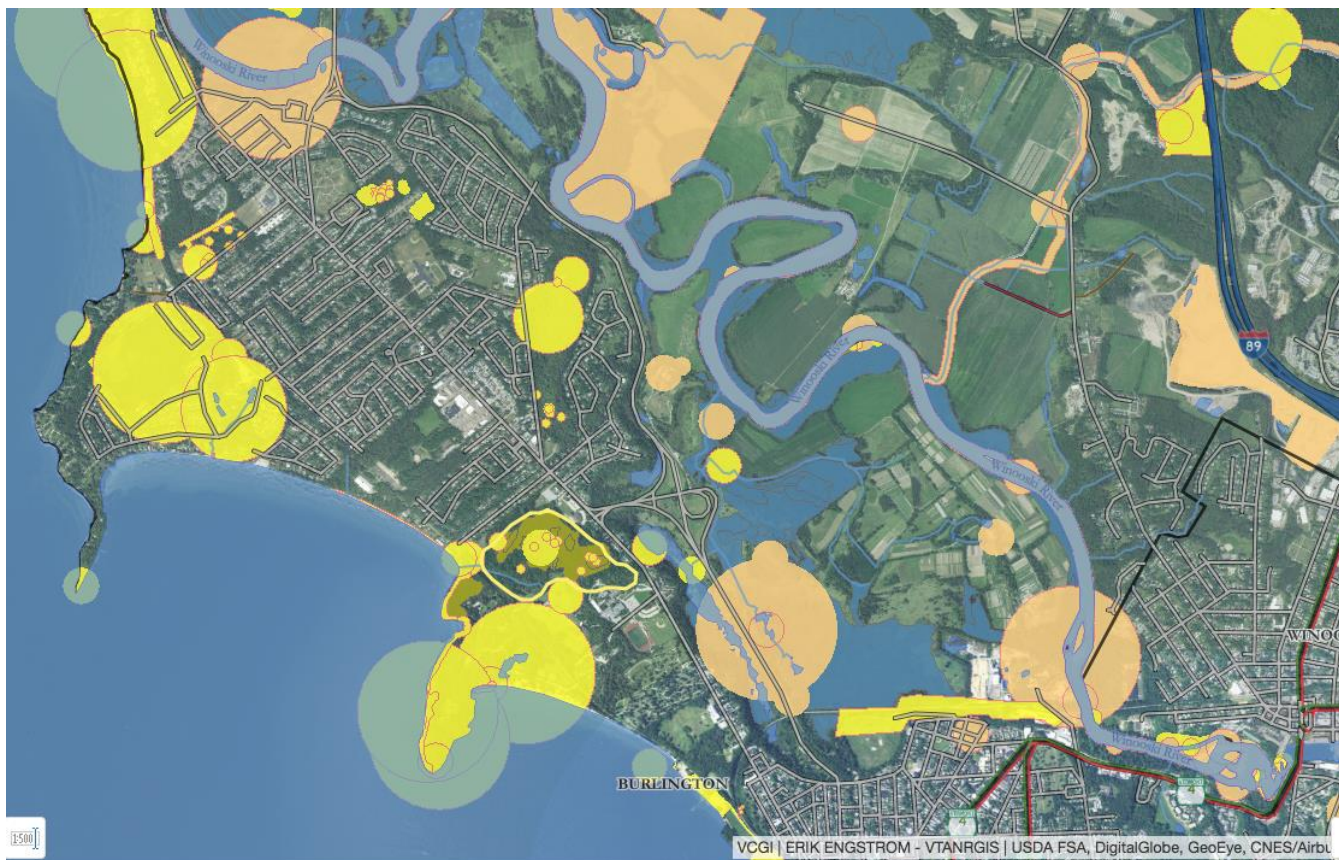
Map 5: Highest Priority Surface Water and Riparian Areas

The small stream through the southern edge of Arms Forest is designated a Highest Priority Riparian Area and is outlined by a yellow dotted line.



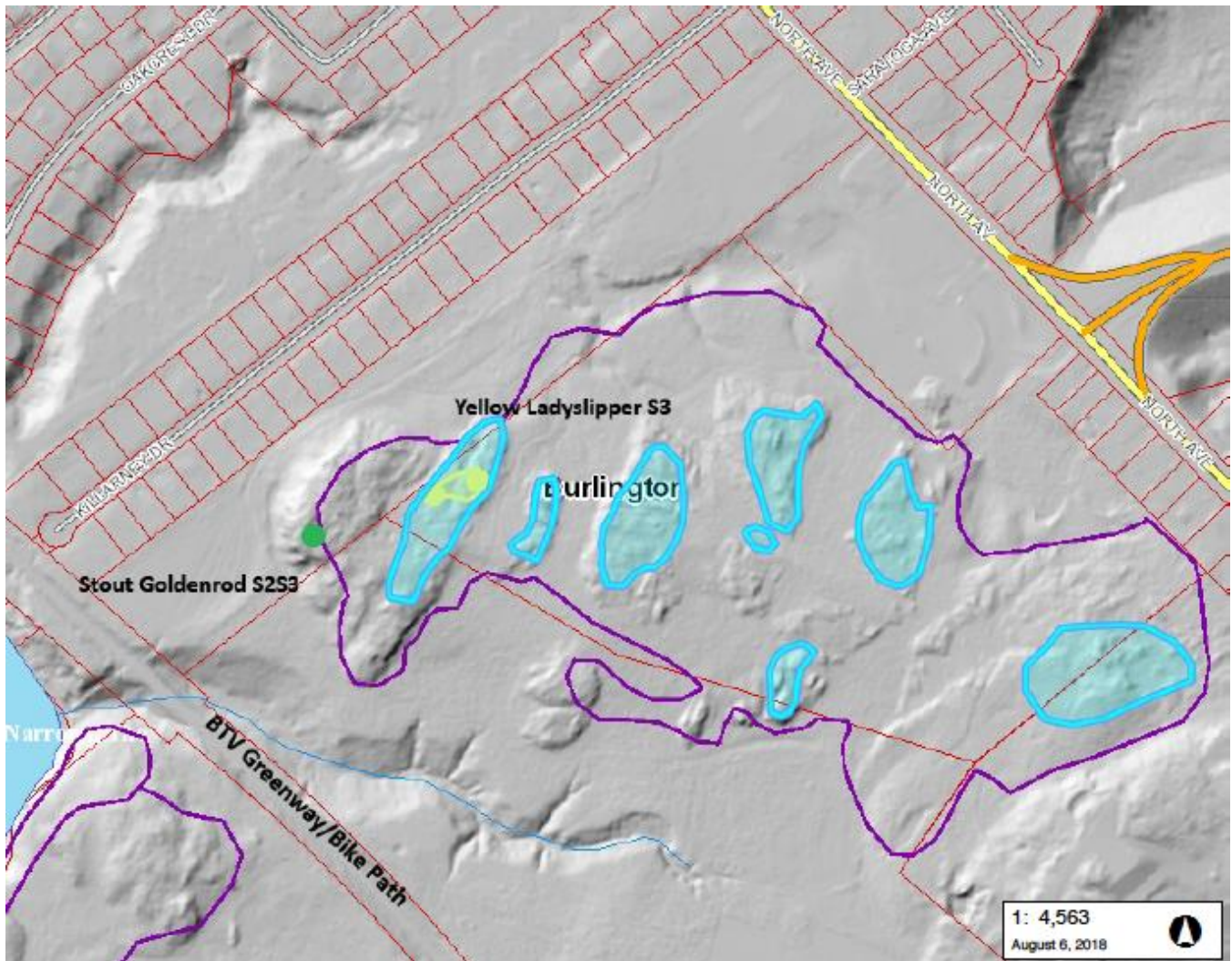
Map 6a: Uncommon Natural Communities

Uncommon Upland Natural Communities are mustard and Uncommon Wetland Natural Communities are blue (along the Winooski River).



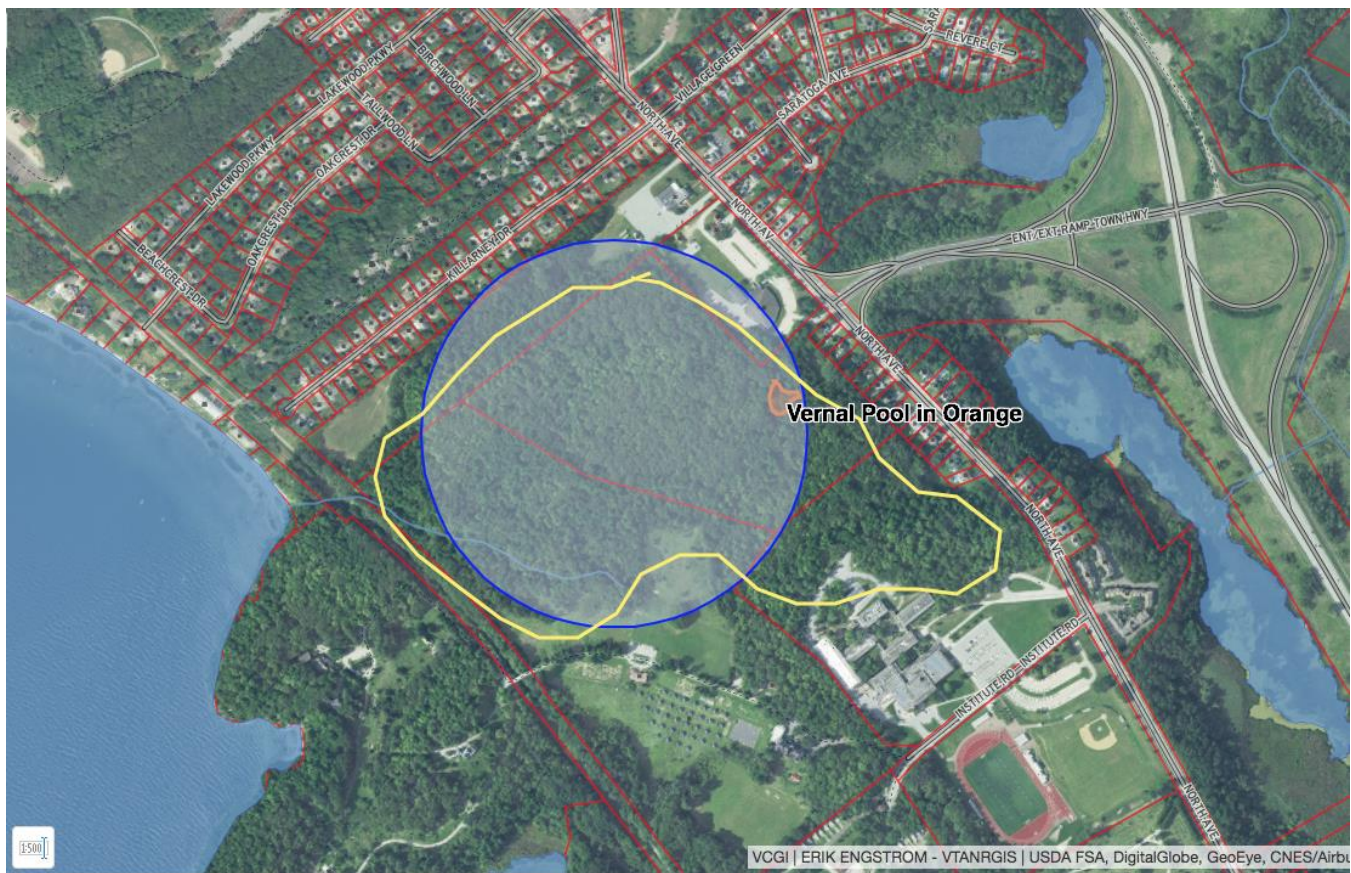
Map 6b: Uncommon and Rare Species

Uncommon plant species are yellow, uncommon animal species are tan. Rare plant species are yellow outlined in red. Rare animal species are tan and outlined in red.



Map 6c: The Uncommon Natural Communities overlaid on a LIDAR map.

The Uncommon Mesic Maple-Ash-Hickory-Oak Forest is outlined in purple. The Uncommon Transition Hardwood Limestone Forest sites are outlined in blue. The Stout Goldenrod, *Solidago squarrosa* population is noted in green and the Yellow Ladyslipper population, *Cypripedium parviflorum*, is outlined in yellow.



Map 7: Arms Forest Vernal Pool and Upland Buffer Zone

The vernal pool is outlined in orange and the upland zone required for amphibians life cycle is outlined in blue. It's about 57 acres with a diameter of about 925 feet.



Map 2: Arms Forest Class II Wetland

There is a Class II Wetland marked in yellow near the brook in the Episcopal Diocese portion of the forest that drains into the lake.