LAKEHEAD REGION
CONSERVATION AUTHORITY

Watershed-Based Resource Management Strategy

Version 1.0

November 2024

VERSION	APPROVAL DATE	RESOLUTION #
1.0	November 27, 2024	#120/24

EXECUTIVE SUMMARY

All Conservation Authorities in Ontario are required to complete a Watershed-Based Resource Management Strategy under Section 21.1 of the *Conservation Authorities Act* and Ontario Regulation 626/21 under this Act, by December 31, 2024.

The Strategy will assist the LRCA with evolving or enhancing the delivery of Mandatory Programs and Services and assess issues and risks that impact effective delivery. Components of the Strategy include:

- Setting guiding principles and objectives to inform the design and delivery of Mandatory Programs.
- Characterizing the system by summarizing existing technical studies, monitoring programs and other information on the natural resources within the LRCA area of jurisdiction that directly informs and supports the delivery of the LRCA's Mandatory Programs and Services.
- A review of the Mandatory Programs and Services for the purpose of determining if they comply with the mandatory programs and services regulation.
- Assess and identify any issues and risks which may limit effective delivery of the Mandatory Programs and Services.
- Developing potential actions by identifying future programs, reports, services, and actions to meet objectives and long-term goals and identify where opportunities exist for improving and/or maintaining watershed health.
- Process for periodic review and update of the Strategy.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
1 INTRODUCTION 1
1.1 Purpose of Document 1
1.2 Legislative Requirements 2
2 BACKGROUND 3
2.1 Area of Jurisdiction 3
2.2 Lakehead Region Conservation Authority 3
2.3 Strategic Plan 4
2.4 Inventory of Programs 4
2.4.1 Mandatory Programs 5
2.4.2 Non-Mandatory Programs 6
3 GUIDING PRINCIPLES AND OBJECTIVES 7
3.1 Guiding Principles 7
3.2 Objectives 8
4 CHARACTERIZE THE SYSTEM 10
4.1 Existing Studies 10
4.1.1 Risk of Natural Hazard Studies 11
4.1.2 Source Water Protection Studies 14
4.1.3 Conservation and Management of LRCA Owned Land Studies 15
4.2 Monitoring Programs 17
4.2.1 Risk of Natural Hazard Monitoring Programs 17
4.2.2 Conservation and Management of Owned Land Monitoring Programs 23
4.2.3 Other Programs and Services Monitoring Programs 23
4.2.4 Non-Mandatory Programs and Services Monitoring 24
4.3 Available GIS and Imagery Resources 25
5 Programs and Services 26
5.1 Mandatory Programs and Services 26
5.2 Other Programs and Services (Category 2 and 3 (non-mandatory) that support Category 1 (Mandatory) Programs. 29
5.2.1 Category 2: Non-Mandatory Programs at the request of a Municipality 29
5.2.2 Category 3: Non-Mandatory Programs 29
6 ISSUES AND RISKS 33
6.1 Risk Mitigation Actions 33
7 BUSINESS PLAN 34
8 PROCESS FOR REVIEW 34
8.1 Consultation Strategy 34
8.1.1 Public Consultation 34
8.1.2 Board of Director Consultation 34
8.2 Strategy Review Schedule 35

LIST OF TABLES

Table 1: Category 1: Mandatory Programs
Table 2: Category 2: Non-Mandatory Programs
Table 3: Guiding Principles
Table 4: Objectives
Table 5: Existing Studies
Table 6: Monitoring Programs
Table 7: Precipitation Gauge Locations
Table 8: Streamflow/Level Gauge Locations
Table 9: Mandatory Programs and Services provided by the LRCA
Table 10: Non-Mandatory Programs and Services provided by the LRCA that support Category 1 Programs

LIST OF APPENDICES

Appendix A: Summary of Studies
Appendix B: Summary of Monitoring Programs
Appendix C: Summary of Available GIS Data
Appendix D: Issues, Risks and Potential Actions

LIST OF MAPS

Map 1: Area of Jurisdiction
Map 2: Completed Floodplain Studies
Map 3: Completed Wetland Studies
Map 4: Precipitation Gauge Locations
Map 5: Streamflow Gauge Locations
Map 6: Snow Survey Locations
Map 7: Provincial Groundwater Monitoring Network Locations
Map 8: Provincial Water Quality Monitoring Network Locations

1 INTRODUCTION

The Lakehead Region Conservation Authority (LRCA) is a community-based environmental non-profit agency that provides for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources within the Lakehead Watershed. The LRCA was established in 1954 (initially the Neebing Valley Conservation Authority) by the Province of Ontario at the request of municipalities in the Lakehead watershed. The area of jurisdiction of the LRCA is shown on Map 1: Area of Jurisdiction.

As legislated, the LRCA provides mandatory programs that manage the risk of natural hazards, manage land owned or managed by the Authority, protect sources of drinking water and monitor groundwater and surface water. The Authority also provides non-mandatory programs including programs at the request of a municipality (GIS mapping service, water sampling) and programs that the LRCA considers to be beneficial to the watershed such as stewardship on public and private lands and environmental education programming.

Conservation Authorities have been mandated to complete a Watershed-Based Resource Management Strategy by December 31, 2024. This document is the first version of the LRCA's Watershed-Based Resource Management Strategy, which will guide the efficient, transparent, and inclusive approach for the delivery of mandatory programs and services provided by the Authority.

In addition to the Watershed-Based Resource Management Strategy, a Lands Inventory and Conservation Lands Strategy are being developed as legislated.

1.1 Purpose of Document

The purpose of the Watershed Strategy is to assist the LRCA with evolving or enhancing the delivery of programs and services and improve efficiencies and their effectiveness in supporting Mandatory Category 1 programs.

The goal of the Watershed Strategy is to design and deliver cost-effective programs and services that protect people and property from natural hazards and achieve the pillars in the LRCA Strategic Plan:

- Conserve and Sustain
- Protect and Support
- Connect and Explore
- Govern and Enhance.

1.2 Legislative Requirements

Ontario Regulation 686/21: Mandatory Programs and Services, sets out the Mandatory Programs and Services which must be delivered by all Conservation Authorities in Ontario. Subsection 12(1)3 of the regulation requires all Conservation Authorities to prepare a "watershed-based resource management strategy" in accordance with subsections 12(4) through (9) on or before December 31, 2024.

The Watershed-Based Resource Management Strategy "Watershed Strategy" is to include the following components:

1. Guiding principles and objectives that inform the design and delivery of the programs and services that the authority is required to provide under section 21.1 of the Act.
2. A summary of existing technical studies, monitoring programs and other information on the natural resources the authority relies on within its area of jurisdiction or in specific watersheds that directly informs and supports the delivery of programs and services under section 21.1 of the Act.
3. A review of the authority's programs and services provided under section 21.1 of the Act for the purposes of,
    i. determining if the programs and services comply with the regulations made under clause 40 (1) (b) of the Act,
    ii. identifying and analyzing issues and risks that limit the effectiveness of the delivery of these programs and services, and
    iii. identifying actions to address the issues and mitigate the risks identified by the review, and providing a cost estimate for the implementation of those actions.
4. A process for the periodic review and updating of the watershed-based resource management strategy by the authority that includes procedures to ensure stakeholders and the public are consulted during the review and update process.
5. The Authority must ensure that stakeholders and the public are consulted during the preparation of the Watershed Strategy in a manner that the Authority considers advisable.
6. The Authority must ensure that the Watershed Strategy is made public on the Authority's website, or by such other means as the Authority considers advisable.

The Watershed Strategy is to only include Mandatory Programs and Services, and can only include Non-Mandatory Programs, if an Agreement has been executed with the Conservation Authority's member municipalities. The LRCA does not have any such Agreement in place; therefore, the Watershed Strategy does not include Non-Mandatory Programs (i.e., Stewardship and Environmental Education).

2 BACKGROUND

The current LRCA Five-Year Strategic Plan 2023-2027 outlines the overall priorities and initiatives for the Authority over the five-year period, carrying on from the Authority's first ever Strategic Plan that was adopted in 2018. The plan provides a focus on the continual protection of natural hazards, natural heritage, and ecosystems, in partnership with the community and organizations in the watershed.

The Watershed-Based Resource Management Strategy will encompass the LRCA's vision to provide a healthy, safe, and sustainable Lakehead Watershed for future generations, with a mission to lead in the conservation and protection of the Lakehead Watershed. The Watershed-Based Resource Management Strategy will serve as a complimentary document to the Strategic Plan and Conservation Lands Strategy, that specifically relates to the mandatory programs provided by the LRCA. The two documents encompass similar themes, focused on achieving goals and objectives that align with the LRCA's mandate. The Watershed-Based Resource Management Strategy will follow the same pillars focusing on the four priorities: Conserve and Sustain, Protect and Support, Connect and Explore, and Govern and Enhance.

2.1 Area of Jurisdiction

The LRCA's area of jurisdiction is approximately 2,719 square kilometres (Map 1) and includes the eight Member Municipalities of the LRCA including: City of Thunder Bay, Municipalities of Neebing, Shuniah and Oliver Paipoonge and the Townships of Conmee, O'Connor, Gillies and Dorion. The Ministry of Natural Resources is responsible for the areas outside the jurisdiction of the Authority. The scientific boundary of the Lakehead Watershed is 11,526 square kilometres.

2.2 Lakehead Region Conservation Authority

The LRCA is a community-based environmental protection and advisory agency, established in 1954 (initially the Neebing Valley Conservation Authority) by the Province of Ontario at the request of municipalities in the Lakehead watershed. The LRCA's purpose is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in the Lakehead Watershed. Conservation Authorities undertake a broad range of programs, including: watershed management, erosion control, Flood Forecasting and Warning, recreation and land management, water level monitoring, Plan Review, environmental education and stewardship. We improve quality of life by actively providing Conservation Areas for semi-passive recreation and environmental education opportunities.

Our integrated approach to resource management leads to a wide range of programs and projects, which are aimed at keeping our watersheds healthy. We improve quality of life by actively providing open space and protecting life and property from flooding and erosion, as well as restoring and conserving aquatic and natural habitats. In addition to serving our watershed residents, we also provide advice and counsel to all levels of government regarding natural hazards.

The LRCA is one of 36 Conservation Authorities across Ontario, including one of five in Northern Ontario.

2.3 Strategic Plan

In 2017, the LRCA adopted vision and mission statements and in January 2018, the LRCA adopted its first ever Five-Year Strategic Plan for the period 2018-2022. The Strategic Plan was updated in 2022 for the next five-year period (2023-2027). The Strategic Plan identifies four main priorities including: conserve and sustain; protect and support; connect and explore; and govern and enhance. LRCA's vision and mission statements are as follows:

Vision: A healthy, safe and sustainable Lakehead Watershed for future generations.
Mission: To lead the conservation and protection of the Lakehead Watershed.

2.4 Inventory of Programs

O. Reg. 687/21: Transition Plans and Agreements for Programs and Services under Section 21.1.2 of the *Conservation Authorities Act* mandated that every Conservation Authority prepare prior to February 28, 2022, an inventory that listed all programs and services that the Authority was providing or intended on providing in the future. As required, the LRCA prepared the inventory and updated it as programs developed. As outlined in Version 4.0 of the Inventory, the programs are organized into three categories:

- Category 1: Mandatory Programs and Services
- Category 2: Non-Mandatory Programs and Services at the request of a Municipality
- Category 3: Non-Mandatory Programs and Services.

2.4.1 Mandatory Programs

The Mandatory Programs (Category 1) were categorized into Program Areas and Subservices. The programs include:

Table 1: Category 1: Mandatory Programs

Category 1: Mandatory Programs	
Program Area	**Subservice**
Enabling Service	• Administration • Community Relations • Vehicle and Equipment • Information Technology • Corporate GIS
Risk of Natural Hazards	• Floodplain Mapping • Technical Studies • Communications and Outreach • Flood Forecasting and Warning • Drought and Low Water Response • Infrastructure: Neebing-McIntyre Floodway • Infrastructure: Victor Street Erosion • Review of Proposals under an Act • Plan Review Comments • Administering and Enforcing the Act (Section 28 Development Regulations)
Management, Operation and Maintenance of CA Owned Land	• Conservation Areas • Administer Section 29 Regulations in Conservation Areas • Other Owned Land
Source Water Protection	• Source Water Protection
Other Programs and Services	• Water Quality and Quantity Monitoring: Provincial Groundwater Monitoring Network • Water Quality and Quantity Monitoring: Provincial Water Quality Monitoring Network • Watershed-Based Resource Management Strategy

2.4.2 Non-Mandatory Programs

The Non-Mandatory Programs include both programs at the request of a municipality (Category 2) and those that the Conservation Authority deems to be necessary (Category 3).

Table 2: Non-Mandatory Programs

Category 2: Non- Mandatory Programs at the Request of a Municipality	
Program Area	**Subservice**
Mapping Service	• GIS Mapping Service. Maintaining hardware and software required to provide a web-based mapping service that provides mapping capabilities to users.
Water Quality Monitoring	• Mosquito and Pennock Creek Monitoring
Category 3: Non- Mandatory Programs	
Program Area	**Subservice**
Education	• Environmental Education • Nature Interpretive Programming
Stewardship	• Superior Stewards • Tree Seedling • Seeds for Conservation • Private Land Stewardship • Invasive Species

3 GUIDING PRINCIPLES AND OBJECTIVES

LRCA's Strategic Plan (2023-2027) provides a framework for the LRCA outlining the Authority's guiding principles (pillars), vision and mission.

Vision: A healthy, safe and sustainable Lakehead Watershed for future generations.
Mission: To lead the conservation and protection of the Lakehead Watershed.

The objectives of the Watershed-Based Resource Management Strategy provide high-level context and guidance and direction for actions related to the Mandatory Programs and Services provided by the LRCA. Aligning with the LRCA's Five-Year Strategic Plan, the objectives will focus on the Strategic Plan's four pillars relating to the programs and services provided by the LRCA.

3.1 Guiding Principles

Principle: a concept or idea that guides measurable actions.

Table 3: Guiding Principles

Strategic Plan Pillar	Guiding Principles
Conserve and Sustain *Enhance the management and sustainability of natural habitats and ecosystems through an integrated approach.*	• The conservation, restoration, development, and management of natural resources is best implemented on a watershed basis.
Protect and Support *Safeguard people, property and communities through robust watershed management.*	• Water and other natural resources are vital natural assets; they buffer the impacts of climate change, mitigate natural hazards, filter contaminants, assimilate waste, sustain biodiversity, and provide green spaces for recreation, among other community benefits. • The health and safety of watershed residents is a primary consideration for all decisions.
Connect and Explore *Maximize intergenerational educational, engagement and recreational opportunities through strong collaborations.*	• The management of water and other natural resources is a shared responsibility among Conservation Authorities, Municipalities, government agencies and other stakeholders.

	• Natural green spaces are critical to the community, providing environmental, economic, social, mental and physical health benefits. • Community education leads to environmental stewardship – active participation in conservation efforts to protect land and water resources.
Govern and Enhance *Distinguish the organization as a leader in environmentally-sustainable practices and responsible stewardship.*	• The Watershed-Based Resource Management Strategy provides the necessary framework for identifying and assessing resource conditions, trends, risks, and issues and implementing the delivery of programs to manage them. • The Watershed-Based Resource Management Strategy informs policy and decision-making by the Conservation Authority, participating Municipalities, and other partners. • Resource management decisions are integrated and transparent and take into consideration a broad range of community uses, needs, and values, including ecosystem needs.

3.2 Objectives

Objective: a statement describing desired outcomes for measurable short-term actions that help achieve a goal.

Table 4: Objectives

Strategic Plan Pillar	Objectives
Conserve and Sustain *Enhance the management and sustainability of natural habitats and ecosystems through an integrated approach.*	• Protect, enhance and restore natural areas to improve ecosystems health and resilience. • To identify and understand key resource issues and the primary stressors that cause them.
Protect and Support *Safeguard people, property and communities through robust watershed management.*	• Develop and maintain programs that will protect life and property from natural hazards such as flooding and erosion. • To avoid, reduce or mitigate risk to public health and safety and property damage from flooding and other natural hazards and the impacts of climate change. • To monitor key indicators of natural resource issues to describe conditions, trends, and risks. • To characterize surface/groundwater systems and natural resources, which support hydrological and ecological integrity and influence natural hazard processes.

	• To work with the City of Thunder Bay and the Municipality of Oliver Paipoonge to mitigate potential risk to drinking water sources and ensure a sustainable and clean municipal water supply for the watershed community.
Connect and Explore *Maximize intergenerational educational, engagement and recreational opportunities through strong collaborations.*	• To protect and maintain Conservation Authority owned lands for public safety, natural heritage protection, outdoor recreation, and socio-economic health. • To educate and engage the watershed community to promote awareness of natural hazards and watershed health, and to encourage the protection and restoration of land and water resources through stewardship action.
Govern and Enhance *Distinguish the organization as a leader in environmentally-sustainable practices and responsible stewardship.*	• Demonstrate organizational excellence through the effective and efficient delivery of LRCA's programs and services in an equitable and respectful manner. • Manage the LRCA's landholdings in a responsible and sustainable way.

4 CHARACTERIZE THE SYSTEM

The LRCA relies on a variety of existing reports, studies and information to inform and support the delivery of the mandatory programs and services.

The information has been summarized in the following appendices summarized by Member Municipality and program area:

- Appendix A: Studies
- Appendix B: Monitoring Programs
- Appendix C: Available GIS Data
- Appendix D: Issues, Risks and Potential Actions

4.1 Existing Studies

The existing studies utilized in the administration of mandatory programs and services are summarized by Member Municipality in Appendix A and include the following:

Table 5: Existing Studies

Program Area	Type of Study
Risk of Natural Hazards	• Watershed Report Card • Floodplain Mapping • Lake Superior Information • Wetland Evaluations • Erosion Studies
Source Water Protection	• Thunder Bay Area Aquifer Characterization Groundwater Management and Protection Study (2005) • Lakehead Source Protection Area, Water Budget and Water Quantity Stress Assessment (2007) • Groundwater Vulnerability Analysis Issues Evaluation Threats, Inventory and Water Quality Risk Assessment for Hamlet of Rosslyn Village WHPA (2008) • Lakehead Watershed Characterization Report (2008) • City of Thunder Bay Source Protection Technical Study - Phase 1 (2009) • City of Thunder Bay Source Protection Planning Technical Study - Phase 2 (2009) • Approved Assessment Report (2011) • Approved Source Protection Plan (2013)
Conservation and Management of Owned Land	• Asset Management Plan • Forest Management Plans • Natural Heritage Information

4.1.1 Risk of Natural Hazard Studies

Watershed Report Card

Every five years the LRCA prepares a Watershed Report Card (last version completed in 2023) for the LRCA Area of Jurisdiction that uses criteria established by Conservation Authorities to provide an average grade for groundwater quality, surface water quality, forested areas and wetland coverage. The grade scores are calculated based on available data collected during the five-year reporting period such as Watershed Assessments on various rural rivers and streams and data collected in partnership with the Ministry of the Environment, Conservation and Parks (i.e., Provincial Groundwater Monitoring Network and Provincial Water Quality Monitoring Network). Forest conditions and wetland cover are calculated in house using available GIS data at the time of assessment.

The LRCA currently does not complete any benthic macroinvertebrates or chloride surface water monitoring, which are parameters monitored by other Conservation Authorities.

Floodplain Mapping

The Regulatory Floodplain is the approved standard used in a particular watershed to define the limit of the floodplain for regulatory purposes. LRCA's Floodplain Mapping is used to complete mandatory program services and requirements including administering: O. Reg. 41/24: Prohibited Activities, Exemptions and Permits; Plan Review; and Flood Forecasting. Adaptive watershed management requires a preventative and proactive approach to address the potential impacts of urbanization and climate change.

The Authority has completed various floodplain mapping studies over the years, which are currently used during the administration of O. Reg. 41/24, and for Plan Review purposes. When the original studies were completed, partial funding was provided under a variety of government funding programs. The studies were completed between 1979 and 1985, with McVicar Creek updated in 1995.

National Disaster Mitigation Funding was used to fund updates to floodplain mapping studies that were completed including:

- McIntyre River (2015),
- Neebing River (2018),
- McVicar Creek (2019),
- Kam River (2020),
- Pennock Creek, (2020),
- Mosquito Creek, (2020).

Completed studies are shared with applicable Member Municipalities for use by the engineering departments, for asset management and to be incorporated into their Official Plan and Zoning By-Law.

Floodplain mapping has been completed on the major watercourses in the City of Thunder Bay and a small portion of the watersheds in the Municipality of Oliver Paipoonge. One small creek (Northstar Creek) in the Municipality of Shuniah has floodplain mapping, which was completed by a developer. Completed mapping is shown on Map 2: Completed Floodplain Studies. The majority of the watersheds in the jurisdiction do not have floodplain mapping completed, due to a lack of funding and lack of development pressure.

Lake Superior Information

The 100-year flood elevation is obtained from the Great Lakes St. Lawrence River System and Large Inland Lake Technical Guides (2001). Required studies include confirmation of the current 100-year flood level, determination of 100-year erosion hazard and the wave uprush hazard and confirmation there are no dynamic beaches along the shoreline.

Wetland Studies

The LRCA utilizes the historic Ministry of Natural Resources (MNR) delineated provincially significant wetlands as available in the Lands Inventory Ontario (LIO) warehouse. Since 2015, the LRCA has completed wetland mapping and evaluation studies within selected watersheds through funding from external sources. The watersheds with evaluated and mapped wetlands are the Neebing River (2019), McVicar Creek (2016), McIntyre River (2018) and Mosquito Creek (2019) watersheds, which represent approximately 14% of the total watershed area, respectively. Through this process McVicar and the McIntyre wetlands were deemed to be Provincially Significant. In 2021, the remaining wetlands in the LRCA area of jurisdiction had their outer extents mapped and confirmed along with the production of a GIS shapefile that included the wetland types and ecosites as defined by Ontario's Ecological Land Classification. Completed Wetland Studies are shown on Map 3. The rural wetland boundaries delineated in 2021 require ground truthing and further refinement.

Erosion Studies

Kam River Erosion Site Inventory

The Kaministiquia River Erosion Sites Inventory Report (Study) updated the previous 1987 record of Erosion Sites and delineated the 100-year Erosion Hazard Limit and Fill Line maps. The Study acquired historical air photos and satellite imagery (from 1983 and 2006), digital orthophotos (from 2007 and 2017), LiDAR data (May 2018), features from LIO, and information from various historical studies to estimate the actual recession rate of the Kaministiquia River (Kam River) top of bank and river edge at identified Erosion Sites. Further, topographic and bathymetric surveys were conducted to collect data on

water level, slopes, river thalweg, soil samples, drainage features, structures at each Erosion Site, as well as photo logs and video surveillance along the Kam River.

The actual rate of erosion at each Erosion Site over the 35-year period of study (i.e., 1983 to 2019) was estimated, and an average erosion rate was calculated to represent all toe erosion with one rate and all slope erosion with one rate. The 100-year Erosion Hazard allowance was determined by using the greater of the site-specific rate or the average rate (associated with the given site) and multiplied by 100. The allowance in metres was applied from either the projected 2:1 slope (toe erosion) or the top of slope (slope erosion). All stable slopes were considered to be stable with an average annual recession rate of 0 m/year. The Fill Line is located 15 metres from either the 100-year Erosion Hazard Limit, or 15 metres from the intersection of the 2:1 stable slope measured from the rivers edge.

The study identified several areas of concern based on the erosion site findings, which were grouped into categories for specific recommendations. Areas of concern in Group I show signs of erosion or recent failure and have inherent threat to life, infrastructure, or adjacent structures. Areas of concern in Group II show signs of erosion or failure, however threat to loss of life or infrastructure is not immediate. The study recommends regular monitoring of the areas of concern and notes that property owners are responsible to monitor their own lands.

Documents produced as part of the study included a LiDAR Project Report, Erosion Sites Inventory Report, and 100-year Erosion Hazard Limit and Fill Line Maps. The estimated 100-year erosion Hazard Limit and Fill Line Maps will require updating approximately every 10 years.

Victor Broadway Assessment Study

In 2019, LRCA retained KGS Group to complete a study to determine the 100-year erosion limits of the Kam River. The results of that study identified the Victor/Broadway area as an area of concern which was categorized into the highest risk group with regards to inherent threat to life, adjacent structures or infrastructure. As a result of that determination, Hatch Consulting was retained by the Lakehead Region Conservation Authority to perform a study of the existing erosion mitigation and slope stabilization measures along the bank of the lower Kaministiquia River, review the causes of erosion, and determine mitigation measures.

The report presented the results of a geotechnical investigation, laboratory testing, subsurface assessment, and slope stability assessment conducted for the study of the Kaministiquia River's bank along Victor Street and Broadway Avenue southwest of Thunder Bay. This study also presents concepts to mitigate risks.

Objectives of the study were to determine the viability and efficacy of the existing measures, assess the cause and extent of slope instability, and develop options or concepts to mitigate potential risk to public and private property within the study area. The main focus area of the study was Victor Street and the associated utilities and infrastructure along its corridor. Victor Street is the only access and egress for 74 residential lots; the consequences of a slope failure damaging Victor Street and the associated utilities would be detrimental for the residents who rely on it. The study area also reviewed the area along Broadway Avenue between Victor Street and Daisey Lane as well as the Daisey Lane neighbourhood.

4.1.2 Source Water Protection Studies

The following technical reports were prepared as part of the process to create the Lakehead Source Protection Plan.

Technical Reports:

- ***Thunder Bay Area Aquifer Characterization Groundwater Management and Protection Study (2005)***
    - The Thunder Bay Aquifer Characterization Groundwater Management and Protection Study was completed to meet the following objectives: obtain a better understanding of the groundwater resources, uses and vulnerability within the study area; complete a hydrogeological characterization and mapping of the area; complete an inventory and assess potential contaminant sources; assess water use in the area; assess groundwater vulnerability; and assist in the development of groundwater protection strategies.
- ***Lakehead Source Protection Area, Water Budget and Water Quantity Stress Assessment (2007)***
    - The report provided an analysis of how much water was available within the boundaries of the Lakehead Source Protection Area. The focus of the water budgeting activities carried out for the Lakehead Source Protection Area was restricted to municipal drinking water systems only, which included the ground water supply in Rosslyn, the Lake Superior intake for Thunder Bay, and the former intake in Loch Lomond for Thunder Bay (which technically was no longer classified as a municipal system). The water budget was linked to the Watershed Characterization (LRCA, 2006) and provided a conceptual quantitative look at the watershed.
- ***Groundwater Vulnerability Analysis, Issues, Evaluation, Threats, Inventory and Water Quality Risk Assessment for Hamlet of Rosslyn Village WHPA (2008)***

- AMEC conducted a Groundwater Vulnerability Analysis, Issues Evaluation, Threats Inventory and Water Quality Risk Assessment for the Wellhead Protection Area of the Hamlet of Rosslyn Village.

- ***Lakehead Watershed Characterization Report (2008)***
  - The Watershed Characterization Report is a documentation of the water resources within the boundaries of the Lakehead Source Protection Area. The Characterization Report provides a description of the natural environment and the human influences that may impact water quantity and quality of the watershed as it relates to Source Protection Planning.
- ***City of Thunder Bay Source Protection Technical Study - Phase 1 (2009)***
  - Stantec Consulting Limited completed a Surface Water Vulnerability Analysis for the Bare Point Water Treatment Plant surface water intake on Lake Superior.
- ***City of Thunder Bay Source Protection Planning Technical Study - Phase 2 (2009)***
  - Stantec Consulting Limited completed the Issues Evaluation and Threats Inventory and Water Quality Risk Assessment (Tier 1) for the Bare Point Water Treatment Plant surface water intake on Lake Superior.
- ***Approved Assessment Report (2011)***
  - The Approved Assessment Report describes local watershed characteristics and the available water supply in the watershed of the Lakehead Source Protection Area. It identifies the vulnerable areas for Municipal residential drinking water systems where the sources of drinking water may face risk of contamination or depletion and assesses the potential threats to the sources of Municipal residential drinking water within the defined vulnerable areas.
- ***Approved Source Protection Plan***
  - The Source Protection Plan is the strategic document for the Lakehead Source Protection Area that outlines policies and procedures to ensure that all significant and potential threats to the sources of Municipal residential drinking water systems are managed in a way that they will never become significant drinking water risks.

4.1.3 Conservation and Management of LRCA Owned Land Studies

Asset Management Plan

In 2021, an update to the LRCA Asset Management Plan (AMP) was completed for existing assets. The AMP was developed to prioritize needs and minimize future repair and rehabilitation costs and maintain assets. The AMP will ensure that sufficient financial planning is undertaken to afford future asset repair maintenance, rehabilitation or replacement or expansion in order to maintain acceptable levels of service for users. The AMP covered a period of 20 years and will require regular updates (i.e. every five years)

to ensure that assets are managed efficiently and sustainably. Reports associated with the AMP include:

- Asset Management Plan Update,
- Condition Assessment of Conservation Areas,
- Condition Assessment of Diversion Structure,
- Condition Assessment of Office Building.

Forest Management Plans

Ten LRCA-owned lands have Forest Management Plans developed under the Managed Forest Tax Incentive program (MFTIP), which provides some tax relief as well as a plan for proper long-term forest management. In 2017, the LRCA contracted KBM to develop and approve Managed Forest Plans for a twenty-year period, from January 1, 2017, to December 31, 2036. The Plans require updating every 10 years, with the next update scheduled in 2026.

Forest Management Plans registered under the MFTIP are for the following LRCA-owned properties:

- Cascades Conservation Area
- Cedar Falls Conservation Area
- Hazelwood Lake Conservation Area
- Hurkett Cove Conservation Area
- Little Trout Bay Conservation Area
- Wishart Conservation Area
- Mills Block Conservation Area
- Harpell/ Bocking (no public access)
- William's Forest (no public access)
- Granite Point (no public access)

Natural Heritage Information

The collection of current natural heritage information on LRCA owned land is a priority and a plan to prioritize data collection will be an action item for completion.

4.2 Monitoring Programs

The LRCA provides a variety of Monitoring Programs as part of the administration of mandatory programs and services. A full summary of the Monitoring Programs administered in each Member Municipality is summarized in Appendix B. Monitoring Programs include the following:

Table 6: Monitoring Programs

Program Area	Type of Monitoring Program
Risk of Natural Hazards	• Neebing River Climate Change Station • Precipitation • Streamflow/level • Snow Surveys • Spring Thaw Records • Lake Level Monitoring • Neebing- McIntyre Floodway Level Monitoring • Victor Street/Broadway Erosion Annual Inspections
Conservation and Management of Owned Land	• Infrastructure Inspections • Water Quality • Invasive Species Monitoring
Other Programs and Services	• Provincial Groundwater Monitoring Network (PGMN) • Provincial Water Quality Monitoring Network (PWQMN)
Non-Mandatory Programs and Services	• Wolf River Weir inspections (DFO funded) Mosquito Creek/Pennock Creek Water Quality Monitoring (City of Thunder Bay funded) • Invasive Species (externally funded)

4.2.1 Risk of Natural Hazard Monitoring Programs

Neebing River Climate Change Station

In partnership with MECP, the Water Survey of Canada Neebing Gauge (02AB008) site was upgraded by the Province to be designated as one of five in the province as a Climate Change Detection and Adaptation Monitoring site. In addition to the existing monitoring of streamflow and precipitation, in 2011 a groundwater monitoring well was installed as part of the Provincial Groundwater Monitoring Program which records groundwater levels every hour and has the groundwater collected annually for water quality analysis. In 2012, soil moisture, air and water temperature sensors were installed and surface

water sampling of the Neebing River was initiated as part of the Provincial Water Quality Monitoring Network. In 2016, a barometric pressure sensor was added to the groundwater well.

Precipitation

Tipping bucket precipitation gauges have been installed at all LRCA streamflow gauge sites. The tipping buckets data is recorded by Water Survey of Canada loggers; however, the precipitation equipment is maintained by the LRCA. The tipping bucket gauges provide a measurement of precipitation which is recorded in the data logger at the gauge site. Tipping bucket gauges do not operate during the winter months. Additionally, tipping buckets are installed as part of the PGMN well program at the Kakabeka Falls and Murillo Fire Hall sites. The data is recorded and downloaded quarterly. The Municipalities of Shuniah and Neebing operate tipping buckets that are accessed by the LRCA.

In 2007, a Geonor Precipitation Gauge was installed at the LRCA office at 130 Conservation Road. The Geonor provides precipitation data (rainfall and snowfall water content) throughout the year. In addition, local volunteers have joined the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS), which is a non-profit, community-based network of volunteers who record and report precipitation utilizing a reporting forum through the internet. The data is viewable by the public through the CoCoRaHS website http://cocorahs.org/.

The precipitation monitoring network is summarized in Table 7 below and is shown on Map 4: Precipitation Gauge Locations.

Table 7: Precipitation Gauge Locations

Gauge Name	Operating Season	Gauge Type	Location
McVicar Creek	Spring Summer Fall	Tipping Bucket	City of Thunder Bay Briarwood Street off of Farrand Street
McIntrye River	Spring Summer Fall	Tipping Bucket	City of Thunder Bay Corner of Highway 102 and Dog Lake Road
Neebing River	Spring Summer Fall	Tipping Bucket	City of Thunder Bay Neebing Avenue, behind Arthur Street Market Place
Upper Neebing River	Spring Summer Fall	Tipping Bucket	City of Thunder Bay Corner of John Street and Thompson Road
Current River	Spring Summer Fall	Tipping Bucket	Gorham Township Onion Lake Dam Road
North Current River	Spring	Tipping Bucket	Municipality of Shuniah

	Summer Fall		Isku Park Road
Slate River	Spring Summer Fall	Tipping Bucket	Municipality of Oliver Paipoonge Candy Mountain Road
Whitefish River	Spring Summer Fall	Tipping Bucket	Village of Nolalu Corner of Highway 588 and Old School Road
Corbett Creek	Spring Summer Fall	Tipping Bucket	Municipality of Oliver Paipoonge 98 McNally Road
Geonor	All Year	Geonor – All Weather Precipitation Gauge	City of Thunder Bay LRCA Office 130 Conservation Road
Dorion Fish Hatchery Station	All Year	OTT Pluvio2 - All Weather Precipitation Gauge	Dorion Fish Hatchery Station Fish Hatchery Road
LRCA office CAN-ON-70	All Year	CoCoRaHS Gauge Evapotranspiration	City of Thunder Bay LRCA Office 130 Conservation Road
CAN-ON-87	Spring Summer Fall	CoCoRaHS Gauge	Township of O'Connor Connolly Road
CAN-ON-99	All Year	CoCoRaHS Gauge	Municipality of Neebing Copper Cliff Road East
CAN-ON-97	All Year	CoCoRaHS Gauge	Municipality of Oliver Paipoonge Tysoski Road
CAN-ON-681	All Year	CoCoRaHS Gauge	City of Thunder Bay Caspian Place
CAN-ON-621	All Year	CoCoRaHS Gauge	Simon Fraser Drive City of Thunder Bay
CAN-ON-1030	All Year	CoCoRaHS Gauge	Norah Street South City of Thunder Bay
CAN-ON-1031	All Year	CoCoRaHS Gauge	Hwy 11/17 Pearl
CAN-ON-1077	All Year	CoCoRaHS Gauge	Melbourne Road City of Thunder Bay
Shuniah Municipal Gauges	Spring Summer Fall	Tipping Bucket	Shuniah #1 – Lakeshore Drive Shuniah #2 – Road #5 South Shuniah #3 – Lakeshore Drive

Neebing Municipal Gauge	Spring Summer Fall	Tipping Bucket	East Oliver Lake Municipality of Neebing
PGMN	Spring Summer Fall	Tipping Bucket	Kakabeka Falls Fire Hall (PGMN well site)
PGMN	Spring Summer Fall	Tipping Bucket	Murillo Fire Hall (PGMN well site)

Streamflow/Level

Water Survey of Canada in partnership with the LRCA shares the data from streamflow/level gauges on watersheds that affect the LRCA Area of Jurisdiction. In addition to the LRCA gauges, other gauges are accessed through Environment Canada and the MNR WISKI Web (i.e. Wolf River gauge and Fort William Historical Park's Kaministiquia River gauge).

The streamflow gauges measure water levels at each gauge station and record the levels in the data logger at the gauge station. Environment Canada Stage Discharge Curves are used to convert the stream level to stream flow. Return period stream flows have been calculated for all watercourses where floodplain mapping has been completed. The streamflow/level gauge locations are summarized in Table 8 below and are shown on Map 5: Streamflow Gauge Locations.

Table 8: Streamflow/Level Gauge Locations

Gauge	**Location**
McVicar Creek 02AB019	City of Thunder Bay Briarwood Street off of Farrand Street
McIntrye River 02AB020	City of Thunder Bay Corner of Highway 102 and Dog Lake Road
Neebing River 02AB008	City of Thunder Bay Neebing Avenue, behind Arthur Street Market Place (upgraded in 2011/2012 for climate change monitoring purposes).
Upper Neebing River 02AB024	City of Thunder Bay Corner of John Street and Thompson Road
Current River 02AB021	Township of Gorham Dam Road
North Current River 02AB014	Municipality of Shuniah Isku Park Road
Slate River 02AB023	Municipality of Oliver Paipoonge Candy Mountain Road
Whitefish River 02AB017	Village of Nolalu, Township of Lybster Corner of Highway 588 and Old School Road

Whitefish River 02AB027	Municipality of Oliver Paipoonge 70 Sideen Drive
Corbett Creek 02AB022	Municipality of Oliver Paipoonge 98 McNally Road

The Conservation Authority has access to real-time streamflow gauge levels and precipitation data 24 hours per day through equipment located at the Authority office. All streamflow data is stored in a database at the Authority office and is also available through Water Survey of Canada's website: https://wateroffice.ec.gc.ca/index_e.html.

The LRCA utilizes Water Information Systems by KISTER (WISKI) software. The internet-based software enhances the LRCA's ability to collect real-time streamflow levels and precipitation levels. The WISKI software package also includes an Alarm Manager which will send alerts to the LRCA when critical levels and precipitation rates have been detected on area gauges.

Snow Surveys

Since 1974, snow surveys have been conducted bi-monthly (15th and 30th) by the staff of the LRCA between November 15th and May 15th each year. The three historical snow survey locations are located at Hazelwood Lake Conservation Area (Current River), Madeline Street in the City of Thunder Bay (McVicar Creek) and Vibert Road in the Municipality of Oliver Paipoonge (Pennock Creek). Snow depth and weight (water content) are collected and forwarded to the MNR's Surface Water Monitoring Centre as part of the Flood Forecasting Program.

Historical averages are compared to current snow depth/water content results to determine snowpack conditions for a particular time of year. Snow water equivalent values are used to estimate the potential water content in the snow during times of melt. As part of the CoCoRaHS program the LRCA records snow depth at the LRCA office.

The snow survey locations are shown on Map 6: Snow Survey Locations.

Spring Thaw Records

Since 1971 the Lakehead Region Conservation Authority has maintained Spring Thaw Records of when area rivers are considered to be open and ice free. Records have been kept for the Neebing River, McIntyre River, McVicar Creek and the Kaministiquia River. Typically, rivers are ice-free between mid-March and mid-April.

Lake Level

Since 2010, using an installed staff gauge fixed to the bedrock, Oliver Lake resident volunteers report to the LRCA the level of Oliver Lake in the Municipality of Neebing, which is then recorded at the LRCA for historical purposes.

Measurements were taken at Loon Lake in the Municipality of Shuniah between June 2010 to October 2014 at the public dock. Since that time the municipal dock was removed and replaced with a new structure.

Neebing-McIntyre Floodway Level

In 2024, an automated system to collect water level readings at four locations along the Diversion and Floodway channels were installed to digitally log water level data and automatically send the logger data to the LRCA office via a Solinst cloud telemetry system. The system collects accurate measurements of water levels to ensure future updates to the flood models can be properly calibrated. The data will also provide records of diversion. The four logger locations are:

- Diversion Structure (Neebing River),
- Redwood Bridge (Diversion Channel),
- Chapples Pedestrian Bridge (Diversion Channel),
- Balmoral Street Bridge (Floodway Channel).

Victor/Broadway Erosion

In order to protect City of Thunder Bay infrastructure along Victor Street (i.e. road surface and water mains), the LRCA has completed soil nailing at several erosion sites along the Kaministiquia River banks on land owned by the City of Thunder Bay .

Five sites were treated in 2005, and three sites were treated in 2014/2015 with DST Consulting Engineer's proprietary soil nail stabilization system SNART (Soil Nail and Root Technology), which is comprised of steel bars inserted into the soil extended below all potential failure surfaces. The nails are typically installed on a 1 to 1.5 metre grid to varying depths up to 11.0 metres. Vegetation was then planted over the area. The design life of the soil nailed areas is estimated to be 50 to 100 years. Bi-annual inspections are conducted by engineering consultants of the erosion prone, soil nailed remediated City owned lands along Victor Street to assess the condition of the existing remediation and to identify any new emerging erosion issues.

4.2.2 Conservation and Management of Owned Land Monitoring Programs

Infrastructure Inspections
Annually engineering consultants are hired to conduct inspections and provide condition reports on the following infrastructure:

- Mission Island Marsh Conservation Area Boardwalk
- Diversion Structure
- Neebing River Weir
- Hazelwood Lake Dam.

Additionally, staff inspect the Hazelwood Lake Conservation Area Causeway and prepare an annual report.

Water Quality Monitoring
The LRCA monitors water quality at four conservation areas: Hazelwood Lake, Hurkett Cove, Mission Island Marsh and Silver Harbour. *E. coli* levels are monitored at Hazelwood Lake and Mission Island Marsh under the Thunder Bay District Health Unit's Bathing Beach Program. Cyanobacteria and algae blooms are monitored at all four sites, with the assistance of Blue Green Labs to conduct micrology assessments.

Invasive Species
In partnership with Parks Canada Lake Superior National Marine Conservation Area, LRCA is monitoring to gain a better understanding of the extent and potential impacts of Narrowleaf Cattail at Hurkett Cove Conservation Area. The two-year project (2024-2025) will result in the development of a management strategy, with the aim of reducing the spread of invasive cattails, impacts on Wild Rice, and subsequent loss of biodiversity at the site.

4.2.3 Other Programs and Services Monitoring Programs

Provincial Groundwater Monitoring Program (PGMN)
The LRCA, in partnership with the MECP, participates in the Provincial Groundwater Monitoring Program (PGMN) in which LRCA monitors ambient groundwater level and water chemistry in eight groundwater monitoring wells. Water levels are recorded hourly with level loggers installed in each of the wells. The level loggers are downloaded four times per year and corrected using collected barometric pressure and temperature data. LRCA staff collect water samples once per year and submit them to the MECP laboratory for analysis. Laboratory costs and sample shipping costs are paid by the MECP. The data is available from MECP MECP Open Data Catalogue.

Groundwater monitoring is conducted at the following locations (See Map 7).

- Neebing River (behind Arthur Street Market Place)
- Birch Beach
- Loon Lake

- Kakabeka Fire Hall
- Murillo Fire Hall
- Dorion Fish Hatchery
- Wishart Conservation Area
- Hazelwood Lake Conservation Area

Provincial Water Quality Monitoring Program (PWQMN)
The Authority in partnership with the MECP participates in the Provincial Water Quality Monitoring Network (PWQMN) program, in which LRCA monitors seven surface water locations. LRCA staff collect samples once per month during the ice fee period and submit them to the MECP laboratory for analysis. Samples collected and analyzed for: total and dissolved nutrients, chloride and metals. Laboratory costs and sample shipping costs are paid by the MECP. Field parameters collected include: conductivity, water temperature, dissolved oxygen, pH and turbidity. The data is available from MECP MECP Open Data Catalogue.

Monitored watersheds include (see Map 8):

- McVicar Creek
- McIntyre River
- Neebing River (two locations)
- Current River
- Kaministiquia River

4.2.4 Non-Mandatory Programs and Services Monitoring

Neebing-Weir and McIntyre River Sea Lamprey Monitoring
Subject to being awarded an annual contract from DFO, the LRCA conducts Sea Lamprey trapping on the Neebing and McIntyre Rivers. Five days per week for eight to twelve weeks, sea lamprey traps are emptied to conduct mark and release studies, collect biological data, environmental data and complete daily reports to provide data to DFO in order for population estimates to be undertaken. These estimates are used along with that of other streams to estimate the population in all of Lake Superior.

Wolf River Weir inspections
Subject to being awarded an annual contract from DFO LRCA staff inspect the Sea Lamprey Barrier and grounds on the Wolf River. LRCA staff conduct five inspections annually and complete a Barrier Inspection/Maintenance Report.

Mosquito Creek/Pennock Creek Water Quality Monitoring
At the request of the City of Thunder Bay Engineering and Operations Division, LRCA staff complete surface water sampling along Mosquito Creek (ten sites) and Pennock Creek (two sites) within the City of Thunder Bay once per month, from June through October. Mosquito Creek and Pennock Creek are both watersheds where residents are serviced by municipal water and private septic systems.

Invasive Species
Partnered with the Invasive Species Centre, the Thunder Bay Regional Phragmites Collaboration is coordinated by LRCA and is composed of 35 stakeholders and groups with the shared vision of a "phrag-free" landscape by 2033. Phragmites stands that have been treated with herbicide for eradication are being monitored to track the success of the treatment and new reported and/or discovered stands are being recorded for future treatment.

4.3 Available GIS and Imagery Resources

The LRCA relies on a variety of GIS Data in the administration of its programs and services. The various sources are outlined in Appendix C: GIS Data. It is anticipated that LiDAR data will be available for LRCA's entire area of jurisdiction from the MNR in 2025 as part of the Ontario Elevation Mapping Project.

5 Programs and Services

5.1 Mandatory Programs and Services

As outlined in the LRCA Inventory of Programs and Services, the LRCA provides all the prescribed Mandatory Programs and Services as outlined in O. Reg. 686/21: Mandatory Programs and Services. The LRCA does not undertake an Ice Management program as it is not considered to be necessary in our area of jurisdiction. The LRCA has completed a Land Inventory and a Conservation Areas Strategy (referred to as "Conservation Lands Strategy") as required in the regulation. The Mandatory Programs and Services provided by the LRCA are summarized in the following table.

Table 9: Mandatory Programs and Services provided by the LRCA

General Category	Subservice	
Risk of Natural Hazards	Floodplain Mapping	Creation and maintenance of floodplain models and mapping.
	Technical Studies	Studies, mapping and data collection to understand the risks related to natural hazards including how those risks might be affected by climate change. Development of plans and policies to support the delivery of programs.
	Communications and Outreach	Promoting public awareness of natural hazards including flooding, drought and erosion. Public events and materials. Social media services and website. Media relations.
	Flood Forecasting and Warning	Daily data collection and monitoring of weather forecasts, provincial and local water level forecasts and watershed conditions. Flood event forecasting. Flood warning and communications. Maintenance of Equipment. Documentation of flood events. Flood Warning System.
	Drought and Low Water Response	Conditions monitoring/analysis. Technical and administrative support to the Water Response Team representing major water users and decision makers who recommend drought response actions.
	Infrastructure: Neebing-McIntyre Floodway	Operation and minor maintenance of Neebing-McIntyre Floodway.

	Infrastructure: Victor Street Erosion	Monitoring and minor maintenance of Victor Street Erosion. Erosion prone City of Thunder Bay owned land, to ensure protection of infrastructure and maintain access and egress to Victor Street.
	Review of Proposal Under an Act	Input to the review and approval processes under other applicable law (i.e. Aggregate Resources Act, Drainage Act, Environmental Assessment Act, etc.) with comments principally related to natural hazards, wetlands, watercourses and Section 28 permit requirements.
	Plan Review Comments	Technical information and advice to municipalities related to Section 5.2: Natural Hazards (PPS), on circulated municipal land use planning applications (Official Plan and Zoning By-Law Amendments, Subdivisions, Consents, Minor Variances). Input to Municipal land-use planning, documents (OP, Comprehensive ZB, Secondary plans) related to natural hazards, on behalf of MNR(delegated to CAs in 1983).
	Administering and Enforcing the Act (Section 28 Development Regulations)	Reviewing and processing permit applications, associated technical reports, site inspections, communication with applicants, agents and consultants related to development in a regulated natural hazard.
Management, operation and maintenance of CA owned land	Conservation Areas	Operation and minor maintenance in Conservation Areas. Forest management, natural heritage management. Comment on planning applications as a landowner.
	Administer Section 29 Regulations in Conservation Areas	Conservation areas enforcement/compliance.
	Other owned land (i.e. floodplain lands, erosion prone lands, forest management land, etc.)	Operation and minor maintenance in other Conservation Authority owned land. Forest management, natural heritage management.
Source Water Protection		Provide programs and services to ensure the Authority carries out its duties, functions and

		responsibilities as a Source Protection Authority under the provisions of the *Clean Water Act* (2006). Applies to municipal drinking water systems: City of Thunder Bay Bare Point Water Treatment Plant and Municipality of Oliver Paipoonge Rosslyn Village Drinking Water System. Comment on planning applications related to Source Water Protection.
Other Programs and Services	Water Quality and Quantity Monitoring: Provincial Groundwater Monitoring Network	A long standing (20+ year) CA/MECP partnership for groundwater level and quality monitoring. CA maintains equipment, data transfer to MECP, water sampling; MECP provides equipment, standards, data management and lab analysis. Includes summer students.
	Water Quality and Quantity Monitoring: Provincial Water Quality Monitoring Network	A long standing (50+year) CA/MECP partnership for stream water quality monitoring. CA takes water samples; MECP does lab analysis and data management. Includes summer students.
	Watershed-based Resource Management Strategy	Developing funding principles and objectives that inform the design and delivery of programs and services the CA is required to provide. Collate/compile existing resource management plans, watershed plans, studies and data. Strategy development, implementation and annual reporting. A review of programs and services provide for the purposes of compliance with the regulations and Section 21.1 of the CA Act. Develop process for periodic review including procedures to engage/consult with stakeholders and the public. Strategy development must include a stakeholder and public consultation component. Make available to the public.

5.2 Other Programs and Services (Category 2 and 3 (non-mandatory) that support Category 1 (Mandatory) Programs.

The following Non-Mandatory Programs are provided by the LRCA that directly support the prescribed Mandatory Programs.

Table 10: Non-Mandatory Programs and Services provided by the LRCA that support Category 1 Programs

General Program	Subservice
Category 2	• Mosquito Creek/Pennock Creek Water-Quality Monitoring
Category 3	• Education: Environmental Education • Education: Nature Interpretive Education • Stewardship: Tree Seedling Program • Stewardship: Private Land Stewardship • Stewardship: Seeds for Conservation • Invasive Species: Sea Lamprey • Invasive Species: Phragmites

5.2.1 Category 2: Non-Mandatory Programs at the request of a Municipality

Mosquito Creek/Pennock Creek Water Quality Monitoring

At the request of the City of Thunder Bay Engineering and Operations Division, LRCA staff complete surface water sampling along Mosquito Creek (ten sites) and Pennock Creek (two sites) within the City of Thunder Bay once per month, from June through October. Mosquito Creek and Pennock Creek are both watersheds where residents are serviced by municipal water and private septic systems.

This program provides additional surface water quality data related to the Mandatory Program: Other Programs and Services, Water Quality and Quantity Monitoring, Provincial Water Quality Monitoring Program.

5.2.2 Category 3: Non-Mandatory Programs

Education: Environmental Education

The Environmental Education program provides curriculum-based educational presentations and field trips to Conservation Areas and within school classrooms. The non-mandatory (i.e., not related to the risk of natural hazards) education program is operated with 100% other funding (no levy). The program covers a wide array of topics including watersheds, various natural heritage, and natural science topics such as birds, trees, aquatics invertebrates, and other topics, many of which are tied directly to Ontario

Ministry of Education curriculum expectations. As a private landowner, the LRCA is uniquely positioned to provide meaningful, impactful outdoor education programming utilizing Conservation Areas as "living classrooms". Watershed stewardship best practices and fostering a sense of wonder and appreciation for the natural world is the goal of the education program, as the best way to inspire people to care about the natural world and the environment is to give them meaningful educational and recreational experiences.

The Environmental Education program supports all the Mandatory Programs administered by the Authority by educating school age children about all aspects of the natural environment, natural hazards, natural heritage, climate change, etc.

Education: Nature Interpretive Programming
Nature Interpretive Programming is programming developed for execution on LRCA-owned land. This program is funded with non-levy funds. Programs and events with nature interpretive programming components within Conservation Areas vary year to year; however, the Dorion Bird Festival is held annually at Hurkett Cove Conservation Area. Nature interpretive programming also includes Watershed Explorer programs (typically funded by the TD Friends of the Environment Fund), guided hikes, workshops, and other non-school-based interpretive programming.

The Nature Interpretive Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land. This program educates the public related to various environmental topics, natural hazards, natural heritage, and climate change impacts related to land owned by the CA.

Stewardship: Tree Seedling Program
The Tree Seedling Program provides an opportunity for the public to purchase locally grown tree seedlings in the watershed. This program's goal is to achieve a no net loss of trees in the overall watershed by providing trees to plant to the public to offset any harvesting on LRCA owned land.

The Tree Seedling Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land and also supports the Risk of Natural Hazards Programs by encouraging planting to mitigate and prevent erosion.

Stewardship: Private Land Stewardship
To promote and practice stewardship on private, LRCA and municipally owned lands, staff apply for funding for a variety of projects annually. The specific program varies annually however works towards: removing invasive species, installing low impact developments, planting native species, assisting homeowners to restore impacted riparian zones along lake/river shorelines, etc.

The Stewardship Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land as it works towards the proper management of LRCA owned lands. It also supports all the Risk of Natural Hazards programs, as it assists in educating, mitigating and preventing flooding and erosion issues on land within the watershed.

Stewardship: Seeds for Conservation

The Seeds for Conservation program offers native perennials grown from seed sustainably harvested by staff from LRCA Conservation Areas. The plants are grown in the LRCA Greenhouse by LRCA staff. With insufficient access to Northwestern Ontario native species through local nurseries, LRCA's Seeds for Conservation program provides regionally adapted seed and plants for habitat restoration projects, pollinator gardens, rain gardens, and more. It is used by LRCA and community partners such as Fort William First Nation, Ontario Native Women's Association, the City of Thunder Bay, EcoSuperior, Lakehead University and Confederation College.

The Seeds for Conservation Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land as it provides native plants for projects, and enhancement and remediation efforts on LRCA owned land. It also supports all the Risk of Natural Hazards programs, as it provides plants to mitigate and prevent flooding and erosion on land within the watershed.

Invasive Species: Sea Lamprey

A contract is executed annually between the LRCA and DFO for Sea Lamprey trapping on the Neebing and McIntyre Rivers. The trapping is undertaken at the weir located on LRCA owned land. Five days per week for eight to twelve weeks, sea lamprey traps are emptied to conduct mark and release studies, collect biological data, environmental data and complete daily reports to provide data to DFO in order for population estimates to be undertaken. These estimates are used along with that of other streams to estimate the population in all of Lake Superior.

The Sea Lamprey Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land as it manages the invasive species on LRCA owned land.

Invasive Species: Phragmites

Partnered with the Invasive Species Centre, the Thunder Bay Regional Phragmites Collaboration is coordinated by LRCA and is composed of 35 stakeholders and groups with the shared vision of a "phrag-free" landscape by 2033. The intent of the Collaborative is to engage interested community groups in the status of Invasive Phragmites in the region, develop an integrated long-term plan for its management, and collaborate on its removal.

The Phragmites Program directly relates to the Mandatory Program: Management, Operation and Maintenance of CA Owned Land; by proactively managing the spread of phragmites in Northern Ontario, it will reduce the likelihood of the LRCA having to manage it on LRCA owned land in the future.

6 ISSUES AND RISKS

A summary of identified issues and risks associated with the Mandatory Programs and Services is provided in Appendix D. Potential Actions have also been summarized in the table.

The main issues and risks identified include:

- Small staff/capacity
- Deficiency of funding:
    - to complete/maintain studies
    - to maintain/operate LRCA owned land
    - Aging Infrastructure replacement costs
- Climate change, no direction from Province
- Absence/insufficient data
    - Floodplain not delineated in rural areas (majority of watershed)
    - Poor base-data (i.e., LiDAR, digital elevation model/contours)
    - Lake Superior data (updated 100-year flood elevation, waver uprush, erosion hazard)
    - Erosion Hazard not delineated
    - Outdated technical guidance documents from the Province
- Lack of qualified professionals in the area to complete required studies
- Lack of prediction modelling capabilities for Flood Forecasting Program
- Liability issues related to land ownership and administration of regulatory programs
- Legal costs
    - Administration of Section 28 regulations
- Liability risks associated with land ownership
- Blue-green algae at Conservation Areas open to the public
- Invasive species on LRCA owned land
- Lack of natural heritage data on LRCA owned land and lack of on-going monitoring
- Encroachment on LRCA owned land

6.1 Risk Mitigation Actions

Potential actions to address issues and mitigate the risks have been summarized in Appendix D: Summary of Issues and Risks.

Estimated costs have not been provided due to the complexity of assessing costs or the potential action is not considered to be quantifiable.

7 BUSINESS PLAN

Each year the Board of Directors reviews and approves the annual budget. The budget includes projects that align with the Authority's priorities for the given year. The budget takes into account the Strategic Plan and Asset Management Plan and categorizes the programs and services into Category 1, 2 and 3 Program areas (i.e., Mandatory, Municipal Programs, Non-Mandatory). Future Budgets will take into consideration the Conservation Lands Strategy and the Watershed-Based Resource Management Strategy. Actions plans will be developed for each Strategy which will prioritize future projects to address the identified potential actions outlined in Appendix D.

8 PROCESS FOR REVIEW

8.1 Consultation Strategy

Ontario Regulation 686/21 Section 12(8) mandates that the LRCA consult with stakeholders and the public during the preparation of the Watershed-Based Resource Management Strategy in the manner in which the authority considers advisable. Additionally, the strategy is to be posted on the authority's website.

8.1.1 Public Consultation

On July 18, 2024 the LRCA held an "Open House" for the organization's 70th anniversary. As part of the event, the LRCA had a public engagement booth where information panels and facts sheets about the Watershed-Based Resource Management Strategy were available for the public to review. It is estimated that approximately 120 people attended the booth.

Additionally, the fact sheet regarding the completion of the strategy was posted on the website from July 10, 2024 to September 26, 2024. The full draft document and updated fact sheet were posted for consultation between October 29, 2024 to November 18, 2024.

No comments from the public were received.

8.1.2 Board of Director Consultation

The LRCA's Board of Directors are responsible for overseeing the organization's governance, strategies, policies and budget. Consultation materials related to the strategy were approved by the Board on July 27, 2024 (Res.#77/24).

Consultation on the draft strategy was undertaken at the October 30, 2024 meeting, with final approval at the November 27, 2024 meeting.

8.2 Strategy Review Schedule

The Watershed-Based Resource Management Strategy will be reviewed and updated every five years or sooner if conditions warrant. Updates to the Strategy will align with the LRCA's Five-Year Strategic Plan. Changes to the Strategy will be at the discretion of the Board of Directors and approved by resolution. Stakeholders and the public will be consulted as considered advisable during the periodic review and update process for the Strategy.

APPENDIX A:

Existing Studies

Appendix A: Studies (2024)

Category 1: Mandatory Programs and Services	Risk of Natural Hazards					Source Water Protection	Conservation and Management of Lands				Non-Mandatory Program and Services
	Watershed Report Card	Floodplain Mapping Studies	Lake Superior Information	Wetland Evaluations	Erosion Studies	Source Water Protection	Asset Management Plan	Forest Management Plans	Natural Heritage Assessments	Natural Heritage Information	Watershed Assessment
City of Thunder Bay		Current River (1979) McIntyre River (2015) Neebing River (2018) Neebing-McIntyre Floodway (2024) McVicar Creek (2019) Kam River (2020) Pennock Creek (2020) Mosquito Creek (2020)	100 year flood elevation - Great Lakes St. Lawrence River System and Large Inland Lake Technical Guides (2001)	MNR delineated PSWs (Williams Bog, Mills Block, Neebing Marsh, Mission Island) McVicar Creek PSW (2016) McIntyre River Watershed PSW (2018) Neebing River Watershed (2019) Rural watersheds (2021) Mosquito Creek Watershed (2019) Jim Jessiman Nature Preserve (2024) Marina Park (2024)	Kaministiquia River Erosion Sites Inventory (2019) Victor/Broadway Bank Stabilization Assessment Study (2021)	City of Thunder Bay Source Protection Technical Study - Phase 1 (2009) City of Thunder Bay Source Protection Planning Technical Study - Phase 2 (2009)		Cascades CA (2016) Mills Block CA (2016)	Jim Jessiman Wetland Assessment (2024)		Slate River (2008) Pennock Creek (2010) Mosquito Creek (2015, 2022, 2023) North Current River (2019)
Municipality of Neebing			100 year flood elevation - Great Lakes St. Lawrence River System and Large Inland Lake Technical Guides (2001)	Rural watershed (2021) MNR delineated PSWs (Pearson, Pine Bay, Cloud Bay, Caldwell Lake, Sturgeon)				Little Trout Bay CA (2016)			Slate River (2008) Pine River (2011) Whitefish River (2012) Cloud River (2014) Mosquito Creek (2015, 2022) Oliver Creek (2016)
Municipality of Shuniah		North Star Creek (2014)	100 year flood elevation - Great Lakes St. Lawrence River System and Large Inland Lake Technical Guides (2001)	Rural watershed (2021)				Granite Point (2016)			Blind Creek (1999, 2010) Wild Goose Creek (1999, 2010) Welsh Creek (2006) McKenzie River (2013) Cold Water Creek (2017) Jarvis River (2018) North Current River (2019)
Municipality of Oliver Paipoonge		Kam River to Rosslyn brick yard (2020) Pennock Creek (2020)		Neebing River Watershed (2019) Rural watershed (2021)		Groundwater Vulnerability Analysis Issues Evaluation Threats, Inventory and Water Quality Risk Assessment for Hamlet of Rosslyn Village WHPA (2008)		William Forest (2016)			Slate River (2008) Corbett Creek (2010) Pennock Creek (2010) Whitefish River (2012) Mosquito Creek (2015, 2022) Oliver Creek (2016)
Township of Conmee				Rural watershed (2021)							Cedar Creek (1998, 2010) Whitefish River (2012) Brule Creek (2007)
Township of O'Connor				Rural watershed (2021)				Cedar Falls CA (2016)			Cedar Creek (1998, 2010) Whitefish River (2012)
Township of Gillies		Whitefish River Fill Line (1985)		Rural watershed (2021)							Slate River (2008) Pine River (2011) Whitefish River (2012) Oliver Creek (2016)
Township of Dorion		Wolf River Fill Line (1985)	100 year flood elevation - Great Lakes St. Lawrence River System and Large Inland Lake Technical Guides (2001)	Rural watershed (2021)				Hurkett Cove CA (2016)			Wolf River (2009) McKenzie River (2013) Cold Water Creek (2017)
Entire Jurisdiction	Watershed Report Card (2023)					Thunder Bay Area Aquifer Characterization Groundwater Management and Protection Study (2005) Lakehead Source Protection Area, Water Budget and Water Quantity Stress Assessment (2007) Lakehead Watershed Characterization Report (2008) Approved Assessment Report (2011)	Asset Management Plan (2022)				
Outside Jurisdiction				Lappe wetland (2018)				Harpell-Bocking (2016) Wishart CA (2016) Hazelwood Lake CA (2016)			

*CA - Conservation Area

APPENDIX B:
Monitoring Programs

Appendix B: Monitoring Programs (2024)

Category 1: Mandatory Programs and Services	Risk of Natural Hazards							Conservation and Management of Lands				Other Programs and Services		Non-Mandatory Programs and Services
									Water Quality Monitoring					
	Climate Change Station	Precipitation	Streamflow/Level (in partnership with WSC)	Snow Surveys	Lake Level Monitoring	Floodway Level Monitoring	Victor Street Erosion	Infrastructure Inspections	Bathing Beach (E.coli)	Cyano Bacteria	Invasive Species	Provincial Groundwater Monitoring Program	Provincial Water Quality Monitoring Program	Miscellaneous Programs
City of Thunder Bay	Neebing River Gauge	McVicar Creek McIntyre River Neebing River Upper Neebing Current River 130 Conservation Road	McVicar Creek McIntyre River Neebing River Upper Neebing Current River Kaministiquia River	McVicar Creek 130 Conservation Road	Lake Superior - ECCC monthly Great Lakes Levels Memo	Level monitoring on the Diversion Structure (Neebing River), Redwood Bridge (Diversion Channel), Chapples Pedestrian Bridge (Diversion Channel) and Balmoral Street Bridge (Floodway)	Victor Street /Broadway Annual Inspections (spring and fall)	Floodway Inspections (Annual LRCA/CTB) Diversion Structure, Mission Island Board Walk, Neebing Weir (Annual Consultant Engineering Assessment)	Mission Island Marsh CA	Mission Island Marsh CA		Neebing River Gauge	McVicar Creek McIntyre River Neebing River x2 Current River Kaministiquia River	Neebing Weir and McIntyre River - Sea Lamprey Monitoring (DFO funded) Mosquito Creek/Pennock Creek Water Quality Monitoring (City funded)
Municipality of Neebing					Oliver Lake (private citizen) Lake Superior - ECCC monthly Great Lakes Level Memo									
Municipality of Shuniah					Lake Superior - ECCC monthly Great Lakes Levels Memo					Silver Harbour CA		Birch Beach Loon Lake		
Municipality of Oliver Paipoonge		Corbett Creek Kakabeka Fire Hall (PGMN Site) Murillo Fire Hall (PGMN Site)	Whitefish River Corbett Creek	Vibert Road								Kakabeka Fire Hall Murillo Fire Hall	Slate River	
Township of Conmee														
Township of O'Connor														
Township of Gillies														
Township of Dorion	Fish Hatchery		Wolf River		Lake Superior - ECCC monthly Great Lakes Levels Memo					Hurkett Cove CA	Narrow Leaved Cattail - Hurkett Cove CA	Fish Hatchery		
Entire Jurisdiction														Invasive Species - Phragmites, Narrow Leaved Cattail
Outside Jurisdiction		Whitefish River (Nolalu) North Current (Gorham)	Whitefish River (Nolalu) North Current (Gorham)	Hazelwood Lake CA				Hazelwood Lake Dam (Annual Consultant Engineering Assessment) Causeway Inspection (Annual LRCA)	Hazelwood Lake CA	Hazelwood Lake CA		Wishart CA Hazelwood Lake CA		

*CA - Conservation Area

APPENDIX C:
Available GIS Data

Appendix C: Available GIS Data (2024)

Category 1: Mandatory Programs and Services	Risk of Natural Hazards						
	Contours	Aerial Photography	LIDAR	LIO Data	Floodplain - GIS Data	Erosion Hazards - GIS Data	Wetland Information
City of Thunder Bay	0.5 metre	NWOOP 2022	Yes		McVicar Creek, 2019 McIntyre River, 2016 Neebing River, 2018 Pennock Creek, 2020 Kam River, 2020 Mosquito Creek, 2020	Victor Street - Kam River 100 year erosion line	McVicar Creek (2016) McIntyre River Watershed (2018) Neebing River Watershed (2019) Rural watersheds (2021) Mosquito Creek Watershed (2019) Jim Jessiman Nature Preserve (2024) Marina Park (2024)
Municipality of Neebing	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Municipalty of Shuniah	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Municipality of Oliver Paipoonge	2 metre	NWOOP 2022	No		Kam River to Brick Yard, 2020 Pennock Creek, 2020 Neebing River, 2018		Rural watersheds (2021)
Township of Conmee	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Township of O'Connor	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Township of Gillies	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Township of Dorion	2 metre	NWOOP 2022	No				Rural watersheds (2021)
Entire Jurisdiction			No	Lakes, watercourses, parcels, roads, municipal boundary, general wetlands, Provinically Significant Wetlands			
Outside Jurisdiction			No				

*CA - Conservation Area

APPENDIX D:

Issues, Risks and Potential Actions

Appendix D: Issues, Risks and Potential Actions (2024)

Mandatory Program Area	Subservice	Issue and Risk	Entire Jurisdiction	City of Thunder Bay	Municipality of Neebing	Municipality of Shuniah	Municipality of Oliver Paipoonge	Township of Conmee	Township of O'Connor	Township of Gillies	Township of Dorion	Outside Jurisdiction	Potential Actions to Address Issues and Mitigate the Risks: Potential Actions	Potential Actions to Address Issues and Mitigate the Risks: Estimated Cost
Category 1: Mandatory Programs and Services														
Mandatory Programs per Subsection 21.1(1) of the Conservation Authorities Act														
All Program Areas		Small staff - capacity issues												
		Lack of funding											Continue to continually seek and apply for available funding when available.	
		Ability to find qualified staff in the event of a vacancy												
		Continual changing legislation												
		Succession planning											Cross train in all areas.	
		Climate change, no direction from Province											Coastal Resilience Plan to be completed by 2027 to assess Lake Superior climate impacts.	
i. Programs and Services related to the Risk of Natural Hazards														
Risk of Natural Hazards	Floodplain mapping	Floodplain not delineated					-Corbett Creek priority -Whitefish River fill line only, outdated			-Whitefish River fill line only, outdated	-Wolf River fill line only, outdated		Seek funding to complete all mapping. Explore Regional Floodplain modelling in areas where there is minimal development pressure and where matching municipal funding is unattainable. Advocate for an equitable funding model for small municipalities. Re-install Lake Level Gauge on Loon Lake.	
		Lack of base data (i.e., LIDAR, digital elevation model/contours)											MNR LiDAR Data expected early 2025.	
		Lack of funding to complete/maintain studies											Seek funding to maintain data. Advocate for equitable funding models for small municipalities.	
		Lake Superior flood elevation outdated											Coastal Resilience Plan to be completed by 2027 which will assess Lake Superior Flood elevation.	
	Technical Studies	Erosion hazard not delineated		-only completed on Kam River/Victor Street area									Seek funding to complete all erosion mapping. Advocate for an equitable funding model for small municipalities.	
		Erosion hazard not delineated on Lake Superior shoreline											Coastal Resilience Plan to be completed by 2027 which will assess Lake Superior erosion rate.	
		Wave uprush not delineated on Lake Superior shoreline											Coastal Resilience Plan to be completed by 2027 which will assess Lake Superior wave uprush.	
		Lack of digital elevation model/contours greater than 2 metre											MNR LiDAR Data expected early 2025.	
		Lack of funding to complete studies												
	Communications and Outreach													
	Flood Forecasting and Warning	Lack of prediction modelling capabilities											Explore affordable options for predictive modelling that align with staff capabilities.	
		Dependence on Water Survey of Canada to maintain joint streamflow gauges											Execute 3rd Party Agreement to demonstrate commitment and importance of partnership.	
	Drought and Low Water Response													
	Infrastructure: Neebing-McIntyre Floodway	Lack of funding for major maintenance											Continue to advocate to the Province to maintain the WECI Funding Program.	
		Liability											Continue to maintain and monitor.	
		Climate Change											Continue to assess Climate Change in future updates to the Integrity Study.	
	Infrastructure: Victor Street Erosion	Lack of funding for future major maintenance to address erosion issues											Continue to advocate to the Province to maintain the WECI Funding Program.	
		No formal agreement with the City of Thunder Bay to manage the infrastructure on City owned land											Execute MOU with City.	
	Review of Proposal under an Act													

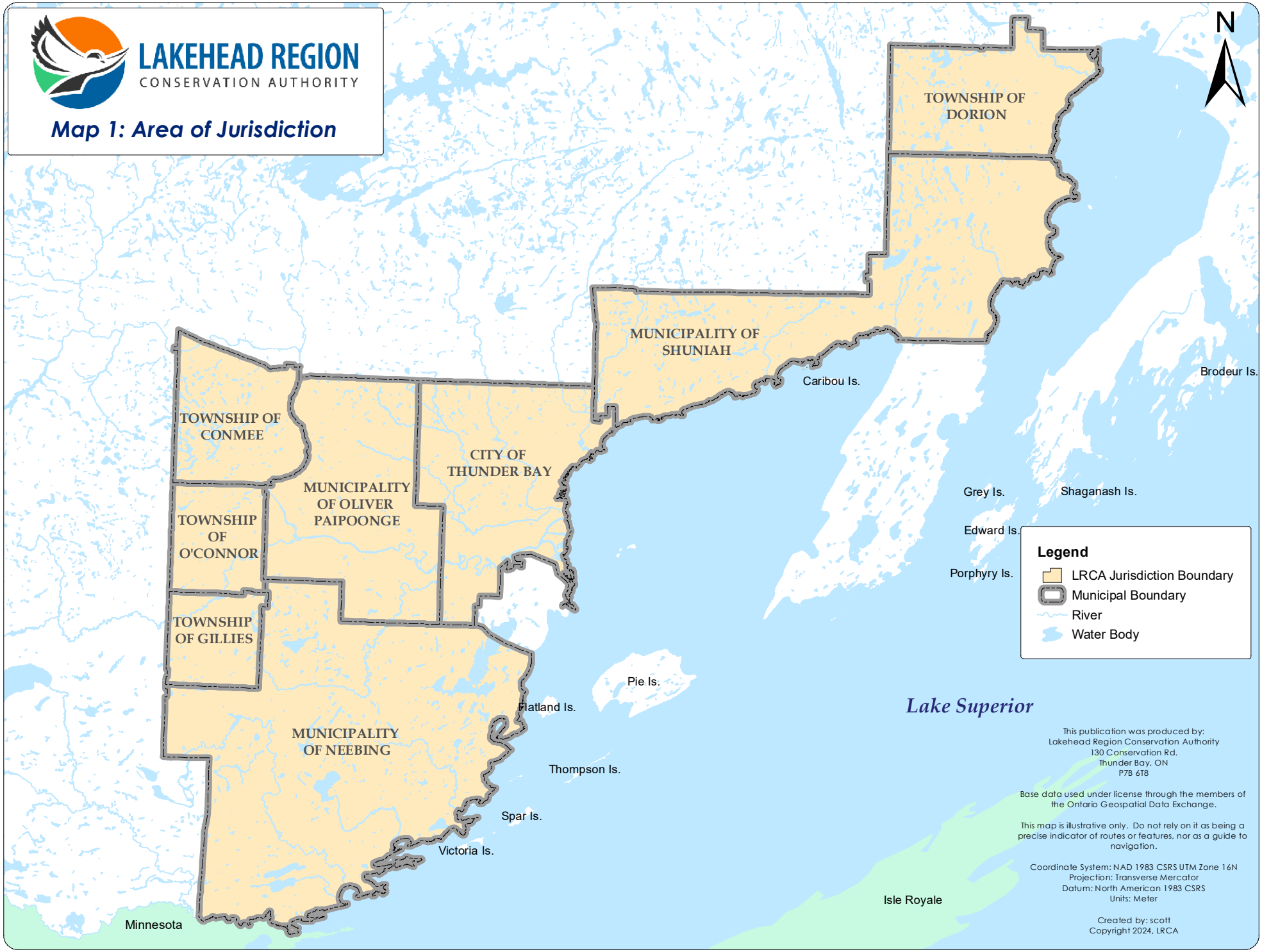
Appendix D: Issues, Risks and Potential Actions (2024)

Mandatory Program Area	Subservice	Issue and Risk	Entire Jurisdiction	City of Thunder Bay	Municipality of Neebing	Municipality of Shuniah	Municipality of Oliver Paipoonge	Township of Conmee	Township of O'Connor	Township of Gillies	Township of Dorion	Outside Jurisdiction	Potential Actions to Address Issues and Mitigate the Risks: Potential Actions	Potential Actions to Address Issues and Mitigate the Risks: Estimated Cost
	Plan Review Comments	Lack of hazard mapping (i.e., floodplain, erosion hazard, coastal hazards, steep slopes, unstable soil and bedrock)											Seek funding to complete hazard assessments and mapping of features. Advocate for an equitable funding model for small municipalities.	
		Lack of data (i.e., LIDAR, digital elevation model/contours)											MNR LiDAR data expected early 2025.	
	Administering and enforcing the Act (Section 28 Development Regulations)	Lack of hazard mapping (i.e., floodplain, erosion hazard, coastal hazards, steep slopes, unstable soil and bedrock)											Seek funding to complete hazard assessments and mapping of features. Advocate for an equitable funding model for small municipalities.	
		Lake of technical guidance from the Province (i.e., outdated technical manuals)											Advocate for updated Provincial Technical Guidance Documents to be completed.	
		Lack of data (i.e., LIDAR, digital elevation model/contours)											MNR LiDAR data expected early 2025.	
		Lack of qualified professional in area to complete required studies (i.e., lack of Coastal Engineers, Wetland hydrology studies, etc.)												
		Lack of provinical support in enforceing the Act												
		Cost of legal proceedings											Maintain adequate Legal Reserve.	
ii. Programs and Services related to the Conservation and Management of Lands owned and controlled by the Authority														
Management, operation and maintenance of CA owned land	Conservation Areas			**Mission Island Marsh CA Cascades CA Mills Block CA**	**Little Trout Bay CA**	**Silver Harbour CA Mackenzie Point CA**			**Cedar Falls CA**		**Hurkett Cove CA**	**Hazelwood Lake CA Wishart CA**		
		Liability risks											Continue to monitor and maintain areas.	
		Blue-green algae												
		Aging infrastructure											Maintain AMP and financial model fund identified repairs/replacements.	
		Lack of natural heritage data											Prepare plan to collect and maintain data	
		Increase costs to maintain											Increase self-generated revenue.	
		Invasive species (phragmites, emerald ash borer, etc.)											Continue to monitor and address when identified.	
		Lack of ongoing monitoring of natural heritage features											Prepare plan to monitor identified natural heritage features.	
	Administer Section 29 Regulations in Conservation Areas	Lack of payment of parking/day use fees											Continue with enforcement to encourage payment. Continue to educate on fees.	
		Liability											Continue to monitor and address enforcement issues.	
		Encroachment											Routinely assess boundaries to identify and address encroachment.	
		Cost of legal proceedings											Maintain adequate Legal Reserve.	
	Other owned land (i.e. floodplain lands, erosion prone lands, forest management land, Administrative Facility, etc.)	Lack of natural heritage data											Prepare plan to collect and maintain data.	
		Increase costs to maintain											Increase self-generated revenue.	
		Lack of ongoing monitoring of natural heritage features											Prepare plan to monitor identified natural heritage features.	
		Liability risks											Continue to monitor and maintain areas.	
		Aging infrastructure (Administrative Facility)											Maintain AMP and financial model fund identified repairs/replacements.	
iii. Programs and Services related to the authority's duties, functions and responsibilities as a Source Protection Authority under the Clean Water Act 2006														
Source Water Protection Program	Source Water Protection	Lack of data												
iv. Other Programs and Services														
Other Programs and Services	Water Quality and Quantity Monitoring: Provincial groundwater Monitoring Network	Costs to maintain infrastructure											Work with MECP to fund.	
		Issues with Murillo well casing											Work with MECP to repair.	
	Water Quality and Quantity Monitoring: Provincial Water Quality Monitoring Network													

Maps

LAKEHEAD REGION
CONSERVATION AUTHORITY

Map 1: Area of Jurisdiction



This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8

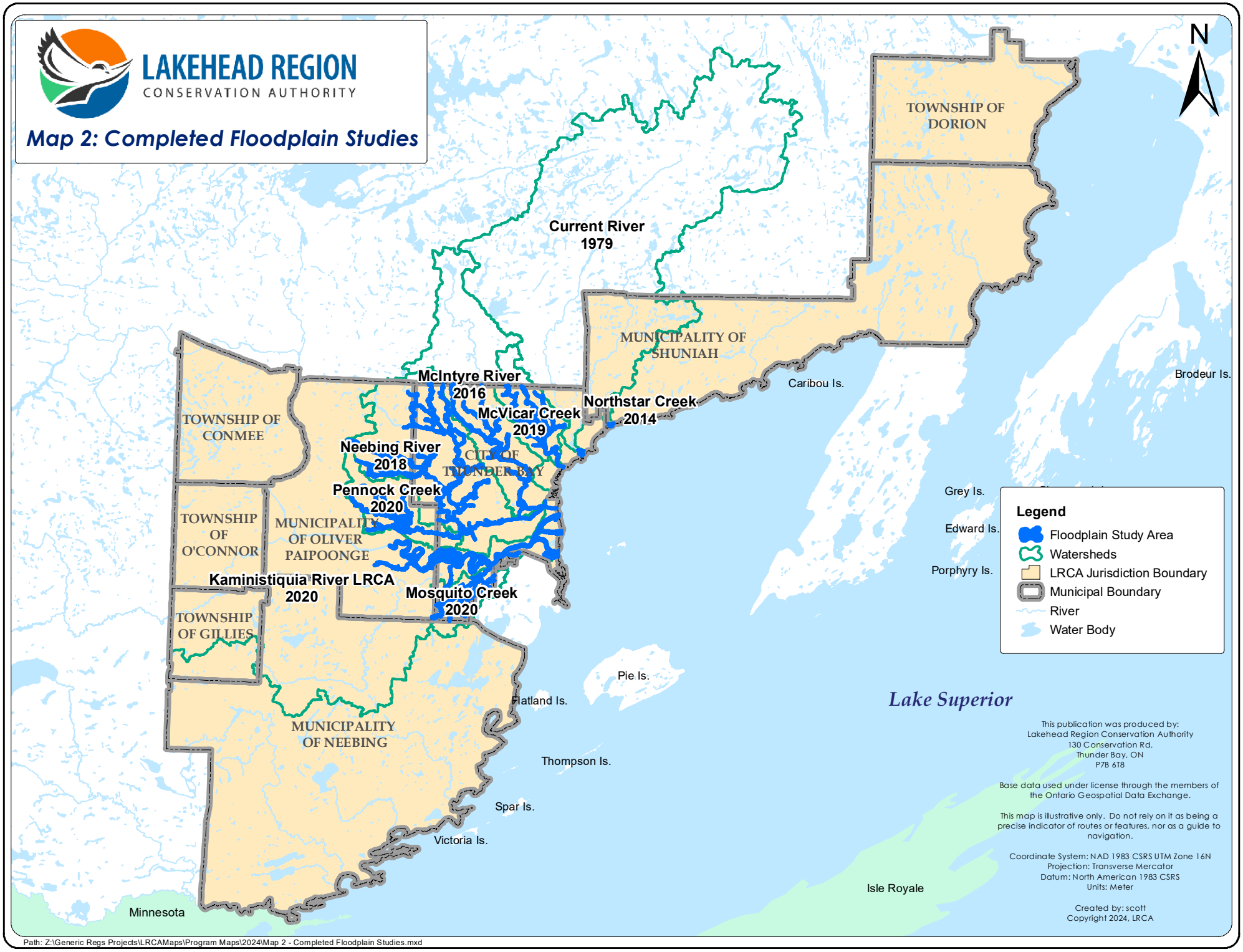
Base data used under license through the members of the Ontario Geospatial Data Exchange.

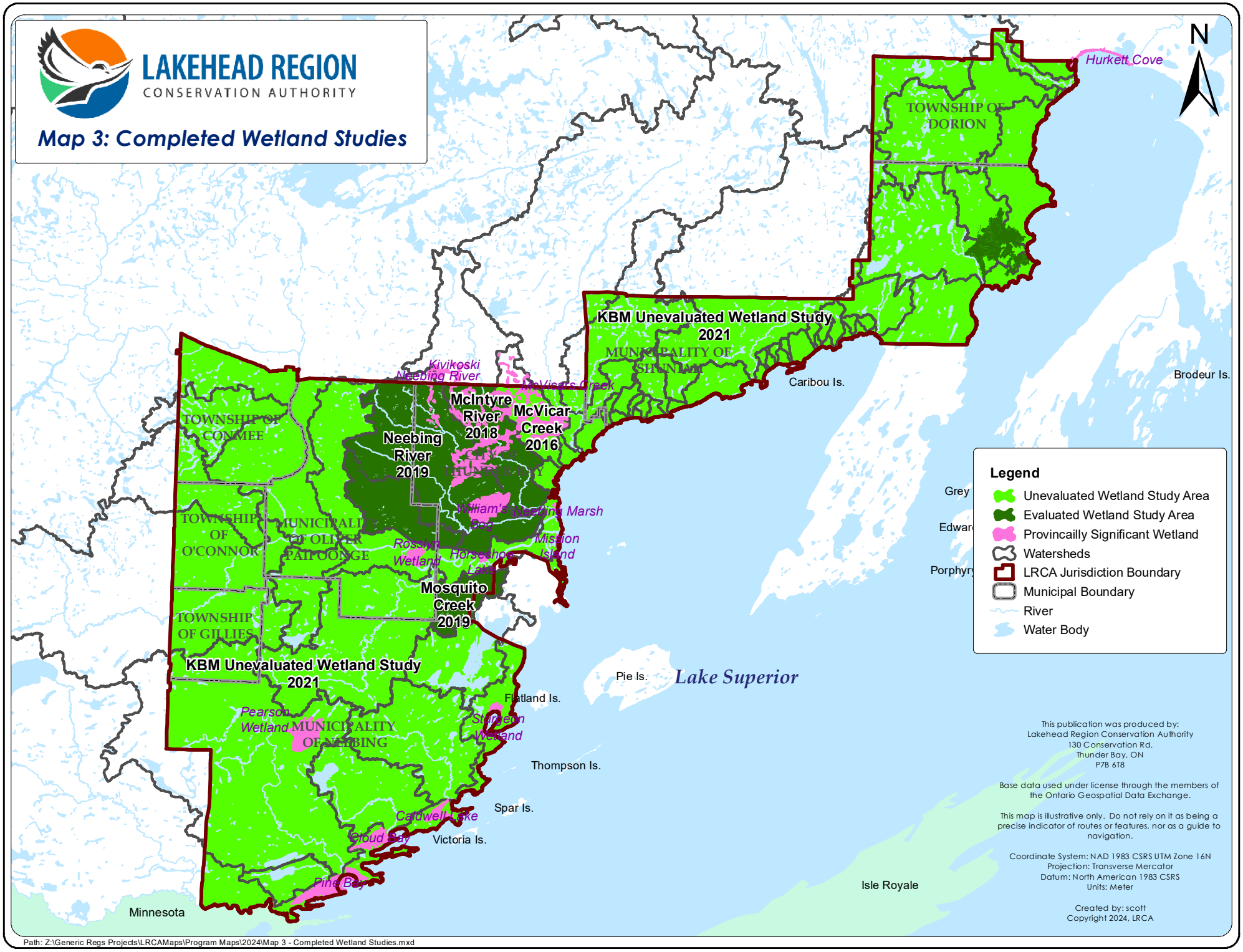
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.

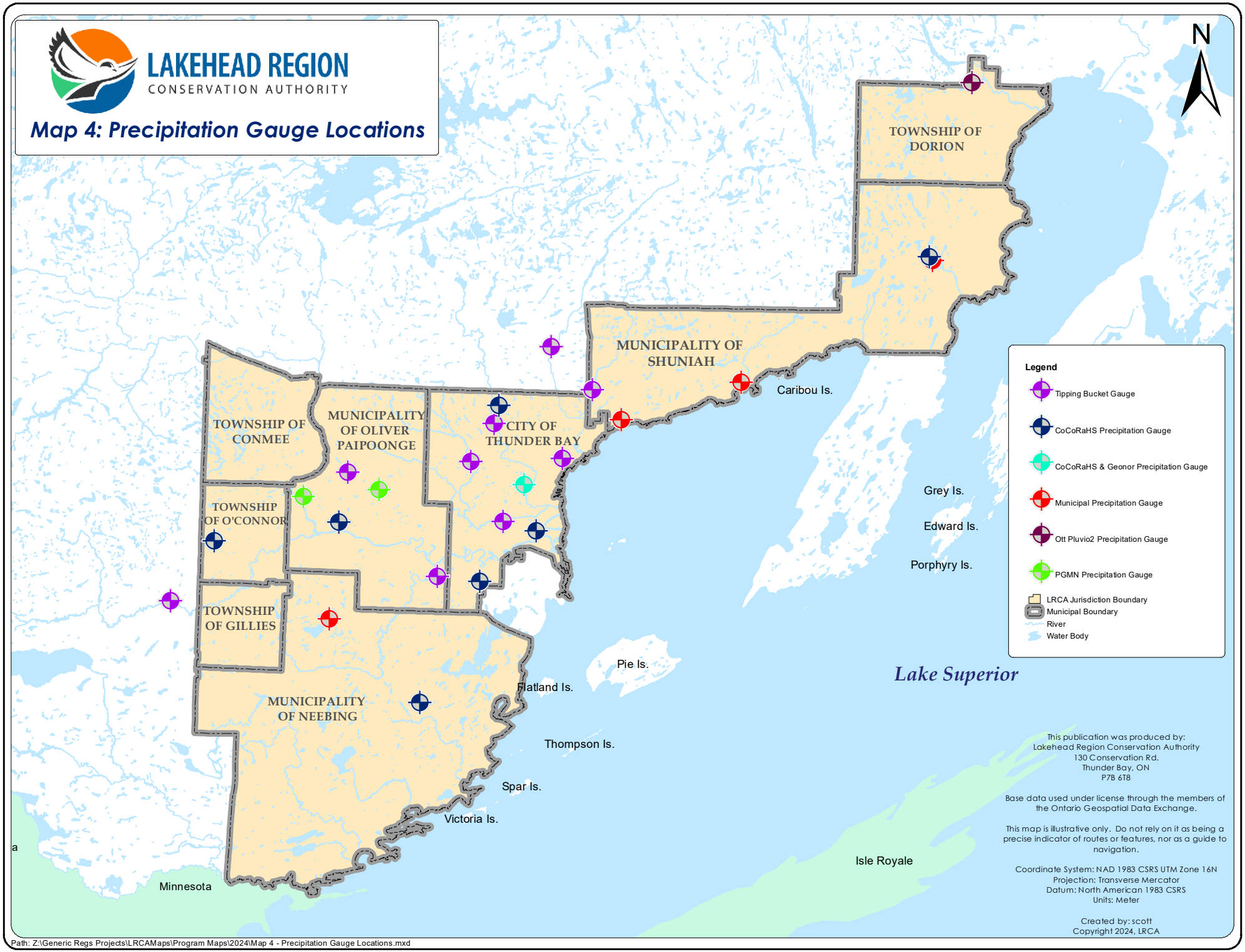
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

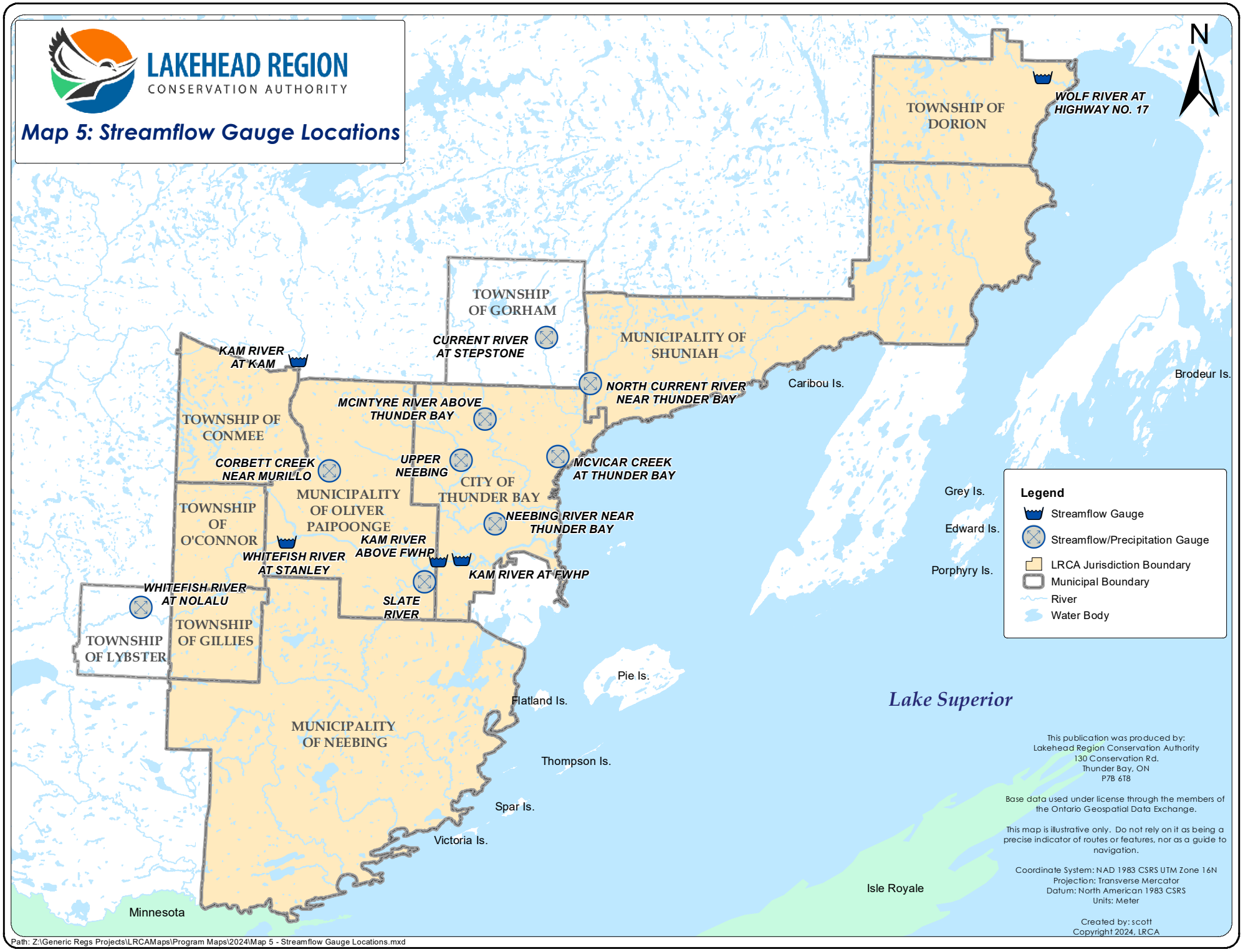
Created by: scott

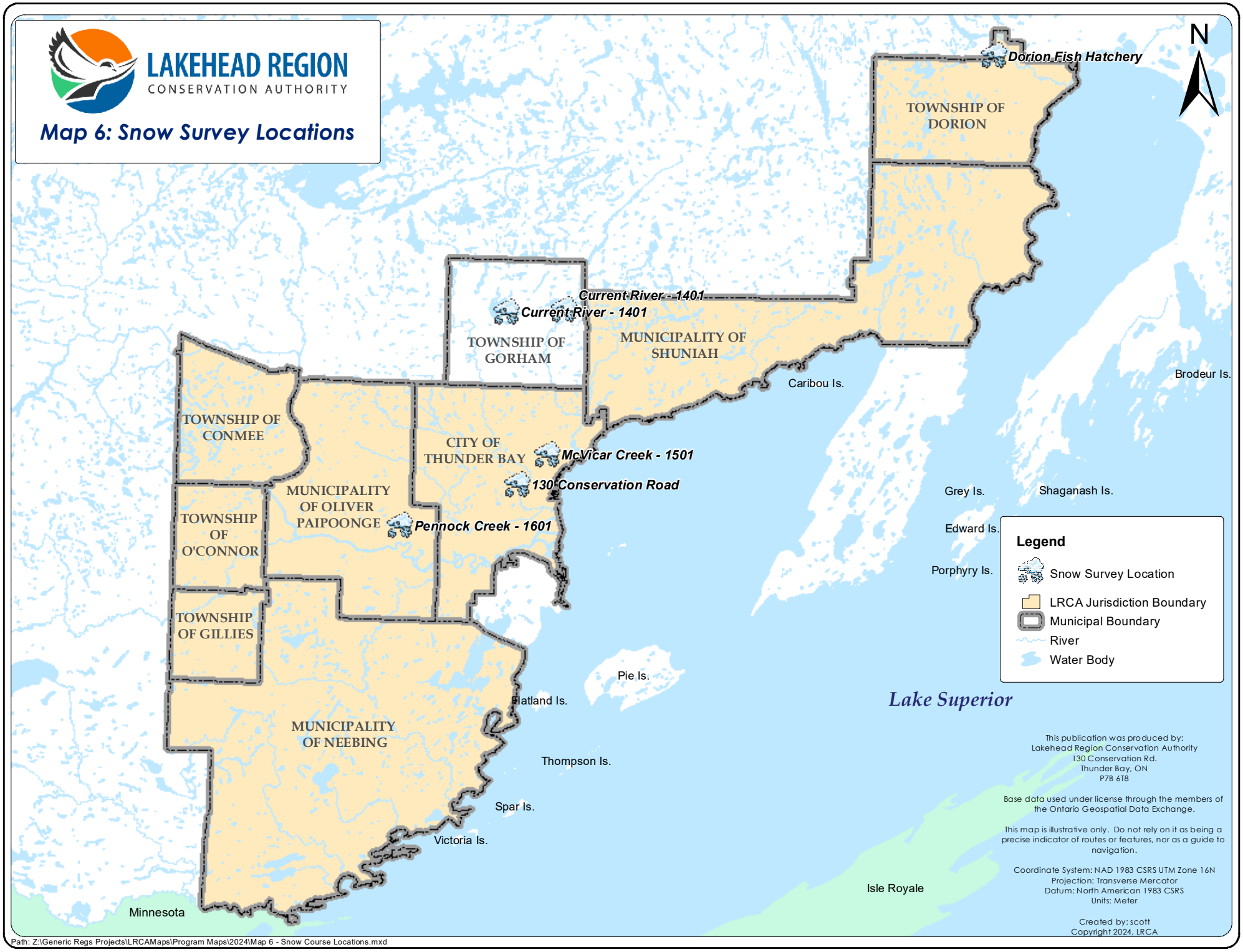
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 1 - Area of Jurisdiction.mxd

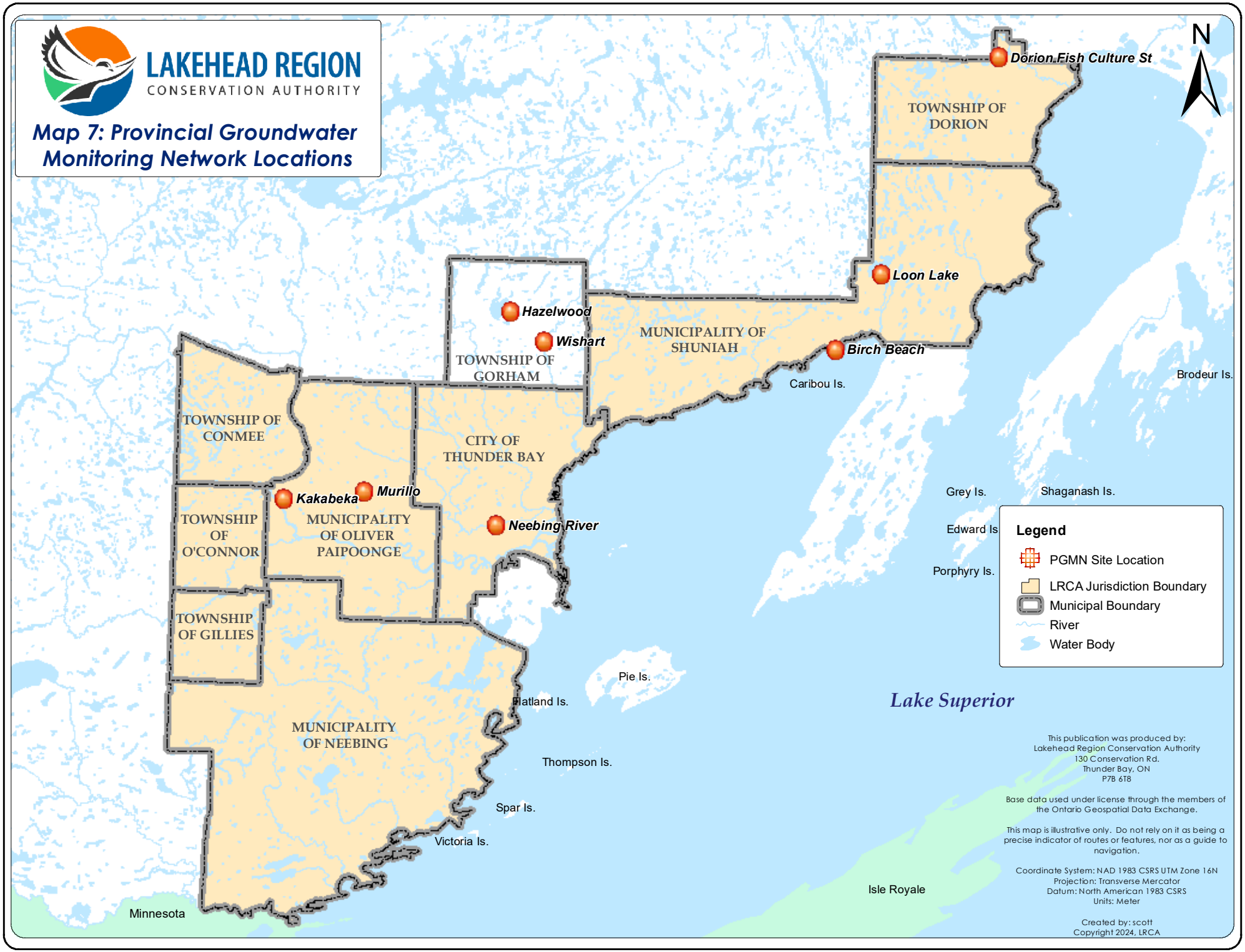

LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 2: Completed Floodplain Studies
N
TOWNSHIP OF DORION
Current River
1979
MUNICIPALITY OF SHUNIAH
McIntyre River
2016
McVicar Creek
2019
Northstar Creek
2014
Caribou Is.
Brodeur Is.
TOWNSHIP OF CONMEE
Neebing River
2018
CITY OF THUNDER BAY
Pennock Creek
2020
Grey Is.
Edward Is.
Porphyry Is.
TOWNSHIP OF O'CONNOR
MUNICIPALITY OF OLIVER PAIPOONGE
Kaministiquia River LRCA
2020
Mosquito Creek
2020
TOWNSHIP OF GILLIES
Legend
Floodplain Study Area
Watersheds
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
Pie Is.
Flatland Is.
Lake Superior
MUNICIPALITY OF NEEBING
Thompson Is.
Spar Is.
Victoria Is.
Isle Royale
Minnesota
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 2 - Completed Floodplain Studies.mxd

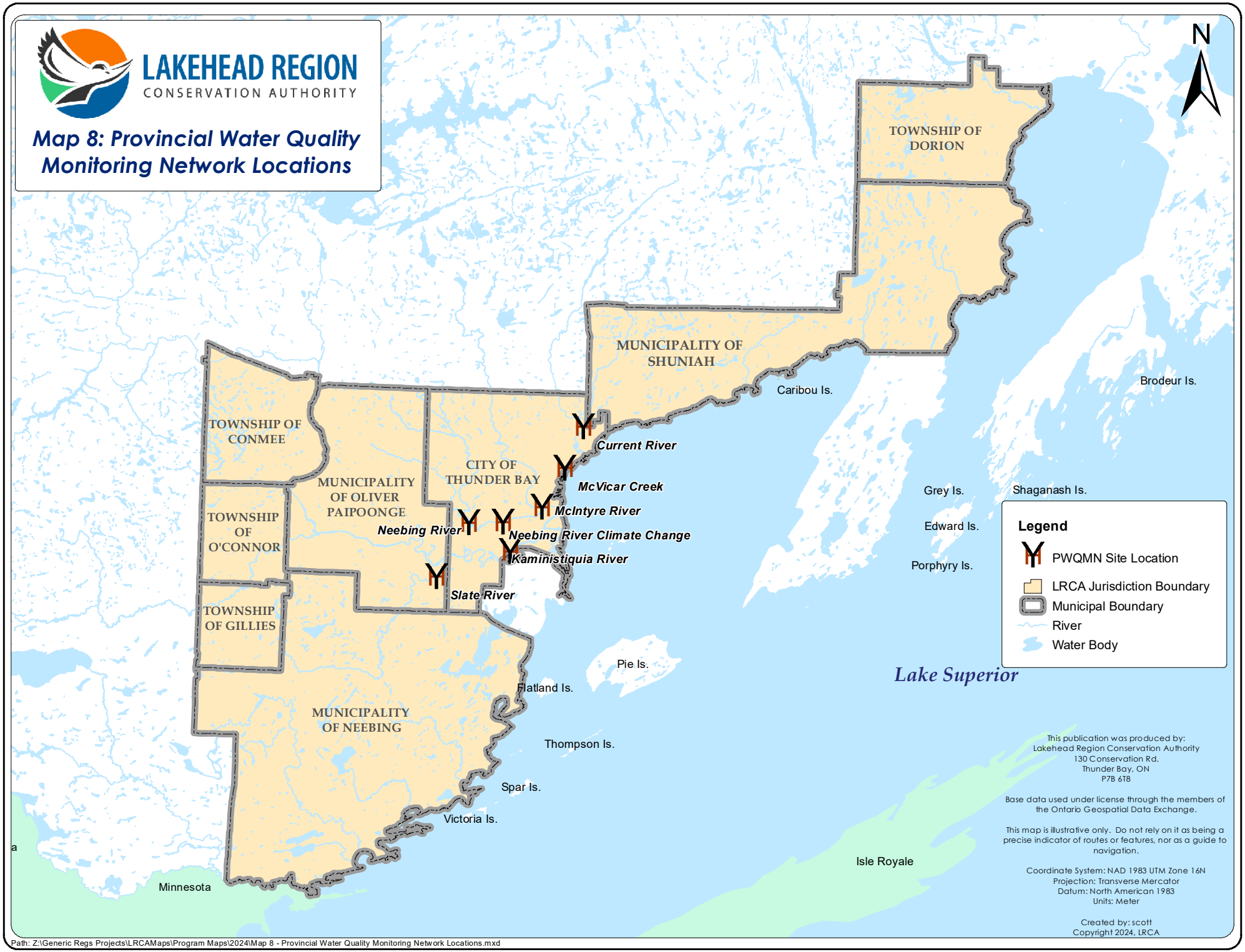

LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 3: Completed Wetland Studies
N
Hurkett Cove
TOWNSHIP OF DORION
KBM Unevaluated Wetland Study 2021
MUNICIPALITY OF SHUNIAH
Caribou Is.
Brodeur Is.
Kivikoski
Neebing River
McVicars Creek
McIntyre River 2018
McVicar Creek 2016
Neebing River 2019
TOWNSHIP OF CONMEE
TOWNSHIP OF O'CONNOR
MUNICIPALITY OF OLIVER PAIPOONGE
William's Meadow Marsh Bog
Rossini Wetland
Horseshoe Lake
Mission Island
Mosquito Creek 2019
TOWNSHIP OF GILLIES
KBM Unevaluated Wetland Study 2021
Pearson Wetland
MUNICIPALITY OF NEEBING
Stuppen Wetland
Flatland Is.
Pie Is.
Lake Superior
Thompson Is.
Spar Is.
Caldwell Lake
Cloud Bay
Victoria Is.
Pine Bay
Minnesota
Isle Royale
Grey
Edwar
Porphyry
Legend
Unevaluated Wetland Study Area
Evaluated Wetland Study Area
Provincailly Significant Wetland
Watersheds
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 3 - Completed Wetland Studies.mxd


LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 4: Precipitation Gauge Locations
N
TOWNSHIP OF DORION
MUNICIPALITY OF SHUNIAH
Caribou Is.
TOWNSHIP OF CONMEE
MUNICIPALITY OF OLIVER PAIPOONGE
CITY OF THUNDER BAY
TOWNSHIP OF O'CONNOR
TOWNSHIP OF GILLIES
MUNICIPALITY OF NEEBING
Grey Is.
Edward Is.
Porphyry Is.
Pie Is.
Flatland Is.
Thompson Is.
Spar Is.
Victoria Is.
Isle Royale
Lake Superior
Minnesota
Legend
Tipping Bucket Gauge
CoCoRaHS Precipitation Gauge
CoCoRaHS & Geonor Precipitation Gauge
Municipal Precipitation Gauge
Ott Pluvio2 Precipitation Gauge
PGMN Precipitation Gauge
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 4 - Precipitation Gauge Locations.mxd


LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 5: Streamflow Gauge Locations
N
TOWNSHIP OF DORION
WOLF RIVER AT HIGHWAY NO. 17
TOWNSHIP OF GORHAM
CURRENT RIVER AT STEPSTONE
MUNICIPALITY OF SHUNIAH
KAM RIVER AT KAM
NORTH CURRENT RIVER NEAR THUNDER BAY
Caribou Is.
Brodeur Is.
MCINTYRE RIVER ABOVE THUNDER BAY
TOWNSHIP OF CONMEE
CORBETT CREEK NEAR MURILLO
UPPER NEEBING
MCVICAR CREEK AT THUNDER BAY
CITY OF THUNDER BAY
MUNICIPALITY OF OLIVER PAIPOONGE
TOWNSHIP OF O'CONNOR
NEEBING RIVER NEAR THUNDER BAY
KAM RIVER ABOVE FWHP
WHITEFISH RIVER AT STANLEY
KAM RIVER AT FWHP
Grey Is.
Edward Is.
Porphyry Is.
WHITEFISH RIVER AT NOLALU
SLATE RIVER
TOWNSHIP OF GILLIES
TOWNSHIP OF LYBSTER
Pie Is.
Flatland Is.
Lake Superior
MUNICIPALITY OF NEEBING
Thompson Is.
Spar Is.
Victoria Is.
Isle Royale
Minnesota
Legend
Streamflow Gauge
Streamflow/Precipitation Gauge
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 5 - Streamflow Gauge Locations.mxd


LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 6: Snow Survey Locations
N
Dorion Fish Hatchery
TOWNSHIP OF DORION
Current River - 1401
Current River - 1401
TOWNSHIP OF GORHAM
MUNICIPALITY OF SHUNIAH
Caribou Is.
Brodeur Is.
TOWNSHIP OF CONMEE
CITY OF THUNDER BAY
McVicar Creek - 1501
130 Conservation Road
MUNICIPALITY OF OLIVER PAIPOONGE
Pennock Creek - 1601
TOWNSHIP OF O'CONNOR
Grey Is.
Shaganash Is.
Edward Is.
Porphyry Is.
TOWNSHIP OF GILLIES
Pie Is.
Flatland Is.
Lake Superior
MUNICIPALITY OF NEEBING
Thompson Is.
Spar Is.
Victoria Is.
Isle Royale
Minnesota
Legend
Snow Survey Location
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 6 - Snow Course Locations.mxd


LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 7: Provincial Groundwater Monitoring Network Locations
N
Dorion Fish Culture St
TOWNSHIP OF DORION
Loon Lake
Hazelwood
Wishart
TOWNSHIP OF GORHAM
MUNICIPALITY OF SHUNIAH
Birch Beach
Caribou Is.
Brodeur Is.
TOWNSHIP OF CONMEE
CITY OF THUNDER BAY
Kakabeka
Murillo
Neebing River
TOWNSHIP OF O'CONNOR
MUNICIPALITY OF OLIVER PAIPOONGE
TOWNSHIP OF GILLIES
Grey Is.
Shaganash Is.
Edward Is
Porphyry Is.
Legend
PGMN Site Location
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
Pie Is.
Flatland Is.
Lake Superior
MUNICIPALITY OF NEEBING
Thompson Is.
Spar Is.
Victoria Is.
Isle Royale
Minnesota
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 CSRS UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter
Created by: scott
Copyright 2024, LRCA


LAKEHEAD REGION
CONSERVATION AUTHORITY
Map 8: Provincial Water Quality Monitoring Network Locations
N
TOWNSHIP OF DORION
MUNICIPALITY OF SHUNIAH
Caribou Is.
Brodeur Is.
TOWNSHIP OF CONMEE
CITY OF THUNDER BAY
MUNICIPALITY OF OLIVER PAIPOONGE
TOWNSHIP OF O'CONNOR
TOWNSHIP OF GILLIES
MUNICIPALITY OF NEEBING
Current River
McVicar Creek
McIntyre River
Neebing River
Neebing River Climate Change
Kaministiquia River
Slate River
Grey Is.
Shaganash Is.
Edward Is.
Porphyry Is.
Pie Is.
Flatland Is.
Thompson Is.
Spar Is.
Victoria Is.
Lake Superior
Isle Royale
Minnesota
Legend
PWQMN Site Location
LRCA Jurisdiction Boundary
Municipal Boundary
River
Water Body
This publication was produced by:
Lakehead Region Conservation Authority
130 Conservation Rd.
Thunder Bay, ON
P7B 6T8
Base data used under license through the members of the Ontario Geospatial Data Exchange.
This map is illustrative only. Do not rely on it as being a precise indicator of routes or features, nor as a guide to navigation.
Coordinate System: NAD 1983 UTM Zone 16N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Created by: scott
Copyright 2024, LRCA
Path: Z:\Generic Regs Projects\LRCAMaps\Program Maps\2024\Map 8 - Provincial Water Quality Monitoring Network Locations.mxd