Northern Project#3 – Problem Statement

Town of Temagami

Bear Island
Temagami First Nation

Lake Temagami

The technology design proposed for the project must extend broadband services from an existing broadband POP in a waterfront community to nearby homes or residences, with limited or no broadband high-speed internet access, that are across and surrounding a large nearby waterbody (such as a lake, river, or extended wetland).
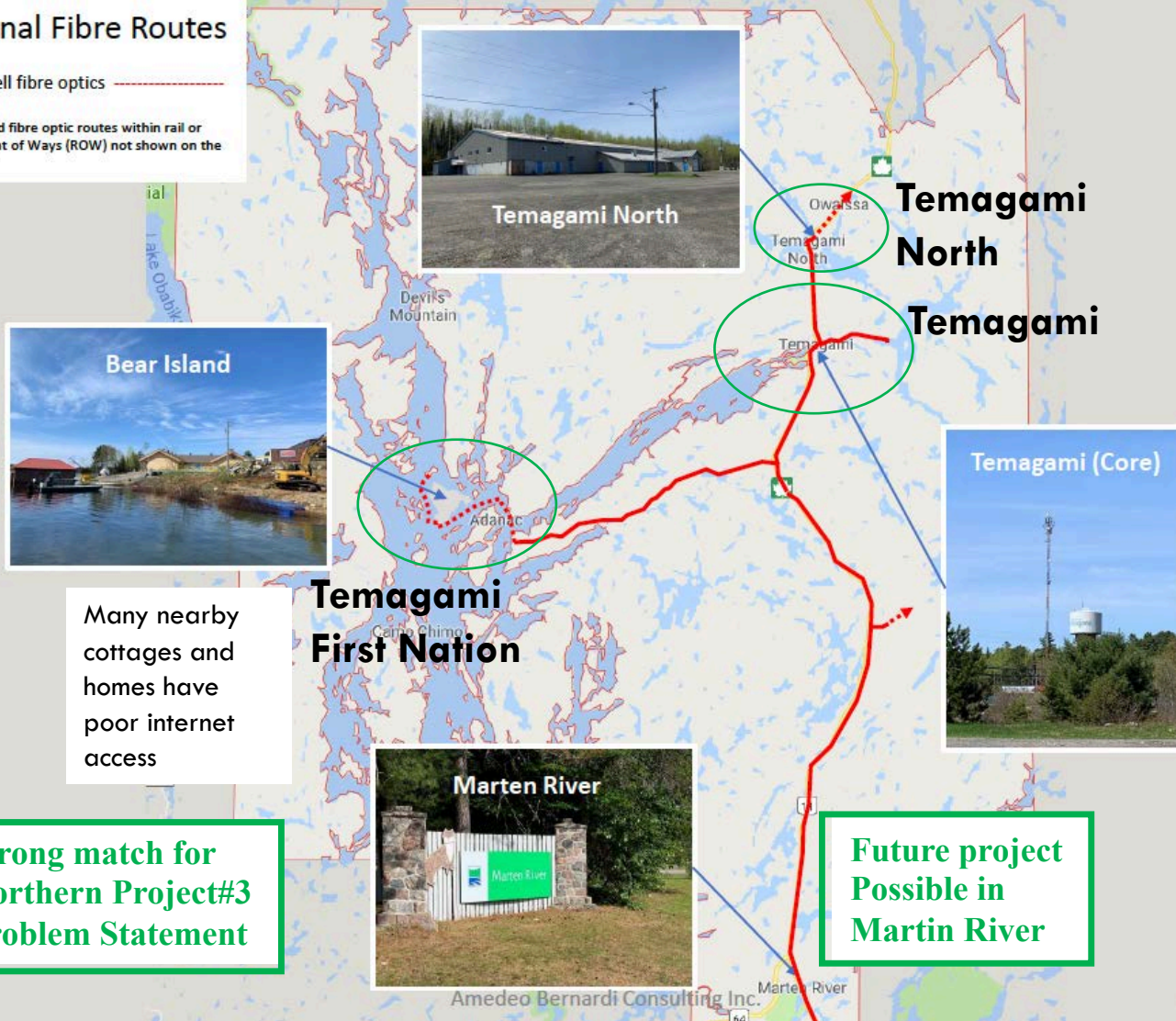
The required solution will extend broadband capacity directly from an existing broadband POP within the selected host northern Ontario waterfront community, or using a network of extended POPs, access the outlying waterfront and nearby homes to extend residential broadband access for homes and cottages up to 3-5 km away .

Temagami + Temagami First Nation

Regional Fibre Routes

Ontera/Bell fibre optics - - - - -

Underground fibre optic routes within rail or pipeline Right of Ways (ROW) not shown on the map.

Temagami North

Temagami **North**

Temagami

Temagami (Core)

Temagami First Nation

Many nearby cottages and homes have poor internet access

Bear Island

Marten River

Strong match for Northern Project#3 Problem Statement

Future project Possible in Martin River

**Municipality of Temagami, Lake Temagami, and Temagami First Nation as host community selections for the project.**

✓ Both municipalities and lake area have poor last km broadband service

✓ 3 communities have fibre internet access

✓ 2 communities could support FWA for residents of the east arm of Lake Temagami.

✓ Bear Island could support FWA for Temagami First Nation residents, along with both the north & south arm of Lake Temagami for lake shore residents.

✓ Strong business case with combined population of about 1,500 residents

✓ Detailed broadband gap analysis report available covering both communities

Amedeo Bernardi Consulting Inc.

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Overview of Tower Locations
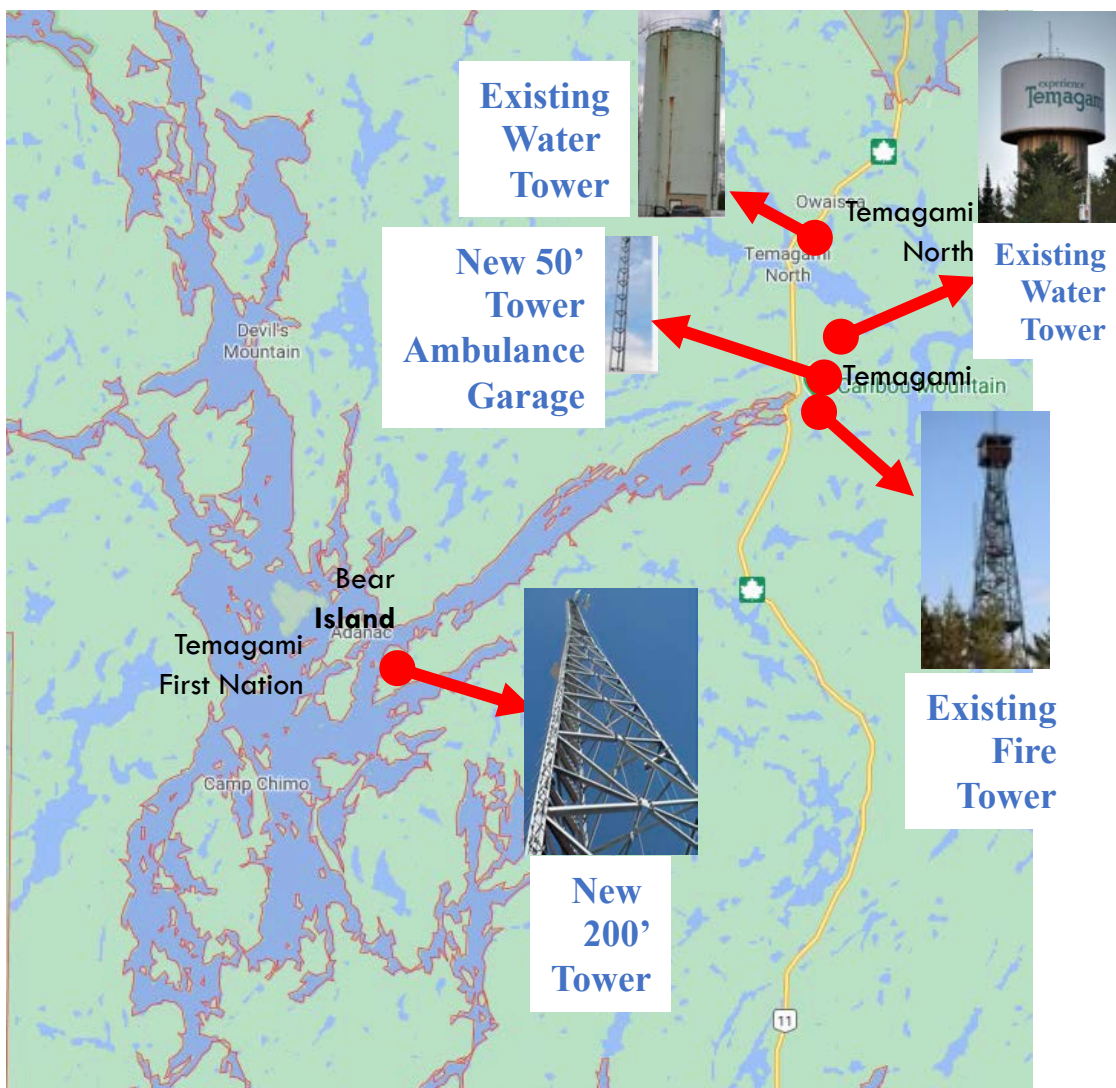
| Tower Location	Tower Type	Tower Height	Type of Service Supported	Area Supported
Temagami North	Existing Water Tower	80 ft.	2.4 GHz, 5.0 GHz Town-wide WIFI, FWA	Temagami North
Temagami	New 50' Tower attached to Ambulance Garage	50 ft.	5 GHz Pt-Pt Backhaul 3.65 GHz LTE Backup	Internet Access Point
	Existing Water Tower	80 ft.	2.4 GHz, 5.0 GHz Town-wide WIFI, FWA	Temagami
	Existing Fire Tower	100 ft.	2.4 GHz, 5.0 GHz, TVWS, FWA	Temagami, Lake East Arm
Bear Island – Temagami First Nation	New 200' Self-Supporting Tower	200 ft.	5.0 GHz, TVWS, FWA Community-wide WIFI	Bear Island Lake Centre
Lake Temagami East Arm			5/0 GHz, TVWS	Lake East Arm, Lake Centre
Lake Temagami North Arm			5/0 GHz, TVWS	Lake North Arm, Lake Centre
Lake Temagami Centre/Hub			5/0 GHz, TVWS	Lake Centre, Temagami Island
Lake Temagami South Arm			5/0 GHz, TVWS	Lake South Arm, Lake Centre

Wireless Network Overview
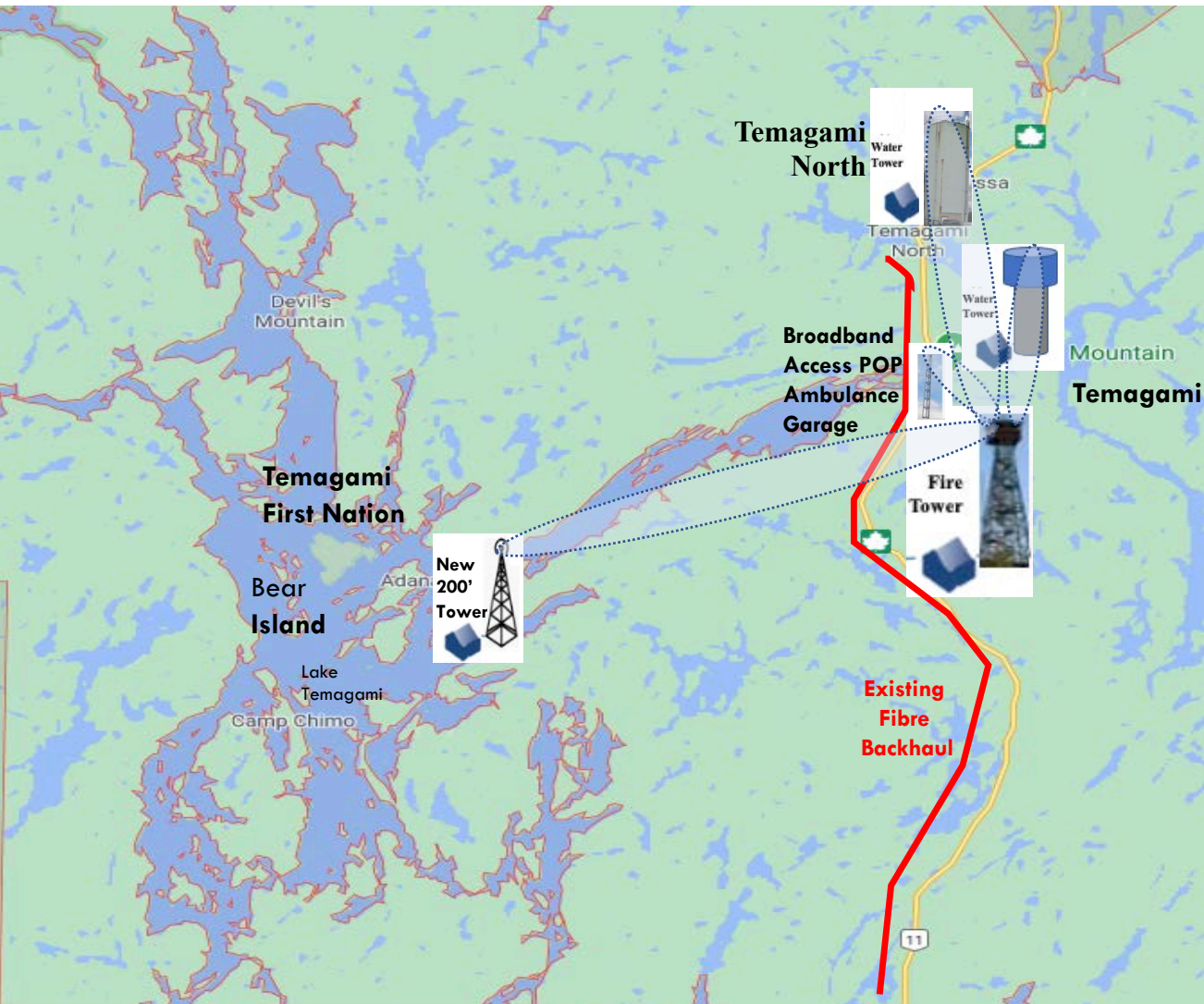
Multi-Tower Implementation

✅ **Temagami North Water Tower** will provide wireless internet access for North Temagami residents.

✅ **Temagami Ambulance Garage** will be the main internet access site and have a new small 50' Tower to connect using radio link to the Temagami Fire Tower.

✅ **Temagami Water Tower** will provide wireless internet access for Temagami residents.

✅ **Overlapping radio coverage in Temagami** for better service coverages for residents

✅ **Temagami Fire Tower** main hub site to connect internet access backhaul from other towers to the Temagami Ambulance Garage and provide fixed wireless internet access to Temagami residents.

✅ **New 200' Tower** providing wireless internet access for the hub area, east Arm, north arm, and south arm for Lake Temagami residents.

✅ **New 200 ft tower** will also provide wireless service coverage for Bear Island working with the Temagami First Nation to improve internet access services

Advantages of Multi-Tower Radio Design
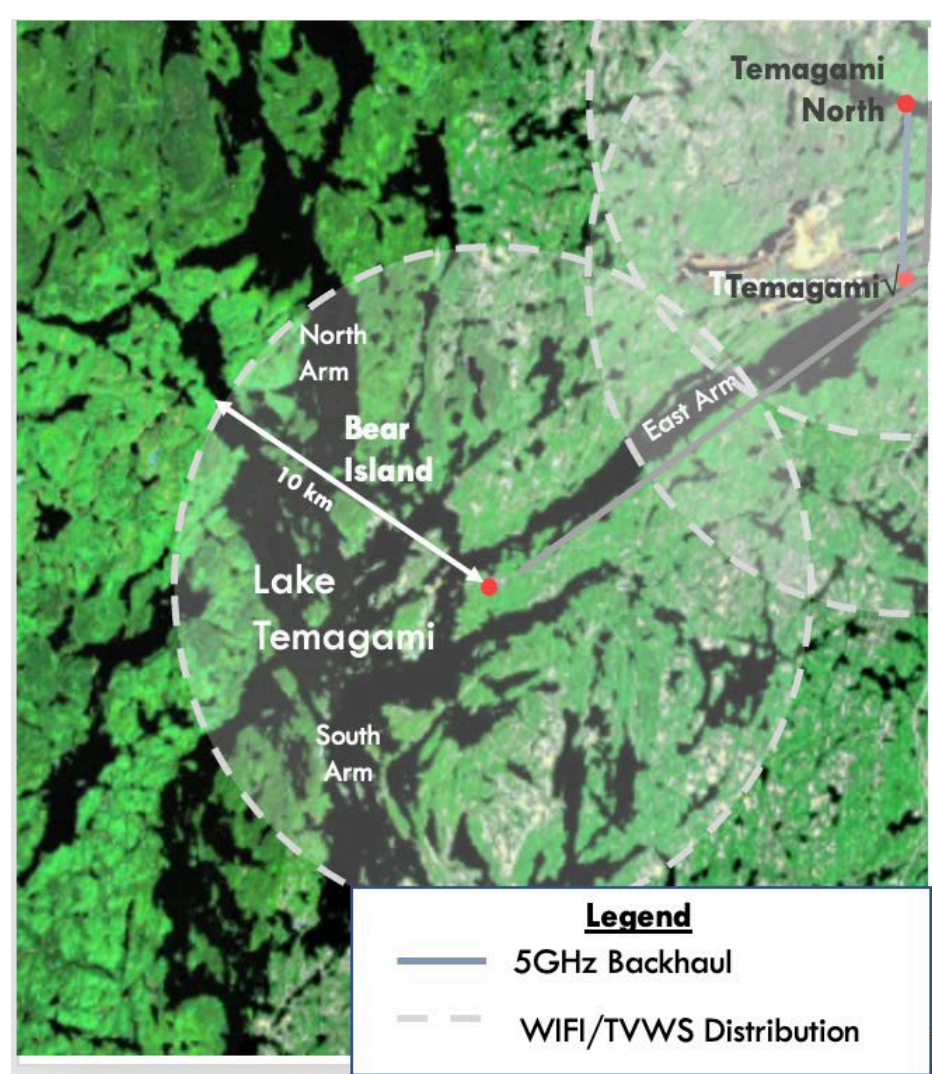
- ✅ **Interconnection of Sites for Higher Reliability**

- ✅ **Radio Signals from Different Directions** to reduce or eliminate radio shadows, more reliable service

- ✅ **Option for Redundant Internet Backhaul** to improve reliability and do load sharing

- ✅ **Higher bandwidth internet access** because stronger signals are available for internet access.

- ✅ **Much wider coverage down each arm of Lake Temagami** will improve coverage for both seasonal and permanent residents.

Your New Community ISP Leepfrog Telecom

Headquartered in Richmond Hill, Ontario

New wireless Internet Service Provider (ISP) for Temagami area, committed to provide high quality, high bandwidth, and affordably priced internet access.

- **Experienced wireless residential and commercial Internet Service Provider** (ISP)

- **Many wireless options** to maximize service quality, download speeds and customer satisfaction.

- **High quality protected network design** to ensure your access to the internet stays up

- **Affordably priced high-performance broadband access** – no data cap, low prices, no contract

- **Great customer support and service** – based in Calgary, with local support staff in the area

- **Optional low-cost monthly telephone –** use your phone from anywhere in the world while travelling

- **Optional low-cost TV service packages** – choose only the TV channels you want in your package

Technology Overview

- No Side Lobes

- Very selective reception just to the main beam

- Facilitates spectral reuse for broadcast in different directions
  - Ideal for small towers or dense configurations

Symmetrical Horn TP Antennas

Hybrid Radio Tower Configurations

- Hybrid fixed wireless solution

- Supports 2.4GHz and 5.0 GHz Unlicensed internet access services

- TVWS Radio technology to get through tree cover

- Range of services offered
  - New 50/10 Mbps internet access services

Technology Innovation

✓ **Multi-tower Placement on Both Sides of Lake Temagami**
  - Ensure wider coverage of entire lake shores and minimizes radio shadow impacts at shorelines

✓ **200' Tower Design to Extend Coverage to North, South and East Arms of Lake Temagami**
  - New tower extends wider coverage over the north and south arms as well as last km coverage for Temagami First Nation on Bear Island, possible future platform for improved cellular coverage in future

✓ **New TVWS Radio Technology for Superior Internet Service through Dense Tree Cover**
  - TVWS technology will improve coverage to residents of Bear Island

✓ **New Antenna Technology to Reduce Interference and Support Spectral Reuse**
  - Boost performance and reduce interference for both 2.4GHz and 5GHz FWA
  - Support more residents per tower

✓ **New LTU 5GHz Technology**
  - Support up to 256 residents per tower
  - Longer transmission distances up to 30 km supported to reach residents further down the lake
  - Better over water support with this generation of radios, higher download and upload speeds

New Internet Access Services for the Community

Residential Internet Packages

- **WIFI Residential Internet Access**
  - 50 Mbps Download / 10 Mbps Upload **(Unlimited Data)** — **$ 90 per Month**
  - 100 Mbps Download / 10 Mbps Upload **(Unlimited Data)** — **$ 125 per Month**
  - 150 Mbps Download / 15 Mbps Upload **(Unlimited Data)** — **$ 160 per Month**
  - 200 Mbps Download / 20 Mbps Upload **(Unlimited Data)** — **$ 195 per Month**

- **TVWS Residential Internet Access**
  - 50 Mbps Download / 10 Mbps Upload **(Unlimited Data)** — **$ 90 per Month**

Business and Commercial Packages

- **WIFI Business/Commercial Internet Access**
  - 50 Mbps Download / 10 Mbps Upload (Unlimited Data) — $ 105 per Month
  - 100 Mbps Download / 10 Mbps Upload (Unlimited Data) — $ 140 per Month
  - 150 Mbps Download / 15 Mbps Upload (Unlimited Data) — $ 175 per Month
  - 200 Mbps Download / 20 Mbps Upload **(Unlimited Data)** — $ 210 per Month

- **TVWS Business/Commercial Internet Access**
  - 50 Mbps Download / 10 Mbps Upload (Unlimited Data) — $ 105 per Month

Community Benefits of Project

✅ **High-speed Reliable Broadband Internet Services to Underserved Residents**
- Fixed wireless access to the home for up to residents
- No data cap!! Low monthly internet access charges.

✅ **Multiple Wireless Options for Access to Residents**
- Choice of technology will be based on level of line-of-sight to the closest tower
- Two choices optimized for near line of sight (some tree cover) or non line of sight (heavy tree cover)

✅ **This technology solution could be extended to other nearby communities easily**
- Significantly reduced incremental cost per community (eg. Martin River)

✅ **WIFI extension to municipal and band office staff can lower cell phone costs for community**
- Access can be extended from this new tower to allow municipal workers to use WIFI instead of cell

✅ **Lower cost optional phone and television services**
- Leepfrog Telecom will also offer optional lower cost value added services via wireless access