Summary Report

DESKTOP ECOLOGICAL LAND CLASSIFICATION

for:

NIPISSING FIRST NATION

by:

LGL Limited
environmental research associates

MARCH 2022

LGL FILE TA9073-02

SUMMARY REPORT FOR DESKTOP ECOLOGICAL LAND CLASSIFICATION OF THE NIPISSING FIRST NATION

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1.0 INTRODUCTION

LGL Limited (LGL) is pleased to provide this updated summary report to Nipissing First Nation (NFN) on the desktop Ecological Land Classification (ELC) completed for a portion of your reserve lands and traditional territory (Figure 1). Shapefile layers have also been provided separately for you use in a geographic information system (GIS) framework. This Summary Report provides a compilation of the results to date which can be used to advance the ELC classification in the future.

2.0 METHODS

2.1 DESKTOP MAPPING

In collaboration with NFN, LGL obtained the 2016 Central Ontario Orthophotography Project (COOP) tiles covering NFN land from Land Information Ontario (LIO). These layers were imported into LGL's web application of ArcGIS Online (AGOL) along with public reference layers such as contours, water and aquatic areas and wetlands. LGL developed two layers for delineating the ELC. One was a point layer at which we identified features visible from the imagery which could be unique habitat for wildlife (i.e. buildings for roosts, rock crevices for snake or bat hibernacula, etc). The other layer was a polygon layer used to delineate the ELC boundaries and attribute the boundaries with the relevant information. The ELC layer was designed so that it would also have fields that can be populated when field verification of each polygon is completed and additional detail is collected.

Certified ELC technicians viewed the imagery to delineate the ELC polygons to the best of their ability with the imagery available. Each polygon was assigned an ELC Community Series code following the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al*. 1998). This system lends itself well to desktop classification with simple 3-letter codes representing most general community types available and can then be adapted to any system through field verification. Although ELC Community Series codes are high-level (i.e. FOD), if a transition between two similar polygons was visible (i.e. FOD beside FOD) that could later be refined to be different communities at a more refined level (i.e. FOD5-3 beside FOD4-1), the polygon was split and both were labeled as the same ELC Community Series. When field verification is completed, this system could be used or adapted to other region-specific systems such as the *Forest Ecosystems of Central Ontario* (Chambers *et al.* 1997) or *Ecosystems of Ontario* (Crins *et al.* 2009). We also developed special codes for areas under current land use (LU) so that there is 100% land coverage with the ELC layer, including non-natural areas.

At the completion of drawing polygons for the entire study area (the outer boundary of the NFN Reserve), the polygons went through a QA/QC process where they were cleaned up through a GIS tool to identify gaps, overlapping areas and missing data. Each polygon was given a unique number so that it can be specifically referred to, if necessary.

Desktop ELC mapping was updated in March 2022 to document the previously unmapped area from the Mosquit River westerly to the western boundary of Nipissing First Nation reserve lands.

2.2 ASSUMPTIONS AND LIMITATIONS

The Desktop ELC classification is a high-level approximation of community boundaries based solely on visual interpretation of the imagery available, and there can be differences in how each person interprets the image. Field verification is important to refine the classification and boundaries as of the date of the investigation, but some community boundaries may change over time due to natural or human influences. The differences between some community types can be very subtle from aerial imagery and can only be properly differentiated in the field with a better characterization of the soil characteristics, hydrology and plant species composition. For example, an open bog (BOO) or an open fen (FEO) can look very similar and are differentiated primarily by "fen indicator plant species," which are often not visible from imagery. Nonetheless, polygons were typically assigned as one type based on the most likely community type from the image interpretation and what appears to be the hydrological conditions.

Community boundaries can be dynamic, especially wetlands. The boundary of a wetland is defined as the point at which at least 50% of the plant species coverage is wetland indicator species, which is sometimes not easily visible from imagery. Where there are gradual slopes and suitable soil conditions, a seed bank may exist of both wetland and upland species and the successful plant growth in a given year is dictated by the seasonal water availability. Human influence can also change the successful growth of plants. Therefore, the boundaries drawn from aerial imagery should be refined in the field in places or situations where the accuracy of the boundary is important to know (i.e. where there is a development application). Soil conditions are also important for accurate community classification. The depth of organic material or presence of mottles or gley (indicating water in the soil) can be used to determine if a community is a lowland deciduous forest (FOD) or a deciduous swamp (SWD), for example, even when some of the plant species are similar.

Wetlands with standing water can be challenging to classify from imagery because they depend on the amount of standing water present and the proportion of wetland plants. In this dataset, open water that has little or no visible vegetation was mostly classified as open aquatic (OAO). However, if the depth of the water is less than 2 m, it may eventually be classified as shallow aquatic (SAS) or shallow marsh (MAS), depending on the classification system used. Conversely, those areas mapped as open water may cease to have open water in drier years or deeper water in wetter years and become a different community type. Areas mapped as open water should not be relied upon for navigation by boat.

Most importantly, when managing land, it is useful to obtain a more refined classification to the vegetation type level (i.e. FOD5-8) which is often only possible through field evaluation. By doing this, the boundaries can be more precise, and a greater level of information will be available about soil conditions, species presence, community age and structure and the habitat that it provides for wildlife, including the observation of wildlife or important plant species at the time. Some communities which are classified the same may have a high level of human disturbance while others are more natural, which is important for determining which are more likely to support sensitive plants and wildlife.

Despite these limitations, even the desktop level of ELC classification provides a critical first step in understanding the composition of the communities of the land. Recognizing that there is some uncertainty, management for habitat at a high level is possible, such as identifying all forested areas or wetlands. This level of information can provide for targeted field investigations at those areas which are deemed most important for management purposes.

3.0 RESULTS

The shapefile layers have been provided separately, which will allow NFN to use GIS software to develop your own interpretations of the data and figures showing it in any manner you choose and to incorporate your local and traditional knowledge of the land. LGL will remain available to assist in manipulation of the data derived here and can continue to help with refinement (desktop or field) as needed. However, we have provided a "Map Book" of the additional ELC polygons from this March 2022 update as Figure series 2 for visualization without GIS software. The total area (hectares) and percent composition of each community type is listed in Table 1, sorted by the community types, with non-natural communities at the bottom.

With the full area delineated, it is possible to extract and map those communities that are of particular interest for land management purposes. We have completed this in three ways as an example of the use of the data.

Woodlands are an important feature on the landscape for management consideration and may be of interest if you are looking for species at risk (SAR) bats. The course layers available from public databases may not accurately reflect the coverage of woodlands. During the desktop analysis it was sometimes difficult to differentiate between those of human influence such as cultural woodland (CUW) and plantation (CUP) from those of natural origin such as forest (FO), swamp (SW), treed rock barren (RBT), treed cliff (CLT), treed fen (FET) and treed bog (BOT). These areas are mapped on Figure 3. Natural woodlands are abundant on the NFN reserve, covering a combined 21,790.8 ha or 82.79% of the land of all parcels combined.

Rock barrens may be an important landscape type because they provide unique habitat that is used by certain wildlife such snakes for hibernation. Figure 4 depict rock barrens in the four types; open rock barren (RBO), shrub rock barren (RBS), treed rock barren (RBT) and treed cliff (CLT). Together these habitat types comprise 109.1 ha or 0.41% of the land. This still likely underrepresents the total amount of rocky area because some of the forest also has rocky substrate that is obscured from view by the trees.

Wetlands are also an important component of land management. The LIO layer for wetlands in the province typically under-represents the actual wetlands that occur in an area, especially in remote and natural landscapes. By delineating the wetlands through this exercise, the overall wetland coverage (Figure 5) can be better visualized. Open aquatic (OAO) areas are included in this figure. Based on desktop analysis these areas could be aquatic or shallow wetland habitat. Wetlands are any Marsh (MA), Swamp (SW), Fen (FE) or Bog (BO). The area at Nipissing mapped as OAO is 477.9 hectares or 1.82% of the land (not including Lake Nipissing) and all other wetland types combine to 4,069.3 hectares or 19.40% of the land combined.

There were also several areas that were classified as a land use type (LU) due to continued human influence which controls the vegetation occurring in the area. This may include areas of manicured lawn on municipal or residential properties or areas of transit, industrial or commercial operation. Combined, the land use areas cover 569.9 ha or 2.17% of the land combined.

Notably, there were four polygons identified as natural disaster tornado (NDT), at which the trees appear to have fallen in a pattern that is not typical of forestry management practices or human disturbance. Although we cannot be certain that this was from a tornado, this is our theory of a reasonable explanation of this pattern. Field verification may provide greater insight to these locations.

Table 1: Total Polygons, Area Coverage and Percent Cover for Each Community Series Type

ELC_Code	Community Description	Count	Area (ha)	% Cover
Terrestrial				
BBO	Beach/Bar, Open	1	0.1	0.00
FOC	Forest, Coniferous	670	8809.6	33.47
FOD	Forest, Deciduous	204	1123.3	4.27
FOM	Forest, Mixed	611	8755.8	33.27
RBO	Rock Barren, Open	75	25.9	0.10
RBS	Rock Barren, Shrub	3	4.5	0.02
RBT	Rock Barren, Treed	64	78.4	0.30
CLT	Cliff, Treed	1	0.3	0.00
SHT	Shrub Thicket	5	8.7	0.03
Wetland				
OAO	Open Aquatic	275	477.9	1.82
BOO	Bog, Open	12	30.3	0.12
BOS	Bog, Shrub	19	131.1	0.50
BOT	Bog, Treed	48	69.2	0.26
FEO	Fen, Open	131	313.5	1.19
FES	Fen, Shrub	226	433.2	1.65
FET	Fen, Treed	124	290.4	1.10
MAM	Marsh, Meadow	40	28.3	0.11
MAS	Marsh, Shallow	472	856.6	3.25
SWC	Swam, Coniferous	260	1767.2	6.71
SWD	Swamp, Deciduous	58	147.1	0.56
SWM	Swamp, Mixed	125	829.1	3.15
SWT	Swamp, Thicket	192	210.7	0.80
Cultural				
CUM	Cultural Meadow	119	284.0	1.08
CUP	Cultural Plantation	7	258.0	0.98
CUP3	Cultural Plantation, Coniferous	6	11.1	0.04
CUT	Cultural Thicket	34	294.2	1.12
CUW	Cultural Woodland	12	511.6	1.94
LUC	Land Use, Commercial	17	30.5	0.12
LUI	Land Use, Industrial	9	45.3	0.17
LUM	Land Use, Municipal	11	18.4	0.07
LUO	Land Use, Other	10	19.9	0.08
LUR	Land Use, Residential	132	254.5	0.97
LUT	Land Use, Transit	34	198.6	0.75
NDT	Natural Disaster, Tornado	4	2.7	0.01
Total		**4011**	**26319.9**	**100**

4.0 NEXT STEPS

Field verification of the polygons drawn in this updated desktop exercise will greatly improve the accuracy of those polygons and allow for refined community classification to the Ecosite level. We encourage NFN to seek opportunities for your staff to take the ELC training course and become proficient in the use of the system and how to integrate it with your traditional knowledge of the land. In the meantime, LGL botanists can be available to work in collaboration with you to target key areas of the land to complete ground-truthing in the field. Although this does not serve as certification, it will help your staff to gain valuable field experienced alongside someone who has used these systems extensively.

The layers provided here are a two-dimensional depiction of the community types, but it should be integrated with the wealth of knowledge that NFN has for their land. These data can be combined with known species occurrences, culturally important areas or knowledge of changes in the landscape over time.

A more detailed botanical inventory may be possible from visiting key areas during different seasons in the year, often in conjunction with ground-truthing the ELC. Some plants grow early in the season (spring ephemerals) and are difficult to identify later in the season. Conversely, some plants do not grow until much later in the season. A full botanical inventory of a particular location would require 2-3 visits within the year.

5.0 CLOSING

The ELC presented here provides a valuable tool for important land management activities, development of community facilities, targeted future research, refinement of these layers or important species research in the future. This updated summary report presents some selected ways to briefly describe and show the results of the exercise, but we have provided you with the shapefile layers so that you can view and manipulate the data as needed and we are happy to continue to work with you in this regard.

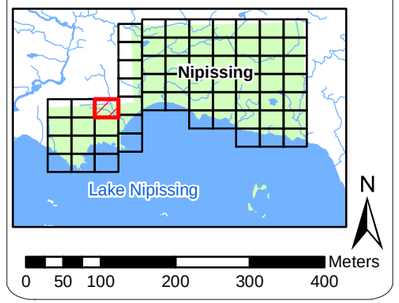
We hope that this meets your current requirements. We would be pleased to discuss it with you in greater detail at your convenience. Please do not hesitate to contact us at the King City office at (905) 833-1244, Connie's cell phone at (905) 717-9482 or cagnew@lgl.com

Figures

LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
BOO	Open Bog
BOS	Shrub Bog
BOT	Treed Bog
CLT	Treed Cliff
CUM	Cultural Meadow
CUP	Plantation
CUP3	Coniferous Plantations
CUT	Cultural Thicket
CUW	Cultural Woodland
FEO	Open Fen
FES	Shrub Fen
FET	Treed Fen
FOC	Coniferous Forest
FOD	Deciduous Forest
FOM	Mixed Forest
LUC	Land Use - Commercial
LUI	Land Use - Industrial
LUM	Land Use - Municipal
LUO	Land Use - Other
LUR	Land Use - Residential
LUT	Land Use - Transit
MAM	Meadow Marsh
MAS	Shallow Marsh
NDT	Natural Disaster - Tornado
OAO	Open Aquatic
RBO	Open Rock Barren
RBS	Shrub Rock Barren
RBT	Treed Rock Barren
SHT	Shrub Thicket
SWC	Coniferous Swamp
SWD	Deciduous Swamp
SWM	Mixed Swamp
SWT	Thicket Swamp



Desktop ELC for Nipissing FN

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Project	TA9073	**Figure**	2-33
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA

LEGEND

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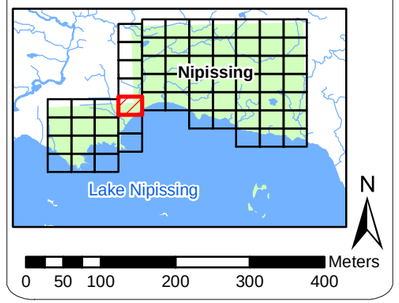

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Project	TA9073	**Figure**	2-34
Date	March 2022	**Prepared By:**	KC
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LEGEND

ELC Communities Boundary

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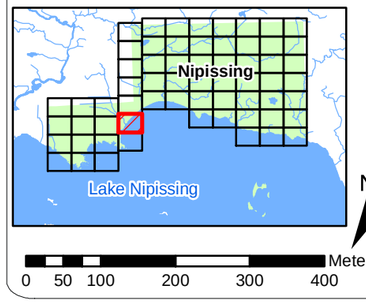

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Date	March 2022	**Prepared By:**	KC
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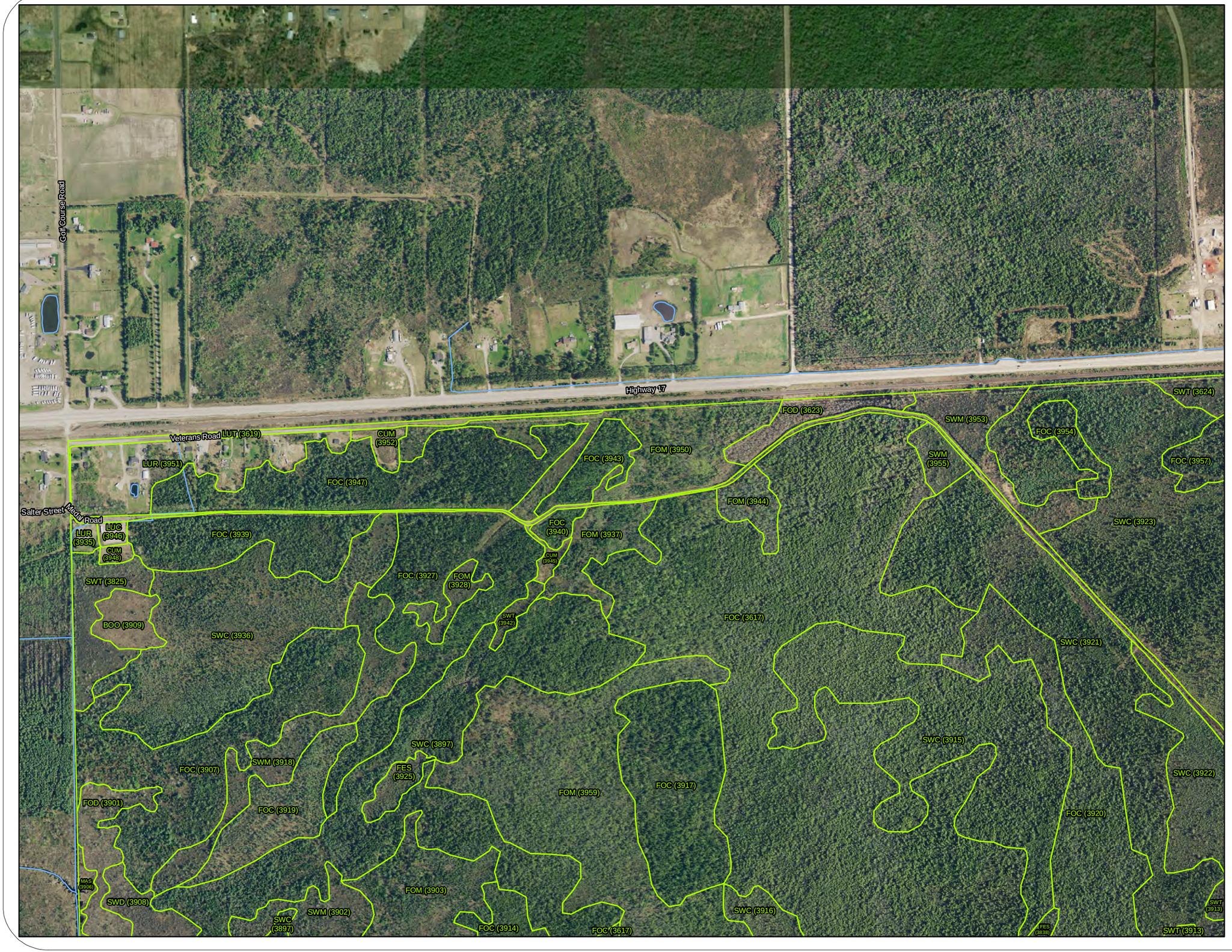

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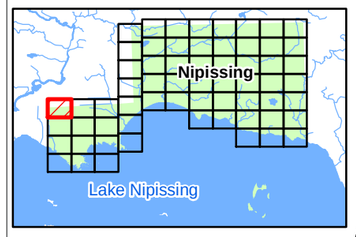

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Project	TA9073	**Figure**	2-51
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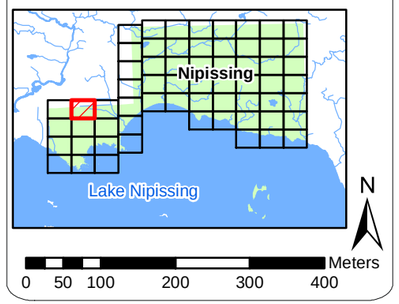

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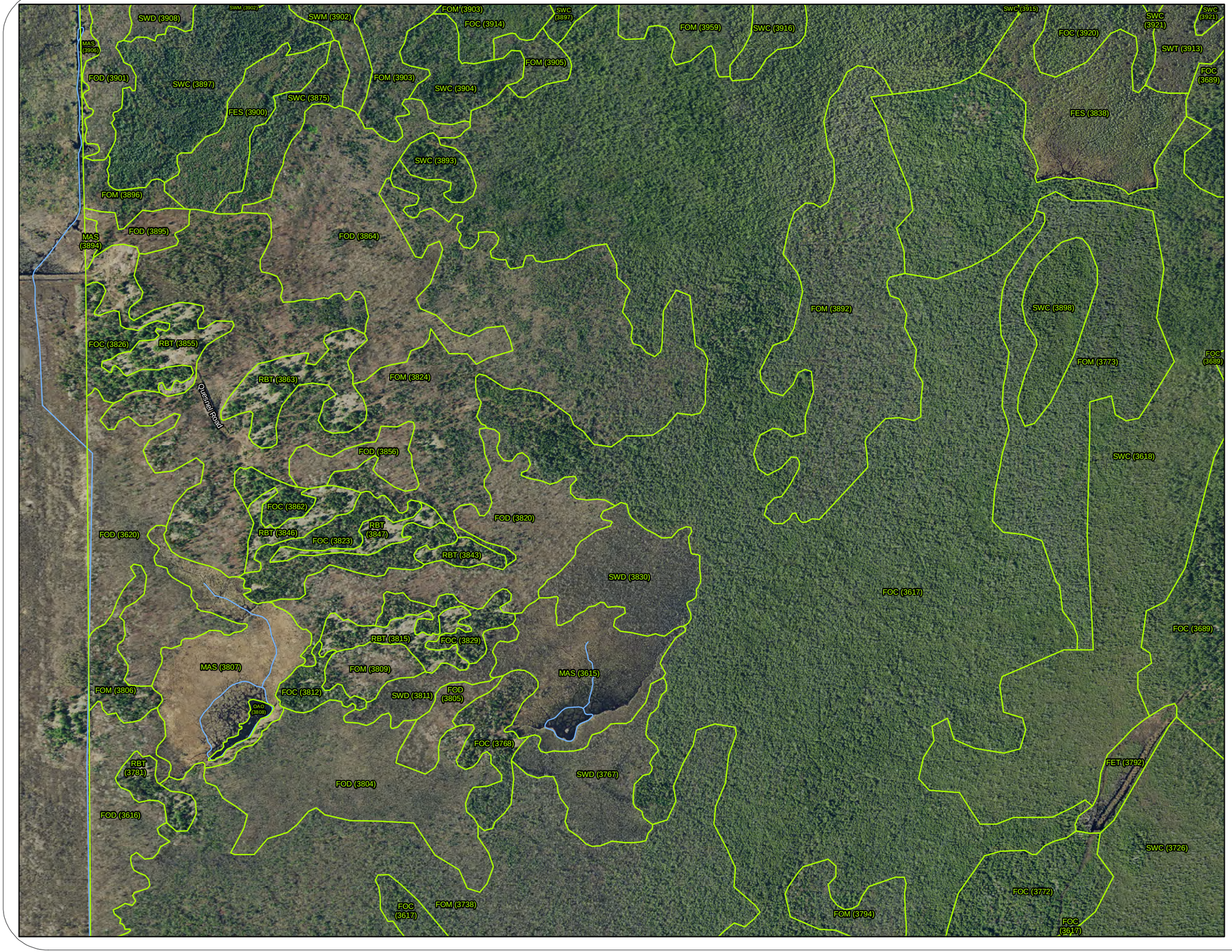

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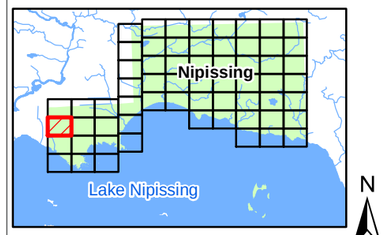

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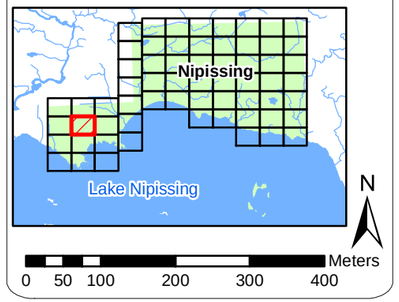

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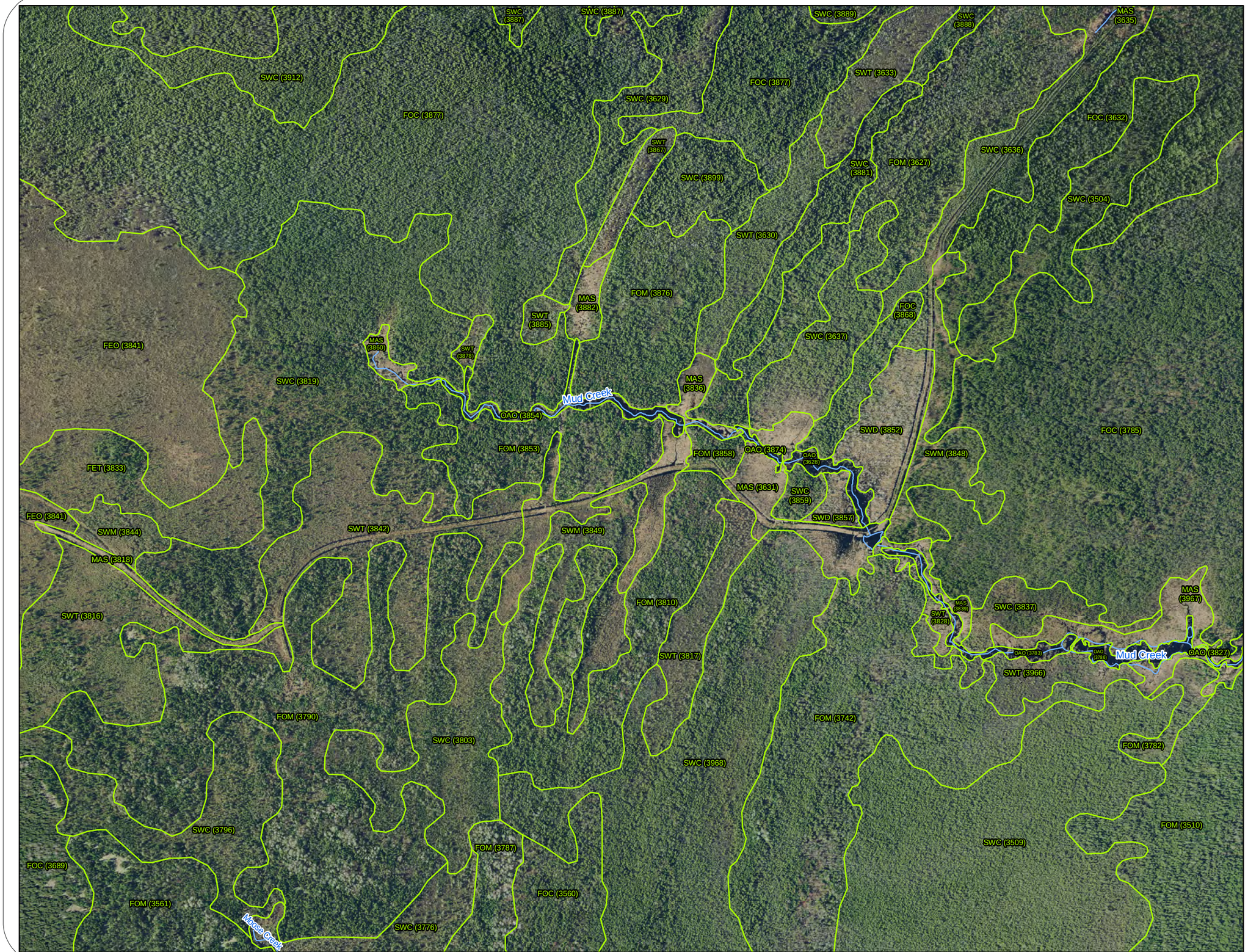

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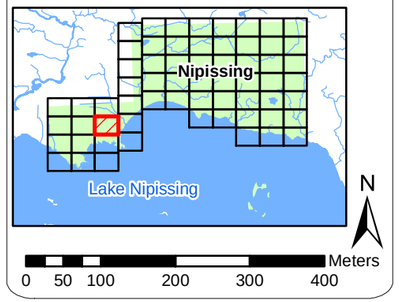
NDT	Natural Disaster - Tornado
OAO	Open Aquatic
RBO	Open Rock Barren
RBS	Shrub Rock Barren
RBT	Treed Rock Barren
SHT	Shrub Thicket
SWC	Coniferous Swamp
SWD	Deciduous Swamp
SWM	Mixed Swamp
SWT	Thicket Swamp



Desktop ELC for Nipissing FN

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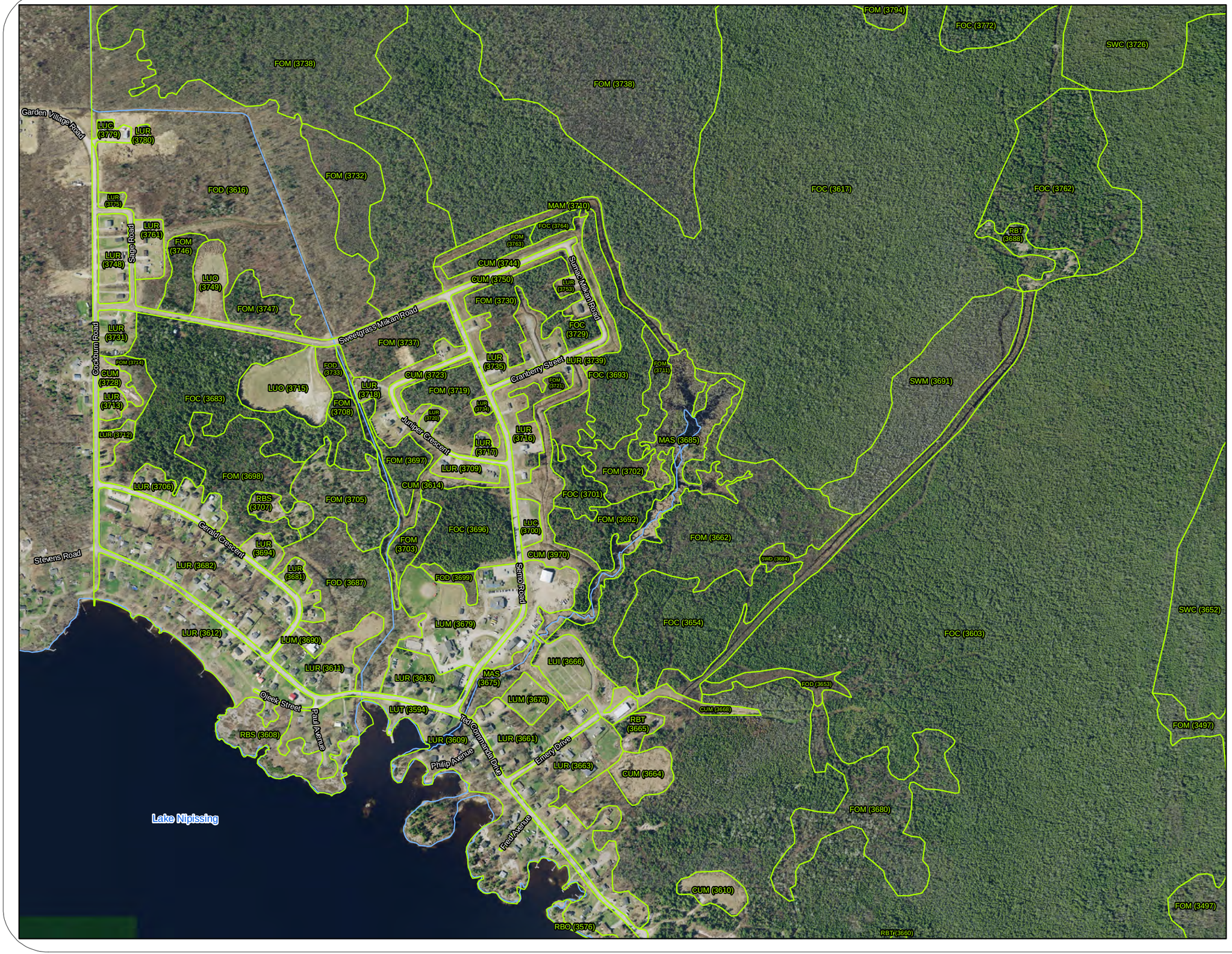
Project	TA9073	**Figure**	2-55
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA



LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
BOO	Open Bog
BOS	Shrub Bog
BOT	Treed Bog
CLT	Treed Cliff
CUM	Cultural Meadow
CUP	Plantation
CUP3	Coniferous Plantations
CUT	Cultural Thicket
CUW	Cultural Woodland
FEO	Open Fen
FES	Shrub Fen
FET	Treed Fen
FOC	Coniferous Forest
FOD	Deciduous Forest
FOM	Mixed Forest
LUC	Land Use - Commercial
LUI	Land Use - Industrial
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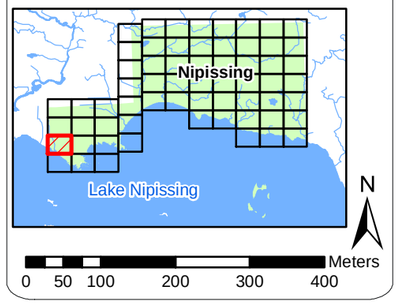

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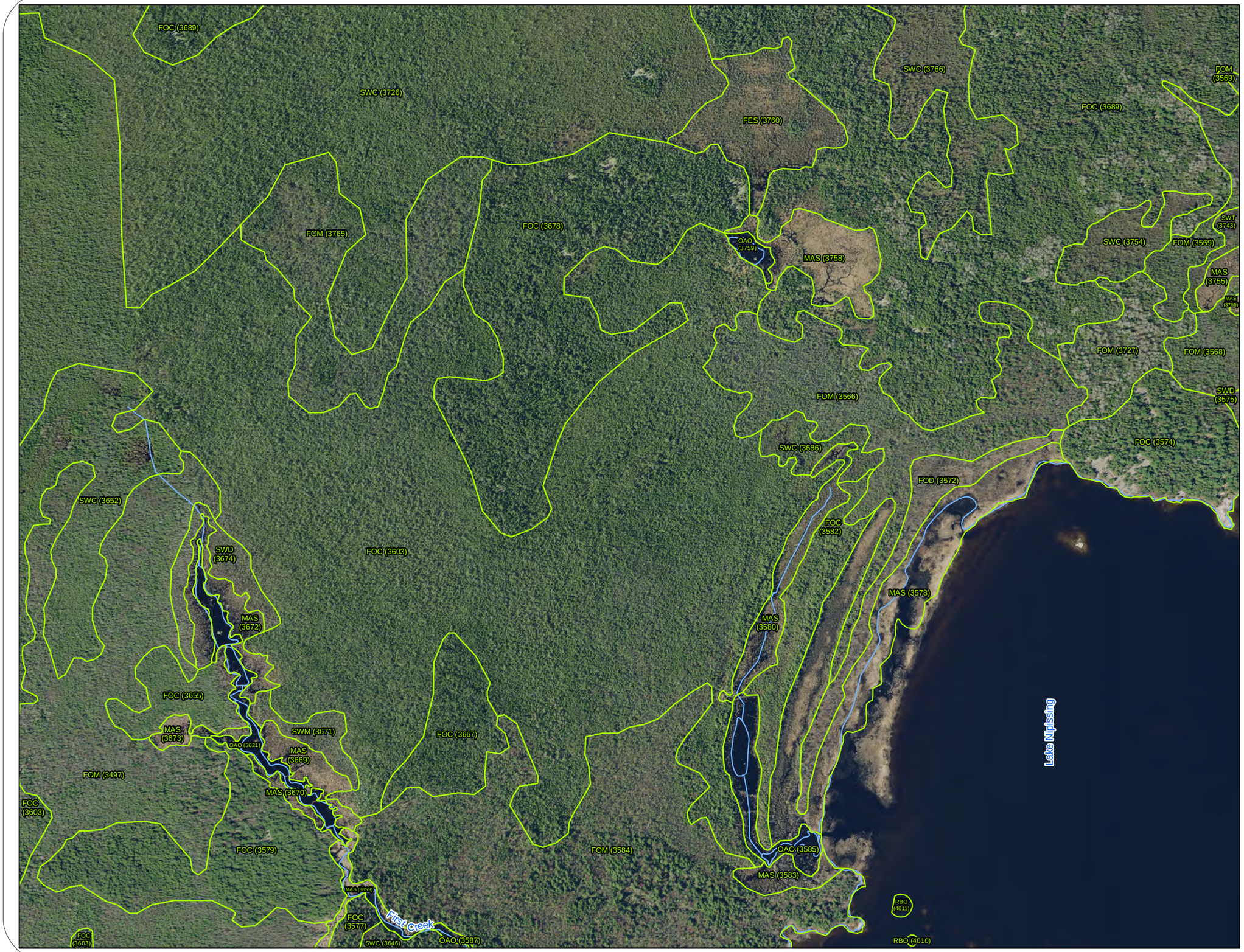
Project	TA9073	**Figure**	2-56
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA



LEGEND

ELC Communities Boundary

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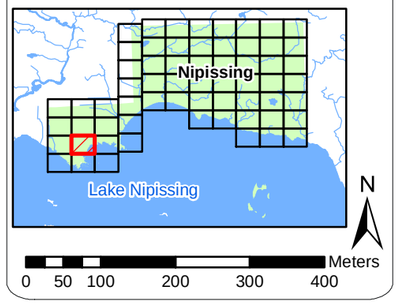

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Project	TA9073	**Figure**	2-57
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA

LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
BOO	Open Bog
BOS	Shrub Bog
BOT	Treed Bog
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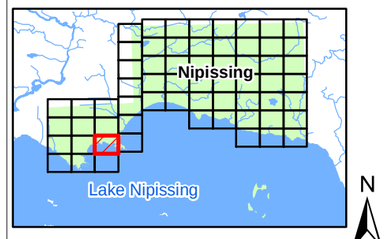

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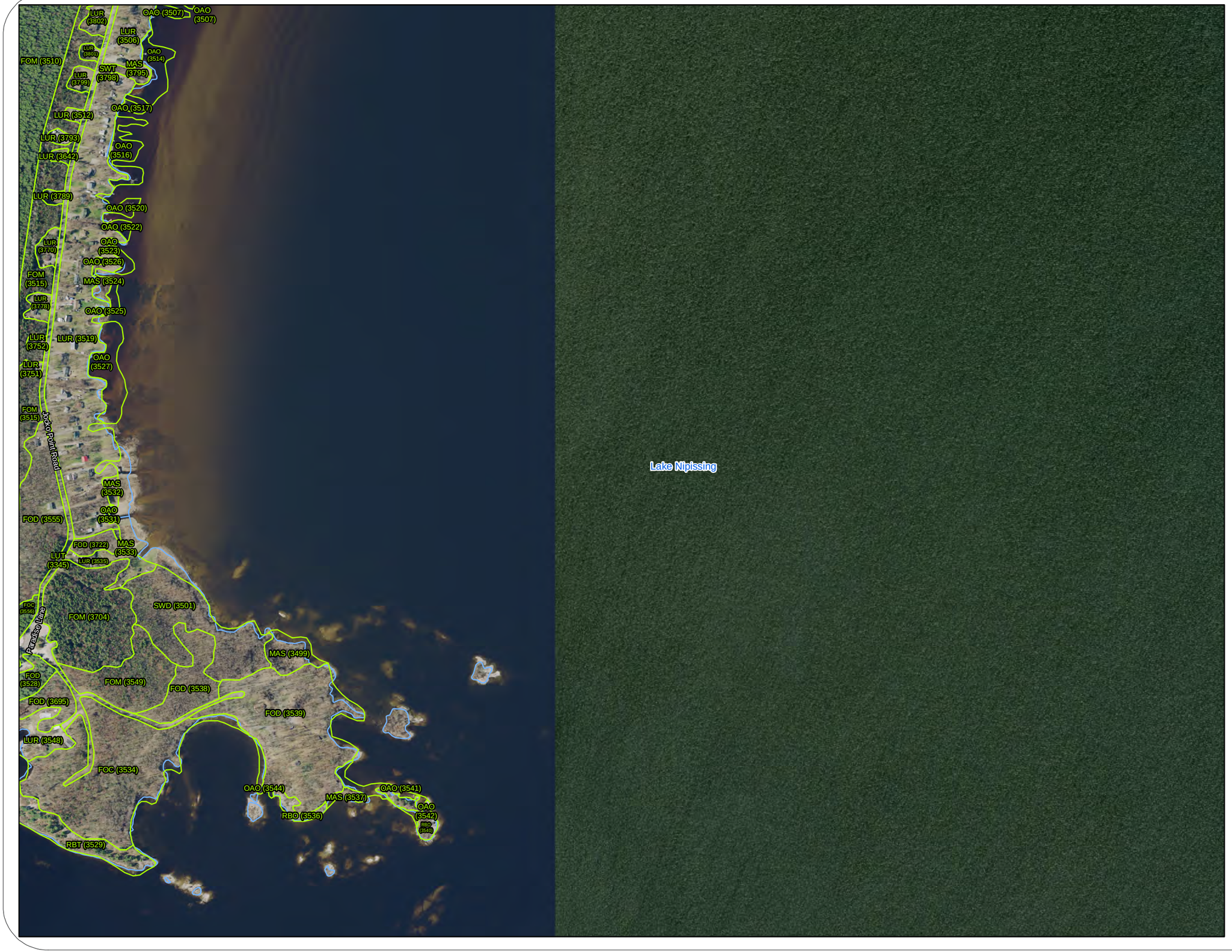
Project	TA9073	**Figure**	2-58
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA



LEGEND

	ELC Communities Boundary
BBO	Open Beach/Bar
BOO	Open Bog
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BOT	Treed Bog
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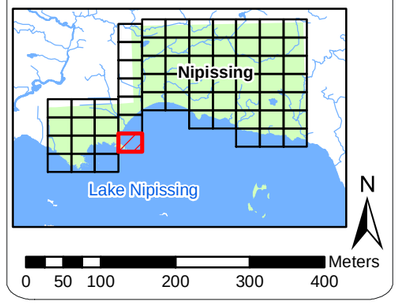

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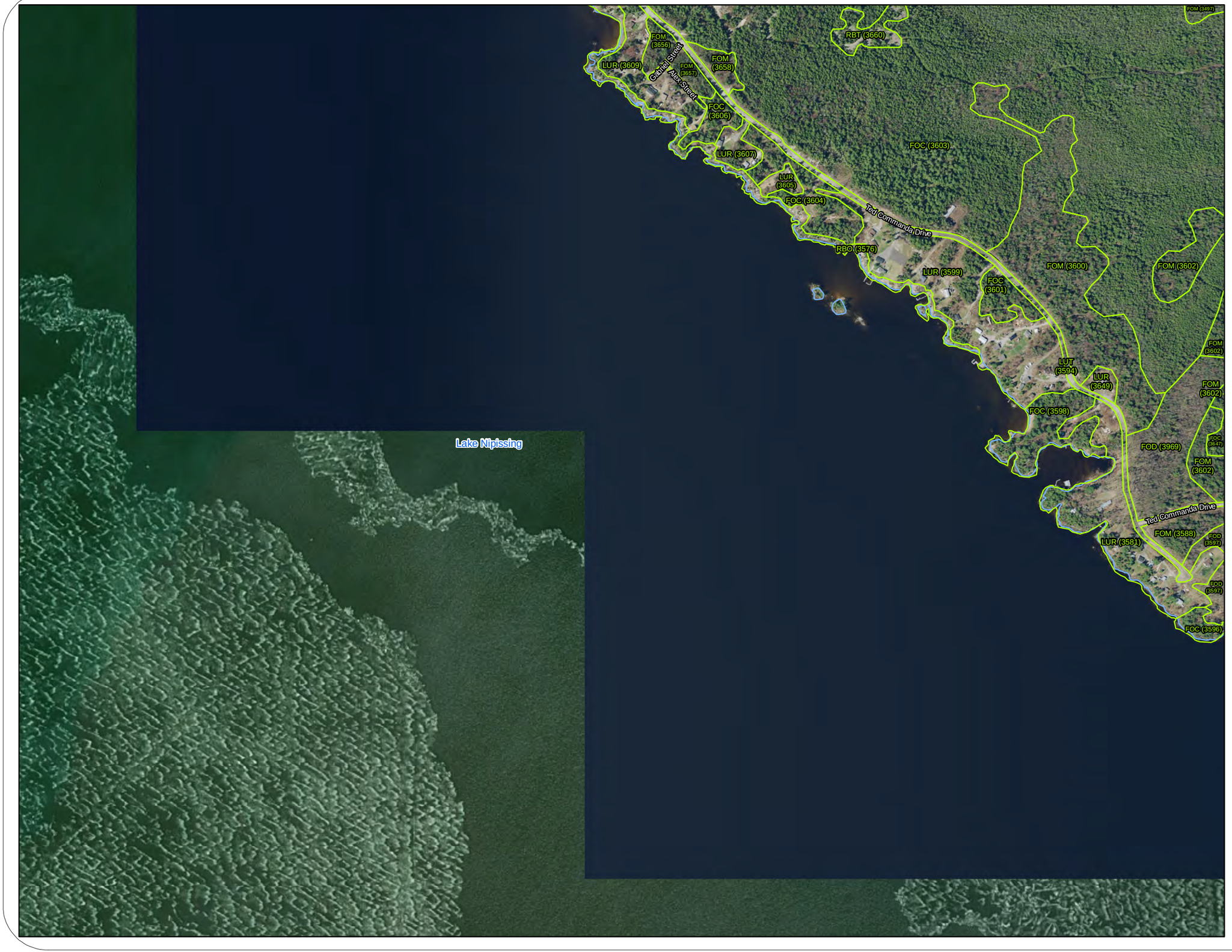
Project	TA9073	**Figure**	2-59
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA



LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
BOO	Open Bog
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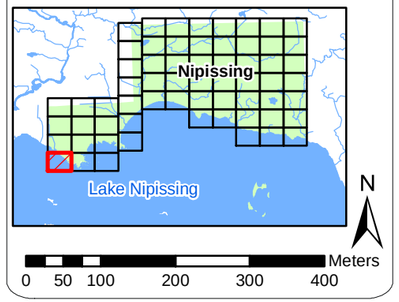

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Project	TA9073	**Figure**	2-60
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA

LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
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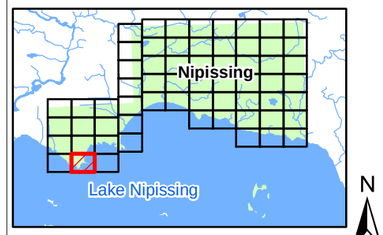

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Project	TA9073	**Figure**	2-61
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA

LEGEND

ELC Communities Boundary

BBO	Open Beach/Bar
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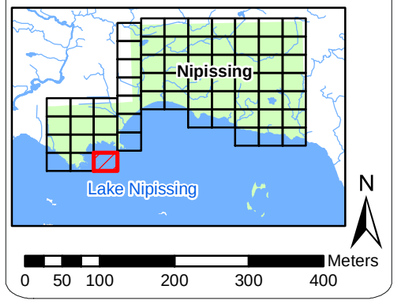

Desktop ELC for Nipissing FN

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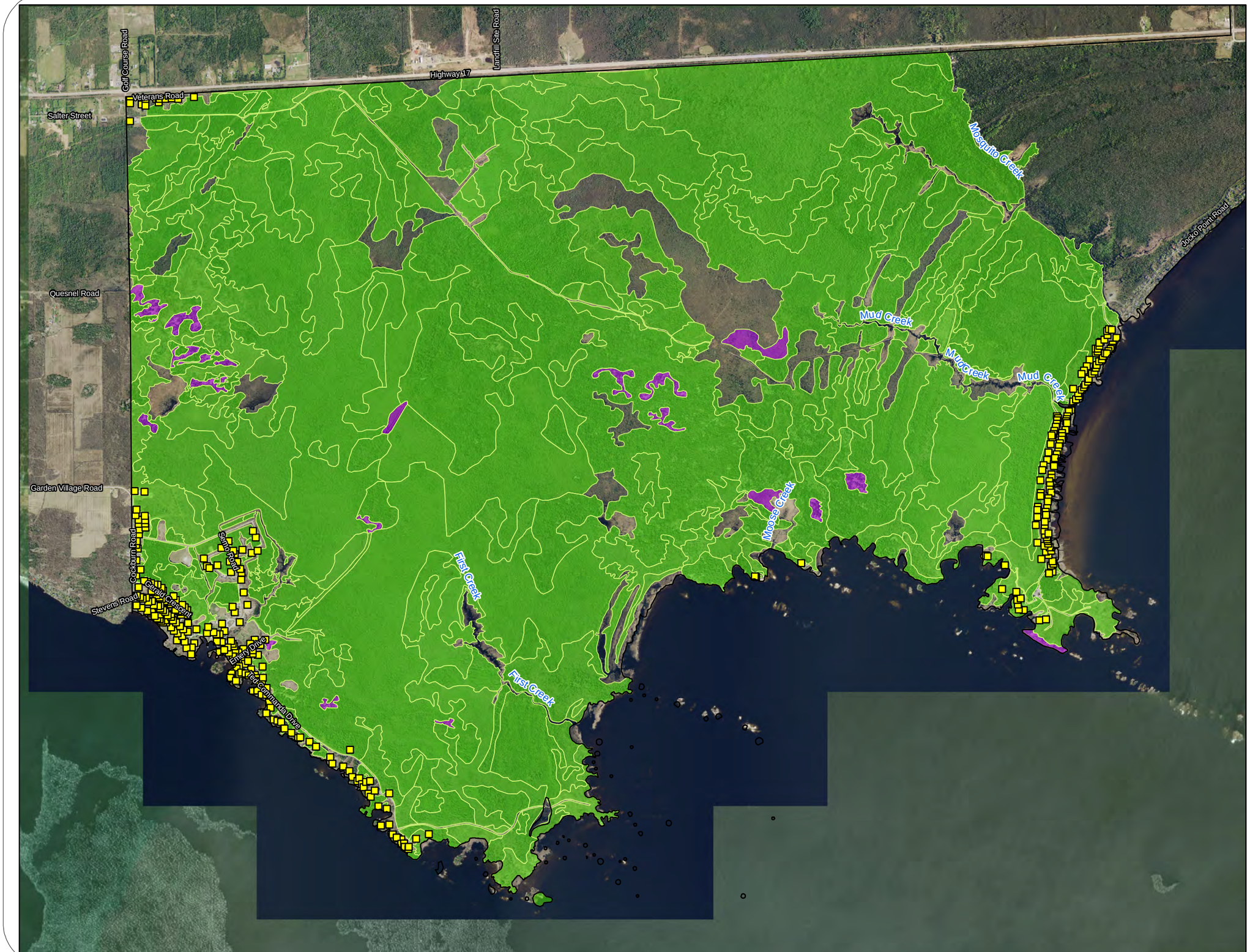
Project	TA9073	**Figure**	2-62
Date	March 2022	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	CJA



LEGEND

- Nipissing First Nation Study
- Potential Hibernaculum (rock crevices, caves, cliffs); boulder pile; exposed rock; exposed rocks; interesting rock outcrop
- Potential Maternity Roosts (buildings)

Woodlands

- Suitable for Bat Maternity Roosts
- Not Suitable for Bat Maternity Roosts

N

0 175 350 700 1,050 1,400 Meters

Desktop ELC for Nipissing FN

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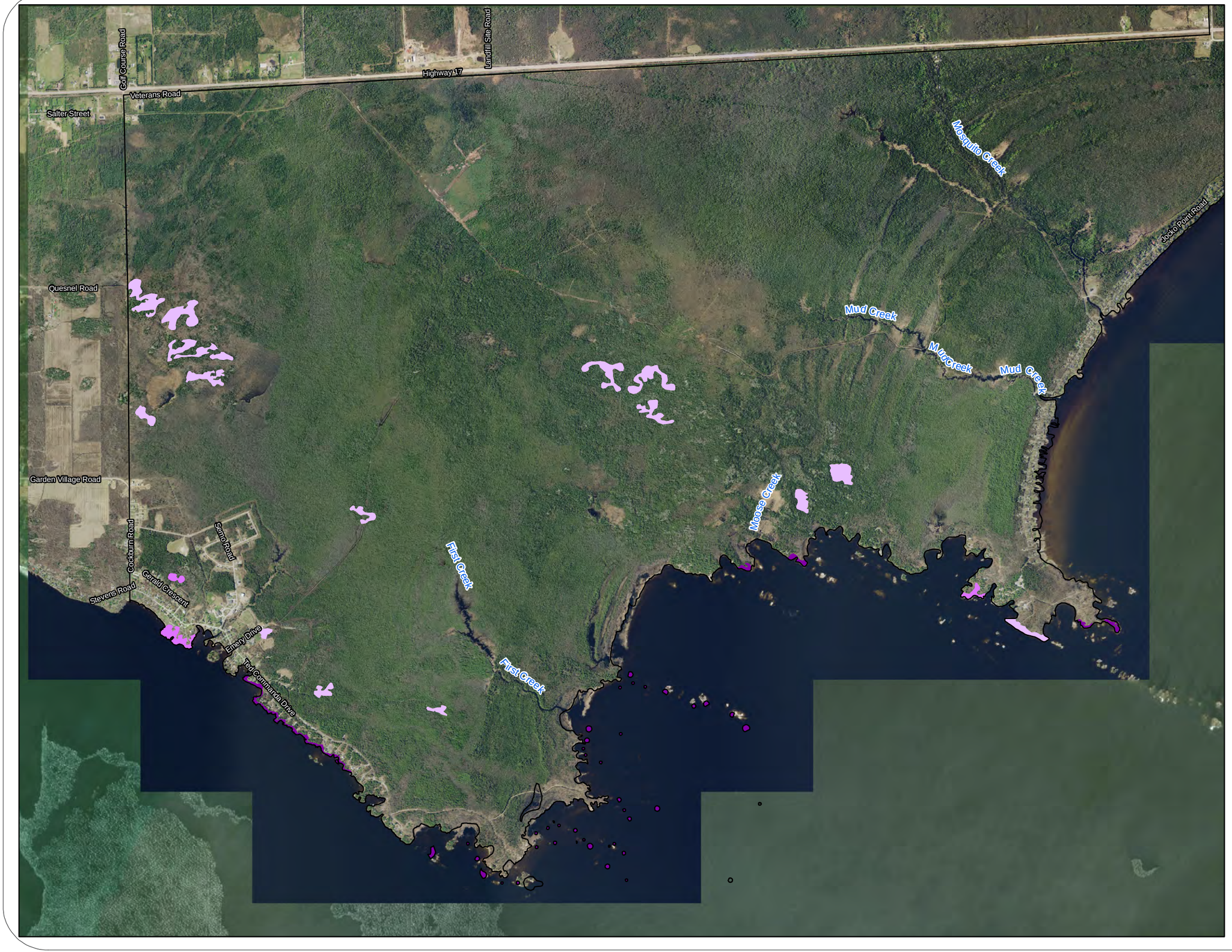
Project	TA9073	**Figure**	3
Date	March 2022	**Prepared By:**	KC
Scale	1:32,000	**Verified By:**	CJA



LEGEND

Nipissing First Nation Study Area

Rock Barrens

- Open Rock Barren
- Shrub Rock Barren
- Treed Rock Barren

N

0 175 350 700 1,050 1,400 Meters

Desktop ELC for Nipissing FN

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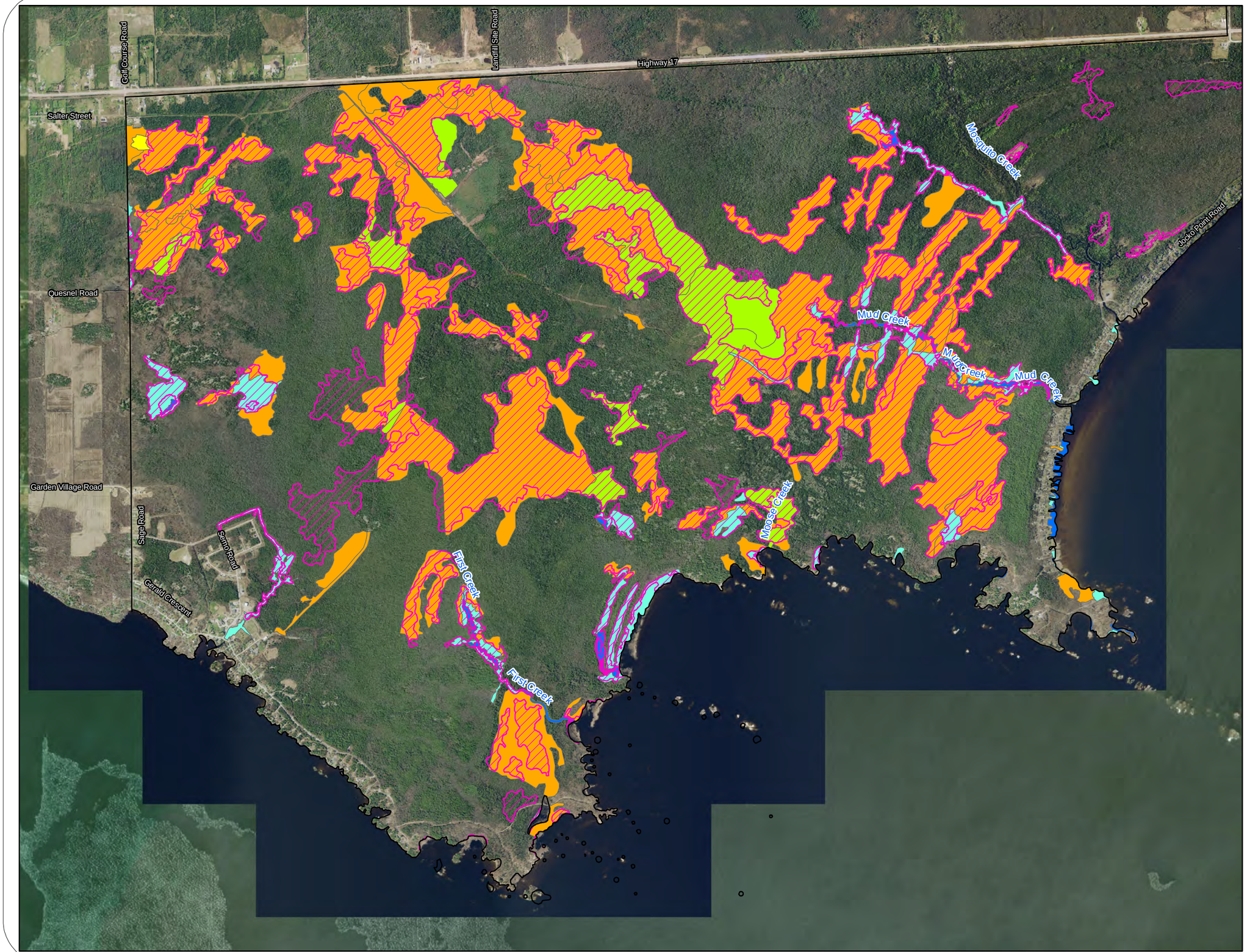
Project	TA9073	**Figure**	4
Date	March 2022	**Prepared By:**	KC
Scale	1:32,000	**Verified By:**	CJA



LEGEND

- Nipissing First Nation Study Area
- Wetland (LIO)

Wetlands and Aquatic Areas

- Bog
- Fen
- Marsh
- Swamp
- Open Aquatic

N

0 175 350 700 1,050 1,400 Meters

Desktop ELC for Nipissing FN

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Project	TA9073	**Figure**	5
Date	March 2022	**Prepared By:**	KC
Scale	1:32,000	**Verified By:**	CJA