

# Lake Vermilion Trail

Location Study

October 25, 2013



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October 25, 2013

Prepared for:

**Arrowhead Regional Development Commission**

Prepared by:



With assistance from:

University of Minnesota Duluth



# Acknowledgments

The Arrowhead Regional Development Commission (ARDC) gratefully acknowledges the cities, agencies, and citizens who contributed to the content of the Lake Vermilion Trail Location Study. The ARDC extends a special thank you to the Steering Committee members listed below who provided guidance, time, questions, and critical insight throughout the process.

## Steering Committee Members

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- » Caroline Owens, Ely (Committee Co-Chair)
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- » Joe Majerus, MN DNR Parks & Trails
- » Lee Peterson, Greenwood Township
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- » Bob Whalen, Mesabi Trail
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- » Tom Aro, Greenwood Township
- » Leo Wilenius, Lake Country Power
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- » Dave Lamwer, Lake Vermilion Resort Association
- » Andy Holak, St. Louis County
- » Dick Donze, Seasonal Resident
- » Julie Scheuring, Camp Vermilion
- » Gary Woody, Resident
- » Mark Kailanen, St. Louis County
- » Rene Aro, Resident



*The Lake Vermilion Trail may use roadway corridors, such as along County Road 24.*

## Arrowhead Regional Development Commission Staff

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- » SRF Consulting Group, Inc. in association with  
The University of Minnesota Duluth Geospatial Analysis Center





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*The Arrowhead State Trail north of Cook.*



*Wakemup Campground beach is a potential trail head and destination for the Lake Vermilion Trail.*



# Introduction

## Project Overview

The Lake Vermilion area in northeast Minnesota is a popular year-round destination for tourism. Opportunities for lake activities, such as boating and fishing, are plentiful and the region hosts several other recreation venues unique to the area, including the Mesabi Trail, two state trails, three state parks, multiple resorts, and a casino. The Boundary Waters Canoe Area Wilderness abuts the north shore of Lake Vermilion and the entire lake adjoins the Superior National Forest.

The Arrowhead Regional Development Commission (ARDC) and the Lake Vermilion Resort Association (LVRA) desire to construct a paved, multi-use trail for non-motorized uses including walking, running, bicycling and in-line skating, that will enhance recreation opportunities and connect the communities of Cook and Tower with Lake Vermilion.

Other than the Mesabi Trail that enters the City of Tower from the south, there are few locations for residents and visitors to walk or bicycle safely on an off-road, paved surface. The Lake Vermilion Trail would create a safe corridor for pedestrian and bicycle recreation, and it would connect with the Greenwood Trail and the Mesabi Trail to form the backbone of a regional trail system.



*Narrow or no paved shoulders create a hazard for bicyclists. A dedicated trail would be beneficial for residents and visitors to the area.*

Trails provide other benefits to users and communities beyond economic stimulus. Trail access has changed the way people and families recreate. In communities with extensive trail systems, it is common to see multiple generations using trails daily as a form of non-motorized recreation. In Minnesota, many individuals use trails to commute to their workplace year-round, despite our long winter season. Trails also provide another option for healthy living, which benefits communities by lowering health care costs as individuals become more physically active.

# Vision and Goals

The ARDC and the Lake Vermilion Trail Steering Committee developed the following vision and goals for the Lake Vermilion Trail during a planning process that started in 2011. That same year, the Steering Committee and the ARDC approved the Lake Vermilion Trail Master Plan.

The master plan identifies seven potential trail route segments and planning-level construction estimates to help identify management structure options and garner public input.

## Vision

The Lake Vermilion Trail will be a premier, paved, scenic travel route providing residents and visitors with safe, non-motorized, year-round transportation and recreation in the beautiful natural landscape on and near the south shore of Lake Vermilion.<sup>1</sup>

## Goal 1

Design and build a paved, non-motorized trail that links the various communities and neighborhoods bordering the south shore of Lake Vermilion.

## Goal 2

Establish a formal trail management structure and develop a long-term plan to maintain the trail.

## Goal 3

Promote opportunities for year-round trail-based recreation, tourism, and economic development.

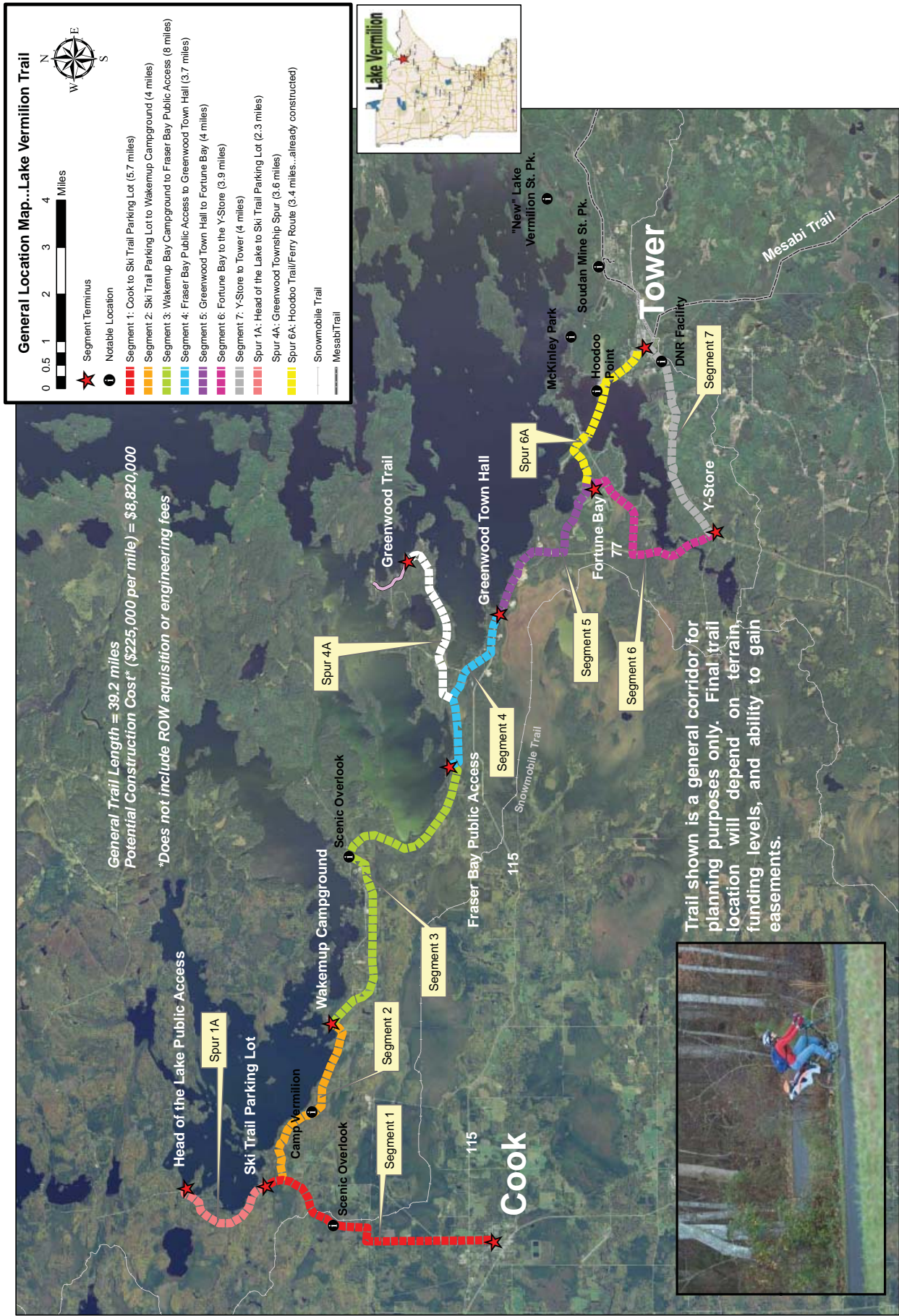
## Goal 4

Promote visibility of the trail and provide a safe recreation and travel route for cyclists, pedestrians and other trail users.<sup>2</sup>

1. Lake Vermilion Trail Plan, September 2011, Arrowhead Regional Development Commission.

2. Ibid.





Source: Lake Vermilion Trail Plan, 2011. ARDC

Figure 1: General Location Map



### Study Purpose

In early 2013, LVRA and ARDC initiated a feasibility study for the two western segments of the Lake Vermilion Trail as the next step in the trail development process. Funding for the Lake Vermilion Trail Study was made possible in part by grants from the Northeast Minnesota Sustainable Development Partnership and the Iron Range Resources and Rehabilitation Board (IRRRB).

The purpose of the feasibility study is to determine and document optimal and alternative routes for the proposed Lake Vermilion Trail between the City of Cook, Lake Vermilion, and Wakemup Campground. The study will be used as a guide for the first phases of trail development, and it will help to outline a strategy for future phases of trail development.

#### The study will help to:

- » Define priority alignments.
- » Provide enough detail to allow for future easement discussions.
- » Determine future design and engineering costs.
- » Determine estimated costs for construction.

#### The following segments are included in this study:

- » Cook to the Lake (Segment 1)
- » Lake to Wakemup Campground (Segment 2)
- » Lake to Head of the Lakes boat landing (Segment 1b)
- » North Woods School connection (Segment 1a)

## Study Process

The Lake Vermilion Trail Steering Committee, ARDC staff, and SRF Consulting Group (SRF) held three meetings between June and September 2013 in the City of Cook to visit the proposed trail segments and review materials prepared by SRF.

In addition to Steering Committee members, St. Louis County staff, officials from neighboring townships, the City of Cook, the City of Tower and the general public were invited to the study meetings.

A public open house was held on October 10, 2013, at the Greenwood Township Town Hall to present the study findings to the general public and to receive feedback on the proposed trail alignments.

The University of Minnesota Duluth Geospatial Analysis Center worked as a subconsultant to provide GIS and mapping services for the project. ARDC staff were involved as committee members and provided regional context and insight. The ARDC served as the fiduciary agent for the study.

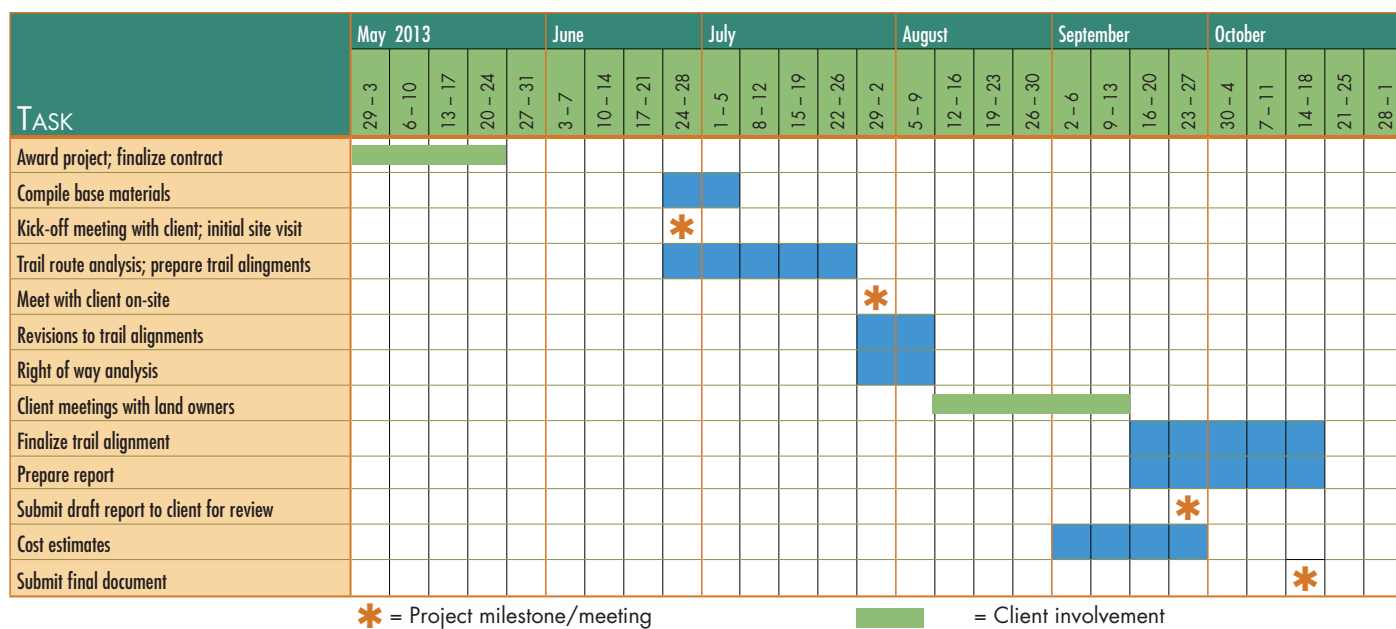


Figure 2: Project Schedule





# Existing Conditions

## Landscape Features

Between the City of Cook and the south shore of Lake Vermilion, the landscape contains a mix of wetland habitats, and spruce and pine forest. Two rivers cross the study area, including the Little Fork River that flows through the City of Cook and Flint Creek that flows east to west about two miles north of Cook.

Flint Creek marks the center of a large wetland complex that dominates the landscape between Cook and Beatty Road/Olson Road. Approximately two miles north of Flint Creek is a ridgeline that rises approximately 30 feet. The ridgeline extends east to west along the south side of Lake Vermilion and continues intermittently west of the lake. Shallow bedrock and rock outcroppings are common along the ridgeline and around the south shore of Lake Vermilion.

## Regional Context

The Lake Vermilion region of Northeast Minnesota includes several national and regionally significant parks, trails, and federal and state lands, including:

- » Soudan Underground Mine State Park
- » Lake Vermilion State Park
- » Bear Head Lake State Park
- » Arrowhead State Trail
- » Mesabi Trail
- » Taconite State Trail
- » Superior National Forest
- » Sturgeon River State Forest
- » Burntside State Forest
- » Kabetogama State Forest
- » Boundary Waters Canoe Area Wilderness



*Wetlands are present along many segments of roadways in the study area.*



*Shallow bedrock and rock outcroppings can be found along roadways adjacent to Lake Vermilion.*



*Flint Creek flows through the study area north of the City of Cook.*

Existing Conditions

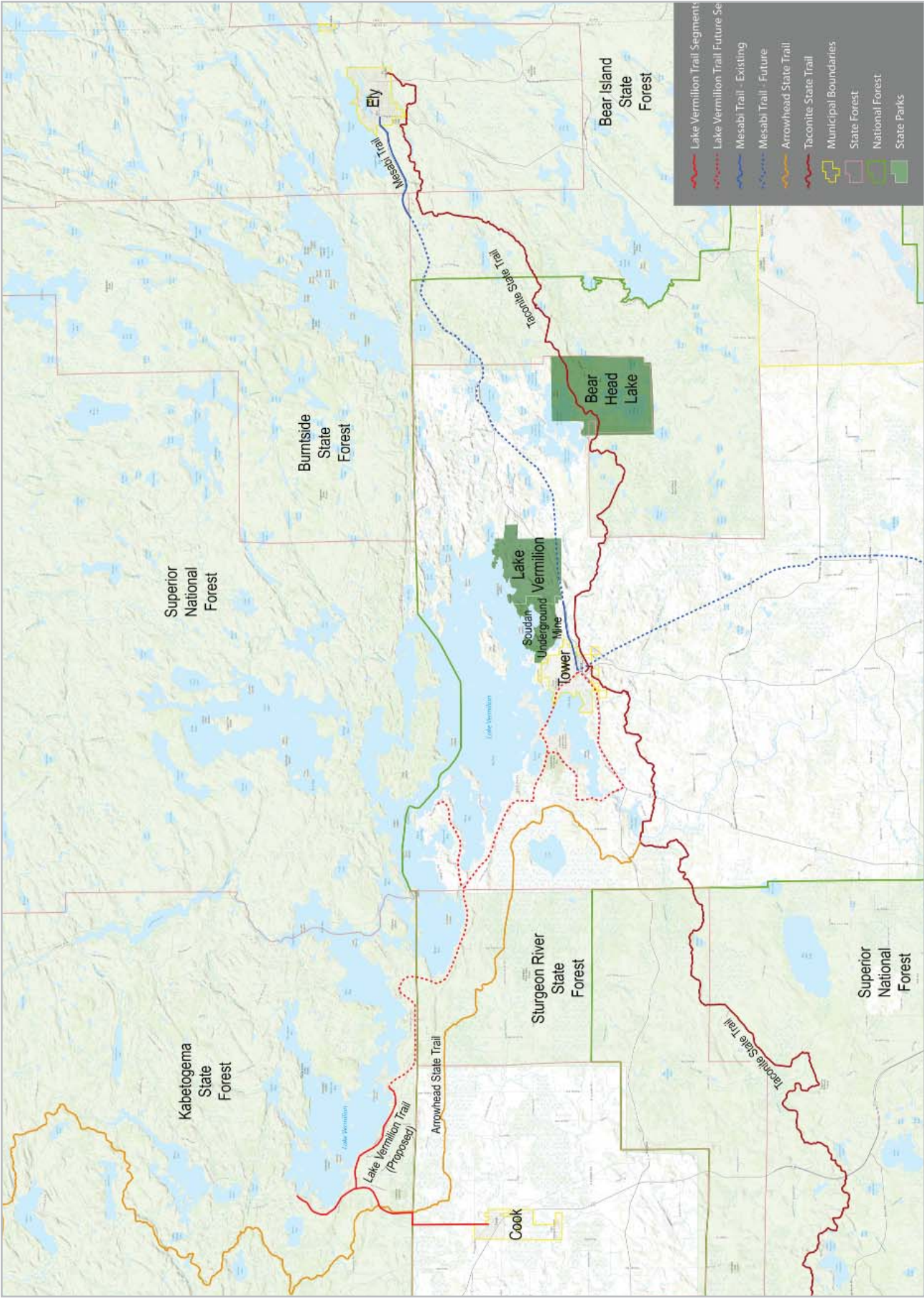


Figure 3: Regional Context Map



## Roads and Right of Way

The road network between the City of Cook and Lake Vermilion includes both paved and gravel roads. Through wetland areas, the roadways are constructed on a bed of gravel fill to elevate them above the wetland soils. This results in narrow road shoulders that slope down to wet ditches. Around the shore of Lake Vermilion where bedrock is close to the surface, the roadways are cut into the surrounding landscape.

The majority of roadways in the study area are county roads that are maintained by the St. Louis County Highway Department. St. Louis County typically does not own the right of way for many of the roadways in the study area. Instead of outright ownership, the County has prescriptive easements for the right of way. A prescriptive easement is an implied easement that is granted after the land has been used in a continuous manner for a prescribed number of years. Fee title is often sought by a public agency prior to major improvement projects.

Utilities located along roadways in the study area include overhead power lines and buried electrical and communication cables. It is common for utility companies to receive utility easements from the underlying property owners to construct the utility infrastructure.



*The parking lot in front of the old school in Cook is a potential trailhead for the Lake Vermilion Trail.*



*The Head of the Lakes public boat landing is another potential trailhead and destination for the trail.*





# Trail and Bike Facilities

There are many types of trails and bicycle facilities specifically developed for a variety of purposes. Determining the appropriate trail type or bicycle facility depends on where the trail will be located and its intended use. For the Lake Vermilion Trail, several alternatives may be considered. These include:

- » Independent trail
- » Multi-treadway trail
- » Trail adjacent to roadway
- » Share the road
- » Road with bike shoulders

The Steering Committee's stated preference is to develop an independent trail facility. Other options, such as on-road bike lanes, may provide a short-term solution until an independent trail is constructed. The following cross-sections illustrate the options and how they relate to adjacent roadway or trail facilities.



*The Lake Vermilion Trail should be a paved, 10-foot wide trail.*



*Bike shoulders would provide a safer location for on-road bicyclists rather than the vehicle lane.*



**Figure 4: Independent Trail Cross-Section**

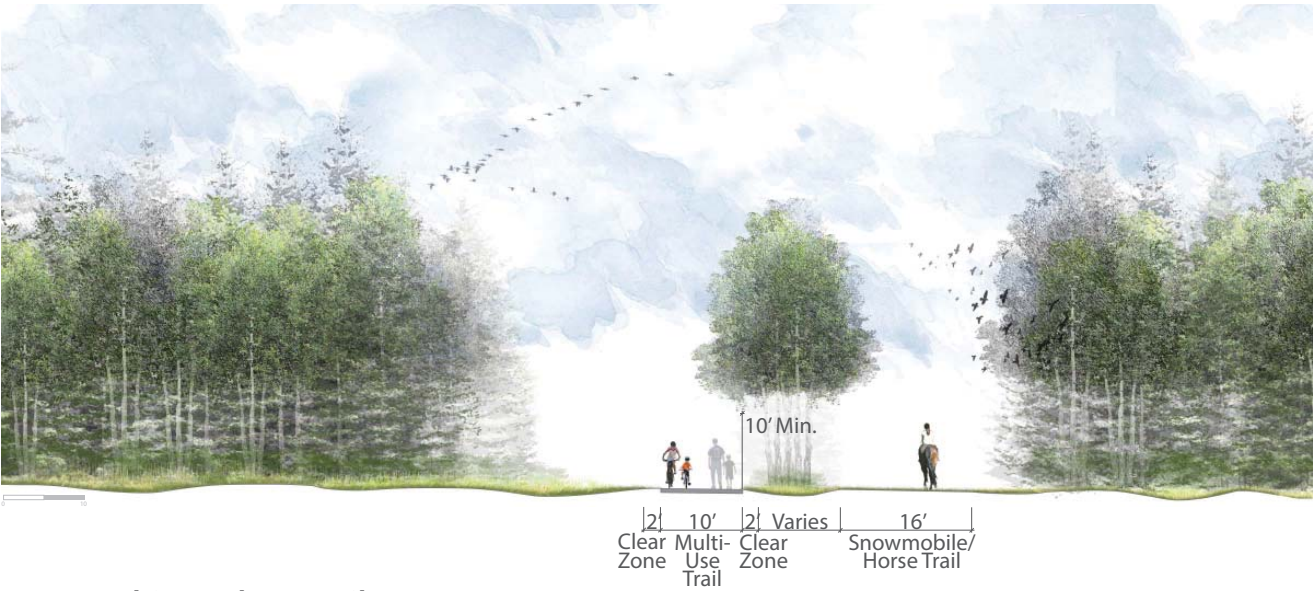


Figure 5: Multi-Treadway Trail

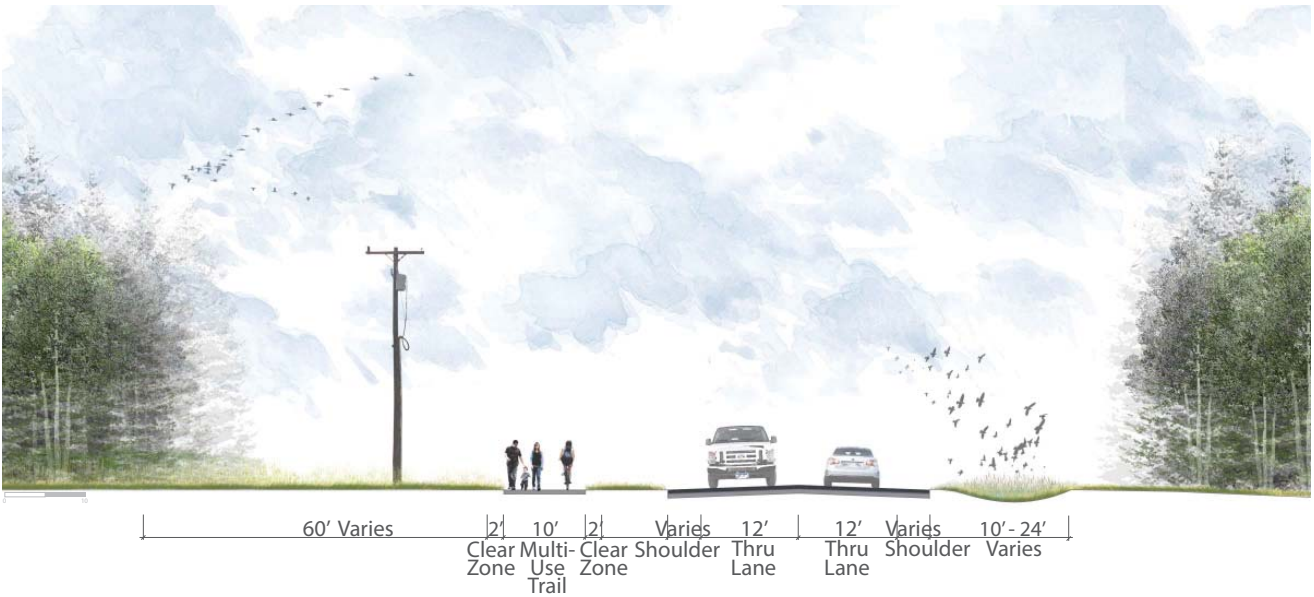


Figure 6: Trail Adjacent to Roadway



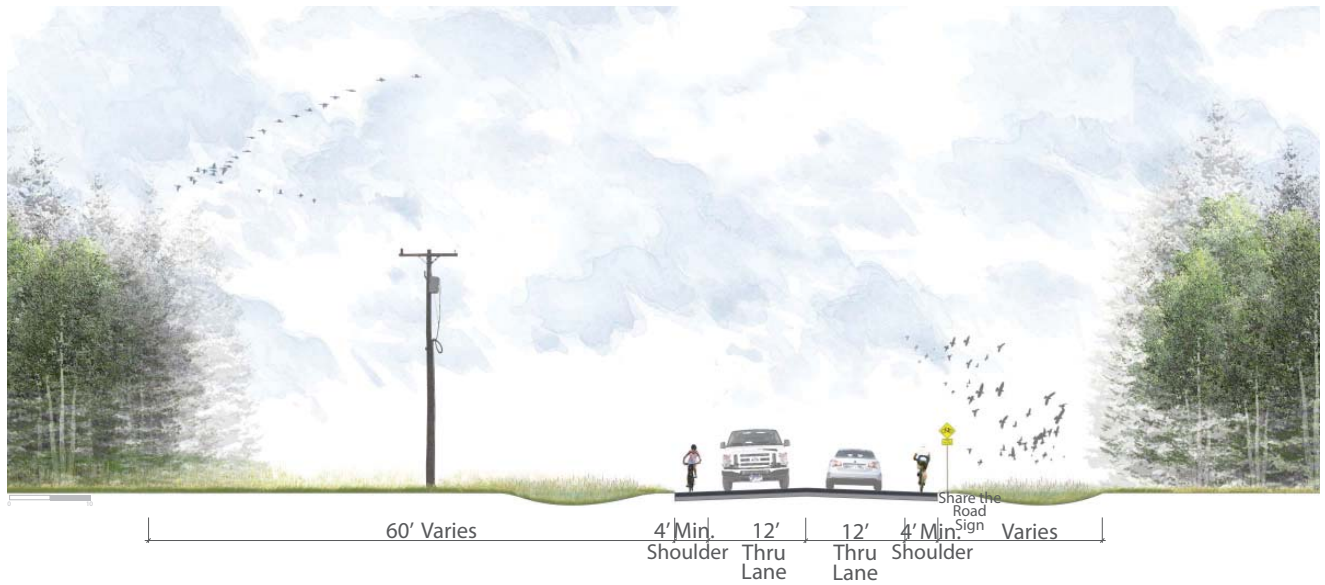


Figure 7: Share the Road

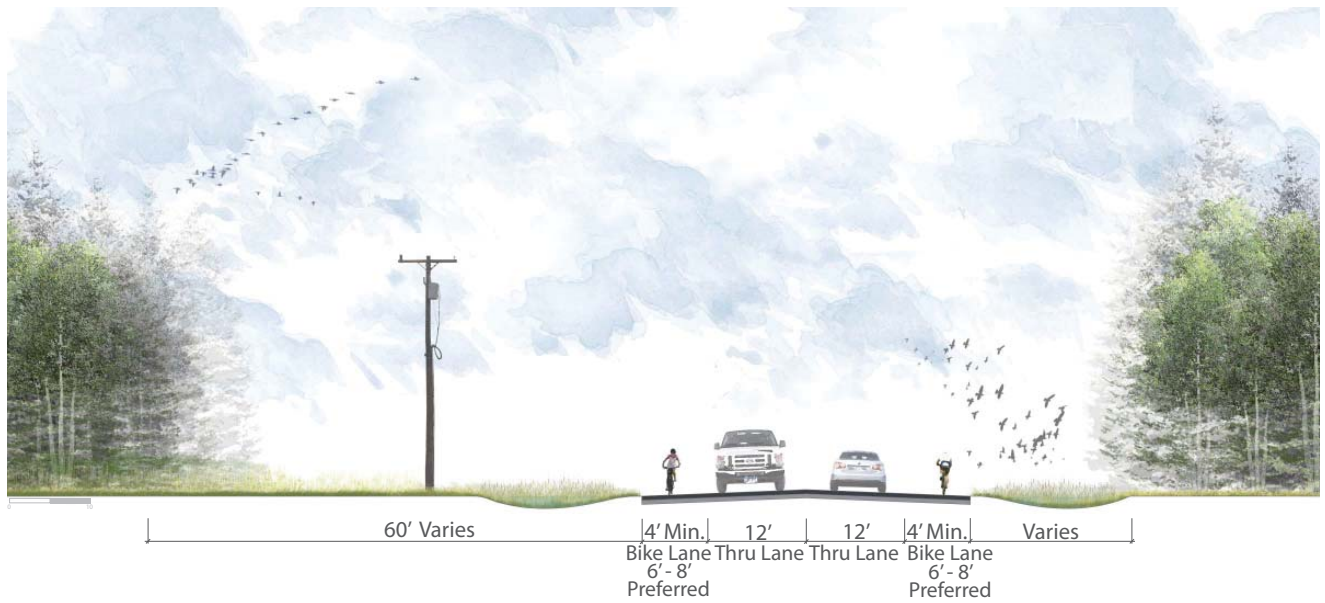


Figure 8: Road with Shoulders





## Corridor Segment Characteristics

The purpose of this study is to assess the feasibility of trail development for segments 1 and 2 of the Lake Vermilion Trail Master Plan. The graphic on the following page illustrates the segments reviewed by the Steering Committee. Segments 1, 2, 1A, and 1B were included in the Master Plan. Segment 3 was added during the feasibility study as an additional option for extending the trail east toward the City of Tower (Figure 9).

Each trail segment was divided into smaller subsegments. Subsegments were arranged according to geographic features and roadway characteristics. Each subsegment was analyzed using a combination of field inspection, aerial image, and map analysis using current geographic information system data provided by St. Louis County and the Minnesota Department of Natural Resources. The segment characteristics that were reviewed include elements that may affect trail development. Table 1 identifies subsegment characteristics.

### Wetlands

Wetlands are very common in the study area, especially north of Cook and south of the ridgeline that runs along the south shore of Lake Vermilion. Trail construction in this area is likely to impact wetlands. As state and federal regulations are in place to protect wetlands, it is important to have a comprehensive understanding of the location and

type of wetland that is in the vicinity of the proposed trail segments. For this study, National Wetland Inventory (NWI) mapping data was used to identify the location of wetlands. Further wetland analysis, including wetland delineation, will be needed during future planning and design phases to verify the location of wetlands relative to the proposed trail corridor. In areas where wetlands will be impacted, it may be necessary to purchase wetland banking credits to offset the effect of trail construction on the local wetland ecosystem.

The following section, Segment Analysis, describes each subsegment in detail.



*Several corridor segments follow County roads. Overhead and some underground utilities are present along the roadways.*

Corridor Segment Characteristics

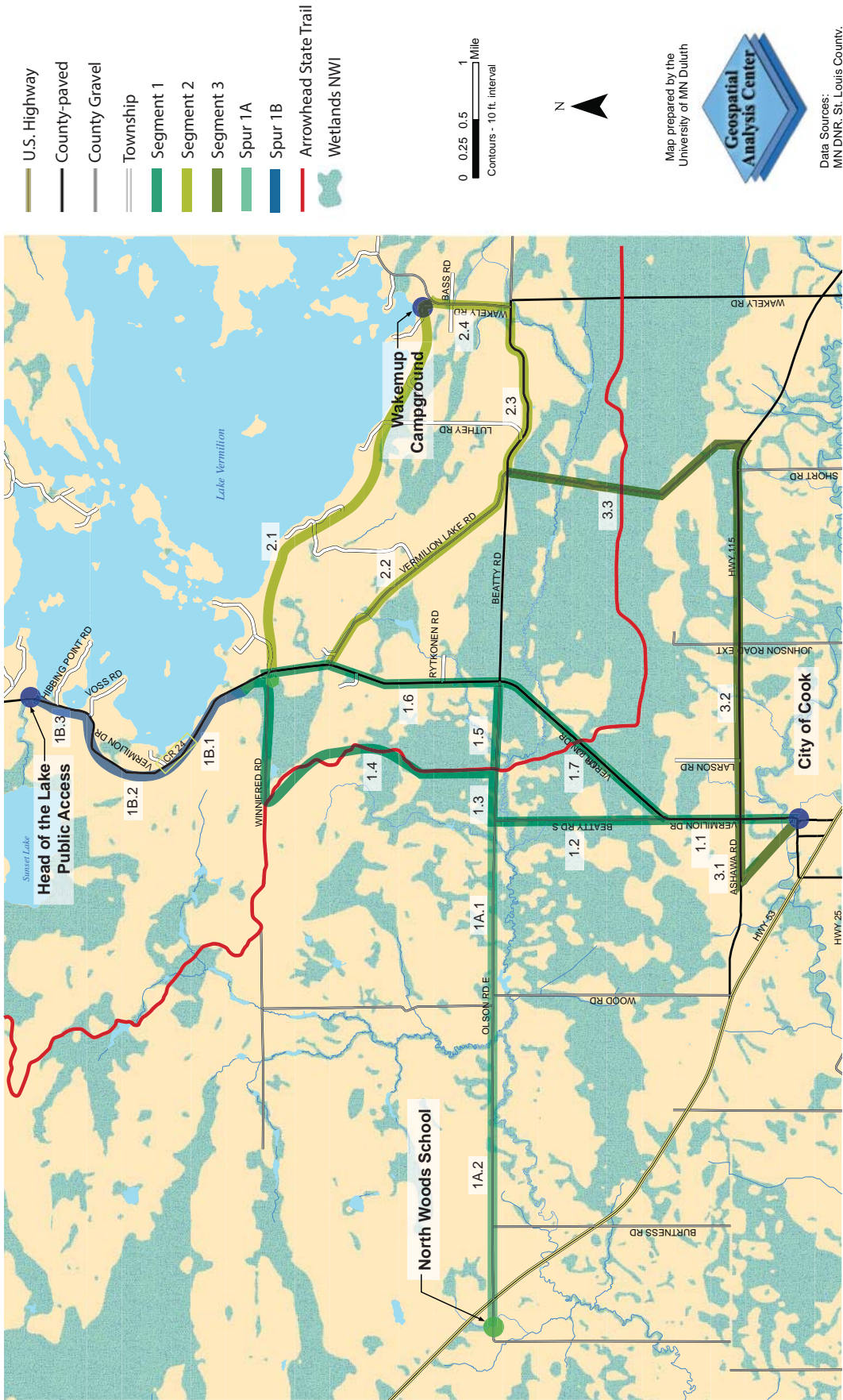


Figure 9: Corridor Segments Map

Segment	Total length (miles)	ROW width (feet) (1)	ROW (public/private) (2)	Paved/unpaved road	Speed limit (mph) (3)	Overhead utilities	# of intersections	Railroad crossings	Bridges/Major Culverts	Wetland issues (4)	Rock outcroppings/ low bedrock	Average Daily Traffic (ADT) (5)
<b>Cook</b>												
1.1	1.1	66'	Public	Paved	30/55	Yes	3	1	Little Fork River	10%	No	2,950
1.2	1.5	66'	Public	Paved	55*	No	1	0	Beaver Dam	73%	No	255
1.3	0.5	66'	Public	Paved	55*	Yes	0	0	0	50%	No	255
1.4	3.5	N/A	Public/Private	N/A	N/A	No	0	0	0	38%	Yes	N/A
1.5	0.8	66'	Public	Paved	55*	Yes	2	0	Creek	60%	No	255
1.6	2.0	66'	Public	Paved	55*	Yes	5	0	Creek	0%	No	370
1.7	1.9	66'	Public	Paved	55	Yes	2	0	Flint Creek	0%	No	2,250
<b>School Spur</b>												
1A.1	1.3	66'	Public	Gravel	55*	Yes	1	1	0	31%	No	90
1A.2	3.0	66'	Public	Gravel	55*	Yes	4	1	Flint Creek	8%	No	90
<b>Lake Spur</b>												
1B.1	0.5	66'	Public	Paved	45	Yes	2	0	0	0%	Yes	370
1B.2	1.5	66'	Public	Paved	45	Yes	2	0	0	1%	Yes	370
1B.3	0.7	66'	Public	Paved	30	Yes	3	0	0	4%	Yes	370
<b>Wakemup</b>												
2.1	4.4	N/A	Private	N/A	N/A	Yes (partial)	3	0	0	4%	Yes	N/A
2.2	2.3	66'	Public	Gravel	55*	Yes	1	0	0	0%	No	210
2.3	1.5	66'	Public	Paved	55	Yes	2	0	0	0%	No	940
2.4	0.8	66'	Public	Paved	55*	Yes	4	0	0	0%	No	390
<b>Highway 115</b>												
3.1	1.5	100'	Public	Paved	55*	Yes	8	1	0	0%	No	780
3.2	3.3	100'	Public	Paved	55*	Yes	3	0	0	0%	No	1,100
3.3	2.2	66'	Public	Gravel	55*	Yes	2	0	0	46%	No	210

\* Non-posted roadway. The rural statutory speed limit is 55 mph.

Notes/Sources:

1. Right of way data provided by St. Louis County
2. Right of way data provided by St. Louis County. Right of way includes a mix of prescriptive easements and dedicated County ownership.
3. Posted speed limits noted when possible. The rural statutory speed limit of 55 mph governs on non-posted County roads.
4. National Wetlands Inventory (NWI). Measured from aerial imagery
5. Minnesota Department of Transportation Traffic Forecasting & Analysis website

Table 1: Segment Characteristics Matrix

# Segment Descriptions

## Segment 1

Segment 1 includes 12 subsegments and extends from the City of Cook to the Head of the Lake Public Access on Lake Vermilion and west to the North Woods School.

### Subsegments 1A.1 & 1A.2

Subsegments 1A.1 and 1A.2 are identified as the School Spur and extend along Olson Road E. between Beatty Road and the North Woods School, just west of State Highway 53. This potential trail spur was added after the completion of the master plan to explore the option of creating an alternative route to the North Woods School. Special funding for trail development may be available, such as Federal Safe Routes to Schools grants, that would enable a connection to the school.

Olson Road west of Beatty Road is an unpaved, gravel roadway in a 66-foot-wide right of way that is not heavily traveled. The Average Daily Traffic (ADT) load for this roadway is estimated at 90 vehicles per day (data from MnDOT). There are five intersections, including the most heavily traveled at State Highway 53. The roadway crosses the CN Railroad and runs parallel to Flint Creek. West of the tracks Olson Road crosses over a tributary of Flint Creek. Rock outcroppings are not an issue along this roadway but wetlands are present. Between State Highway 53 and Beatty Road, 39 percent of Olson Road traverses wetlands, as identified on the NWI. Overhead utilities are present in the right of way.

### Subsegment 1.1

Subsegment 1.1 starts at the CN Railroad crossing in Cook and extends north along Vermilion Drive/CR 24 to the intersection where Beatty Road S/CR 910 meets Vermilion Drive. The roadway is paved along this segment, and the speed limit varies between 35 mph in Cook to 55 mph north of town. The right of way is 66 feet wide, and the ADT is estimated at 2,950 vehicles. The roadway crosses the Little Fork River just north of Cook. There are three intersections along this segment including County Road 115/Ashawa Road. This intersection is a stop condition for traffic traveling east/west along CR 115 but not for traffic traveling north/south along Vermilion Drive. Wetlands are present for 10 percent of this segment. There is one location north of the CR 115 intersection where the roadway cuts through a hillside, creating a situation where steep side slopes are present along the road. Two residential lots with buildings near the roadway are present at this location.

### Subsegment 1.2

Subsegment 1.2 extends along Beatty Road/CR 910 between Vermilion Drive/CR 24 and Olson Road E. This stretch of roadway is paved and situated within a 66-foot-wide right of way. The speed limit is 55 mph. There are no overhead utilities along this roadway and no intersections between the two end points. Traffic is low on this stretch of road with an ADT estimated at 255 vehicles. Seventy-three percent

of this roadway segment is adjacent to wetlands, including several locations where standing water is present in the ditches along the roadway edges. Flint Creek passes through a culvert just south of Olson Road E. in the vicinity of an active beaver lodge.

### **Subsegment 1.3**

Segment 1.3 extends from the intersection of Olson Road E. and Beatty Road to the east along Beatty Road to the Arrowhead State Trail crossing. This stretch of roadway is paved with a 66-foot right of way. The speed limit is not posted so the rural statutory limit of 55 mph governs and ADT estimated at 255. Overhead utilities are present along the roadway and there are no other intersections, railroad crossings, or bridges. Wetlands are present in the right of way and ditches for 50 percent of the segment.

### **Subsegment 1.4**

Segment 1.4 begins at Beatty Road and roughly follows the Arrowhead State Trail in a northerly direction until it reaches the north-south unimproved roadway that is shown as Winnifred Road on some maps. Wetlands are present for more than 38 percent of this alignment in both the south and north portions of the segment. There are no overhead utilities, and land ownership varies with several county, state and private parcels along the alignment. The route extends up Wakemup Hill to a viewpoint that provides views to the Iron Range and to Lake Vermilion. Several routes for the trail were explored

in this area to find a suitable off-road alignment, including options to the west that appeared to have unimproved roads on public lands. However, the presence of wetlands throughout this area makes the route very challenging.

### **Subsegment 1.5**

Subsegment 1.5 extends along Betty Road from the Arrowhead State Trail east to the intersection of Vermilion Drive. This stretch of roadway is paved with a 66-foot right of way. The speed limit is not posted so the rural statutory limit of 55 mph governs and the ADT estimated at 255. Overhead utilities are present along the roadway, and there are no other intersections or railroad crossings. Beatty Road passes over the culvert of a small creek that connects to Flint Creek south of the road. Wetlands are present in the right of way and ditches for 60 percent of the segment.

### **Subsegment 1.6**

Subsegment 1.6 extends along Vermilion Drive/CR 24 between the intersection of Beatty Road and the intersection of East Wakemup Village Road. This stretch of roadway is paved with a 66-foot right of way. The speed limit is not posted so the rural statutory limit of 55 mph governs and the ADT is estimated at 370. Overhead utilities are present along the roadway and there five intersections but no railroad crossings. Vermilion Drive passes over the culvert of a small creek just north of Beatty Road. Wetlands are not present in the right of way along this segment of Vermilion Drive.



## Segment Descriptions

### Subsegment 1.7

Subsegment 1.7 extends along Vermilion Drive/CR 24 between the intersection of Beatty Road S./CR 910 and the intersection of Beatty Road/CR 78. This stretch of roadway is paved with a 66-foot right of way. The speed limit is 55 mph, and the ADT is estimated at 2,250. This is a heavily traveled segment of road as it is the main access route used for travelers heading from the City of Cook to points north along Lake Vermilion. Overhead utilities are present along the roadway, and there are two intersections but no railroad crossings. Vermilion Drive passes over Flint Creek on this segment. According to the NWI, wetlands are not present in the right of way along this segment of Vermilion Drive, although wetlands are common in this vicinity.

### Subsegment 1B.1

Subsegment 1B.1 is the southern portion of the Lake Spur along Vermilion Drive that extends from East Wakemup Village Road north for approximately .5 miles. This stretch of roadway is paved with a 66-foot right of way. The speed limit is 45 mph, and the ADT is estimated at 370. Overhead utilities are present adjacent to the road right of way. There are two intersections and several driveways along this subsegment. According to the NWI, wetlands are not present in the right of way along this segment of road, but rock outcroppings are common. There are no bridges or railroad crossings in subsegment 1B.1.

### Subsegment 1B.2

Subsegment 1B.2 extends north of 1B.1 for approximately 1.5 miles along Vermilion Drive. This stretch of roadway is paved with a 66-foot right of way. The speed limit is 45 mph, and the ADT is estimated at 370. Overhead utilities are present adjacent to the road right of way. There are two intersections and several driveways along this subsegment. According to the NWI, wetlands are found along one percent of the right of way along this segment of road. Rock outcroppings are common. There are no bridges or railroad crossings in subsegment 1B.2.

### Subsegment 1B.3

Subsegment 1B.3 extends north of 1B.2 for approximately .7 miles along Vermilion Drive to the Head of the Lake Public Access. This stretch of roadway is paved with a 66 foot right of way. The speed limit is 30 mph, and the ADT is estimated at 370. Overhead utilities are present adjacent to the road right of way. There are three intersections and several driveways along this subsegment. According to the NWI, wetlands are found along four percent of the right of way along this segment of road, and rock outcroppings are common. There are no bridges or railroad crossings in subsegment 1B.3. This stretch of road extends along the lake shore, and there are several resorts with buildings close to the roadway in this area.

## Segment 2

Segment 2 is located along the south shore of Lake Vermilion between Vermilion Drive and Wakemup Campground. Segment 2 includes four subsegments.

### Subsegment 2.1

Subsegment 2.1 is identified in the Lake Vermilion Trail Master Plan along the ridgeline south of the lake. This area consists of private parcels along the lakeshore and two blocks of industrial property inland. The total length of the subsegment is approximately 4.4 miles. Overhead utilities are present on portions of the subsegment. Subsegment 2.1 crosses three roadways, including West Vermilion Shores Road, Luthey Road and Wakemup Shores Road. Wetlands are present for four percent of this segment and rock outcroppings can be found in the vicinity.

As subsegment 2.1 heads east from Vermilion Drive, it extends along Verdella Boulevard, then south along Longfellow Road, which is a private roadway. From this point, the potential trail corridor heads east to the top of a ridgeline and then south east around the edge of Camp Vermilion. Several private parcels are present along the lake in this area, and the trail would extend behind these properties with no view of the lake. East of Camp Vermilion, the trail corridor would extend to Luthey Road. East of Luthey Road, a large wetland complex exists. The trail corridor would need to skirt around the edge

of the wetland toward Wakely Road, or the trail could cross the wetland on an elevated boardwalk, minimizing its impact on the surrounding environment. The trail would extend along Wakely Road to the Wakemup Campground, which is the proposed terminus for Segment 2.

### Subsegment 2.2-2.4

An alternate trail route between Vermilion Drive and Wakemup Campground follows county roads that include Vermilion Lake Road, Beatty Road, and Wakely Road.

### Subsegment 2.2

Subsegment 2.2 starts at Vermilion Drive and extends southeast along Vermilion Lake Road for approximately 2.3 miles to the intersection of Beatty Road. The right of way is 66 feet wide. Vermilion Lake Road is a gravel roadway with no posted speed limit, so the rural statutory limit of 55 mph governs. The ADT for this road is estimated at 210. Overhead utilities are present along the right of Way, and there is one intersection on the north side at West Vermilion Shores Road. There are no wetlands identified in the NWI along the right of way of Vermilion Lake Road.

### Subsegment 2.3

Subsegment 2.3 extends along Beatty Road from the intersection of Vermilion Lake Road for approximately 1.5 miles to the intersection of Wakely Road. Beatty Road is paved

## Segment Descriptions

and has a posted speed limit of 55 mph. The ADT is estimated at 940. The right of way is 66 feet wide, and overhead utilities are present along the roadway. There is one intersection along this segment at Luthey Road and are several driveways present along this stretch of Beatty Road. According to the NWI, there are no wetlands present in the road right of way. There are no bridges or railroad crossings.

### Subsegment 2.4

Subsegment 2.4 extends north along Wakely Road from the intersection of Beatty Road to Wakemup Campground for approximately .8 miles. The right of way is 66 feet wide, and the roadway is paved. There is no posted speed limit so the rural statutory limit of 55 mph governs. The ADT is estimated at 390. Overhead utilities are present adjacent to Wakely Road, and there are four intersections along this segment including Larson Road and Pederson Road. According to the NWI, there are no wetlands present in the road right of way, and there are no bridges or railroad crossings.

## Segment 3

Segment 3 is an alternative route extending from Cook east toward the City of Tower along Highway 115 and north along Vermilion Lake Road. Although this segment does not get close to Lake Vermilion, it is the only other option for a trail to head east in the direction of Tower, the proposed easterly terminus for the Lake Vermilion Trail. Segment 3 consists of three subsegments.

### Subsegment 3.1

Subsegment 3.1 is an alternate route out of the City of Cook that extends south on Vermilion Drive, over the railroad tracks and then northwest along North River Street to Ashawa Road/Highway 115. The route then extends east along Ashawa Road/Highway 115, crossing over the railroad tracks and extending to the intersection of Vermilion Drive. The right of way along Ashawa Road/Highway 115 is 100 feet wide. The roadway is paved and has an ADT estimated at 780. The speed limit along Highway 115 is 55 mph and is not posted along North River Street in Cook. Overhead utilities are present and the potential trail route crosses the Little Fork River as it passes under North River Street. The CN Railroad

tracks must be crossed two times in subsegment 3.1. The crossing along Vermilion Drive is equipped with a sidewalk. The railroad crossing at Ashawa Road/Highway 115 does not have pedestrian facilities.

### **Subsegment 3.2**

Subsegment 3.2 extends along Highway 115 from Vermilion Drive east to the intersection with Vermilion Lake Road. This segment is approximately 3.3 miles long. The roadway is paved and situated within a 100-foot-wide right of way that includes overhead utilities. There are three intersections, and the ADT along this roadway is estimated at 1,100. There are no railroad crossings, bridges, or wetlands along this segment.

### **Subsegment 3.3**

Subsegment 3.3 extends between Highway 115 and Beatty Road along Vermilion Lake Road. The roadway has a gravel surface and is situated in a 66-foot-wide right of way. There is no posted speed limit so the rural statutory limit of 55 mph governs. The ADT is estimated at 210. Overhead utilities are present along Vermilion Lake Road, and there are wetlands along approximately 46 percent of this segment.

## Key Attributes

Key attributes of each subsegment are presented in a separate matrix to assess the value of the segment for trail development.

+	Positive Attribute
-	Negative Attribute

Notes:

1. A segment on public right of way is a positive attribute.
2. A segment with few or no wetlands is a positive attribute.
3. A segment with few or no utility conflicts is a positive attribute.
4. A segment with no steep grades or surface bedrock is a positive attribute.

Segment	Total Segment Length (miles)	Public Right of Way <sup>1</sup>	Wetlands <sup>2</sup>	Utility Conflicts <sup>3</sup>	Challenging Terrain <sup>4</sup>	Scenic Value
<b>Cook</b>						
1.1	1.1	+	-	-	+	-
1.2	1.5	+	-	-	+	-
1.3	0.5	+	-	-	+	-
1.4	3.5	-	-	+	-	+
1.5	0.8	+	-	-	+	-
1.6	2.0	+	+	-	+	-
1.7	1.9	+	+	-	+	-
<b>School Spur</b>						
1A.1	1.3	+	-	-	+	-
1A.2	3.0	+	-	-	+	-
<b>Lake Spur</b>						
1B.1	0.5	+	+	-	-	-
1B.2	1.5	+	-	-	-	-
1B.3	0.7	+	-	-	-	-
<b>Wakemup</b>						
2.1	3.7	-	-	-	-	+
2.2	2.3	+	+	+	+	-
2.3	1.5	+	+	+	+	-
2.4	0.8	+	+	+	+	-
<b>Highway 115</b>						
3.1	1.5	+	+	-	+	-
3.2	3.3	+	+	-	+	-
3.3	2.2	+	-	-	+	-

Table 2: Segment Evaluation Matrix



# Trail Purpose and Use

It is important to understand the intended purpose and use of the Lake Vermilion Trail so the appropriate trail facility can be planned for each trail segment. For example, a trail facility with a primary use of commuting would best serve its users by being a direct route adjacent to or on a roadway, such as bike lanes. A recreation facility may be more circuitous to take advantage of viewpoints and scenic landscapes, such as an independent trail alignment that is not adjacent to a road or road right of way.

Broad categories, including recreation, commuting, fitness and school connections, were used to gauge the primary and secondary use for each subsegment. Segments may serve multiple purposes and multiple types of users. The Steering Committee determined that the primary purposes of the Lake Vermilion Trail will be recreation and fitness.

Segment	Recreation	Commuting	School Connection	Fitness
<b>Cook</b>				
1.1		P		F
1.2	S	P		
1.3		P		
1.4	P	S		
1.5		P		
1.6		P		
1.7		P		
<b>School Spur</b>				
1A.1			P	
1A.2			P	
<b>Lake Spur</b>				
1B.1	P	S		F
1B.2	P	S		F
1B.3	P	S		F
<b>Wakemup</b>				
2.1	P			
2.2	S	P		
2.3	S	P		
2.4	S	P		F
<b>Highway 115</b>				
3.1	S	P		F
3.2	S	P		F
3.3	S	P		

## Key:

**P** Primary use  
**S** Secondary use  
**F** Fitness use

## Notes:

1. Recreation users include families, young and old on multiple modes including bicyclists of varying experience.

2. Commuters include experienced bicycle riders that desire a direct route.

3. School connection users include children, families and adults on multiple modes of transport and varying levels of experience.

4. Fitness users include individuals living within 1/2 mile of a trail segment who use the trail for regular exercise.

Table 3: Purpose and Use Matrix



# Preferred Alignments

The Lake Vermilion Trail will provide recreation, fitness and commuting opportunities for visitors and residents of the region. The process of analysis and evaluation provided the framework for identifying preferred trail segments for future development of the Lake Vermilion Trail. The map on page 30 illustrates the preferred trail alignment between the City of Cook, Lake Vermilion, and Wakemup Campground.

A planning-level cost estimate for each segment was prepared to provide a preliminary understanding of the estimated costs for developing the trail. In addition to construction costs associated with a 10-foot wide paved trail, other key costs are identified including right of way or easement acquisition and wetland mitigation.

## SEGMENT 1

**Location:** Cook to Head of the Lake Public Access on Lake Vermilion

**Total length:** 7.70 miles

**Corridor Type:** Road right of way

**Terrain:** Variable, including wetlands and spruce lowlands through the southern portion and rock outcroppings in a spruce/pine forest near Lake Vermilion

**Wetlands:** Present for two percent of segment\*

**Corridor Description:** Segment 1 starts at the CN Railroad crossing in Cook and extends north along Vermilion Drive/CR 24 to the intersection where Beatty Road S/CR 910 meets Vermilion Drive. The roadway is paved along this segment and the speed limit varies between 35 mph in Cook to 55 mph north of town. The right of way is 66 feet wide, and the ADT is

estimated at 2,950. The roadway crosses the Little Fork River just north of Cook. There are three intersections along this segment including County Road 115/Ashawa Road.

Segment 1 continues northeast along Vermilion Drive/CR 24 between the intersection of Beatty Road S/CR 910 and the intersection of Beatty Road/CR 78. This stretch of roadway is paved with a 66-foot right of way. The speed limit is 55 mph, and the ADT is estimated at 2,250. This is a heavily traveled segment of road as it is the main access route used for travelers heading from the City of Cook to points north along Lake Vermilion. Overhead utilities are present along the east side of the roadway, and wetlands are prevalent along this stretch of the corridor. Vermilion Drive passes over Flint Creek on this segment.

North of the Beatty Road intersection Segment 1 extends north to East Wakemup Village Road. This stretch of roadway is paved with a 66-foot right of way. The speed limit is not posted so the rural statutory limit of 55 mph governs, and the ADT is estimated at 370. Overhead utilities are present along the roadway. There are three intersections including Rytkenon Road, CR 431/Vermilion Lake Road and Longfellow Road. Vermilion Drive passes over the culvert of a small creek just north of Beatty Road.

From East Wakemup Village Road, Segment 1 extends north within the road right of way along the west edge of Lake Vermilion until it reaches the Head of the Lake Public Access on Lake Vermilion, a DNR boat landing. This stretch of roadway is paved. The right of way varies in this area but the typical width is 66 feet. The speed limit varies from 30 to 45 mph, and the ADT is 370. Overhead utilities are located adjacent to the road right of way. Two small areas of wetlands are present along the

## Preferred Alignments

right of way in this segment of road, and rock outcroppings are common. There are numerous driveways along this segment of road, including several resorts with buildings close to the roadway in this area. This corridor passes through intersections at White Pine Road, Rigis Road, Chaps Road, Voss Road, and Hibbing Point Road.

\*Note: Wetlands are present along the outside of the right of way along Vermilion Drive between Beatty Road S/CR910 and Beatty Road/CR 78 but the NWI does not indicate wetlands within the right of way. Further wetland delineation along this segment will be needed to confirm the presence of wetlands along Vermilion Drive.

### SPUR 1C

**Location:** Vermilion Drive to a high point along the Arrowhead State Trail on Wakemup Hill

**Total length:** .83 miles

**Corridor Type:** Off-road alignment

**Terrain:** Atop a sparsely forested ridgeline

**Wetlands:** N/A

**Corridor Description:** Spur 1C is a short destination trail that would take users to a high point on the Arrowhead State Trail. The spur trail begins on Vermilion Drive across from the intersection of CR 431/Vermilion Lake Road and heads west across a sparsely vegetated low ridgeline. The corridor would cross one private parcel adjacent to Vermilion Drive and then

it would extend west to the Arrowhead State Trail on state-owned land. The terminus provides sweeping views of Lake Vermilion and the surrounding landscape.

### SEGMENT 2

**Location:** Vermilion Drive to Wakemup Campground

**Total length:** 4.39 miles

**Corridor Type:** Off-road alignment

**Terrain:** Variable but includes wetlands and spruce forest, and a gravel ridge with spruce and pine vegetation along the shore of Lake Vermilion

**Wetlands:** Present for four percent of segment

**Corridor Description:** Segment 2 is an off-road alignment that generally follows the ridgeline south of the lake between Vermilion Drive and Wakemup Campground. This area consists of private parcels along the lakeshore and two blocks of industrial property inland. The total length of this segment is approximately 4.4 miles. Overhead utilities are present on portions of the Segment 2. This segment crosses three roadways including West Vermilion Shores Road, Luthey Road, and Wakemup Shores Road. Wetlands are present for four percent of this segment and rock outcroppings can be found in the vicinity. As Segment 2 extends east from Vermilion Drive, it extends along the south side of East Wakemup Village Road and Verdella Boulevard, then south along Longfellow Road, which is a private roadway. From this point, the potential trail corridor heads east to the top of a

ridgeline and then south east around the south edge of Camp Vermilion. Several private parcels are present along the lake in this area, and the trail would extend behind these properties with no view of the lake. East of Camp Vermilion, the trail corridor would extend to Luthey Road. East of Luthey Road, a large wetland complex exists. The trail corridor would need to skirt around the edge of the wetland toward Wakely Road, or the trail could cross the wetland on an elevated boardwalk, minimizing its impact on the surrounding environment. The trail would extend north along Wakely Road to the Wakemup Campground, which is the proposed terminus for Segment 2.

## ALTERNATE SEGMENT 2

**Location:** Vermilion Drive to Wakemup Campground

**Total length:** 4.60 miles

**Corridor Type:** Road right of way

**Terrain:** Rolling hills of spruce and pine forest

**Wetlands:** N/A

**Corridor Description:** A separate alignment that follows County roads between Vermilion Drive and Wakemup Campground is presented as an alternative to Segment 2 because of the high number of private parcels along the south side of Lake Vermilion. Alternate Segment 2 starts at Vermilion Drive and extends southeast along Vermilion Lake Road for approximately 2.3 miles to the intersection of Beatty Road. The right of way is 66 feet wide. Vermilion Lake Road is a gravel roadway with no posted speed limit so the rural

statutory limit of 55 mph governs. The ADT for this road is estimated at 210. Overhead utilities are present along the right of way, and there is one intersection on the north side at West Vermilion Shores Road. There are no wetlands identified in the NWI along the right of way of Vermilion Lake Road.

Alternate Segment 2 extends east along Beatty Road from the intersection of Vermilion Lake Road for approximately 1.5 miles to the intersection of Wakely Road. Beatty Road is paved and has a posted speed limit of 55 mph. The ADT is estimated at 940. The right of way is 66 feet wide and overhead utilities are present along the roadway. There is one intersection along this segment at Luthey Road, and there are several driveways present along this stretch of Beatty Road. According to the NWI, there are no wetlands present in the road right of way.

From Beatty Road, Alternate Segment 2 extends north along Wakely Road to Wakemup Campground for approximately .8 miles. The right of way is 66 feet wide and the roadway is paved. There is no posted speed limit so the rural statutory limit of 55 mph governs. The ADT is estimated at 390. Overhead utilities are present adjacent to Wakely Road. There are two intersections along this segment including Larson Road and Pederson Road. According to the NWI, there are no wetlands present in the road right of way.



# Lake Vermilion Trail : Feasibility Study Proposed Bike Route Alignment



Figure 10: Preferred Alignment Map

## Estimated Costs for Trail Implementation

Trail implementation has both initial costs (acquisition and development) and on-going costs (operations and maintenance). Trail development will occur as opportunities arise to coordinate with other agencies, such as St. Louis County, and as funding becomes available. The estimated costs included in this study are for trail implementation only and do not address on-going operations and maintenance once the trail is developed.

Development costs for the Lake Vermilion Trail have been calculated by preferred trail segment, with a separate estimate for each. The estimated costs include right of way acquisition and wetland mitigation and other elements of trail development. More detailed cost estimates for each preferred trail segment are located in Appendix A.

**Preferred Segment 1** from the City of Cook to the Head of the Lake Public Access: \$3,374,000

**Preferred Trail Spur 1C** from Vermilion Drive to the Wakemup Hill Overlook: \$336,000

**Preferred Segment 2** from Vermilion Drive to Wakemup Campground: \$2,590,000

**Preferred Segment 2 Alternate** from Vermilion Drive to Wakemup Campground along Vermilion Lake Road, Beatty Road and Wakely Road: \$2,016,000

## Additional Cost Estimate Information and Notes

- » The estimated construction costs include a 20% design and administration fee and an additional 20% construction contingency for unknown costs.
- » Estimates are based on 2013 construction costs.

- » Actual right of way or easement requirements shall be confirmed in final design. Easement costs were determined based on current land values in the region. Easement costs are in 2013 dollars. A corridor width of 16 feet is assumed for trail and shoulders.
- » Wetland disturbance is based on a 16 foot wide corridor for the length of the potential trail segment, based on NWI mapping.
- » The trail construction cost includes grading, Class 5 base material and 3" bituminous pavement. Turf establishment is included for five feet each side of the trail.
- » Drainage elements, such as culverts and ditches, and trail signage are included in the cost estimates.
- » A parking lot is included in the estimates for Segments 1, 2 and 2 Alternate. The exact location of the parking lot will be determined during the design phase. Parking lot items include grading, base material, concrete curb and gutter and 3" bituminous pavement.
- » A kiosk for interpretation is included in each of the four trail alternatives. The kiosk includes a 8' x 16' steel roof, metal-frame, open-side structure with three display panels.
- » Rest stops are included at the rate of one per trail mile. Rest stops include a concrete pad, two benches, one bike rack and one waste receptacle.
- » A boardwalk is included in Segment 2 between Luthey Road and Wakely Road. The boardwalk would include a 14 foot -wide, wood deck, wood and mesh railing, helical pile anchors and wood abutments at both ends.



## Recommendations and Next Steps

Trails are becoming important features in many communities and regions around the country. Trails provide safe places for families and individuals to exercise that are away from traffic and, in many cases, located in scenic areas that are inaccessible by roads. The Lake Vermilion region attracts visitors who come to experience the scenic beauty of the area's lakes and natural landscape. The Lake Vermilion Trail could become a primary attraction in the area that would provide an alternative recreation opportunity for both visitors and residents. The trail is intended to connect local communities, state parks and existing trails.

An independent trail that is separated from roadways is the most desirable alternative for the Lake Vermilion Trail. The primary uses of the trail will be recreation and fitness and an independent trail would be the best way to serve the diverse skills and age groups that would use the trail facility. Commuting would be a secondary use for trail users.

The challenging terrain of the area with vast wetlands north of Cook and shallow bedrock with rock outcroppings around the shore of Lake Vermilion pose significant challenges to a trail alignment that is completely independent of road right of ways.

The proposed trail segments use county road right of way for a significant portion of the trail between Cook and Lake Vermilion. An independent trail to Wakemup Campground along the ridgeline south of Lake Vermilion would be an ideal location, but permanent easements from property owners would be necessary to make this alignment possible. In locations where the trail is proposed in road right of way, permanent easements will be needed with the underlying property owners where St. Louis County does not presently own fee title to the right of way.



Magnificent views of Lake Vermilion await trail users from the top of Wakemup Hill, a destination currently only available to snowmobilers on the Arrowhead State Trail.

Photo credit: Carol Booth and Jim Ganahl



An independent trail facility would provide alternative locations for residents and visitors to exercise, walk and enjoy the region's scenic beauty.



### Agency Leadership

The Lake Vermilion Resort Association initiated the idea of the Lake Vermilion Trail because they recognize the value a trail would bring to the region. A public agency is necessary to continue planning and developing the trail. Most state and federal grants for trail development are only available to public agencies. Additionally, trail management and operations are best suited for a public agency that has the staff, equipment, and resources to adequately maintain and operate trail systems.

The Minnesota DNR, St. Louis County, Beatty Township, Cook Township, Owens Township, and the City of Cook are all potential partners for trail planning, development, operations and management.

### Interim On-Road Facilities

Realizing the full build-out of the Lake Vermilion Trail will likely take several years and is dependent on the cooperation and coordination of many public agencies, community organizations, and individual property owners. Yet, there is interest among community leaders and many individuals in the region to provide a safe pedestrian and bicycle facility that will improve community health and fulfill the growing need for alternative recreation and commuting opportunities.

Working with City of Cook, townships, St. Louis County, and state officials to reach this goal may begin by planning for and implementing interim on-road facilities, such as bike

lanes, paved shoulders, and additional roadway signage. Providing for alternative uses on the existing road network will allow additional uses and encourage community leaders to plan for future recreation facilities, such as independent, multi-use trails and more sidewalks in communities.

### Trail Segment Prioritization

The proposed Lake Vermilion Trail from Cook to Lake Vermilion and Wakemup Campground represents a significant amount of trail mileage. Added together, the recommended trail segments total approximately 12.5 miles (Segment 1, Spur 1C and Segment 2). Prioritizing trail planning and development will provide a process whereby small segments can be constructed as funds and opportunities allow. Coordinating with St. Louis County to include trail development in future roadway improvement projects is another alternative for consideration as future county capital improvement projects are planned.

### Public Support

Steering committee members, resort owners, and members of the public should contact public officials at the local, state, and federal levels to let them know about the interest, need for, and benefits of the Lake Vermilion Trail. Solid support from townships and local communities will enhance the public effort to build support for trail development and obtain the required funding.



## Next Steps

The vision of the Lake Vermilion Trail will take time to realize and will likely occur in incremental steps with trail development happening as funds and opportunities become available. As trail planning proceeds, key steps in the process include:

- » Develop a relationship with a lead public agency or agencies to partner for future trail planning and development.
- » Maintain a working relationship with ARDC. ARDC has expertise in public project planning and can provide assistance in applying for funding.
- » Create an advocacy organization or friends group to carry forward the momentum that the master plan and feasibility study has generated.
- » Seek organizational and financial assistance to develop an advocacy group to move the project forward. Potential information sources include National Park Service Trails and Conservation Assistance Program, the Statewide Health Improvement Program, Greater Minnesota Parks and Trails Commission, and regional development organizations, such as the Iron Range Resources and Rehabilitation Board.
- » Seek funding for land acquisition, trail development, and subsequent maintenance.
- » Reach out to other community groups, such as the Sportsman's Club of Lake Vermilion, that have similar interests and can provide additional momentum toward achieving the goal of developing the Lake Vermilion Trail.



*Wakemup Hill provides a view point where visitors can see Lake Vermilion and the surrounding landscape.*

*Photo credit: Carol Booth and Jim Ganahl*



## Preferred Trail Segment 1 Detailed Cost Estimate

<b>UNIT LEGEND:</b> <u>LS</u> =Lump Sum, <u>SF</u> =Square Feet, <u>SY</u> =Square Yard, <u>EA</u> =Each, <u>LF</u> =Lineal Foot, <u>CY</u> =Cubic Yards, <u>AC</u> =Acre, <u>RD STA</u> =Road Station					
<b>Lake Vermilion Trail Segment 1 (7.7 miles)</b> <b>Preliminary Construction Estimate (2013 Dollars)</b>					
Notes	Section 1 - Right-of-Way Acquisition	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
3	Fee title purchase for 16-foot trail corridor	15	AC	\$3,700.00	\$55,500.00
<b>Section 1 - Right-of-Way Acquisition Total:</b>					\$55,500.00
Notes	Section 2 - Wetland Mitigation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
4	Wetland credits	0.31	AC	\$10,000.00	\$3,100.00
<b>Section 2 - Wetland Banking Total:</b>					\$3,100.00
Notes	Section 3 - Mobilization, Surveying & Erosion Control	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
5	Provide all necessary construction surveying and staking to meet layout and grading requirements for all facets of work	1	LS	\$35,000.00	\$35,000.00
6	Mobilization	1	LS	\$77,000.00	\$77,000.00
7	Silt Fence Type Machine Sliced	20,000	LF	\$2.50	\$50,000.00
8	Filter Log Type Straw Bioroll	40,000	LF	\$1.80	\$72,000.00
<b>Section 3 - Mobilization and Surveying Total:</b>					\$234,000.00
Notes	Section 4 - Utility Relocation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
9	Relocate Utility Pole	54	EA	\$3,000.00	\$162,000.00
<b>Section 4 - Utility Relocation Total:</b>					\$162,000.00
Notes	Section 5 - Trail Construction	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
10	Clearing & Grubbing	2	AC	\$5,000.00	\$10,000.00
11	10-Foot Wide Paved Trail, 3" Thickness	40656	LF	\$43.00	\$1,748,208.00
12	Culverts	15	EA	\$1,800.00	\$27,000.00
13	Signage	650	SF	\$32.00	\$20,800.00
14	Turf Establishment	9	AC	\$3,500.00	\$31,500.00
<b>Section 5 -Trail Construction Total:</b>					\$1,837,508.00
Notes	Section 6 - Trailheads/Rest Stops/Overlooks	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
15	10-Stall Bituminous Parking Lot	1	LS	\$20,000.00	\$20,000.00
16	Furnish and Install Kiosk	2	EA	\$30,000.00	\$60,000.00
17	Furnish and Install Rest Stop	8	EA	\$4,700.00	\$37,600.00
<b>Section 6 - Trailheads/Rest Stops/Overlooks Total:</b>					\$117,600.00
<b>SUBTOTAL</b>					<b>\$2,410,000.00</b>
<b>Construction Contingency, 20%</b>					<b>\$482,000.00</b>
<b>CONSTRUCTION SUBTOTAL</b>					<b>\$2,892,000.00</b>
<b>Design &amp; Engineering Contingency, 20%</b>					<b>\$482,000.00</b>
<b>SEGMENT 1 TOTAL</b>					<b>\$3,374,000.00</b>

Notes: See attached sheet for details.

## Appendix A

### Preferred Trail Spur 1C Detailed Cost Estimate

UNIT LEGEND: <u>LS</u> =Lump Sum, <u>SF</u> =Square Feet, <u>SY</u> =Square Yard, <u>EA</u> =Each, <u>LF</u> =Lineal Foot, <u>CY</u> =Cubic Yards, <u>AC</u> =Acre, <u>RD STA</u> =Road Station					
Lake Vermilion Trail Spur 1C (.83 miles)					
Preliminary Construction Estimate (2013 Dollars)					
Notes	Section 1 - Right-of-Way Acquisition	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
3	Fee title purchase for 16-foot trail corridor	0.37	AC	\$3,700.00	\$1,369.00
Section 1 - Right-of-Way Acquisition Total:					\$1,369.00
Notes	Section 2 - Wetland Mitigation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
4	Wetland Credits	0	AC	\$10,000.00	\$0.00
Section 2 - Wetland Banking Total:					\$0.00
Notes	Section 3 - Mobilization, Surveying & Erosion Control	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
5	Provide all necessary construction surveying and staking to meet layout and grading requirements for all facets of work	1	LS	\$3,800.00	\$3,800.00
6	Mobilization	1	LS	\$8,300.00	\$8,300.00
7	Silt Fence Type Machine Sliced	2,200	LF	\$2.50	\$5,500.00
8	Filter Log Type Straw Bioroll	4,400	LF	\$1.80	\$7,920.00
Section 3 - Mobilization and Surveying Total:					\$25,520.00
Notes	Section 4 - Utility Relocation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
9	Relocate Utility Pole	4	EA	\$3,000.00	\$12,000.00
Section 4 - Utility Relocation Total:					\$12,000.00
Notes	Section 5 - Trail Construction	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
10	Clearing & Grubbing	0.2	AC	\$5,000.00	\$1,000.00
11	10-Foot Wide Paved Trail, 3" Thickness	4382	LF	\$43.00	\$188,426.00
12	Culverts	1	EA	\$1,800.00	\$1,800.00
13	Signage	70	SF	\$32.00	\$2,240.00
14	Turf Establishment	1	AC	\$3,500.00	\$3,500.00
Section 5 -Trail Construction Total:					\$196,966.00
Notes	Section 6 - Trailheads/Rest Stops/Overlooks	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
17	Furnish and Install Rest Stop	1	EA	\$4,700.00	\$4,700.00
Section 6 - Trailheads/Rest Stops/Overlooks Total:					\$4,700.00
SUBTOTAL					\$240,000.00
Construction Contingency, 20%					\$48,000.00
CONSTRUCTION SUBTOTAL					\$288,000.00
Design & Engineering Contingency, 20%					\$48,000.00
SPUR 1C TOTAL					\$336,000.00

Notes: See attached sheet for details.

# Preferred Trail Segment 2 Detailed Cost Estimate

# Appendix A

<b>UNIT LEGEND:</b> <u>LS</u> =Lump Sum, <u>SF</u> =Square Feet, <u>SY</u> =Square Yard, <u>EA</u> =Each, <u>LF</u> =Lineal Foot, <u>CY</u> =Cubic Yards, <u>AC</u> =Acre, <u>RD STA</u> =Road Station					
<b>Lake Vermilion Trail Segment 2 (4.39 miles)</b> <b>Preliminary Construction Estimate (2013 Dollars)</b>					
Notes	Section 1 - Right-of-Way Acquisition	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
3	Fee title purchase for 16-foot trail corridor	9	AC	\$3,700.00	\$33,300.00
<b>Section 1 - Right-of-Way Acquisition Total:</b>					\$33,300.00
Notes	Section 2 - Wetland Mitigation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
4	Wetland Credits	0.37	AC	\$10,000.00	\$3,700.00
<b>Section 2 - Wetland Banking Total:</b>					\$3,700.00
Notes	Section 3 - Mobilization, Surveying & Erosion Control	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
5	Provide all necessary construction surveying and staking to meet layout and grading requirements for all facets of work	1	LS	\$20,000.00	\$20,000.00
6	Mobilization	1	LS	\$44,000.00	\$44,000.00
7	Silt Fence Type Machine Sliced	12,000	LF	\$2.50	\$30,000.00
8	Filter Log Type Straw Bioroll	23,000	LF	\$1.80	\$41,400.00
<b>Section 3 - Mobilization and Surveying Total:</b>					\$135,400.00
Notes	Section 4 - Utility Relocation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
9	Relocate Utility Pole	5	EA	\$3,000.00	\$15,000.00
<b>Section 4 - Utility Relocation Total:</b>					\$15,000.00
Notes	Section 5 - Trail Construction	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
10	Clearing & Grubbing	7	AC	\$5,000.00	\$35,000.00
11	10-Foot Wide Paved Trail, 3" Thickness	23,000	LF	\$43.00	\$989,000.00
12	Culverts	9	EA	\$1,800.00	\$16,200.00
13	Signage	370	SF	\$32.00	\$11,840.00
14	Turf Establishment	5.3	AC	\$3,500.00	\$18,550.00
<b>Section 5 - Trail Construction Total:</b>					\$1,070,590.00
Notes	Section 6 - Trailheads/Rest Stops/Overlooks	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
15	10-Stall Bituminous Parking Lot	1	LS	\$20,000.00	\$20,000.00
16	Furnish and Install Kiosk	1	EA	\$30,000.00	\$30,000.00
17	Furnish and Install Rest Stop	4	EA	\$4,700.00	\$18,800.00
<b>Section 6 - Trailheads/Rest Stops/Overlooks Total:</b>					\$68,800.00
Notes	Section 7 - Structures	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
18	Boardwalk	1,000	LF	\$520.00	\$520,000.00
<b>Section 7 - Structures Total:</b>					\$520,000.00
<b>SUBTOTAL</b>					<b>\$1,850,000.00</b>
<b>Construction Contingency, 20%</b>					<b>\$370,000.00</b>
<b>CONSTRUCTION SUBTOTAL</b>					<b>\$2,220,000.00</b>
<b>Design &amp; Engineering Contingency, 20%</b>					<b>\$370,000.00</b>
<b>SEGMENT 2 TOTAL</b>					<b>\$2,590,000.00</b>

Notes: See attached sheet for details.



## Preferred Trail Segment 2 Alternate Detailed Cost Estimate

UNIT LEGEND: <u>LS</u> =Lump Sum, <u>SF</u> =Square Feet, <u>SY</u> =Square Yard, <u>EA</u> =Each, <u>LF</u> =Lineal Foot, <u>CY</u> =Cubic Yards, <u>AC</u> =Acre, <u>RD STA</u> =Road Station					
Lake Vermilion Trail Segment 2 Alternate (4.6 miles) Preliminary Construction Estimate (2013 Dollars)					
Notes	Section 1 - Right-of-Way Acquisition	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
3	Fee title purchase for 16-foot trail corridor	9	AC	\$3,700.00	\$33,300.00
<b>Section 1 - Right-of-Way Acquisition Total:</b>					\$33,300.00
Notes	Section 2 - Wetland Mitigation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
4	Wetland Credits	0	AC	\$10,000.00	\$0.00
<b>Section 2 - Wetland Banking Total:</b>					\$0.00
Notes	Section 3 - Mobilization, Surveying & Erosion Control	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
5	Provide all necessary construction surveying and staking to meet layout and grading requirements for all facets of work	1	LS	\$21,000.00	\$21,000.00
6	Mobilization	1	LS	\$46,000.00	\$46,000.00
7	Silt Fence Type Machine Sliced	12,000	LF	\$2.50	\$30,000.00
8	Filter Log Type Straw Bioroll	24,000	LF	\$1.80	\$43,200.00
<b>Section 3 - Mobilization and Surveying Total:</b>					\$140,200.00
Notes	Section 4 - Utility Relocation	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
9	Relocate Utility Pole	32	EA	\$3,000.00	\$96,000.00
<b>Section 4 - Utility Relocation Total:</b>					\$96,000.00
Notes	Section 5 - Trail Construction	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
10	Clearing & Grubbing	1.5	AC	\$5,000.00	\$7,500.00
11	10-Foot Wide Paved Trail, 3" Thickness	24300	LF	\$43.00	\$1,044,900.00
12	Culverts	9	EA	\$1,800.00	\$16,200.00
13	Signage	400	SF	\$32.00	\$12,800.00
14	Turf Establishment	6	AC	\$3,500.00	\$21,000.00
<b>Section 5 -Trail Construction Total:</b>					\$1,102,400.00
Notes	Section 6 - Trailheads/Rest Stops/Overlooks	Estimated Qty.	Unit	Unit Price (in Dollars)	Total (In Dollars)
15	10-Stall Bituminous Parking Lot	1	LS	\$20,000.00	\$20,000.00
16	Furnish and Install Kiosk	1	EA	\$30,000.00	\$30,000.00
17	Furnish and Install Rest Stop	4	EA	\$4,700.00	\$18,800.00
<b>Section 6 - Trailheads/Rest Stops/Overlooks Total:</b>					\$68,800.00
<b>SUBTOTAL</b>					<b>\$1,440,000.00</b>
<b>Construction Contingency, 20%</b>					<b>\$288,000.00</b>
<b>CONSTRUCTION SUBTOTAL</b>					<b>\$1,728,000.00</b>
<b>Design &amp; Engineering Contingency, 20%</b>					<b>\$288,000.00</b>
<b>SEGMENT 2 ALTERNATE TOTAL</b>					<b>\$2,016,000.00</b>

Notes: See attached sheet for details.

## Detailed Notes for Cost Estimates

1. Construction cost estimate includes a 20% design and administration fee and an additional 20% construction contingency for unknown costs.
2. Estimates are based on 2013 construction costs.
3. Actual right of way or easement requirements shall be confirmed in final design. Easement costs were determined based on current land values in the region. Easement costs are in 2013 dollars. Corridor width of 16 feet for trail and shoulders. Assumes average price per acre of \$3,700.
4. Wetland disturbance based on 16 foot wide corridor for length of potential disturbance based on NWI mapping. Cost based on wetland credit purchases in area in previous year.
5. Survey cost of \$4,545/mile based on recent trail projects' actual survey costs.
6. Mobilization cost of \$10,000 per mile based on recent trail projects' actual mobilization costs.
7. Assumes silt fence placement for distance equal to half the total corridor length for one side of the trail.
8. Assumes filter log bioroll placement for distance equal to half the total corridor length.
9. Assumes an average of 7 utility poles per mile to be relocated.
10. Assumes an average of 1/4 acre per mile for clearing and grubbing.
11. Trail construction cost includes grading, Class 5 base material and 3" bituminous pavement.
12. Assumes an average of two 20 foot culverts per mile including aprons.
13. Assumes 84 square feet of signage per mile. Average based on sign pricing from previous trail projects and includes intersection signage.
14. Turf establishment for five feet each side of trail.
15. Parking lot includes grading, base material, concrete curb and gutter and 3" bituminous pavement.
16. 8' x 16' steel roof, metal-frame, open-side structure with three display panels.
17. Rest stop includes concrete pad, two benches, one bike rack and one waste receptacle.
18. Boardwalk estimated at 14 feet wide with wood decking, wood and mesh railing, helical pile anchors and wood abutments at both ends.



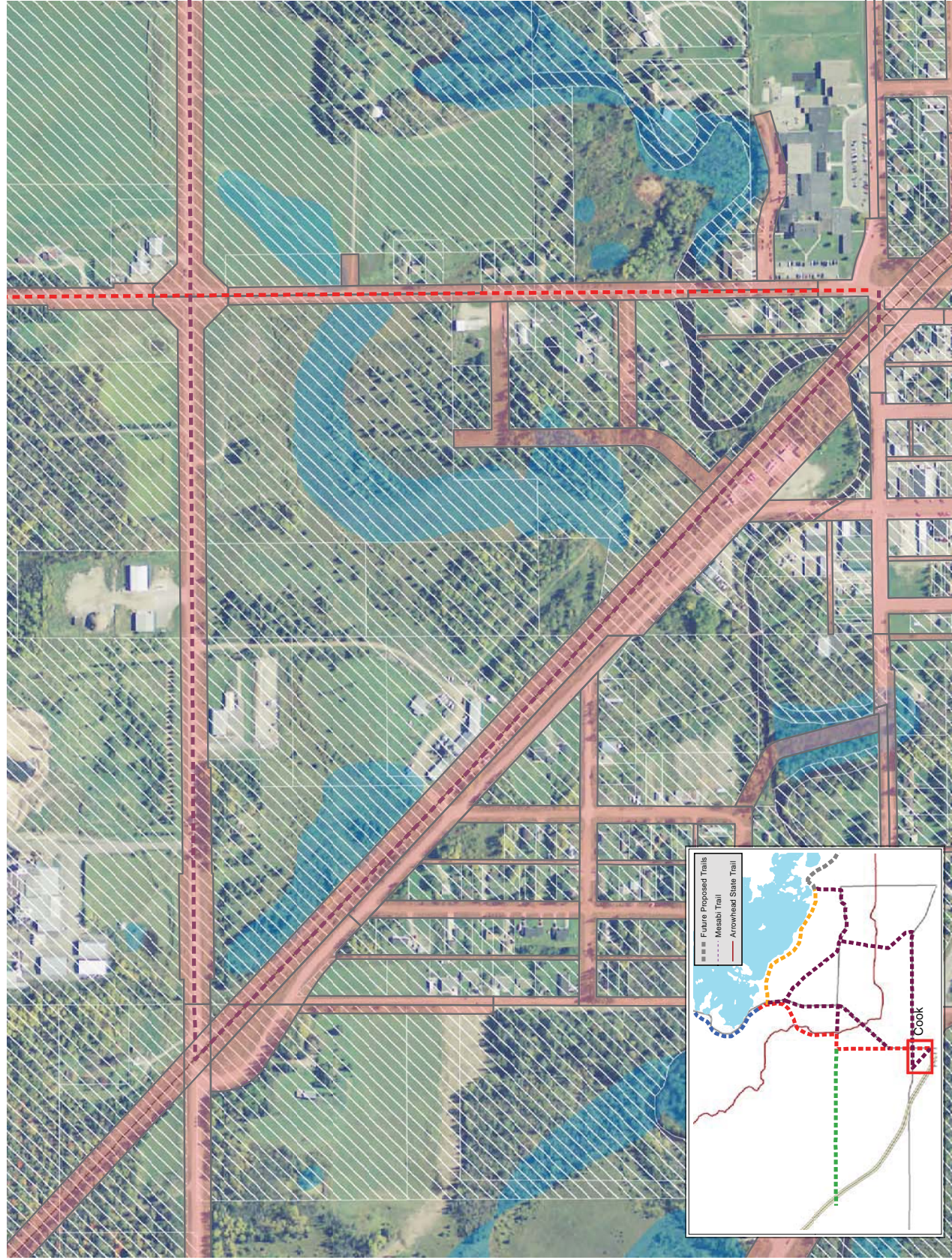
# Appendix B

## Detailed Subsegment Mapping





# Lake Vermilion Trail Feasibility Study - ROW



- Segment 1
- Segment 2
- Spur 1A
- Spur 1B
- Alternate
- Right of Way
- Pollatch
- Private Lands
- Wetlands - NWI

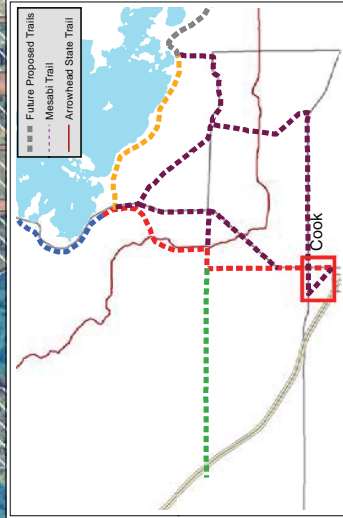
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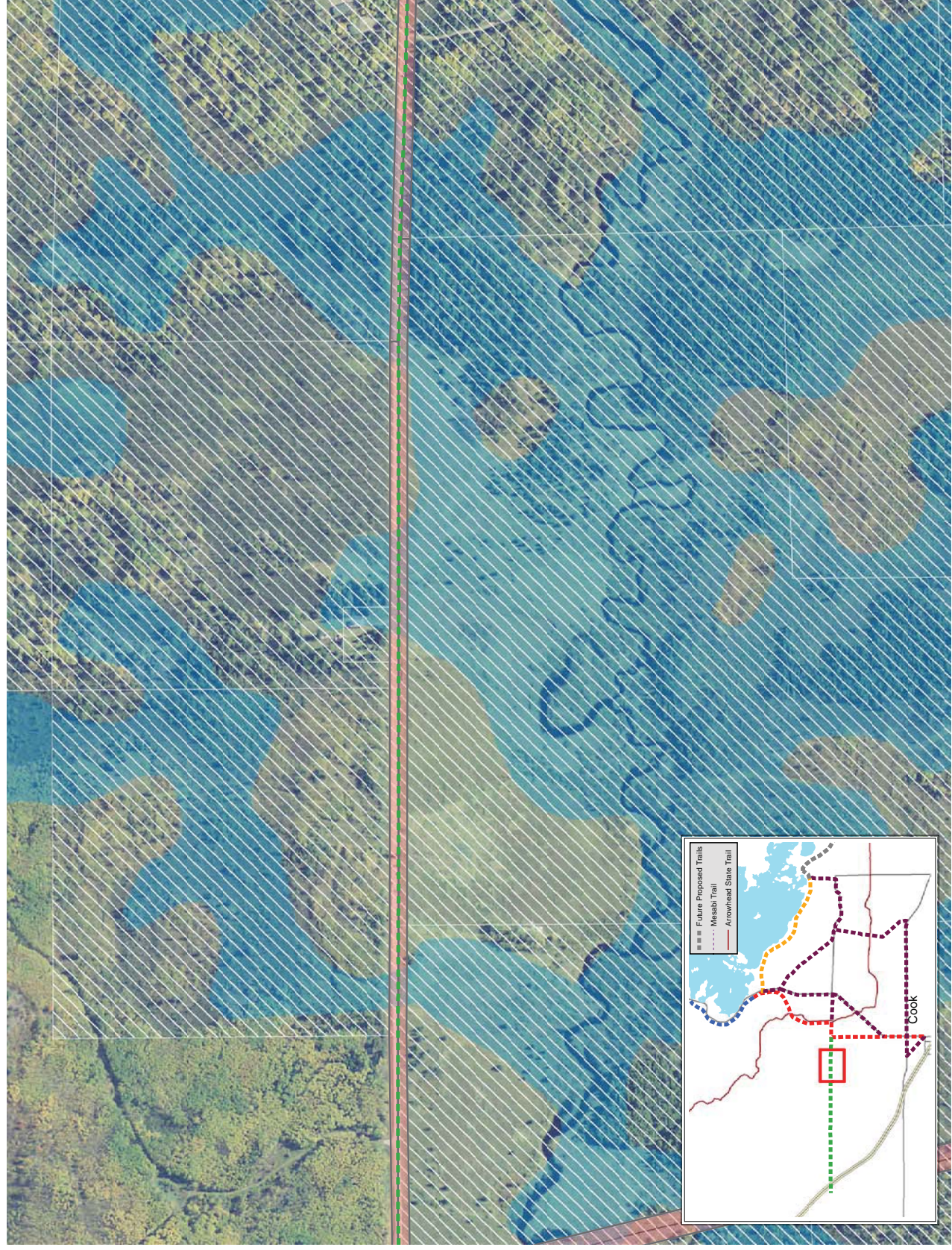


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MN DNR, St. Louis County,  
National Wetland Inventory, and  
SRF Consulting Group, Inc.  
2010 FSA Imagery



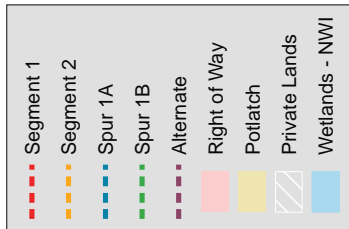


# Lake Vermilion Trail Feasibility Study - ROW





# Lake Vermilion Trail Feasibility Study - ROW



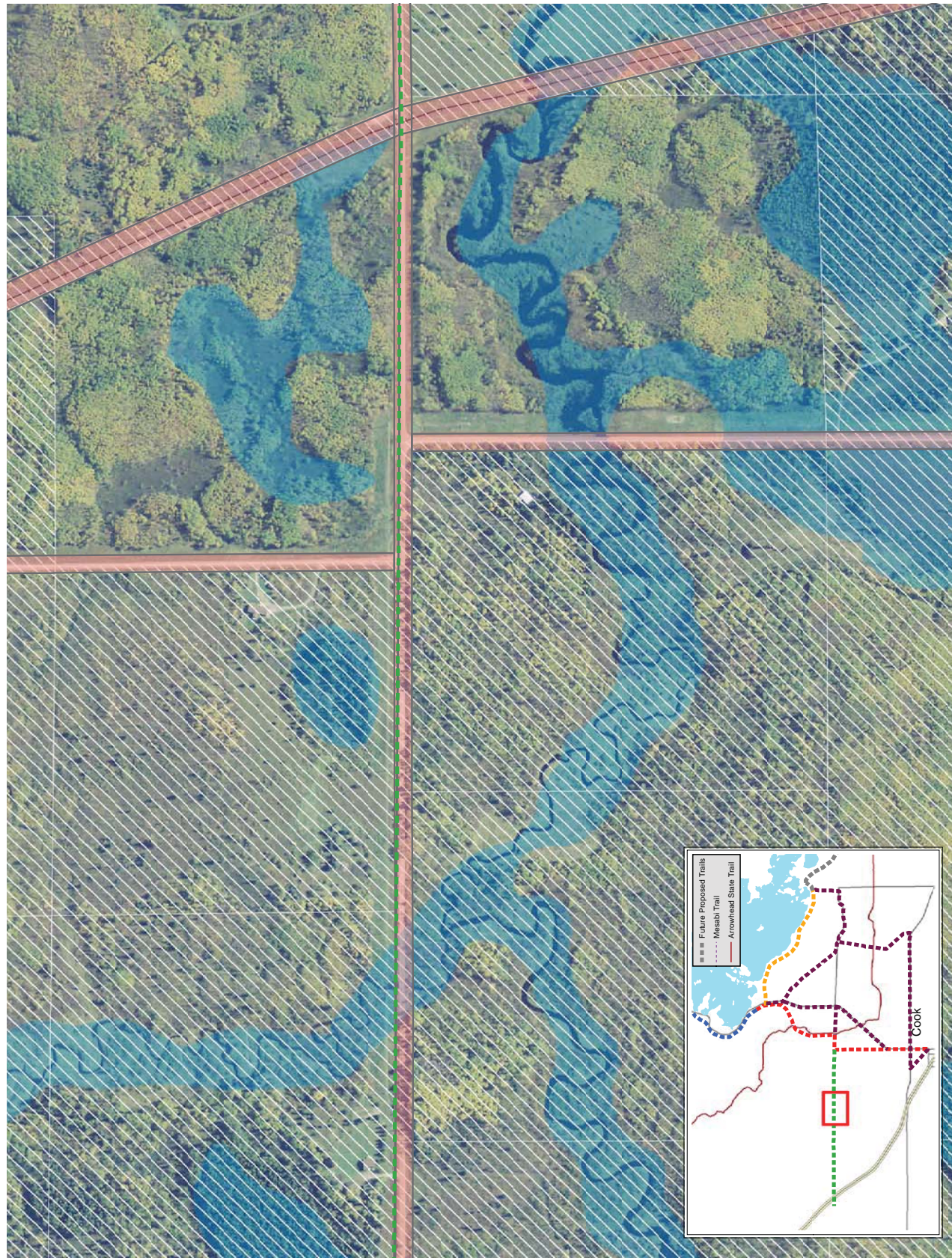
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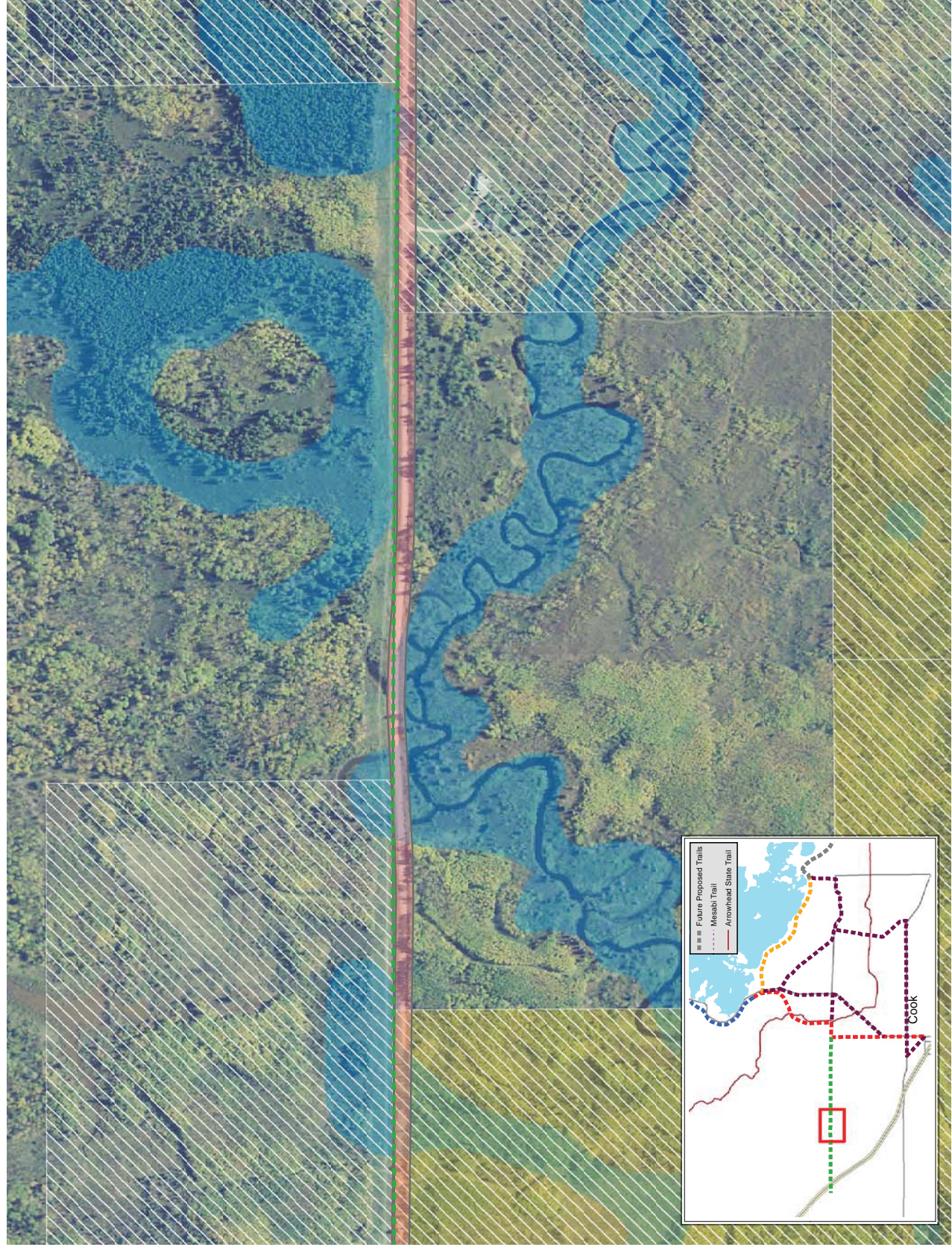


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# Lake Vermilion Trail Feasibility Study - ROW



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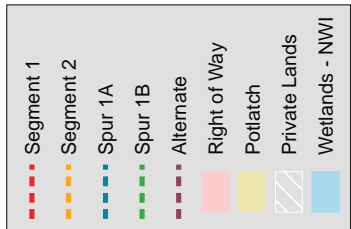
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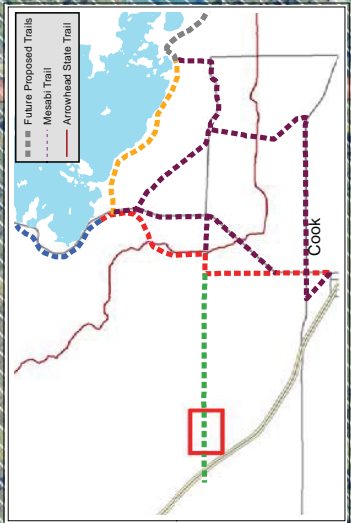
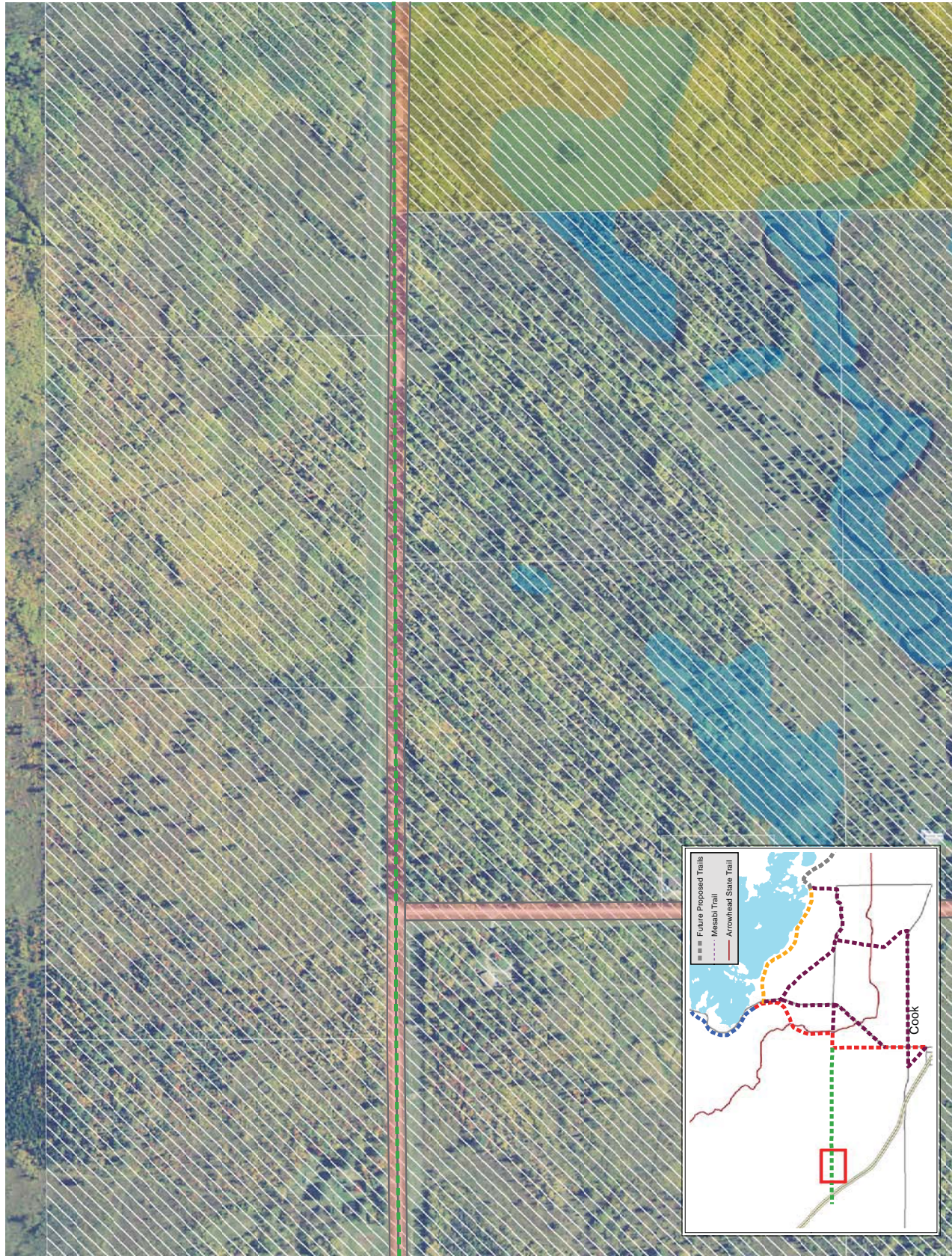
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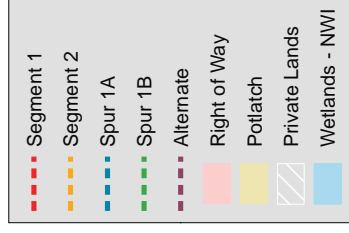


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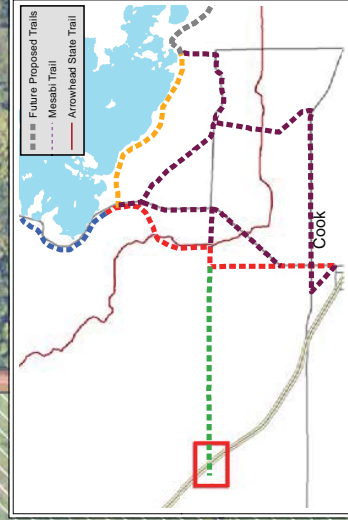
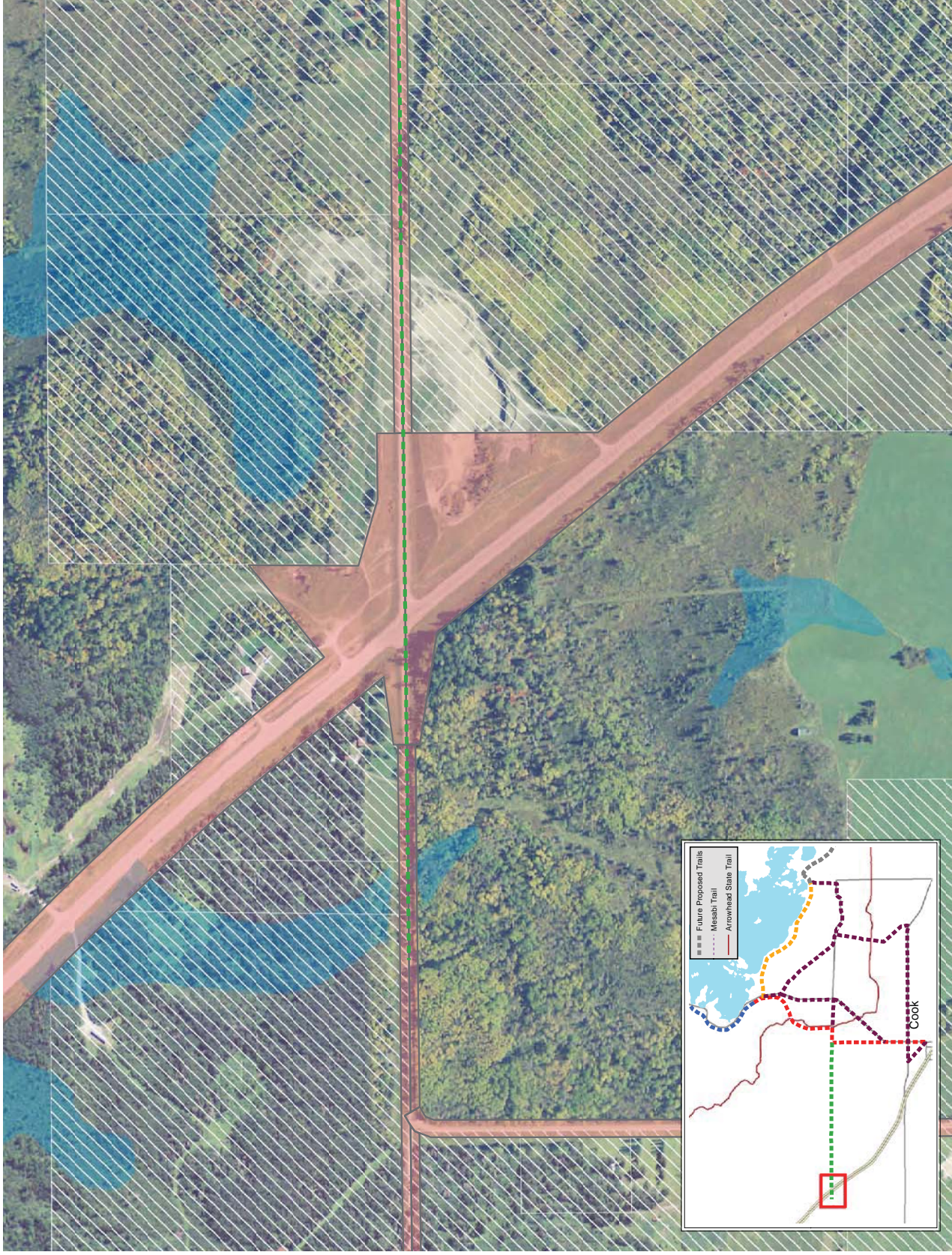
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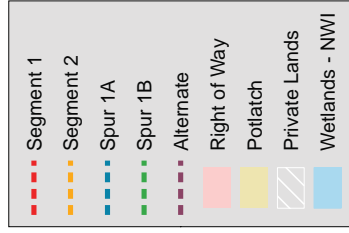


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# Lake Vermilion Trail Feasibility Study - ROW



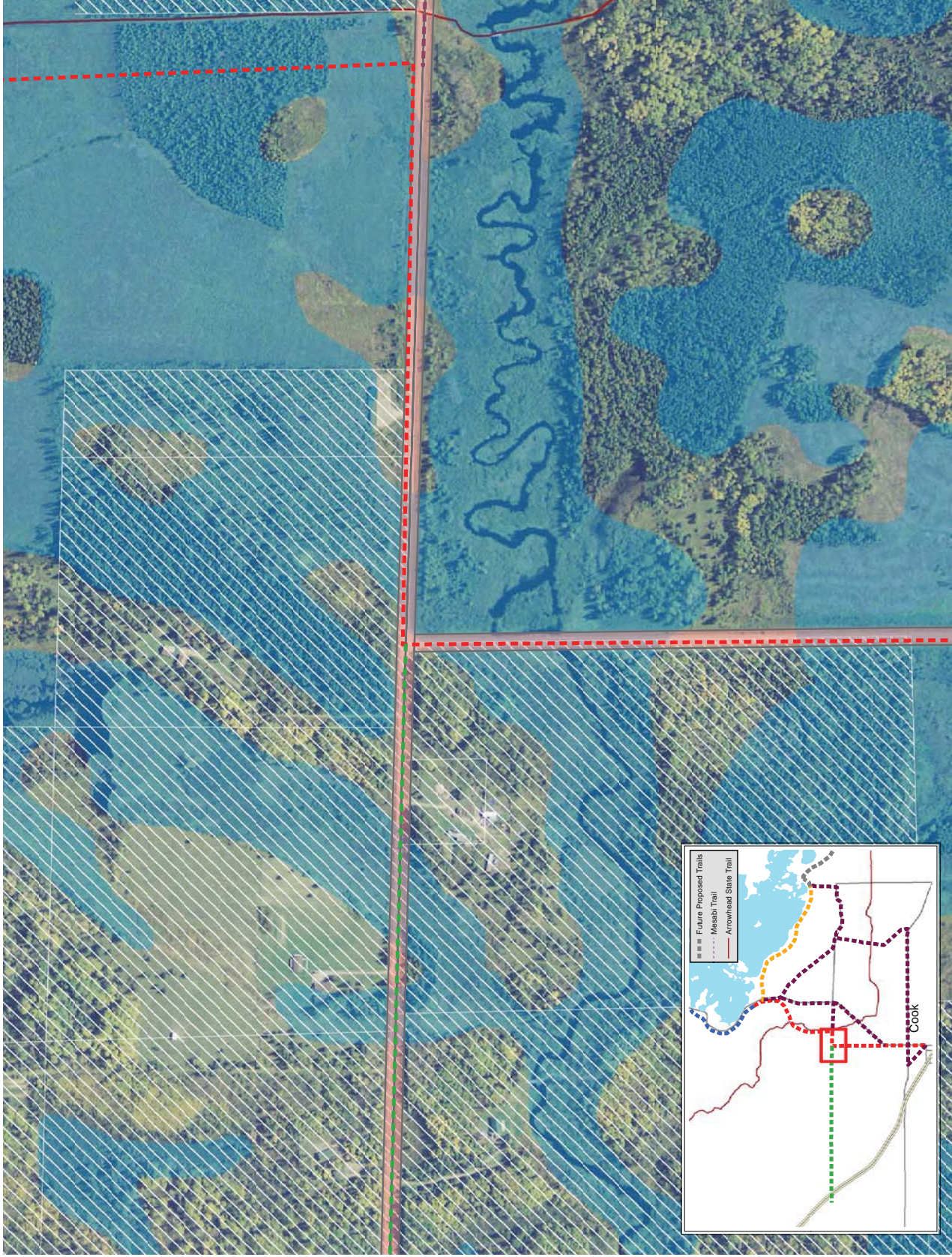
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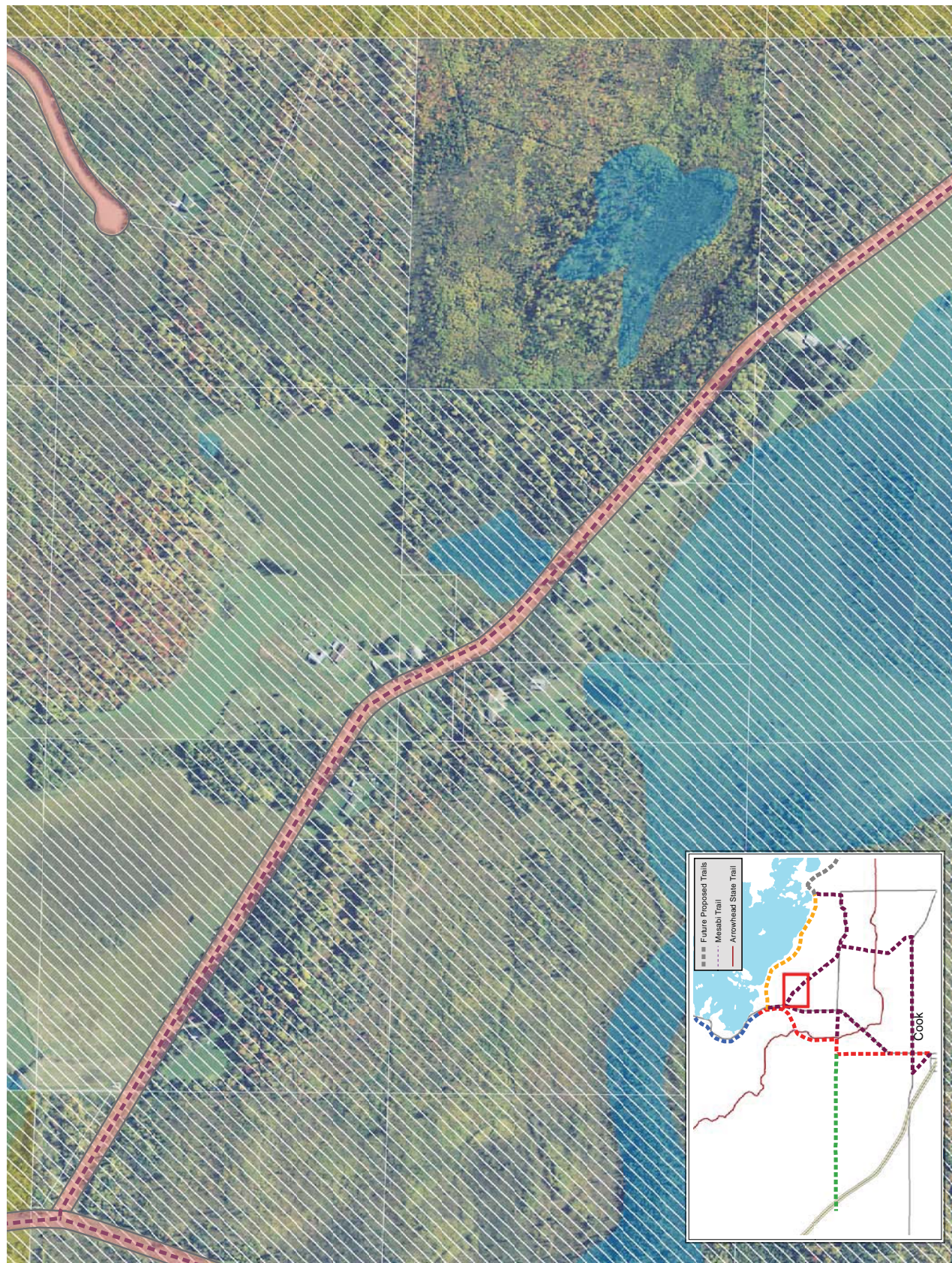


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# Lake Vermilion Trail Feasibility Study - ROW



- Segment 1
- Segment 2
- Spur 1A
- Spur 1B
- Alternate
- Right of Way
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- Private Lands
- Wetlands - NWI

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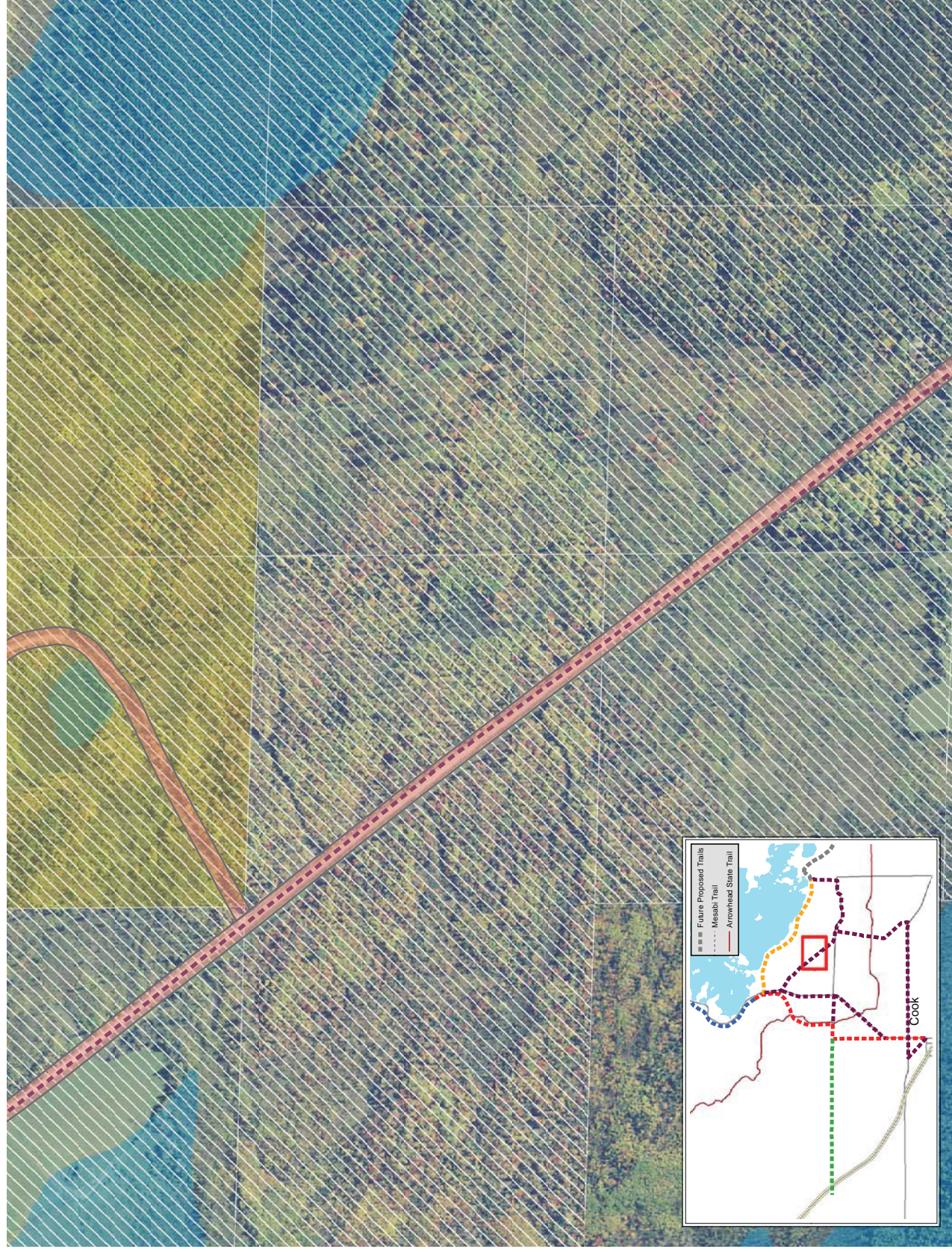
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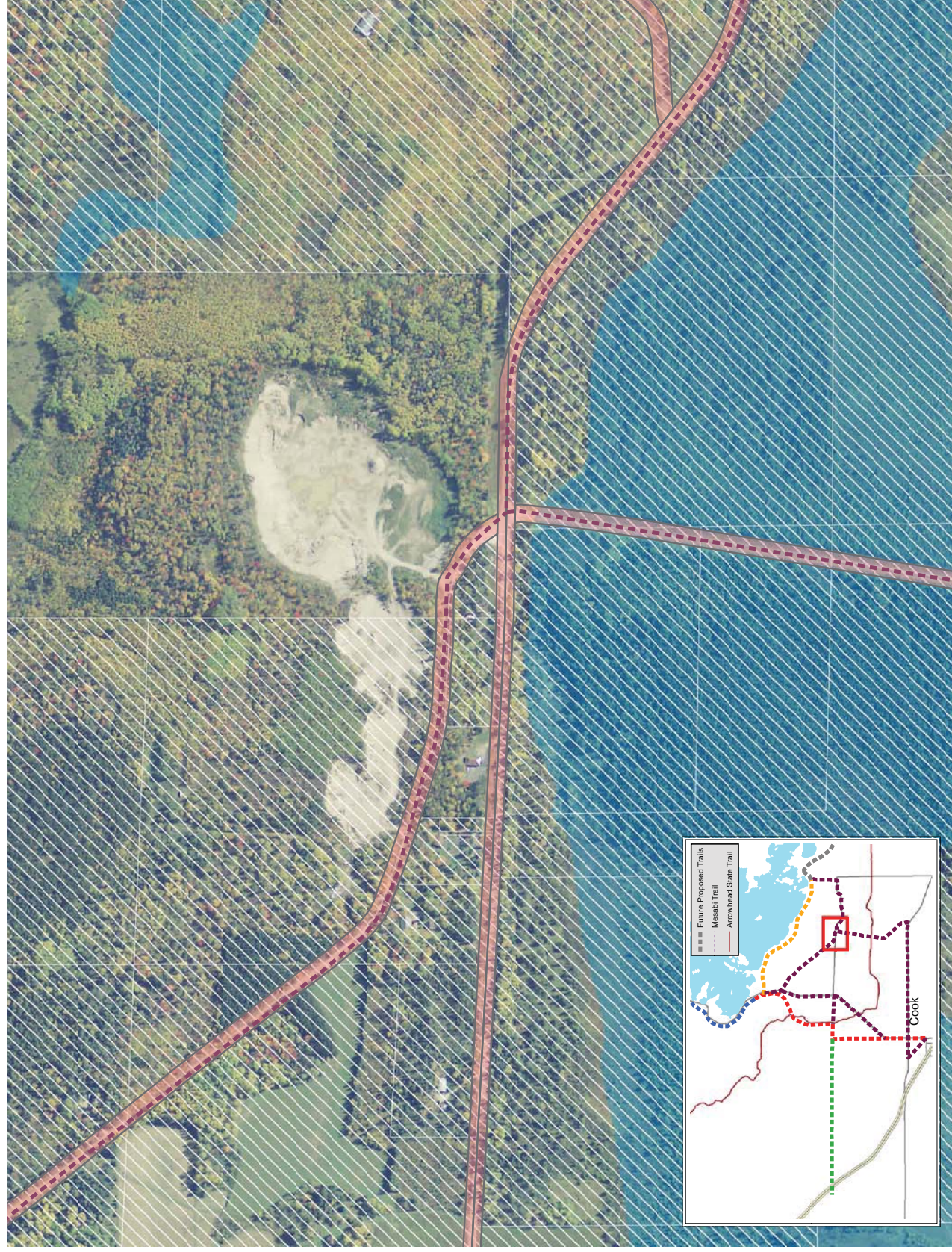


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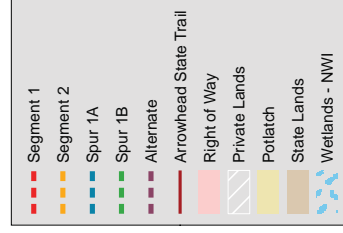


# Lake Vermilion Trail Feasibility Study - ROW





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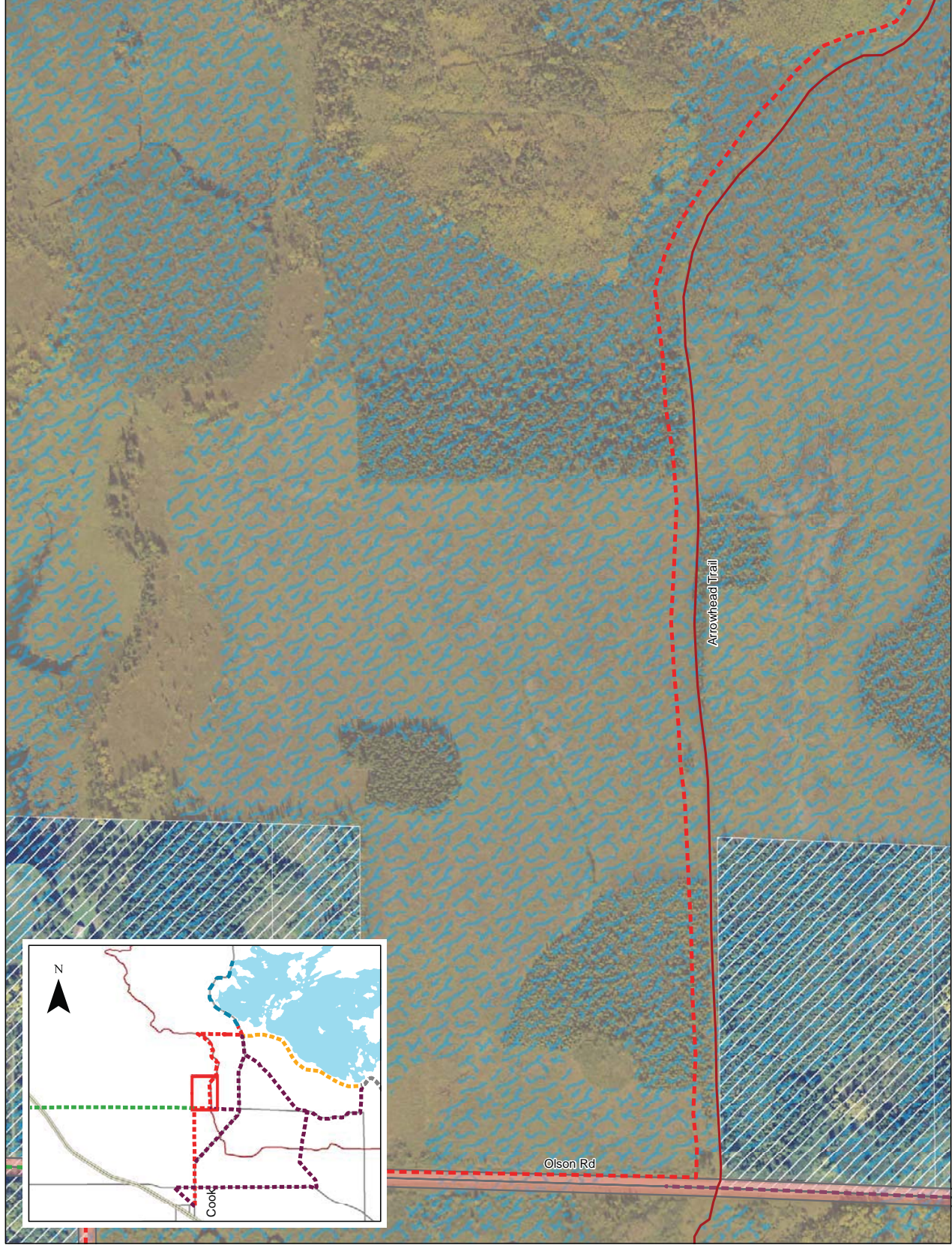
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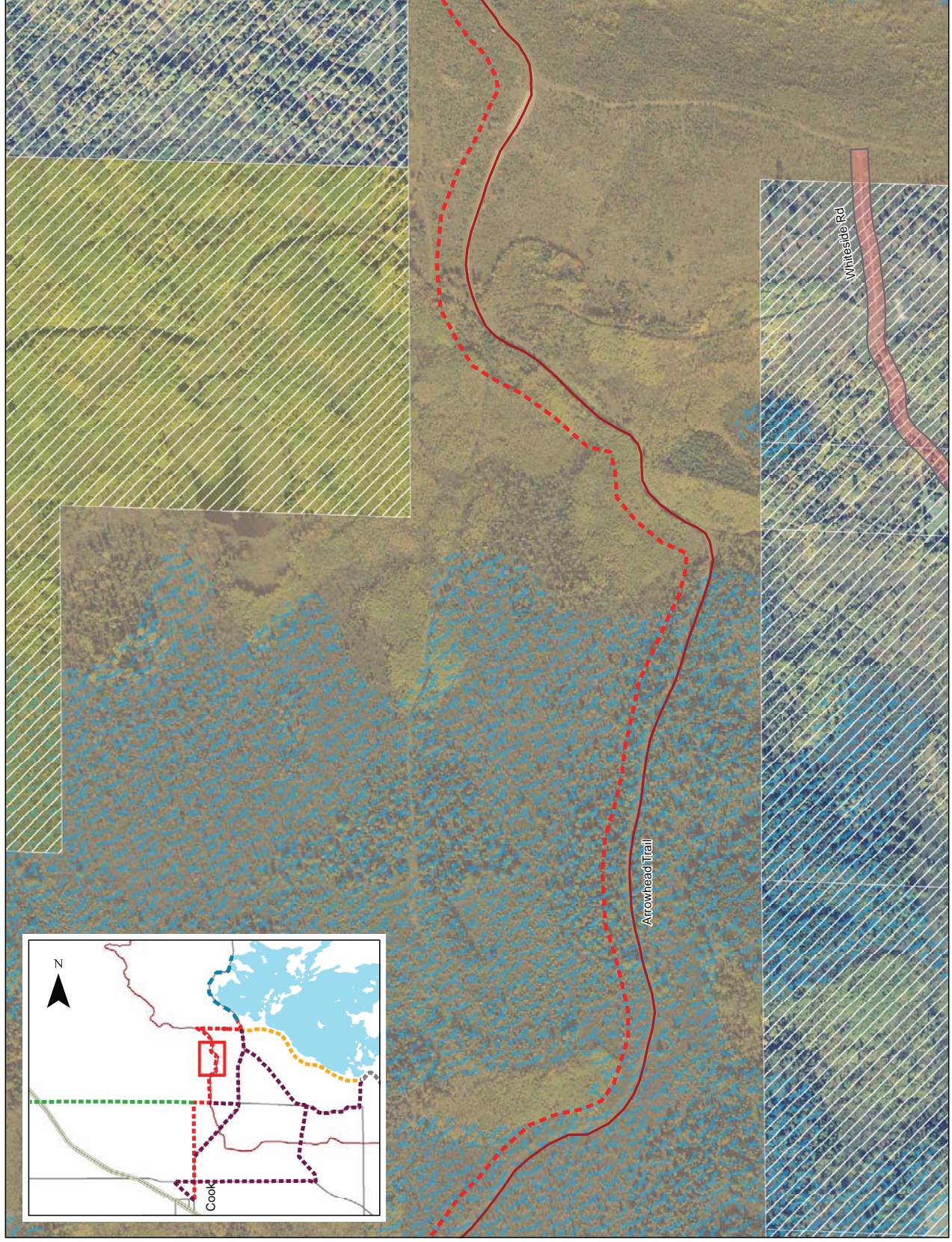


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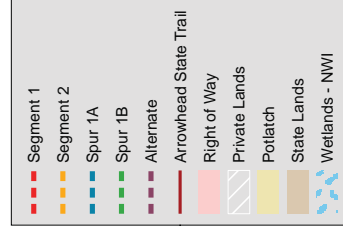


# Lake Vermilion Trail Feasibility Study - ROW





# Lake Vermilion Trail Feasibility Study - ROW



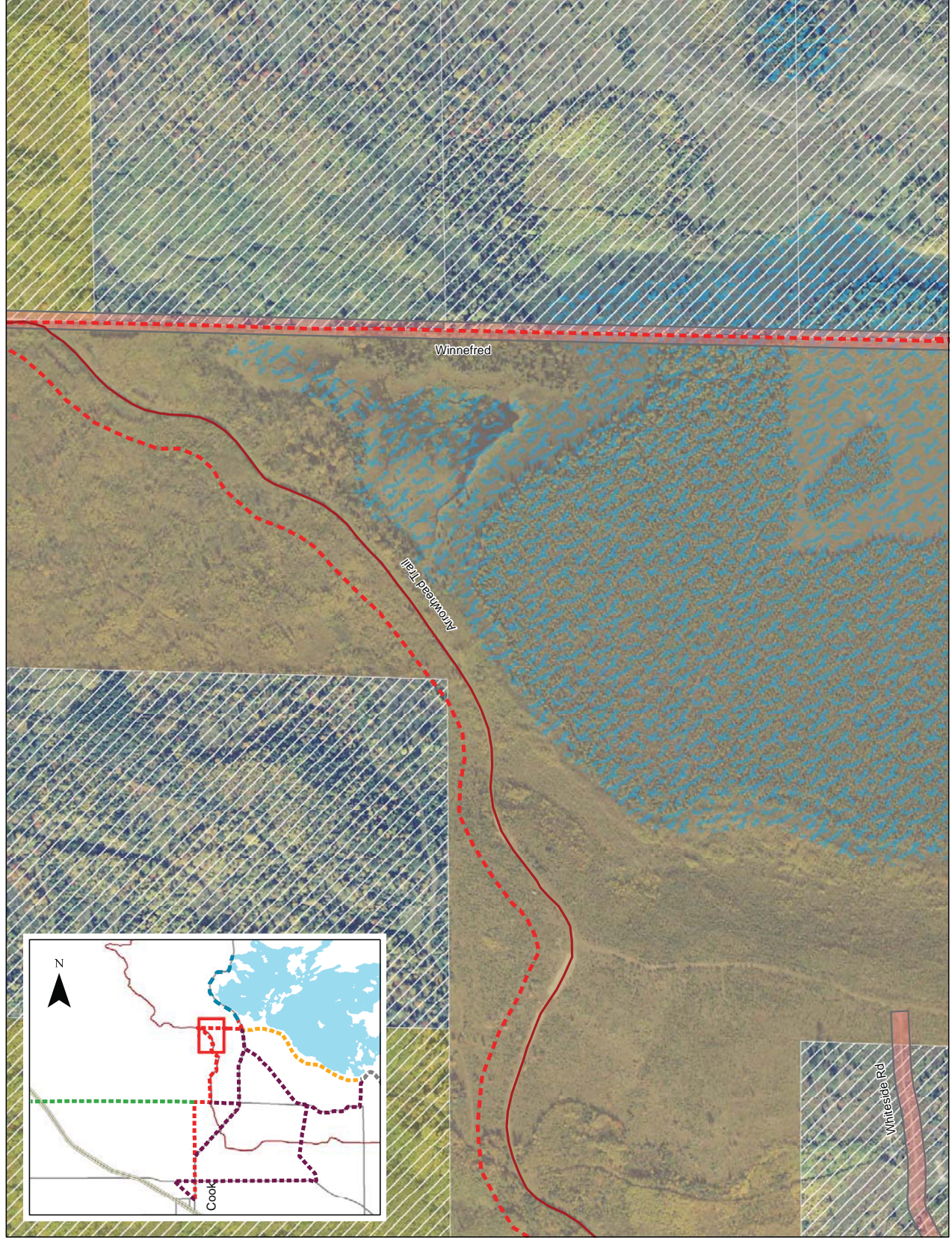
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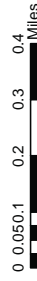
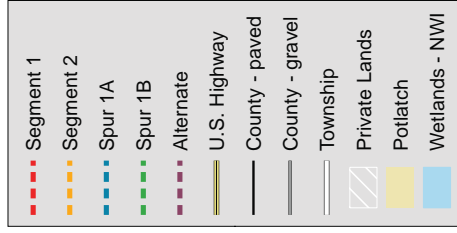


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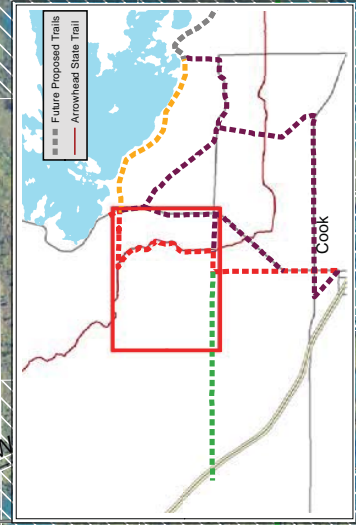
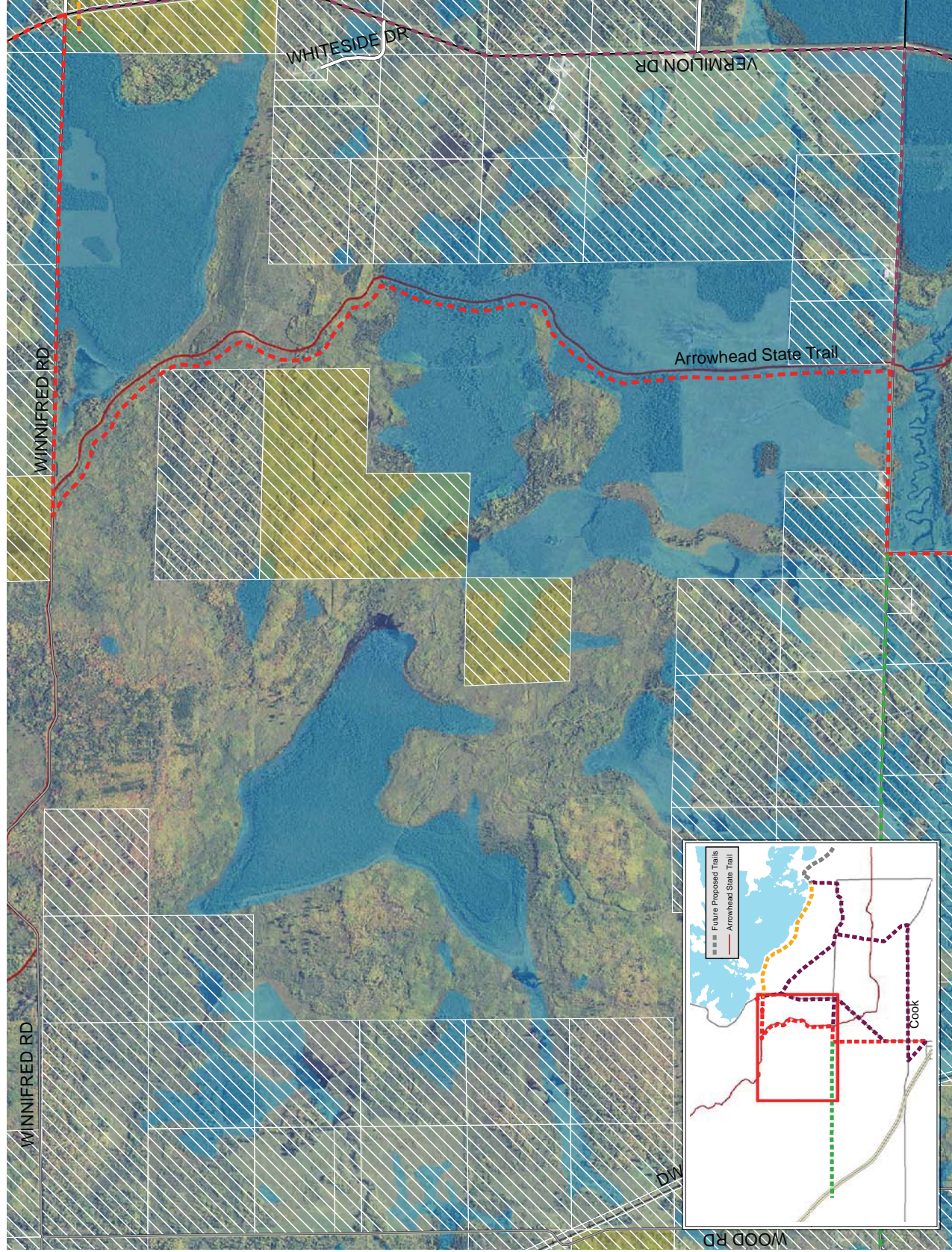
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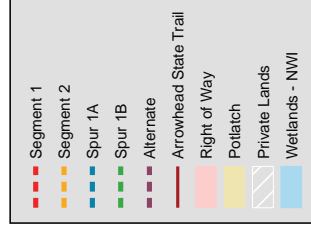


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# Lake Vermilion Trail Feasibility Study - ROW



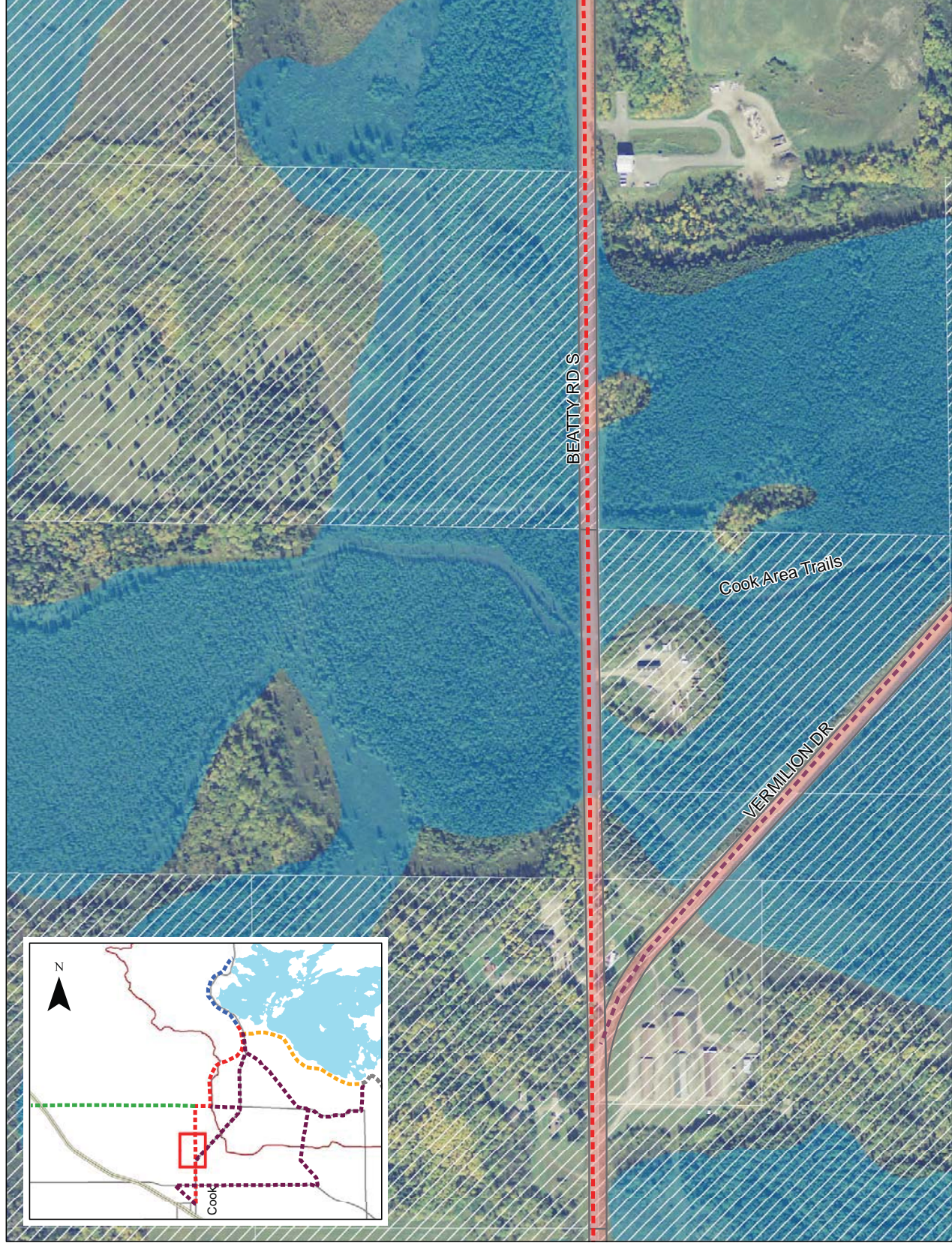
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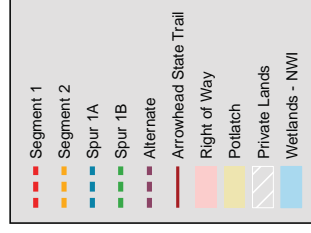


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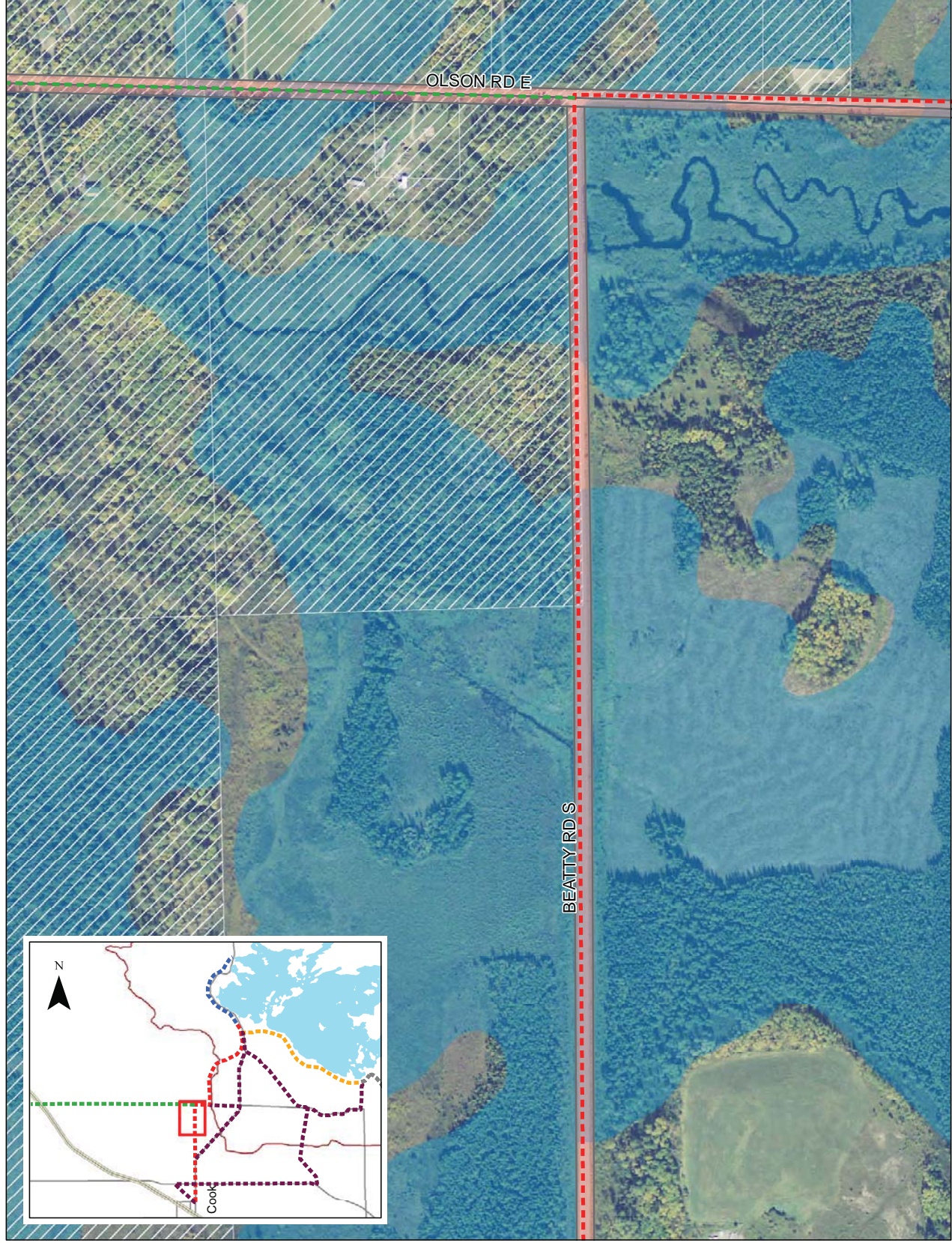
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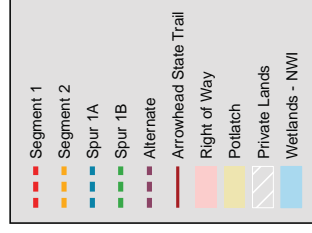


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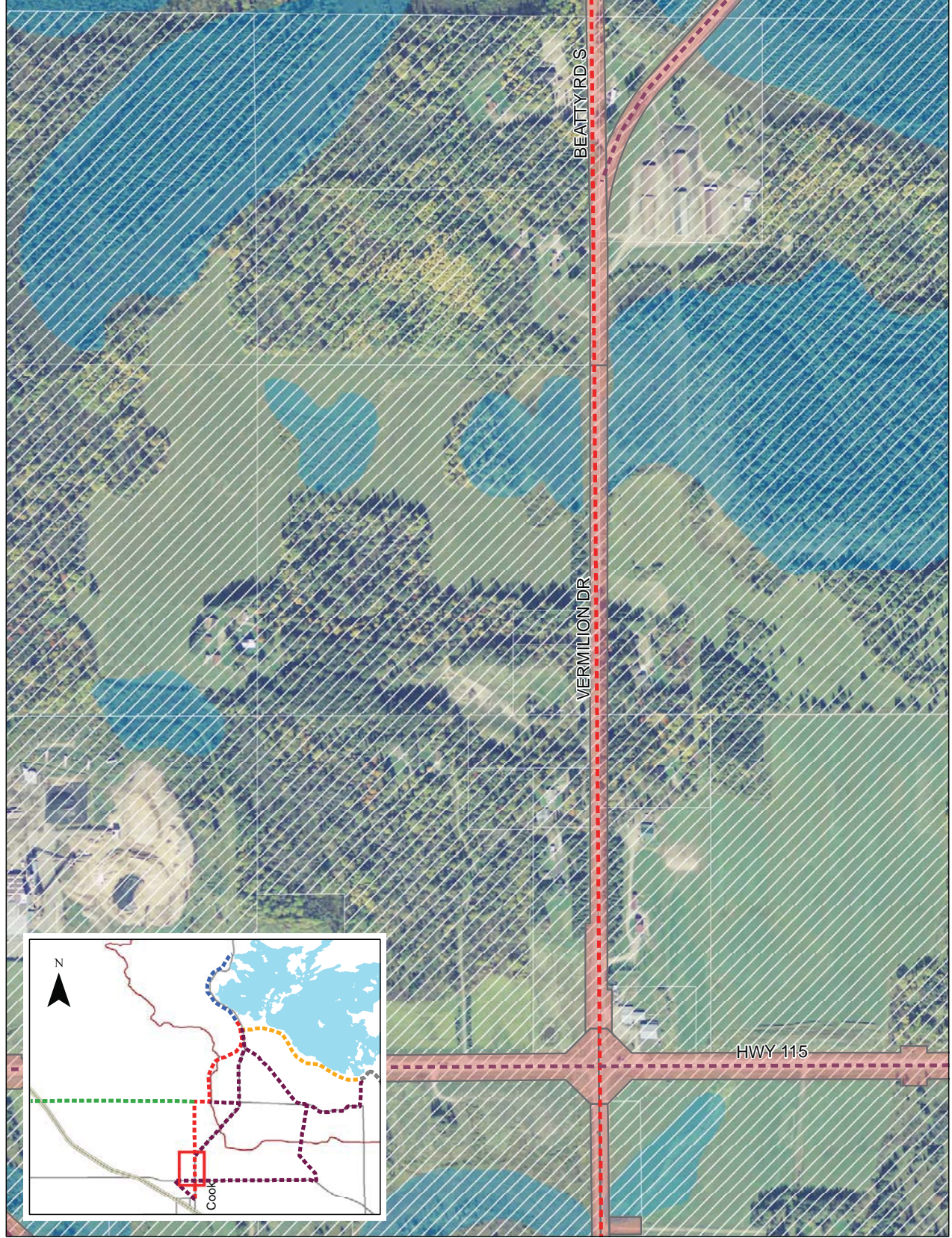
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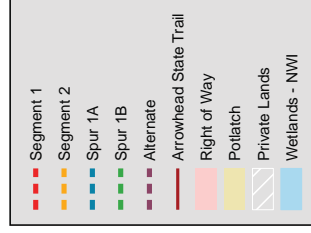


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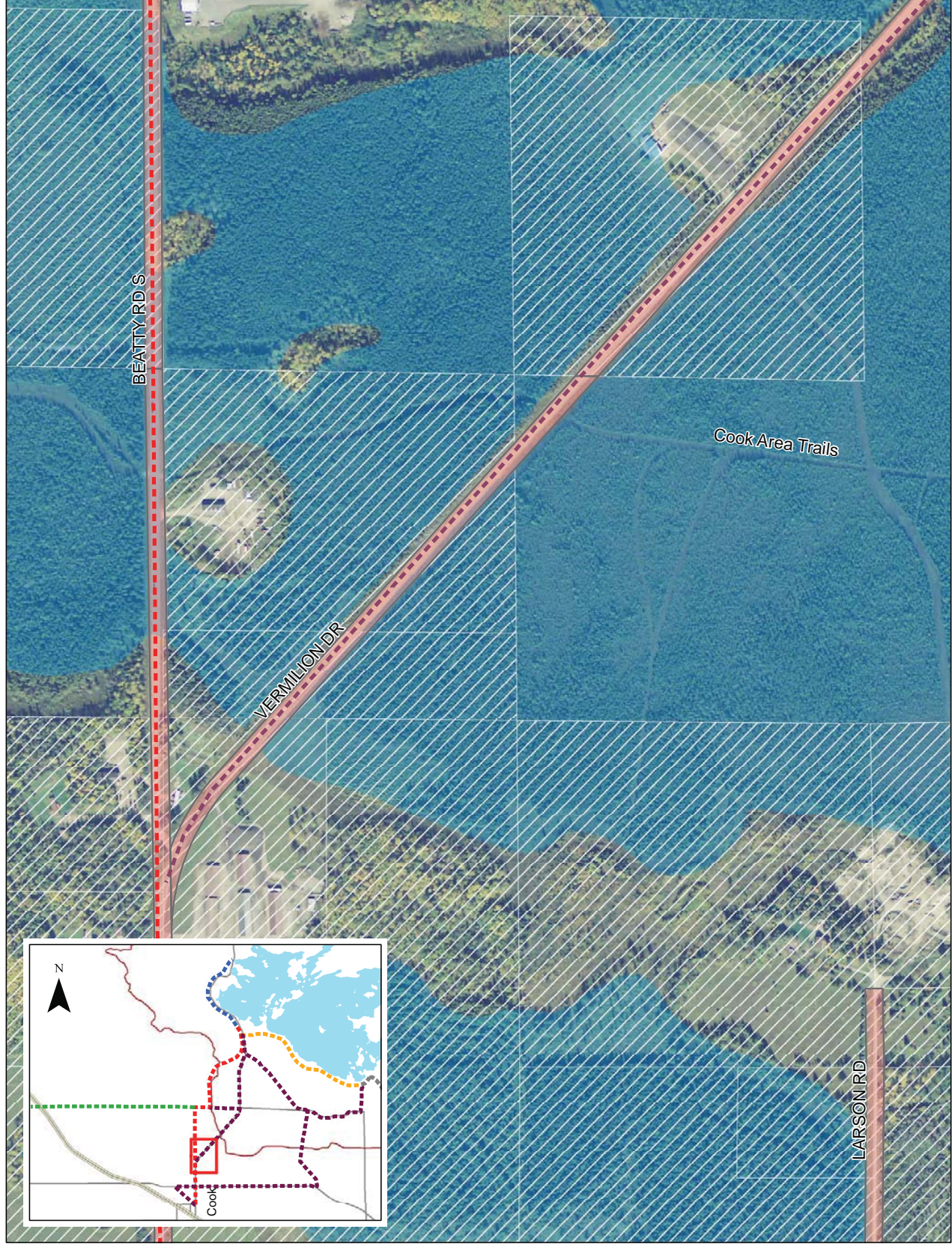
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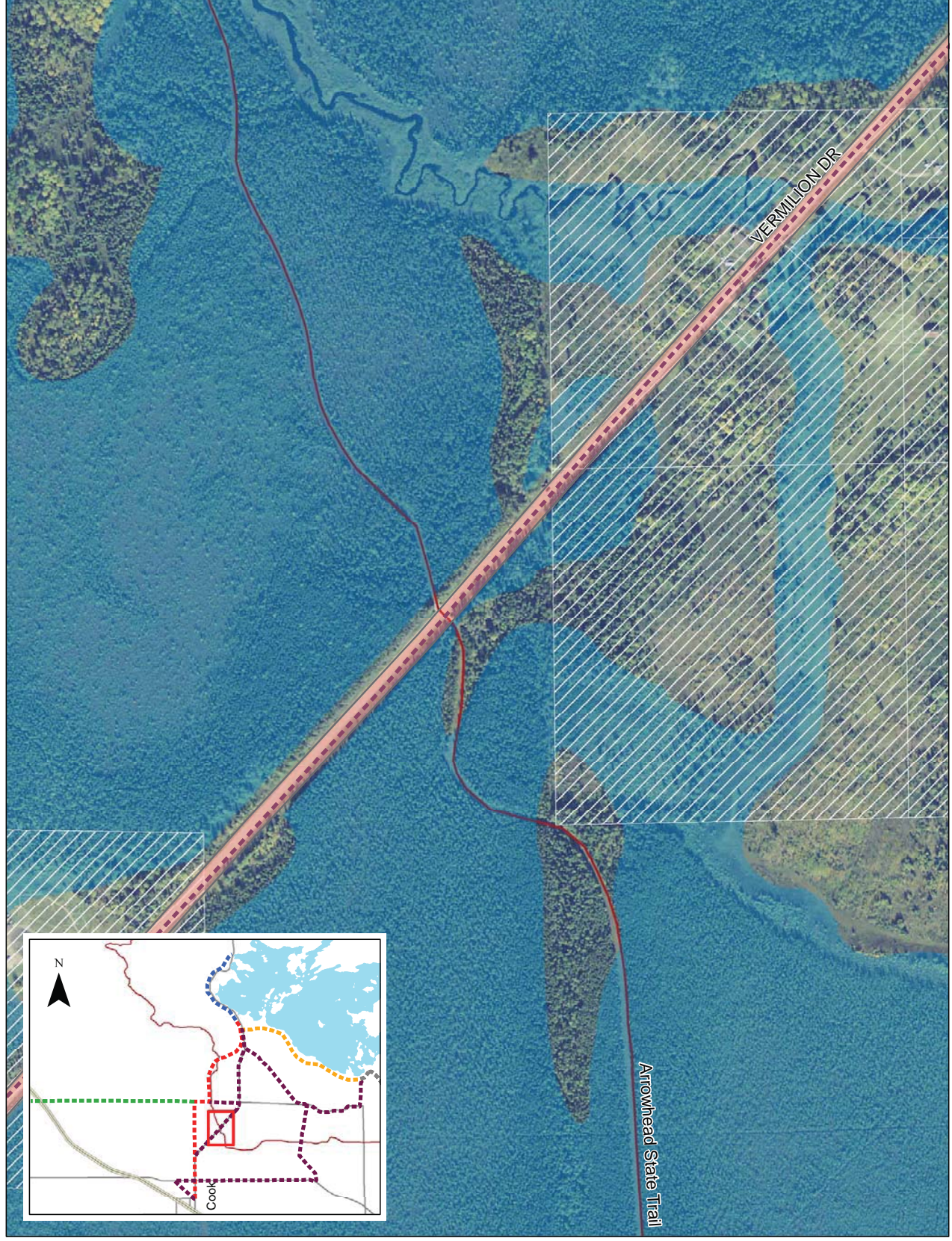


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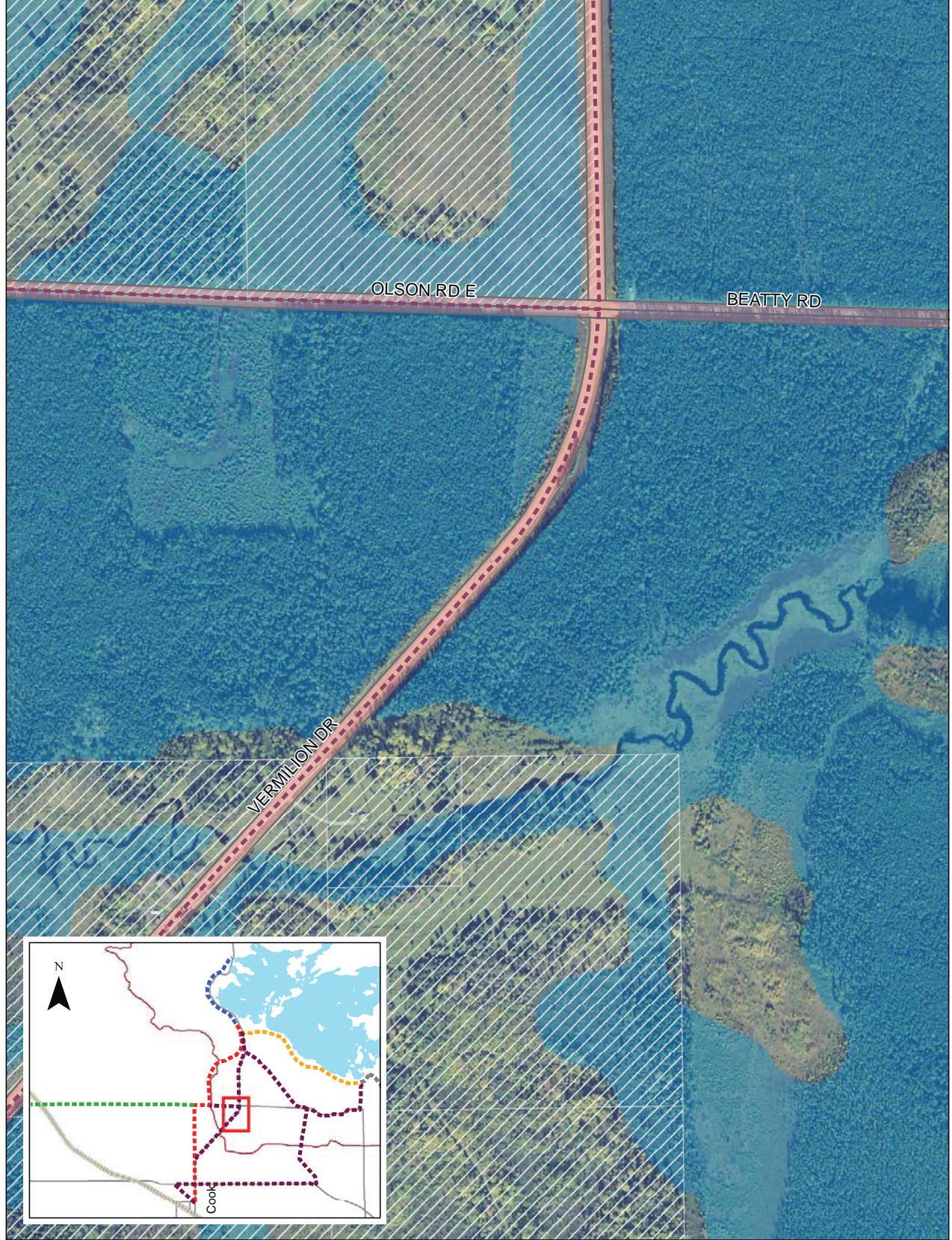
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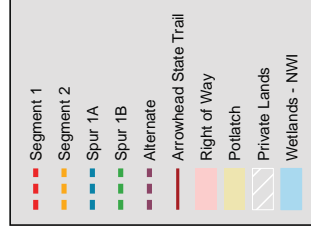
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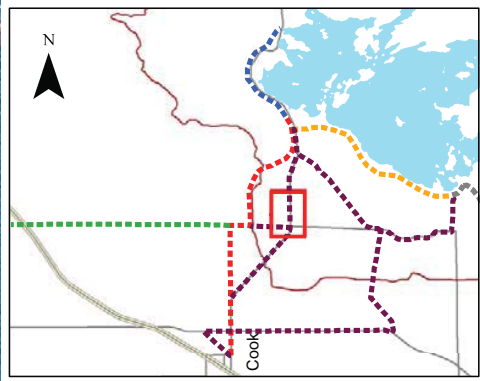
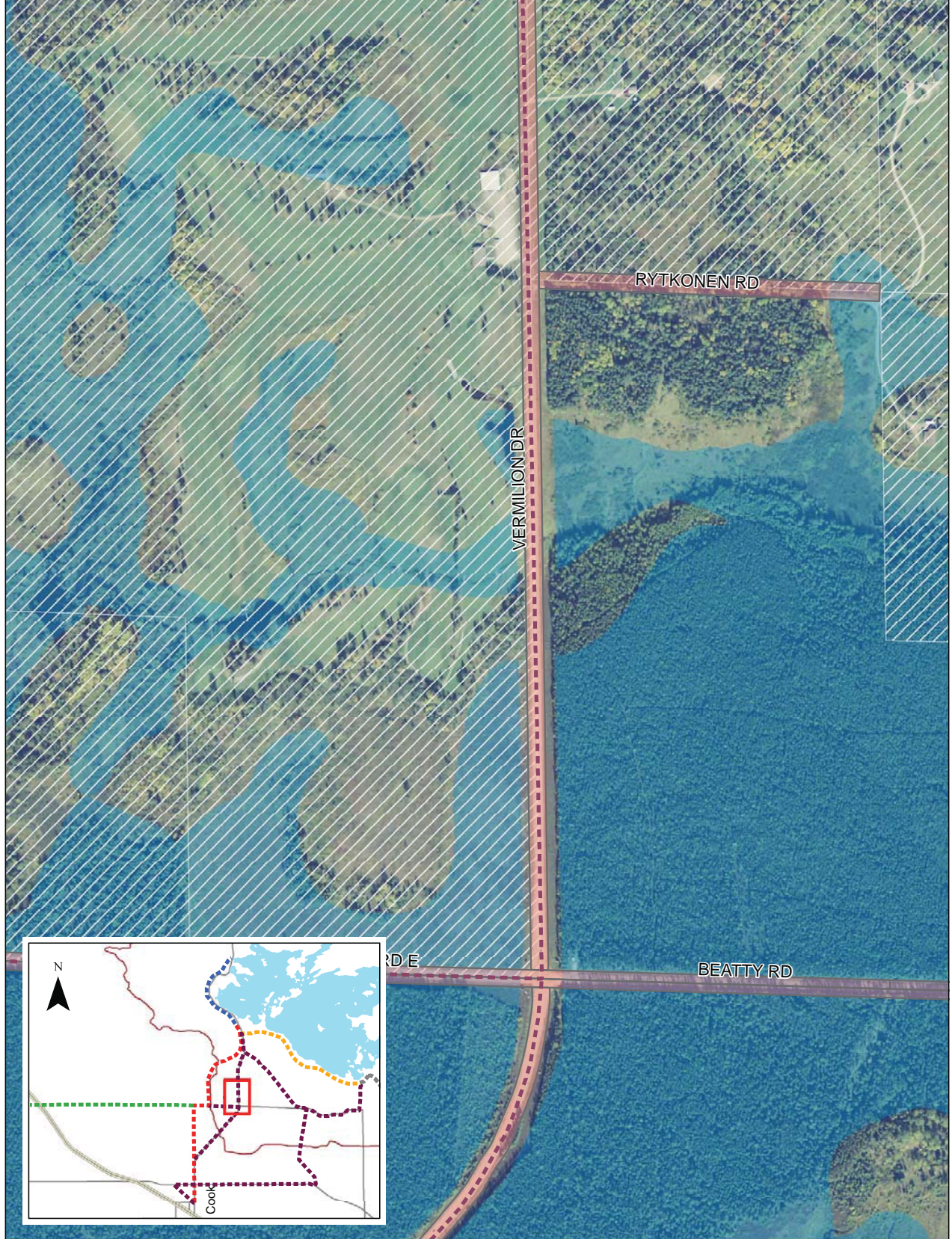
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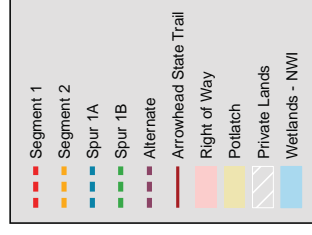


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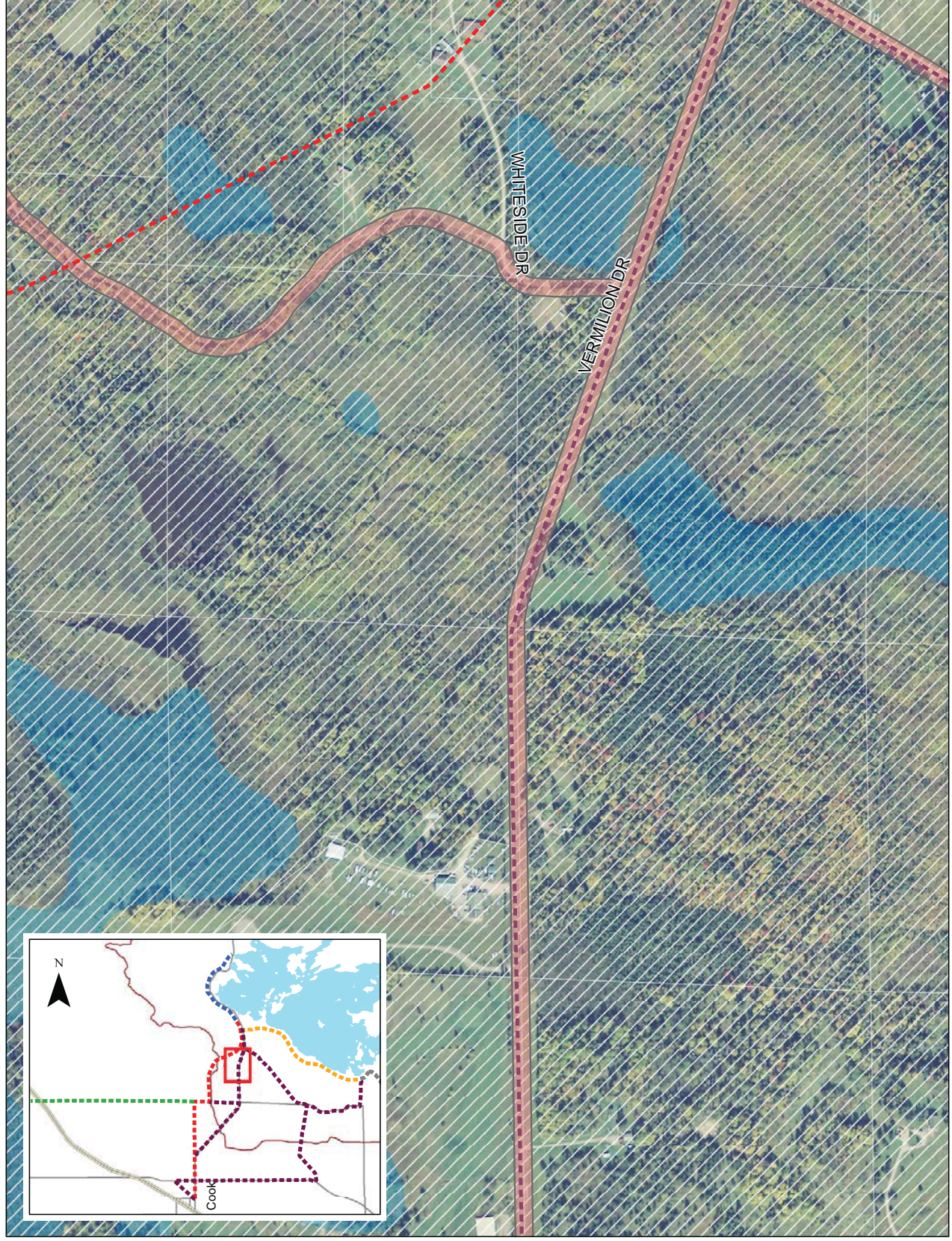
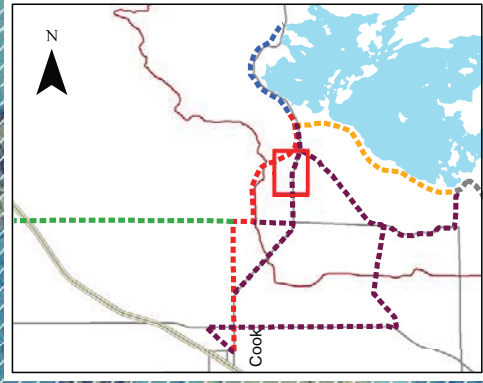
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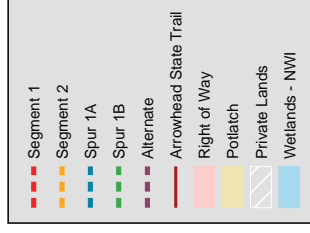


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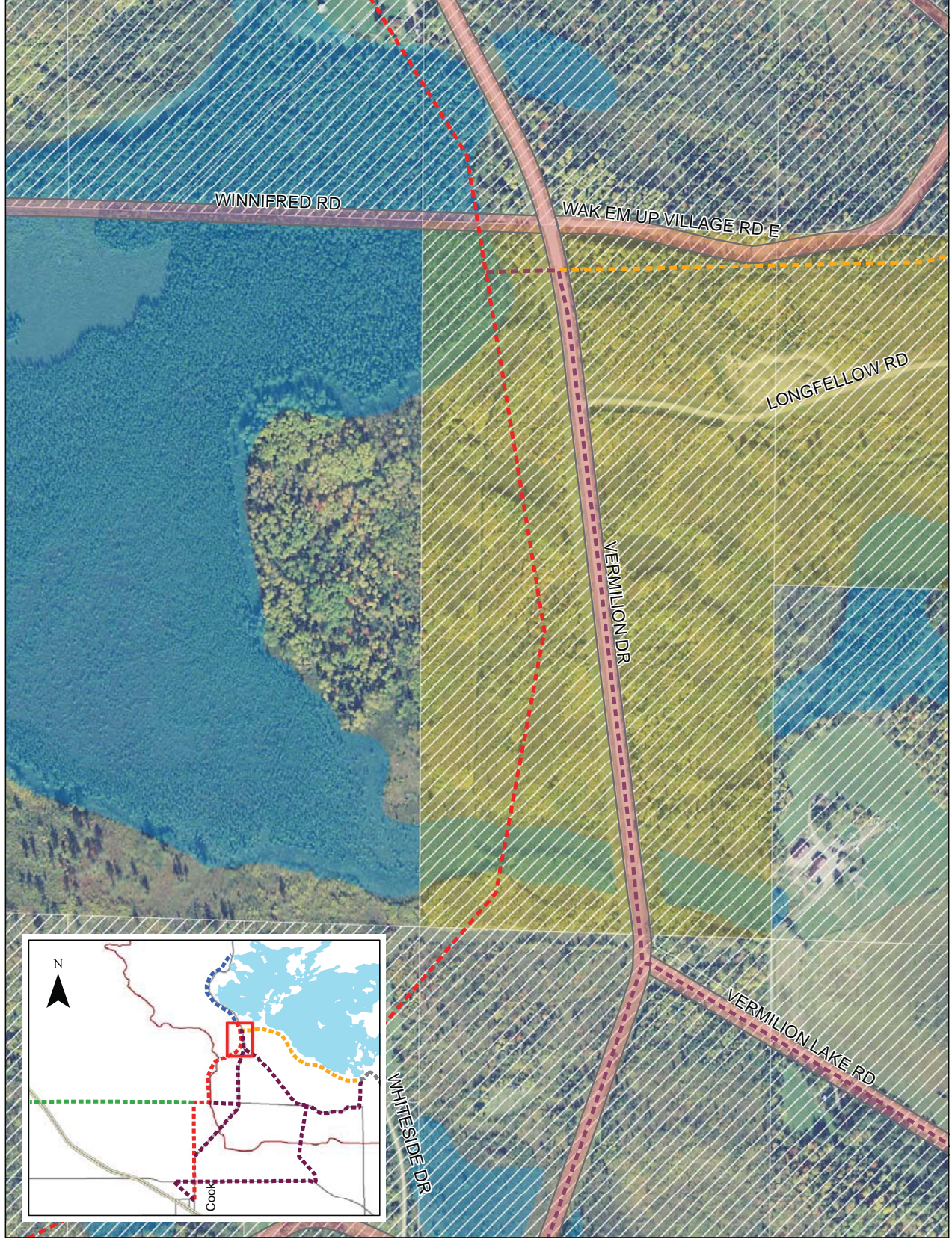
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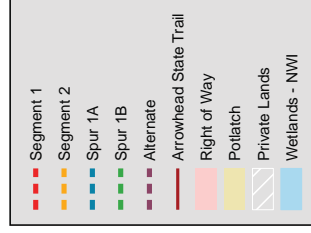


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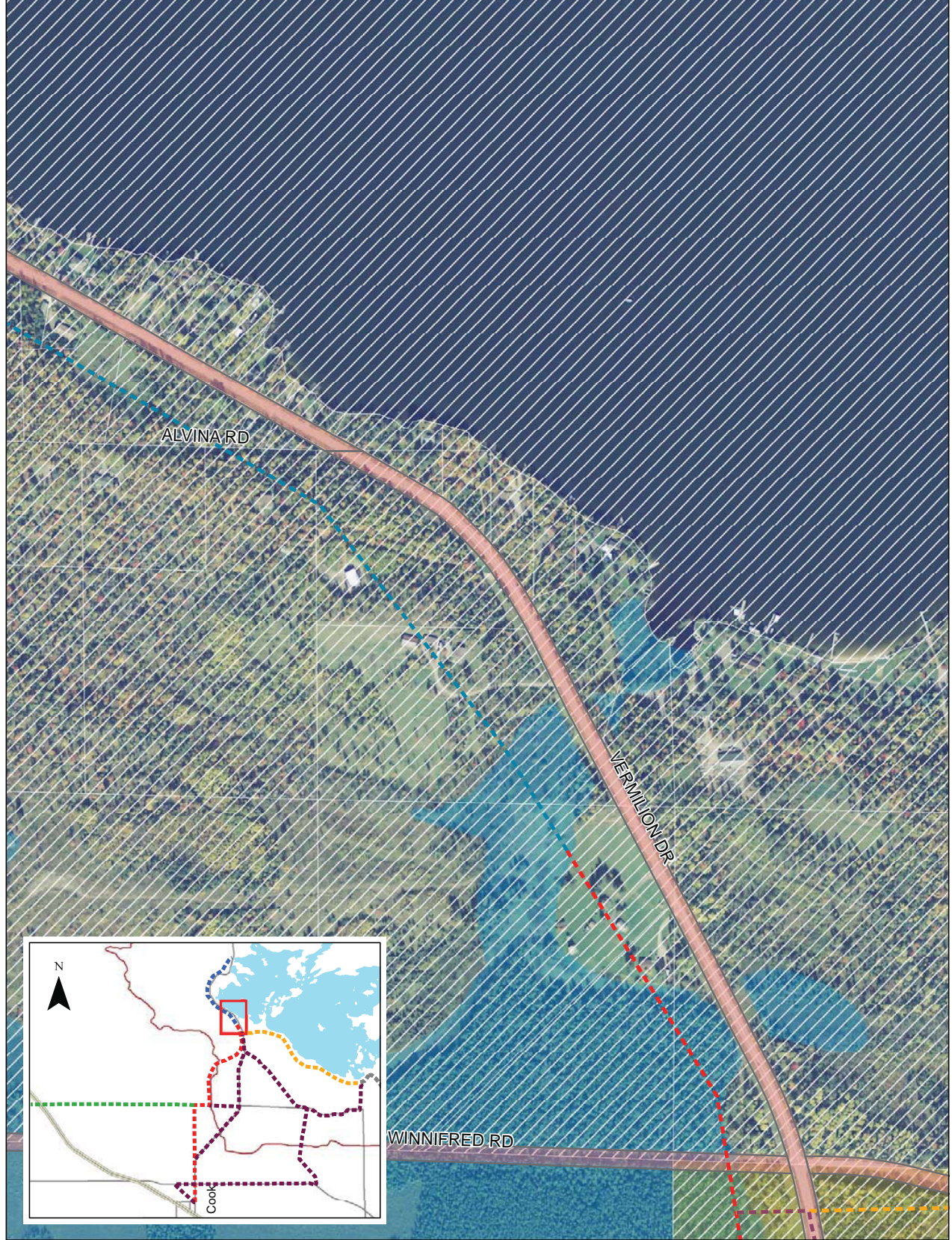
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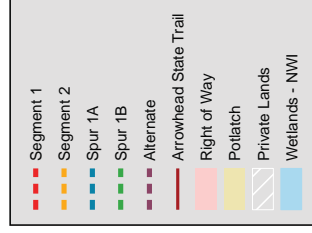


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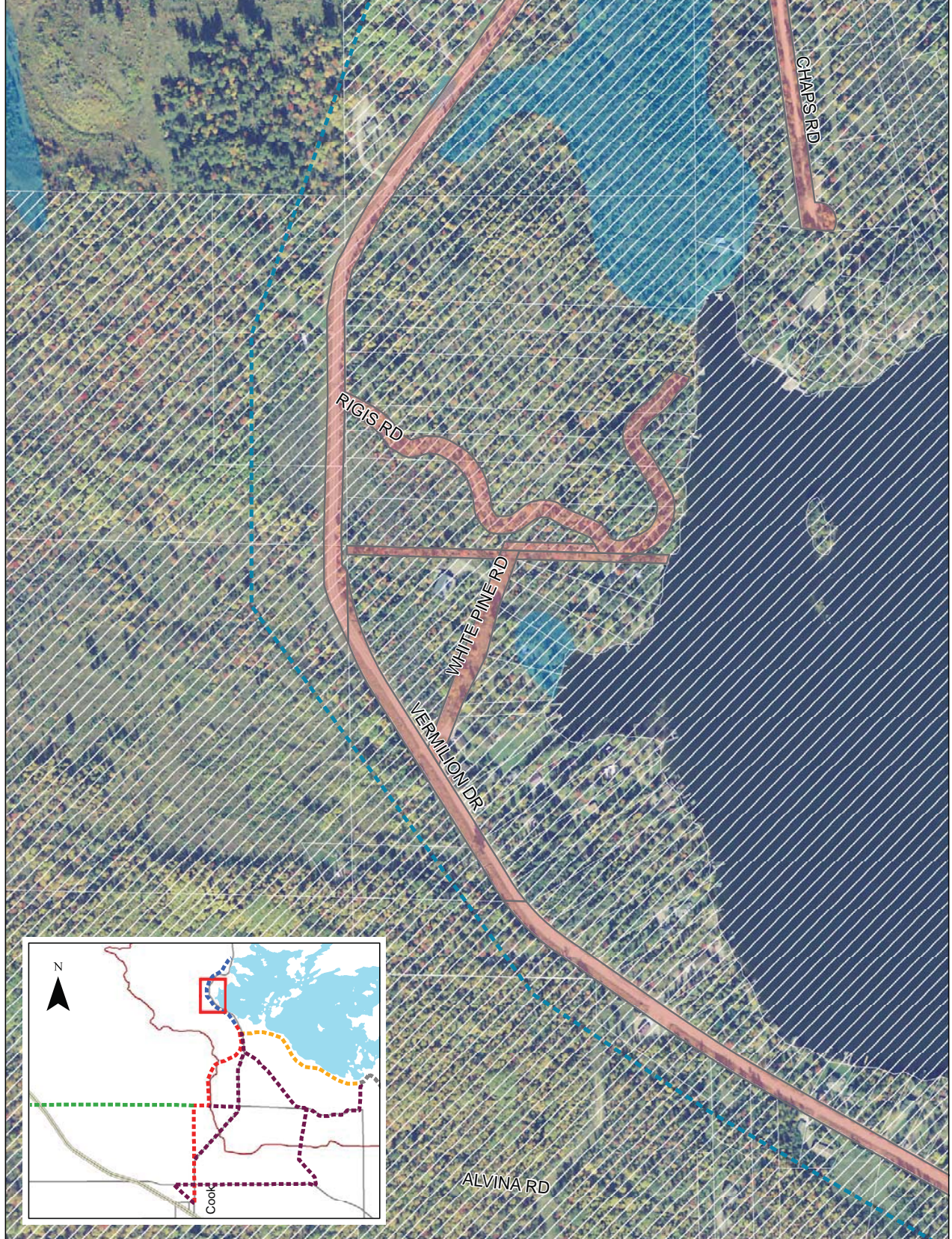
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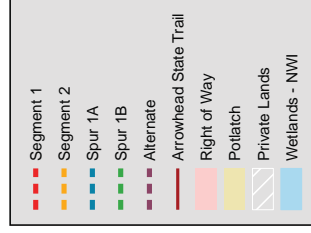


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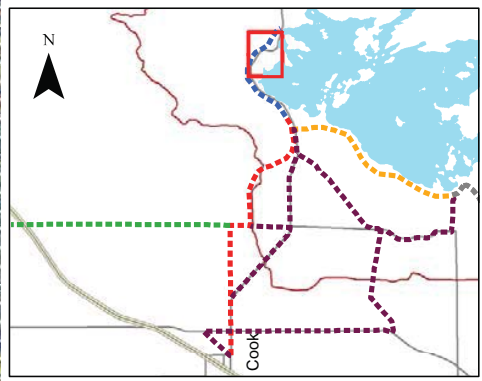
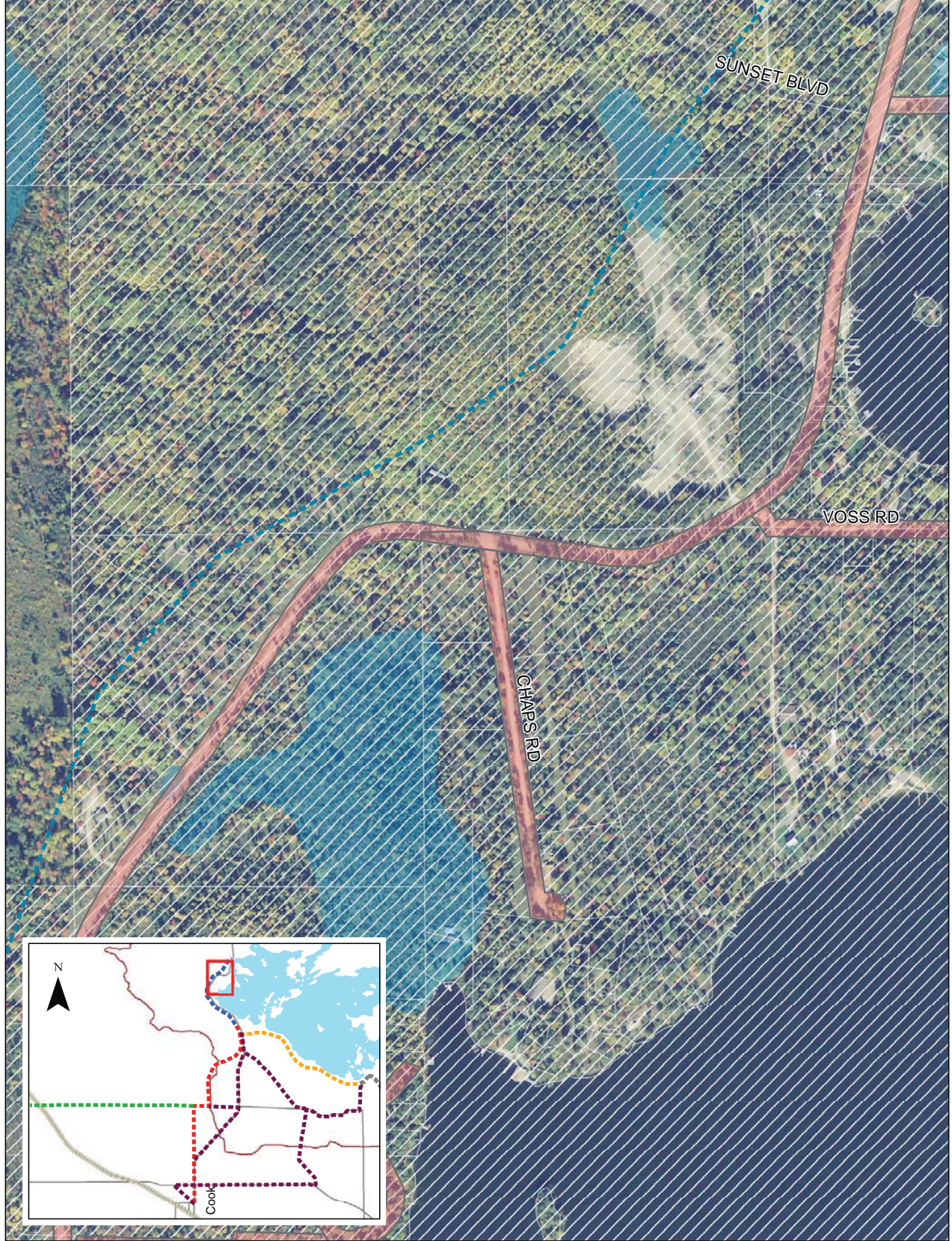
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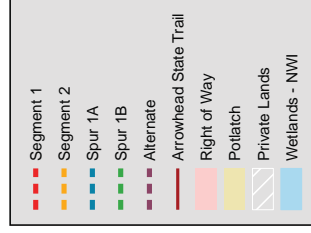


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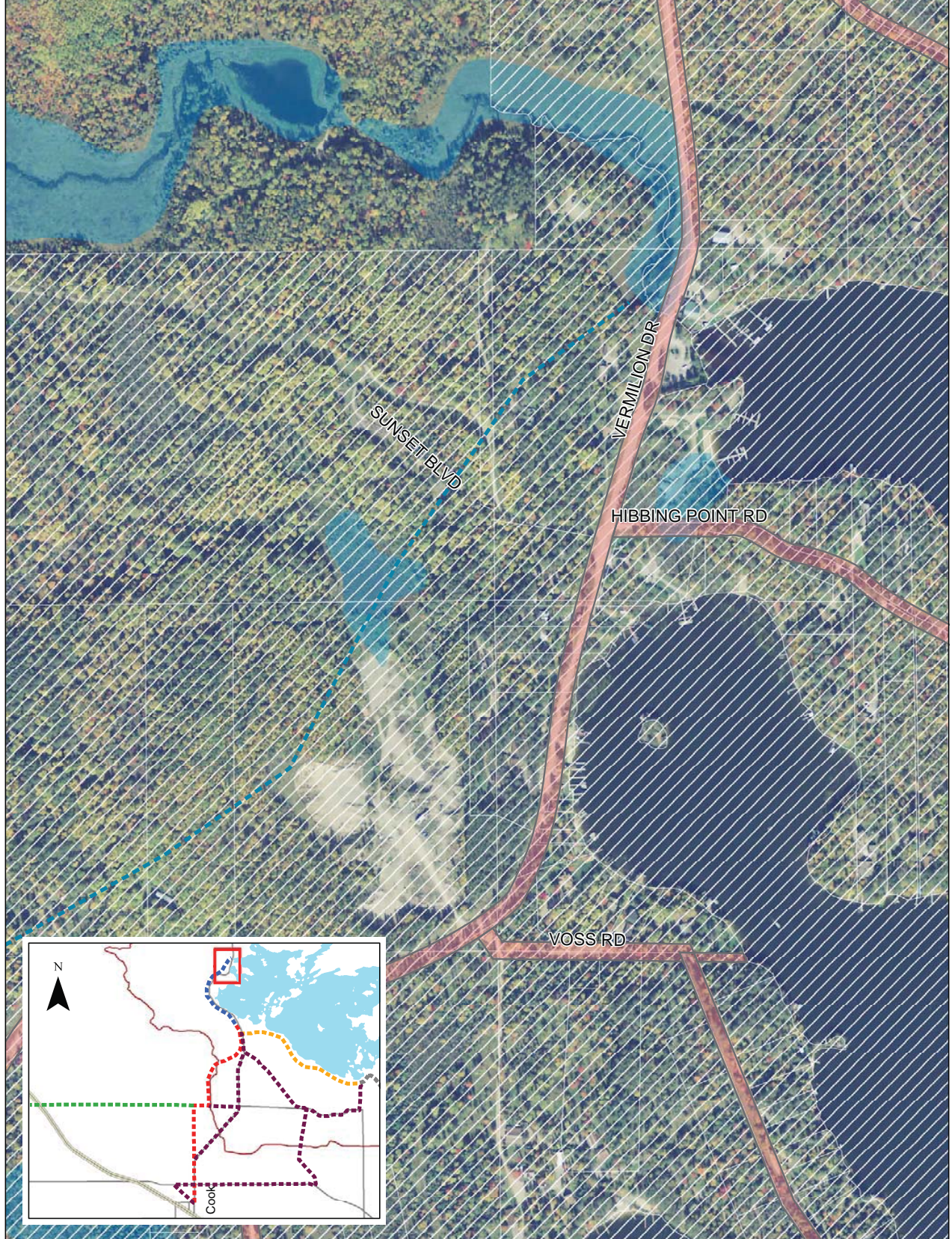
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Map prepared by the  
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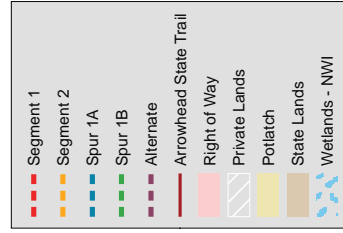


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery





# Lake Vermilion Trail Feasibility Study - ROW



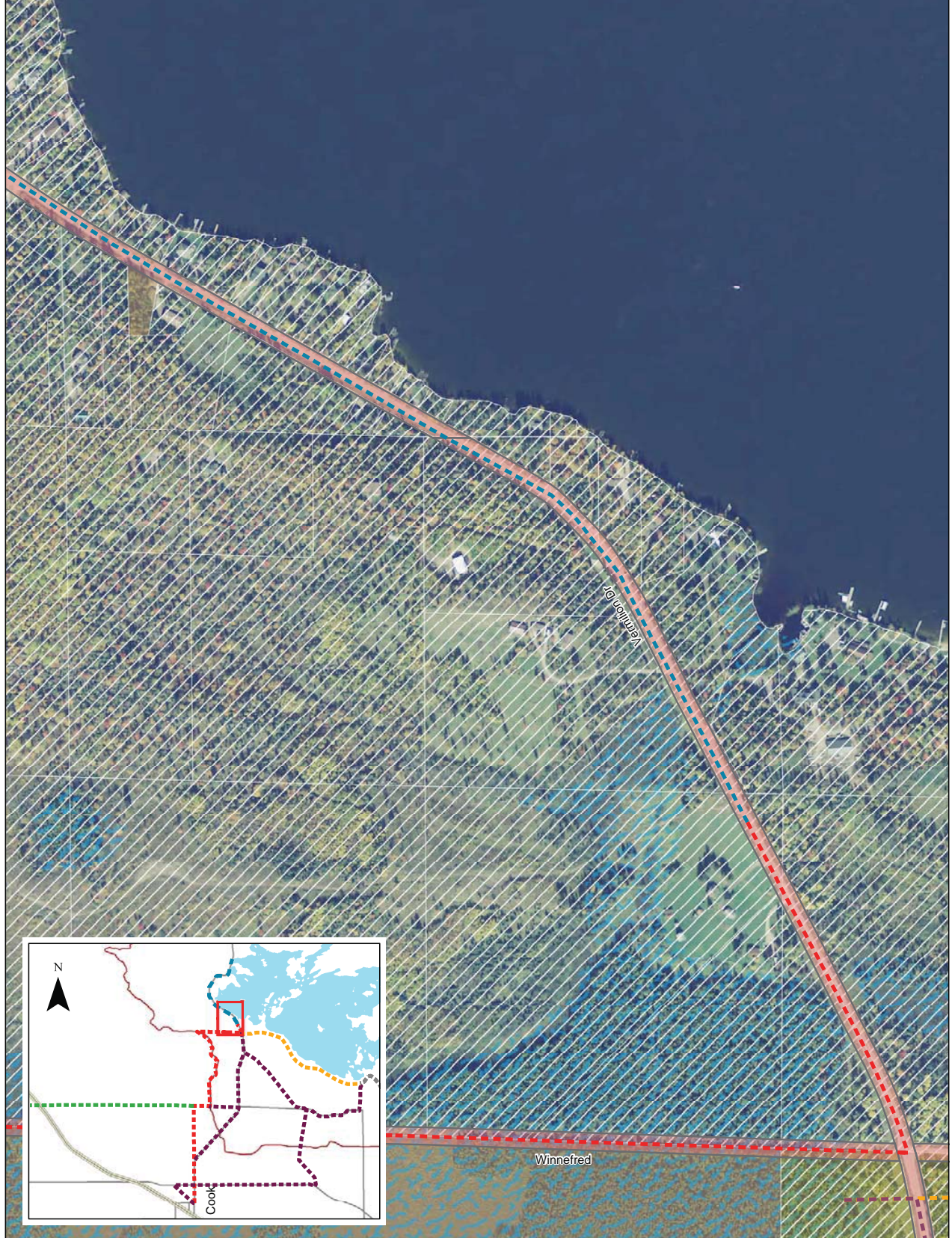
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Map prepared by the  
University of MN Duluth

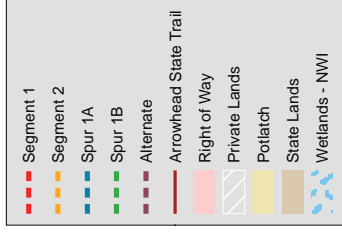
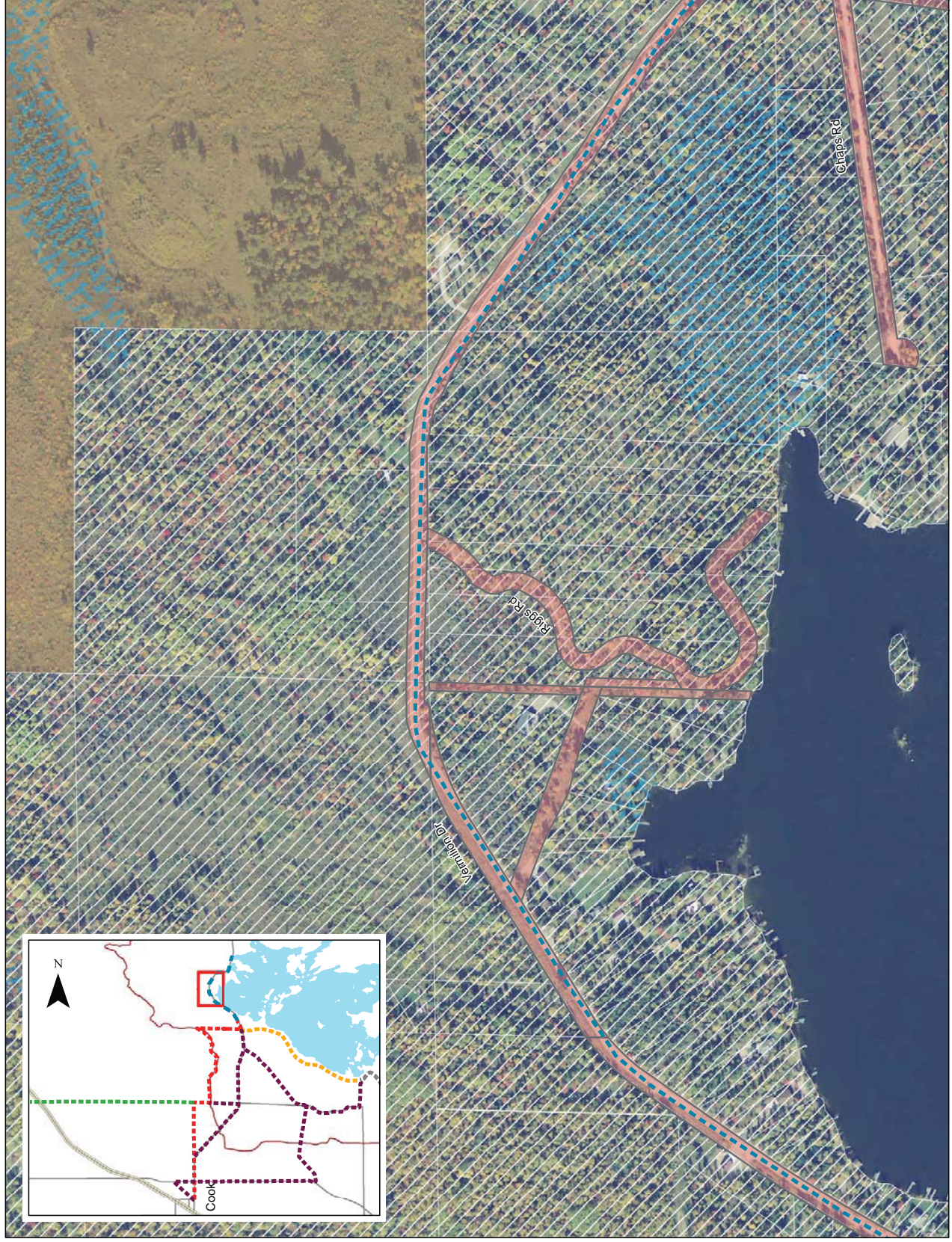


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery





# Lake Vermilion Trail Feasibility Study - ROW



1:4,000



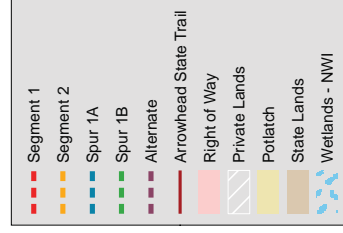
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery



# Lake Vermilion Trail Feasibility Study - ROW



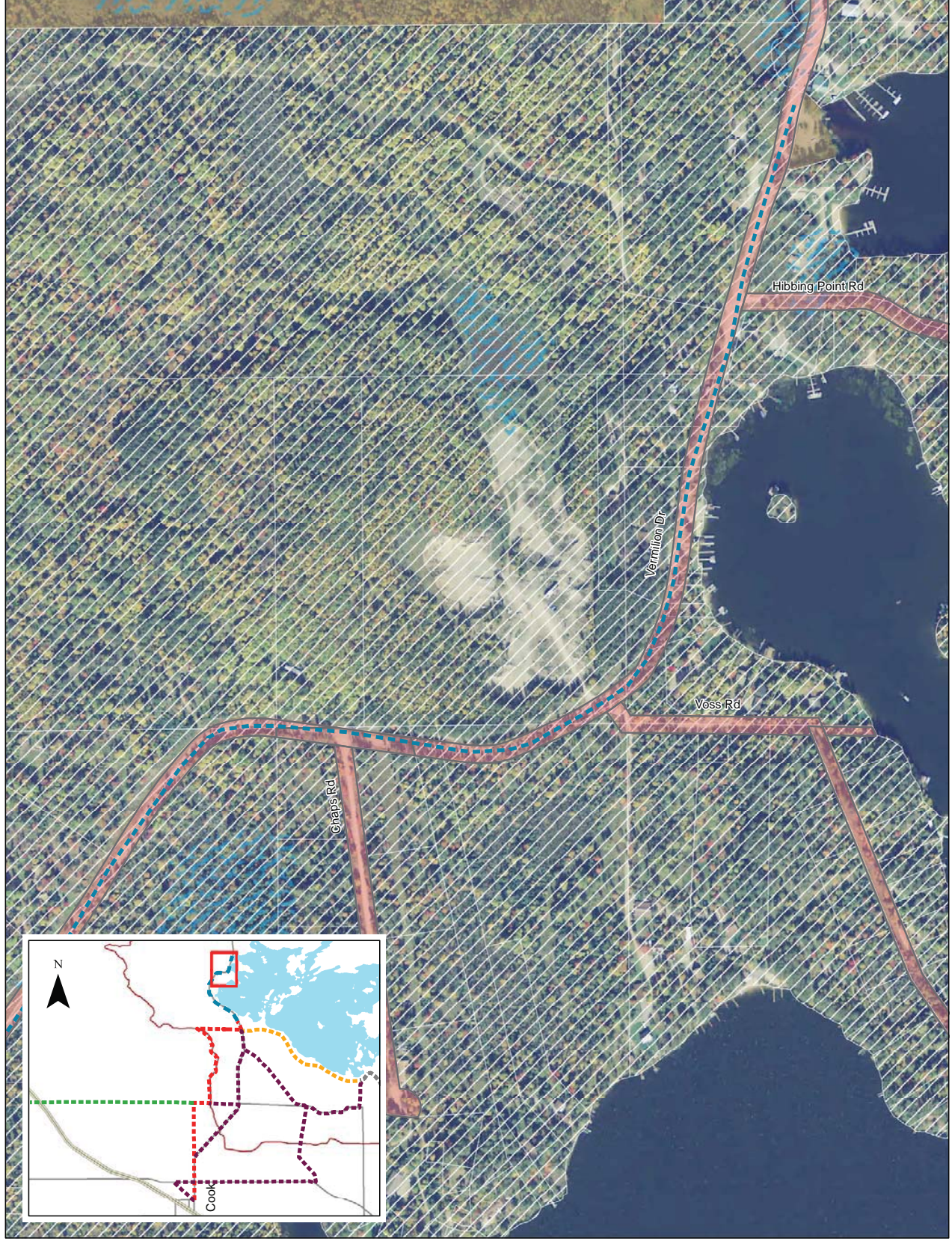
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Map prepared by the  
University of MN Duluth

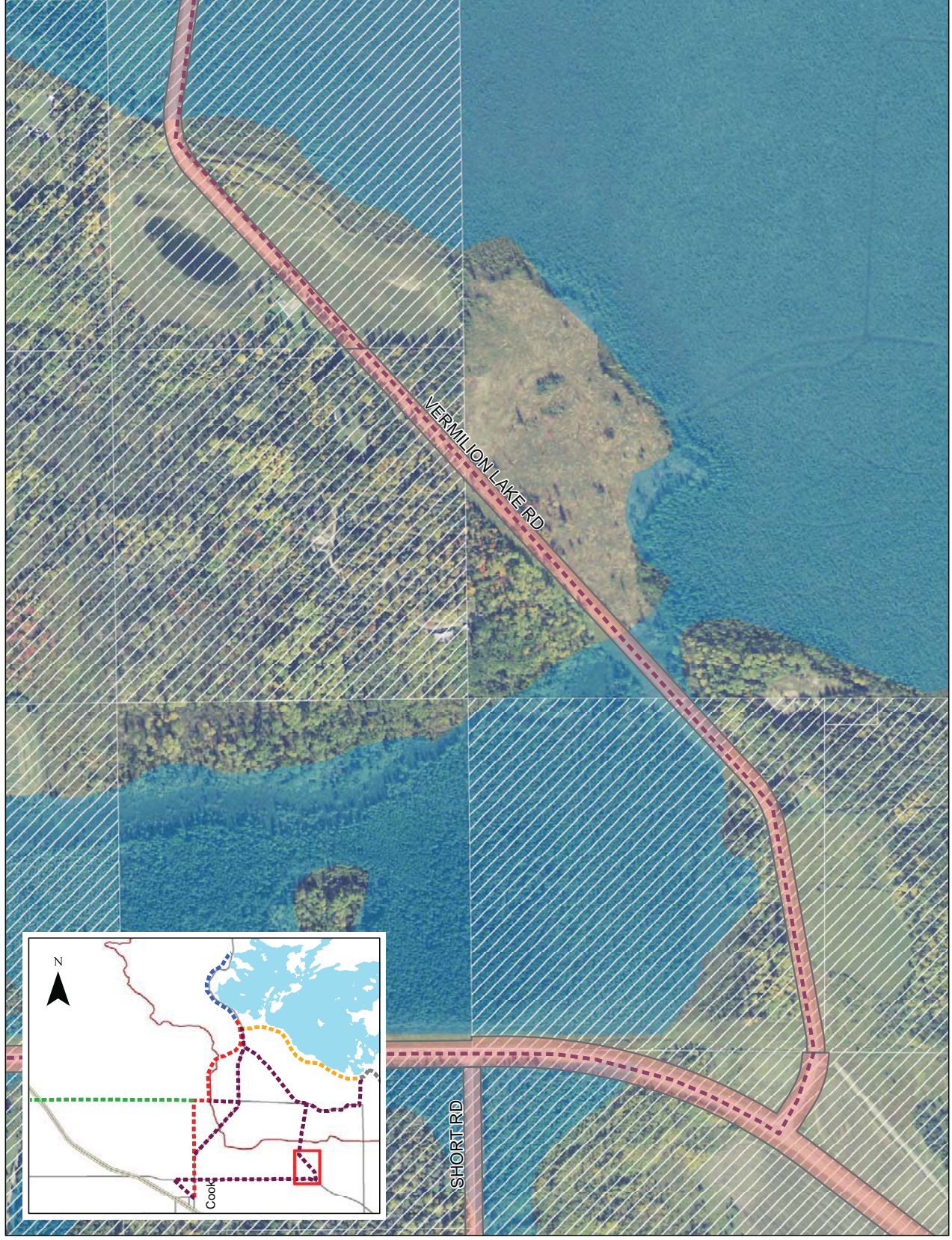


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery





# Lake Vermilion Trail Feasibility Study - ROW



Segment 1	Segment 2	Spur 1A	Spur 1B	Alternate	Arrowhead State Trail	Right of Way	Pollatch	Private Lands	Wetlands - NWI

1:4,000



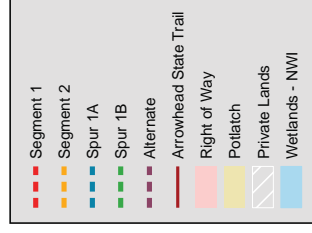
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery



# Lake Vermilion Trail Feasibility Study - ROW



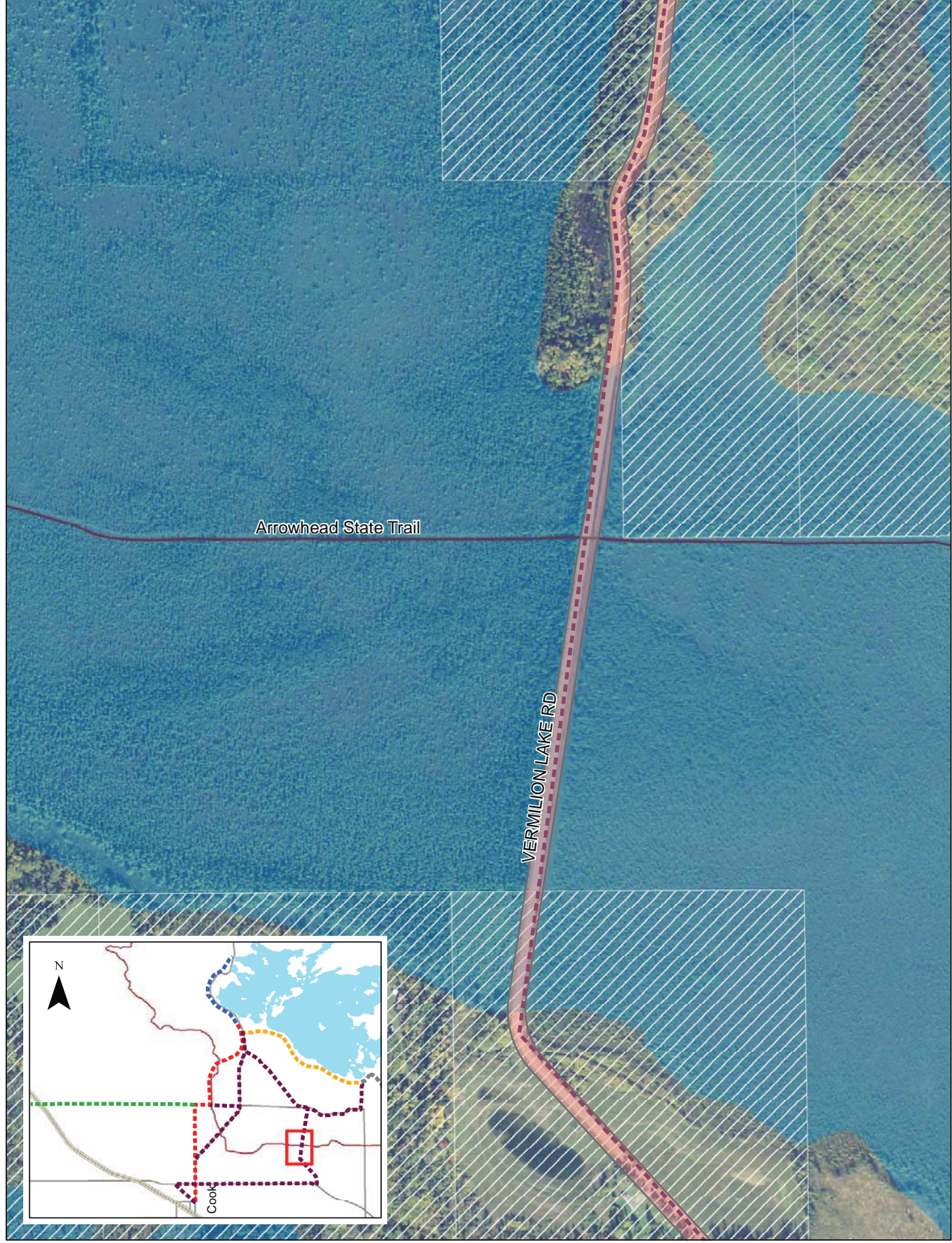
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Map prepared by the  
University of MN Duluth

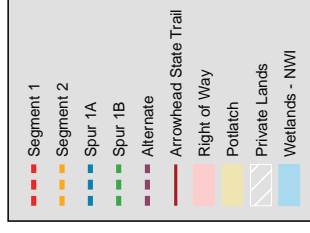
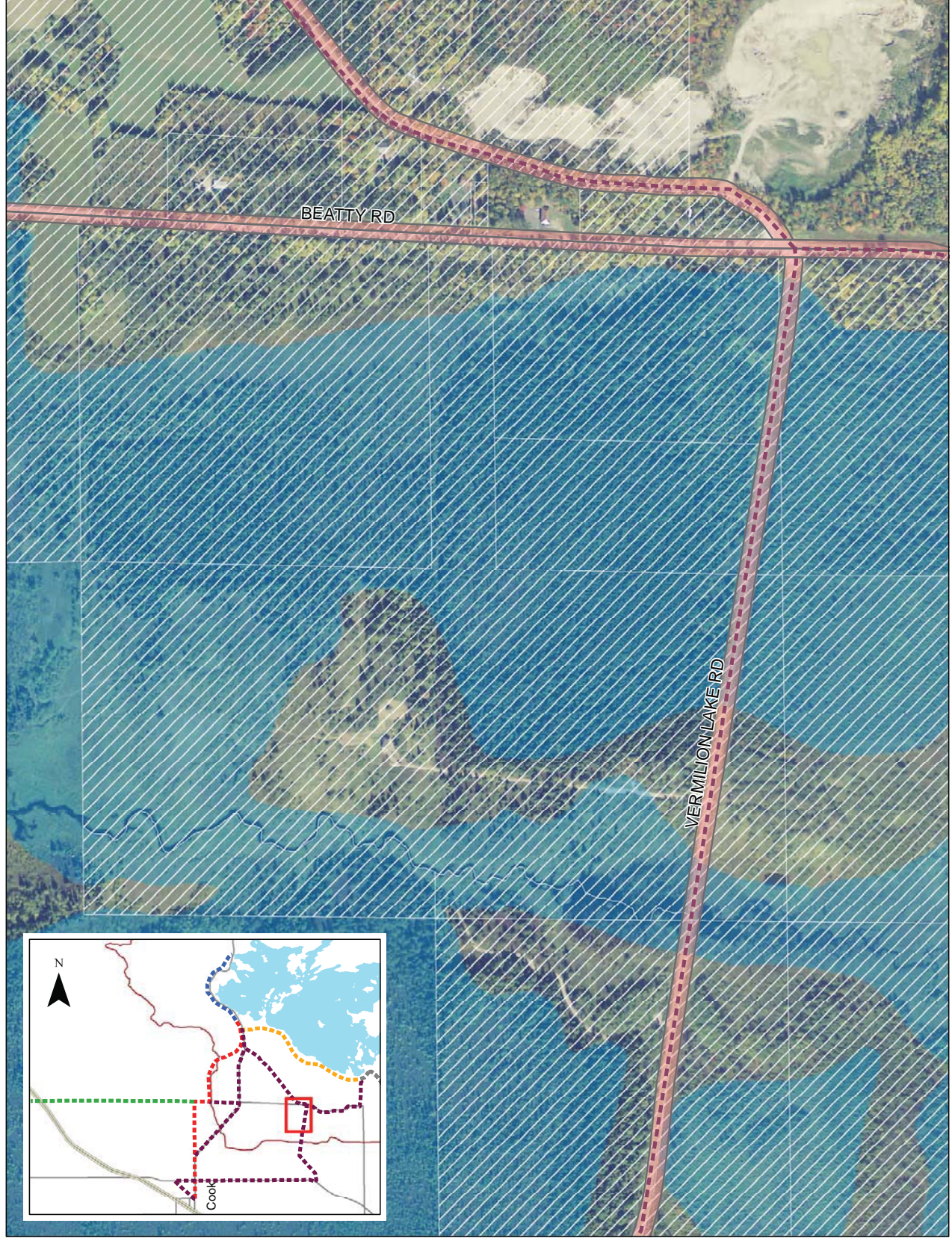


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery





# Lake Vermilion Trail Feasibility Study - ROW



1:4,000



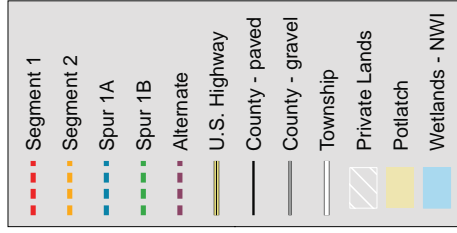
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery



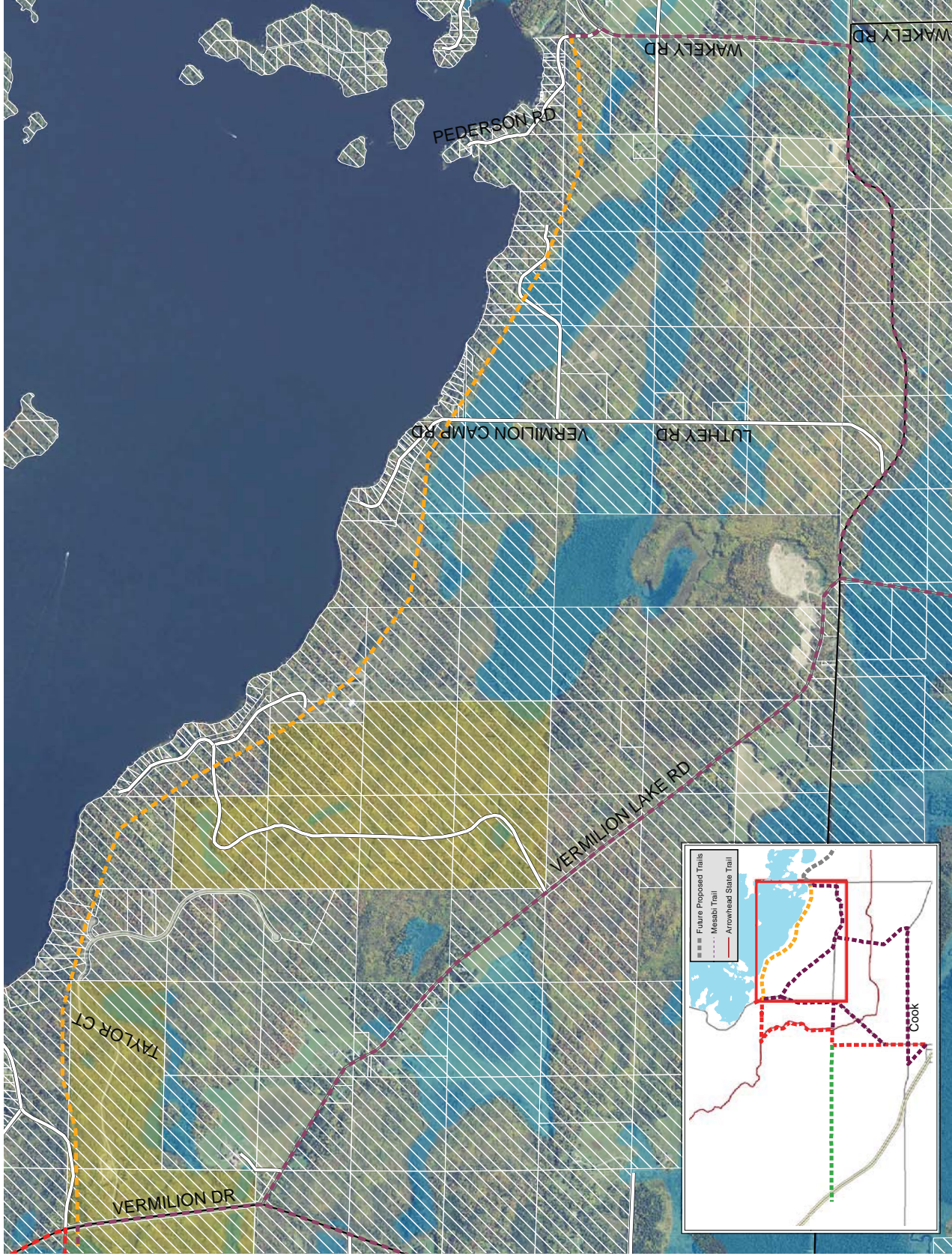
# Lake Vermilion Trail Feasibility Study - Segment 2



Map prepared by the  
University of MN Duluth

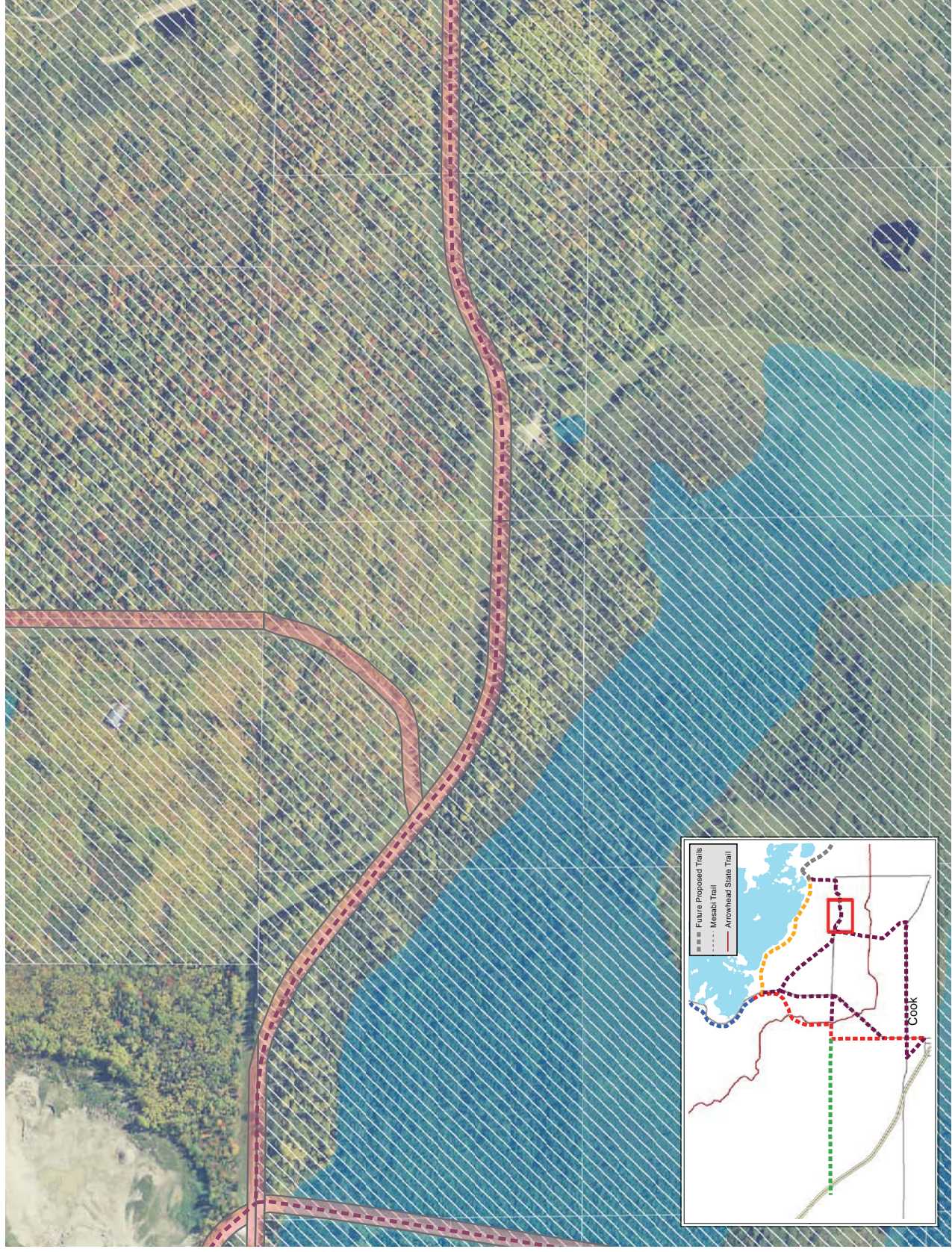


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SRF Consulting Group, Inc.  
2010 FSA Imagery





# Lake Vermilion Trail Feasibility Study - ROW



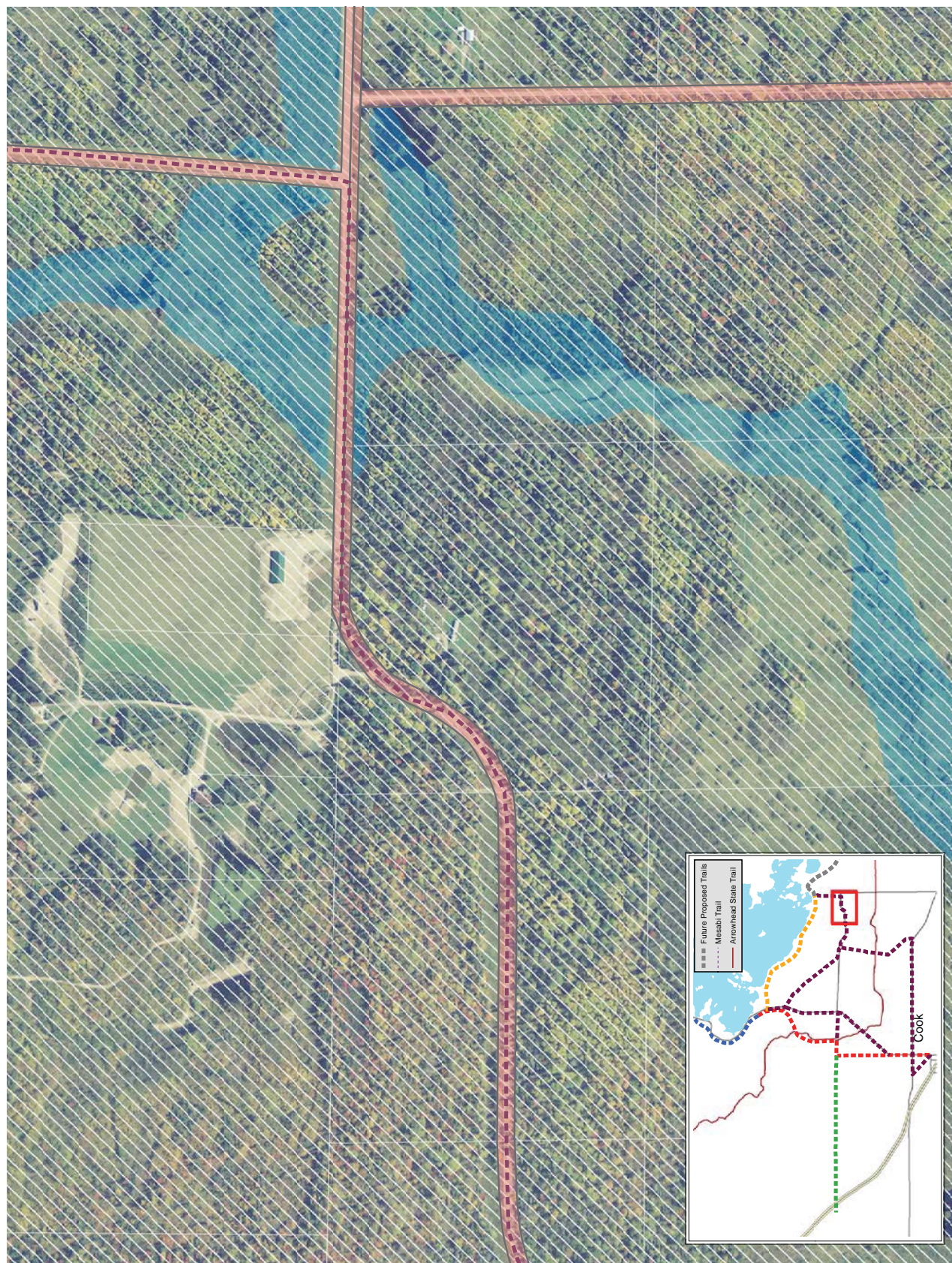
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SRF Consulting Group, Inc.  
2010 FSA Imagery



# Lake Vermilion Trail Feasibility Study - ROW



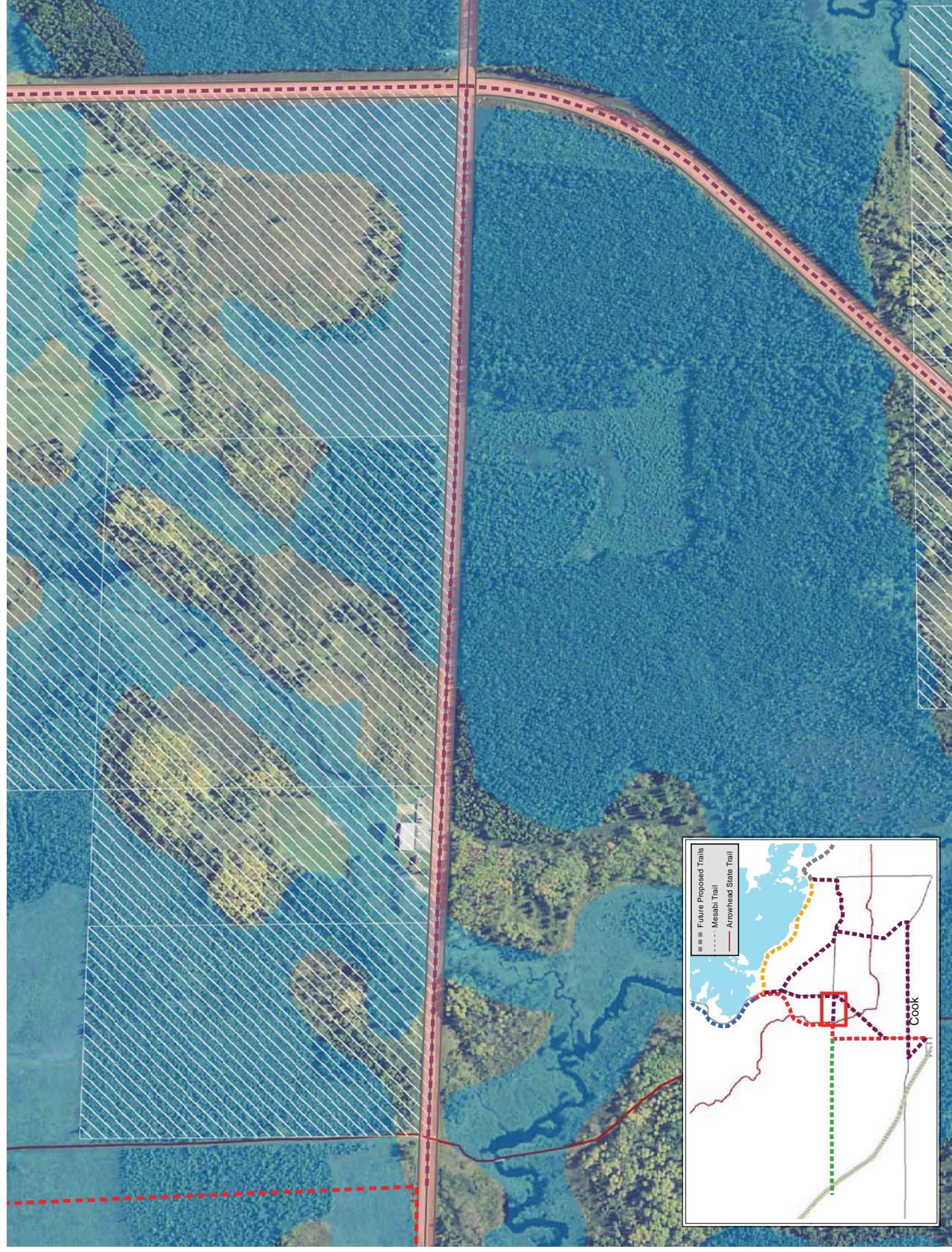
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SRF Consulting Group, Inc.  
2010 FSA Imagery



# Lake Vermilion Trail Feasibility Study - ROW



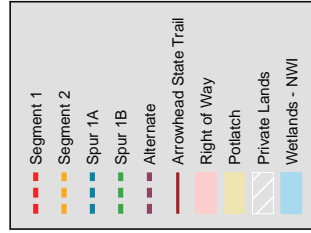
Map prepared by the  
University of MN Duluth



Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SRF Consulting Group, Inc.  
2010 FSA Imagery



# Lake Vermilion Trail Feasibility Study - ROW



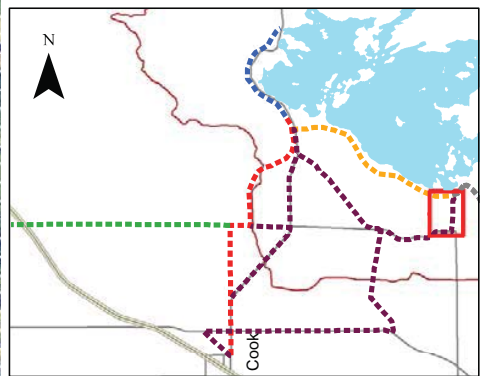
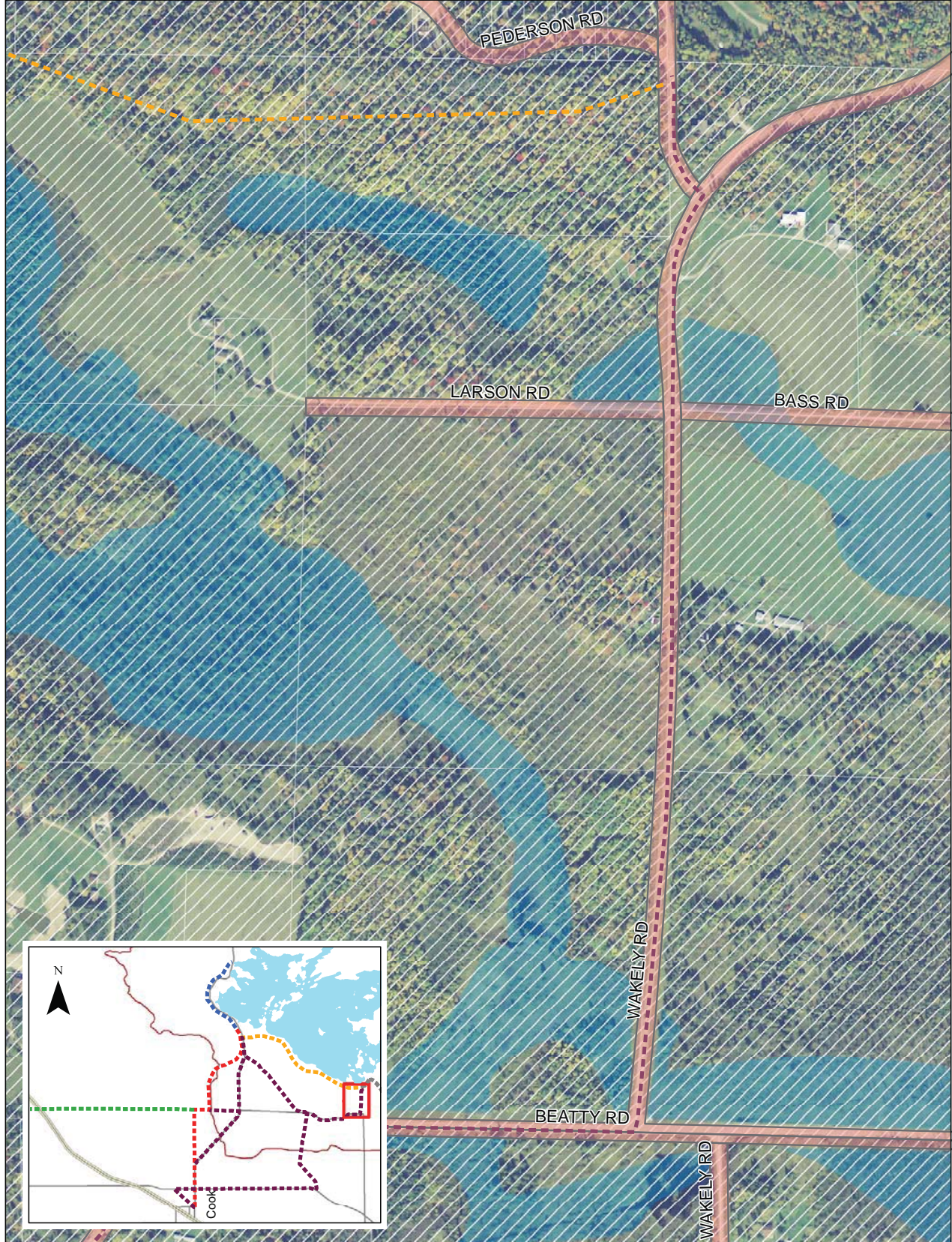
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Map prepared by the  
University of MN Duluth

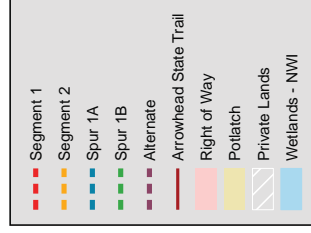


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
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# Lake Vermilion Trail Feasibility Study - ROW



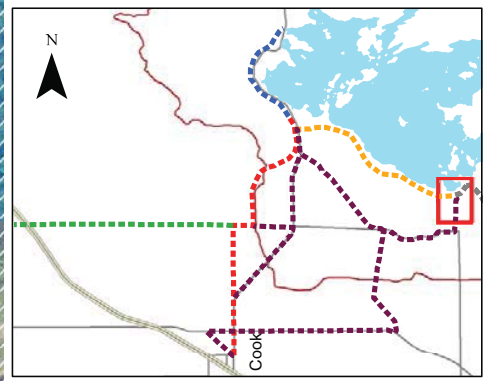
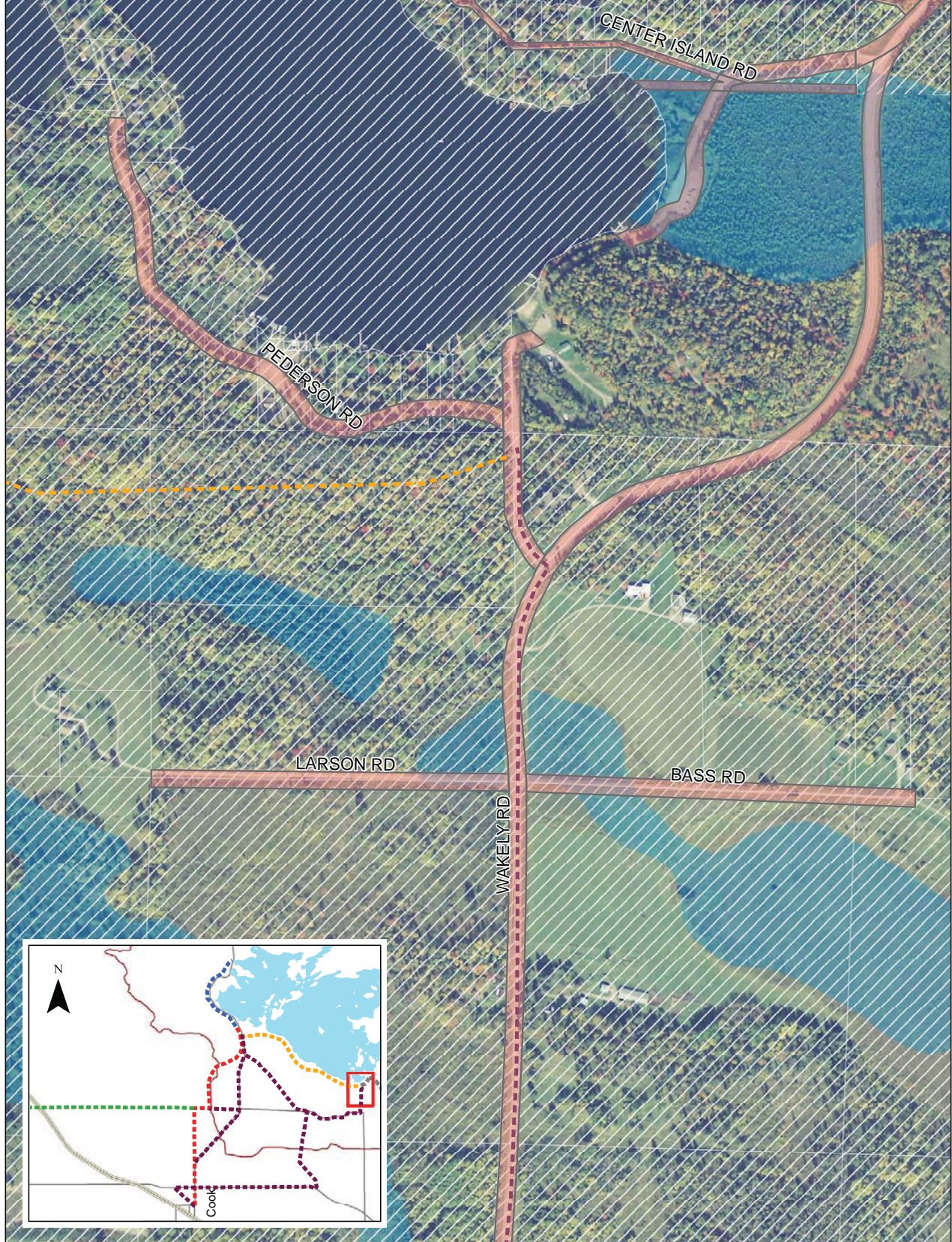
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Map prepared by the  
University of MN Duluth

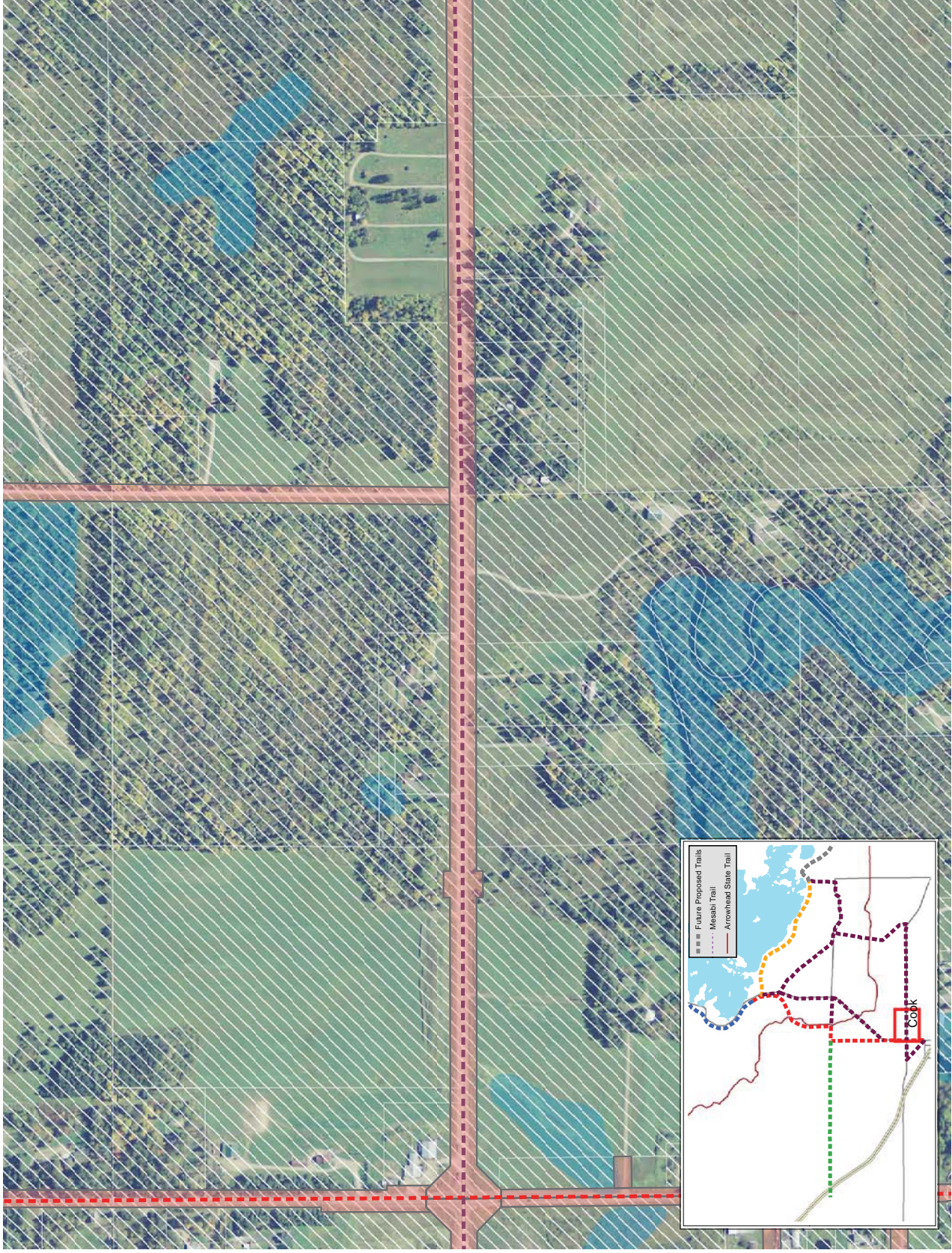


Data Sources:  
MN DNR, St. Louis County,  
National Wetland Inventory, and  
SPF Consulting Group, Inc.  
2010 FSA Imagery



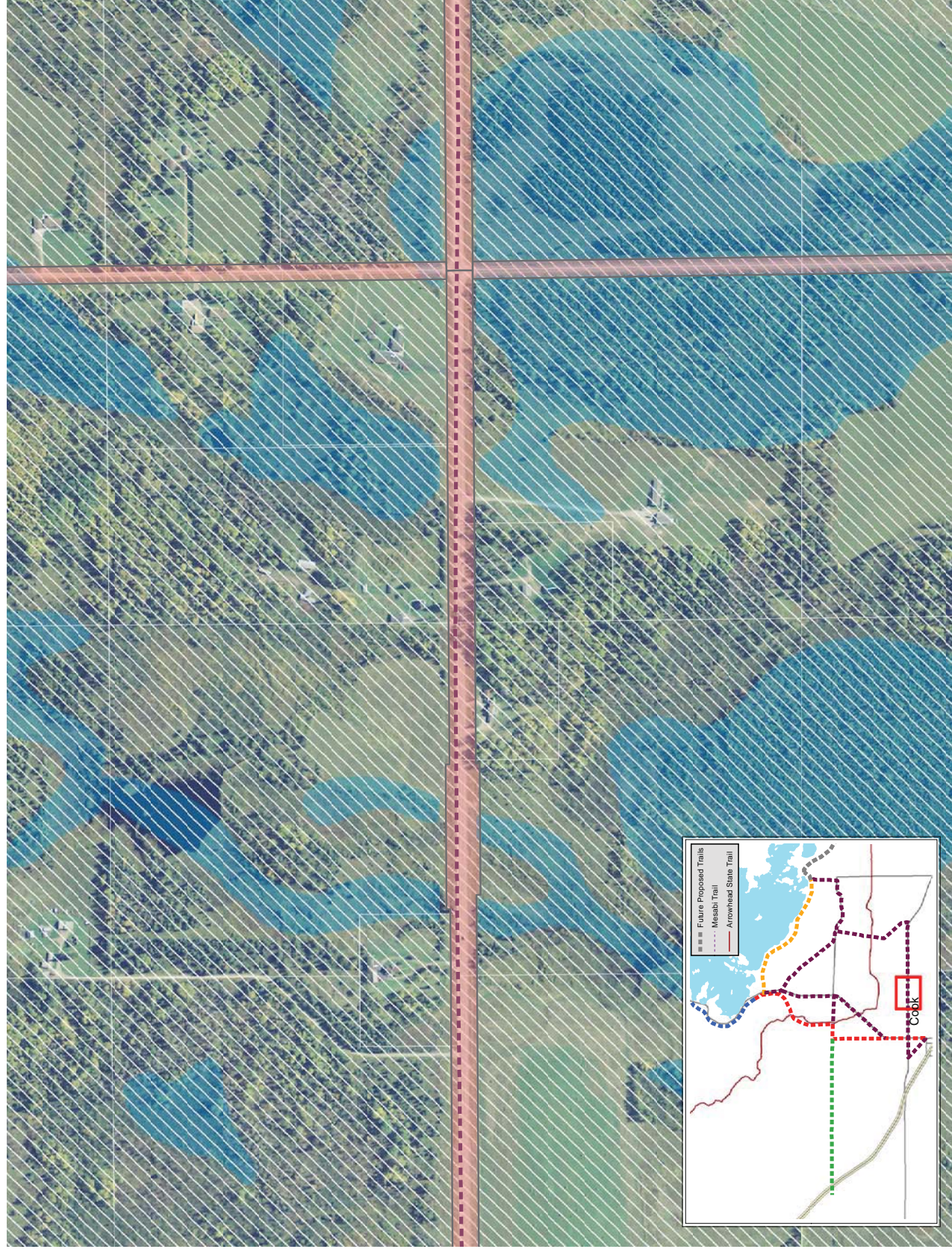


# Lake Vermilion Trail Feasibility Study - ROW



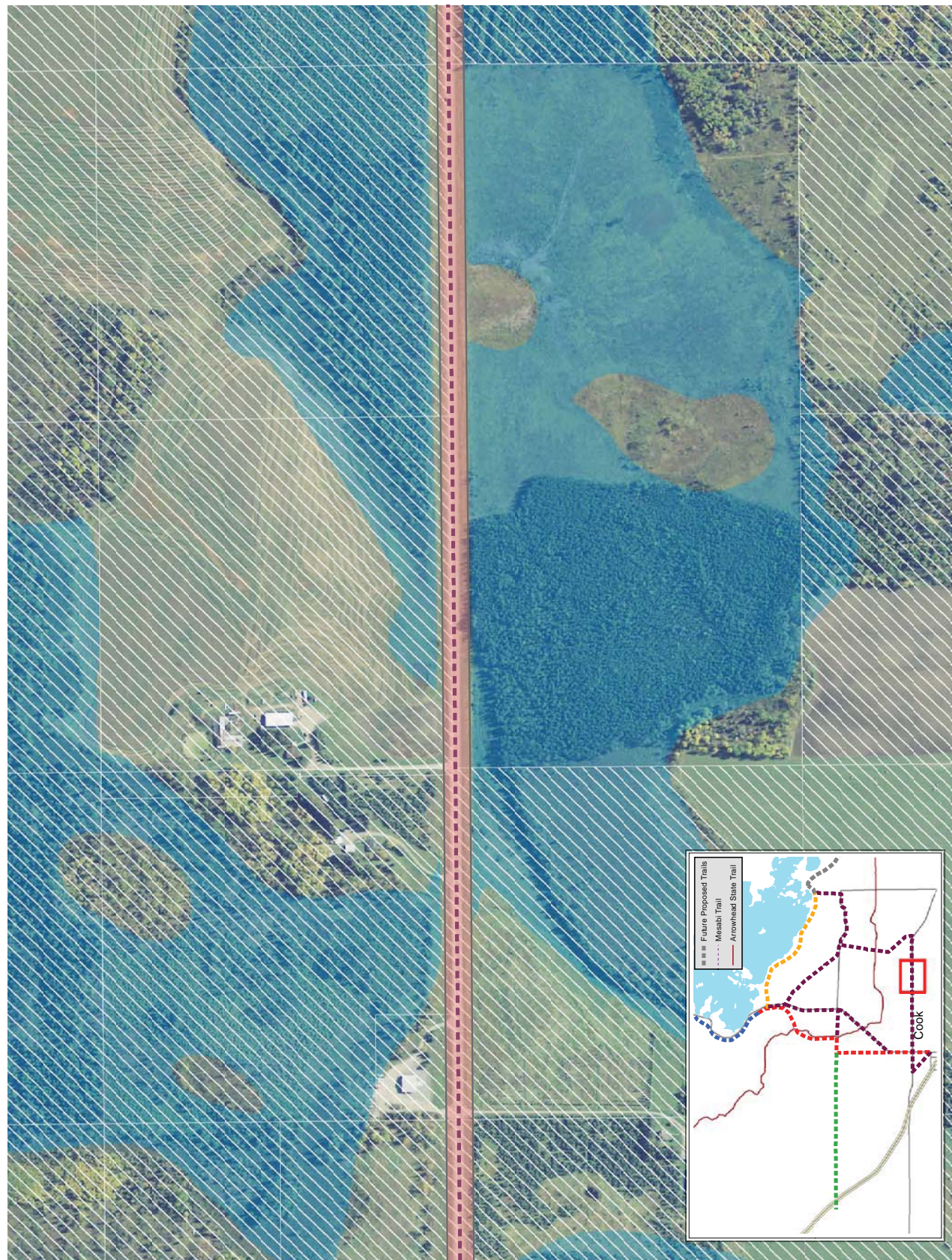


# Lake Vermilion Trail Feasibility Study - ROW





# Lake Vermilion Trail Feasibility Study - ROW



1:4,000



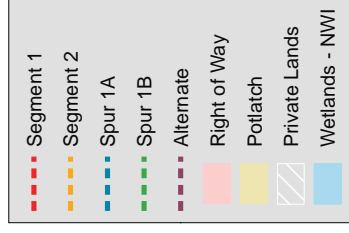
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# Lake Vermilion Trail Feasibility Study - ROW



1:4,000



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