



GROUNDWATER & SURFACE WATER PLAIN LANGUAGE GUIDE

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The areas studied for the Community Access Road have many lakes and rivers that are both above and below the surface of the land. It is important to study both as water impacts every aspect of life.

Groundwater is any water that is found below the Earth's surface. Groundwater is held below the ground in soil and rock layers known as aquifers. For many people, groundwater is the primary source of drinking water.

Water accumulates underground from surface water that seeps through the Earth's surface, eventually becoming groundwater. To understand the area's groundwater, we must also understand what the land and soils that surface water passes through are made up of.

Surface water is water that collects on the ground's surface and can be in the form of a permanent waterbody, like a lake or river, or as a temporary feature, like seasonal spring run-off. Surface water is important to community well-being and day-to-day life. It is an essential source of drinking water, and is important culturally, spiritually and recreationally. Surface water also supports environmental biodiversity and helps sustain all forms of life.



What is...

Bedrock is solid rock layer underneath soil and loose materials



What is...

Watershed is a land area that collects rain and snow and drains it into a common body of water, such as a river, lake, or ocean.

Existing Conditions

The study area is mostly bedrock in the southern parts of the footprint of the Community Access Road, with sloping, generally flat terrain of wetlands with peat in the northern and eastern parts. The Community Access Road lies within three watersheds: Upper Albany – Makokibatan, Lower Ogoki, and Upper Albany – Muswabik and includes 94 different waterbodies. The land of these watersheds is made up of:

- Organic materials like decayed plants and animals that have turned into soil;
- Deposits from ancient lakes and rivers; and
- A mix of rocks, sand and clay left behind by glaciers.

The land in these areas is mostly covered forests and has moderate elevation, averaging between 215 and 260 metres.

Generally, shallow groundwater flow follows the local topography. On a regional scale, groundwater flow is similar to the surface water, which flows north and east towards James Bay. Most groundwater accumulates / recharges in spring as snow melts.

Surface water yield is the amount of water that comes from rain, melting snow and groundwater that flows into rivers and streams. This is important for managing water resources in the area. On average, the area gets 122 to 384 millimetres of surface water yield each year.

Water Quality

Groundwater and surface water were tested for things like minerals, dissolved metals (including mercury), and volatile organic compounds. Samples were collected, sent for laboratory analysis and compared against Canadian and Ontario standards for drinking water quality, groundwater quality and water quality that protects aquatic life. Some lab results were above the standards each time they were tested and others only in the summer during low water flow. As there are no major developments in the area / region, the elevated numbers suggest that some measurements are naturally higher. As such, the local wildlife, fish and plants have adapted to these conditions and flourished.

Water Quantity

With the water table being almost flat across the study area, the movement of groundwater is slow. Field investigations show that the area mainly has shallow groundwater, which interacts with surface water, flowing from higher to lower areas and into waterbodies. Additionally, groundwater movement within the study area is further slowed by areas that are made up of silt and clay. These soils do not allow water to pass through them as easily as other materials and slows down the rate that groundwater flows.

Surface water levels are mainly affected by snowmelt and rainfall and are higher in spring and fall. In summer and winter, water levels are lower because of dry or frozen conditions.



What are...

Volatile organic compounds (VOCs) are a type of organic chemicals that evaporate into water or vaporize easily into the air. When VOCs are found in water it is typically the result of human activity such as oil spills or hazardous waste dumps. The impact on health varies depending on the type, amount and length of exposure to them.

Potential Effects and Mitigations

The Community Access Road may affect the quality and quantity of groundwater and surface water during construction and long-term use (i.e. operations and maintenance).

Groundwater

- Short term use of water for construction activities like installing footings or supplying temporary camps;
- Use of water for maintenance and repair activities;
- Clearing vegetation, and building roads and other facilities;
- Removing water from pits or quarries for material extraction;
- Interrupting groundwater flow in peatland areas during road construction;
- Accidental spills and leaks of fuels and chemicals;
- Waste and wastewater from construction activities;
- Blasting residues from breaking up rock;
- Exposing materials that can generate acid or leach metals during construction; and
- Use of chemicals for dust control and de-icing during road maintenance.

Surface Water

- Short term use of water for construction activities like installing footings or supplying temporary camps;
- Accidental spills and leaks of fuels and chemicals;
- Waste and wastewater from construction activities;
- Blasting residues from breaking up rock;
- Exposing materials that can generate acid or leach metals during construction;
- Use of chemicals for dust control and de-icing during road maintenance;
- Changes in the water quality because of leftover wash-off from trash, waste and leachate at waste handling and storage sites;
- Changes in the quality of water because of leftover wash-off from organic debris during vegetation maintenance; and
- Changes in the quality of water and sediment in nearby waterbodies because of increased erosion in disturbed and exposed areas, leading to sediment being carried and deposited.
- Mitigation measures have been proposed to reduce and / or eliminate or monitor each potential effect. Monitoring activities have also been proposed. These include:
 - Obtain permits for water use and discharges according to provincial regulations;
 - Obtain permits for aggregate pits and quarries under the Aggregate Resources Act;
 - Implement best management practices for design, construction and long-term use of the road;
 - Where possible, wastewater and wash water will be treated prior to being discharged to the local environment, in compliance with government regulations;
- Roads and waterbody crossings will be designed to avoid restricting groundwater flows and minimize impacts on surface water channel characteristics;
- Develop and implement an Erosion and Sediment Control Plan that includes the installation, management and monitoring of appropriate erosion and sedimentation control measures for surface water conditions;
- Develop and implement environmental plans, including spill prevention, waste management and blasting communication plans;
- The storage and handling of solid, organic and hazardous wastes will follow appropriate plans and control measures, and in compliance with applicable laws;
- Restore temporary construction sites to natural conditions after use;
- Maintain roads to provincial standards, including guidelines for dust control;
- Implement a monitoring program to identify potential changes in groundwater and surface water quality and quantity, due to road activities. Surface water monitoring programs may include water quality, streamflow conditions, implications on fish species and habitat, channel stability, and drainage pattern. Groundwater monitoring programs may include assessing water quality parameters (i.e., pH, temperature, conductivity, hardness, total dissolved solids); and
- Establish monitoring programs for potential acid-generating or metal-leaching materials and their effects on water quality and quantity, for groundwater quality.

Residual Effects

Through the proper use of mitigation measures, the potential effects from the construction and long-term use of the Community Access Road are expected to be either eliminated or minimized. Left over effects (after a mitigation measure is applied) is called a residual effect.

The predicted residual effects for groundwater are:

- Dewatering pits or quarries can change groundwater levels up to 721 metres, potentially exceeding 50% of natural variation. These changes are reversible once dewatering stops;
- Road construction in peatlands may restrict groundwater flow and change levels, which may cause long-term effects that are reversible;
- Construction waste and the release of wastewater can affect groundwater quality, with medium-term effects that are reversible once construction stops;
- Blasting residues can affect groundwater quality, with medium-term effects that are reversible after blasting ends; and
- Road maintenance activities can affect groundwater quality over the long term, but stay within water quality standards with proper mitigations. As these activities are short term in duration and temporary, the potential for any effects will be reversed once the maintenance activity is completed.

The predicted residual effects for the surface water are:

- Short-term water takings during the construction phase may result in changes to surface water quantity through reduced streamflow and / or water levels at nearby waterbodies. The specific locations, durations, and volumes of these short-term water takings will be determined during the detailed design stage of the Community Access Road;
- Discharging water during construction can affect the quality of the water and the sediment;
- Redirecting water during construction can change the amount and quality of water and sediment;
- Permanent changes to the land from construction and maintenance can affect the quantity and quality of water, as well as quality of sediment; and
- Organic debris can be washed into nearby waterbodies during construction due to increased erosion, affecting water and sediment quality.

Cumulative Effects

The Cumulative Effects Assessment considered the residual effects (left over effects after a mitigation measure is applied) of the Community Access Road and other future developments, such as but not limited to the Northern Road Link, Anaconda and Painter Lake Forestry Access Road Upgrades and Rapid Lynx Broadband projects, on ground and surface water.

The effects of the two road projects (Northern Road Link and Anaconda and Painter Lake Upgrades) are expected to be similar to the Community Access Road because they are part of the same road corridor; slightly higher effects may occur where these roads meet. The cumulative effects on groundwater and surface water are expected to remain manageable.

Monitoring programs will be set up to ensure the accuracy of the effects assessment and guide the mitigation measures. The following monitoring programs should be implemented:

Construction Monitoring

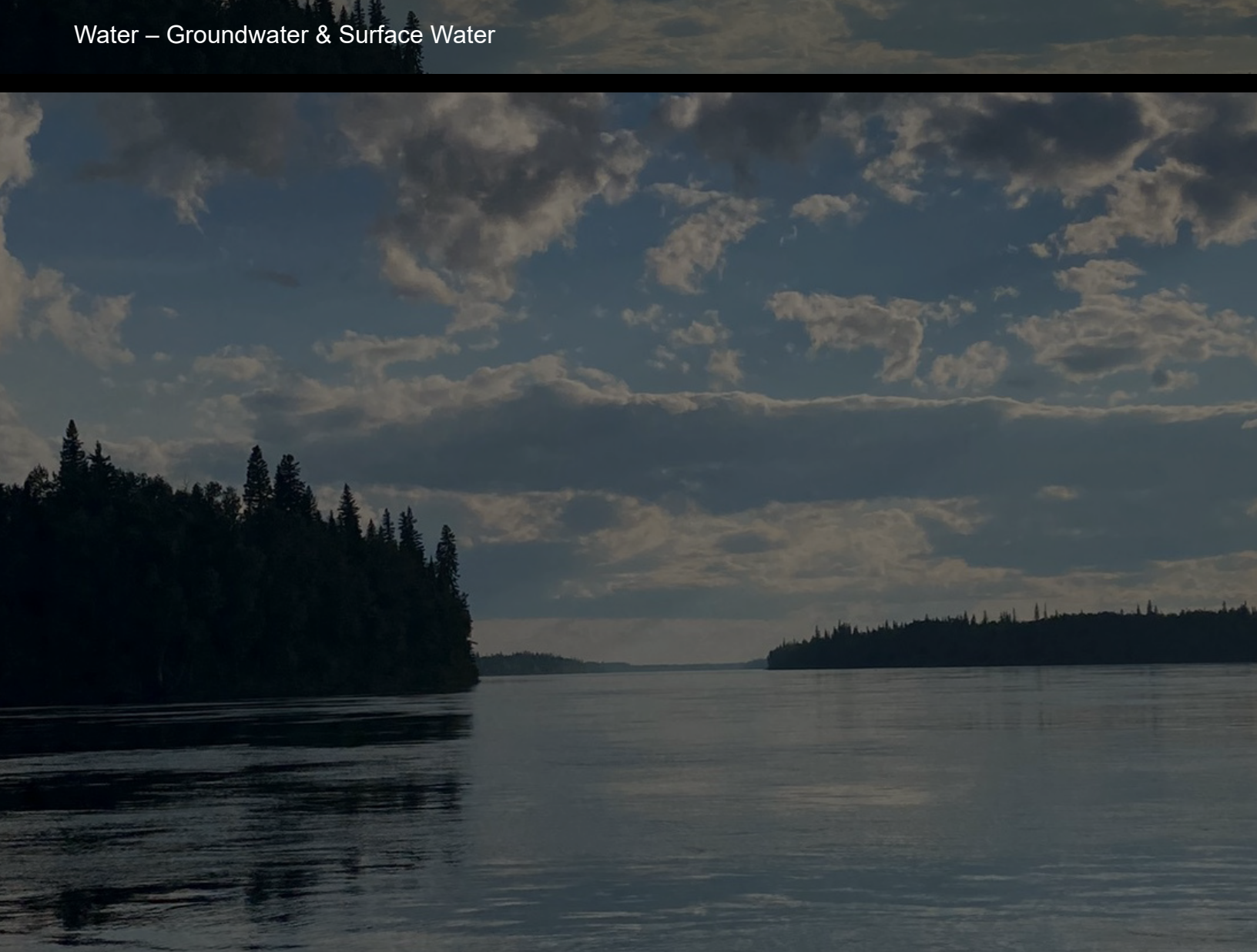
- Set up stations to monitor groundwater levels and quality before construction to make note of the conditions and support permitting. Continue monitoring to identify any impacts on groundwater, with oversight from qualified environmental staff;
- Test soils and bedrock for potential acid rock drainage before construction;
- Conduct surface water surveys at waterbody crossing locations that have not been assessed yet or where work is planned below the high-water mark to meet additional permitting requirements;
- Monitor water taking and release as well as quality of discharged water;
- Inspect all erosion and sediment management measures, bank stabilization features, and temporary in-water construction installations to ensure they are effective; and
- Monitor total suspended solids along with visual inspections for oil, and check streamflow rates and water levels at all water crossings with in-stream work to verify the effectiveness of construction procedures and mitigation measures.



Long-term Use (i.e., Operations) Monitoring:

- Sites with observed impacts should be monitored until conditions return to existing conditions or a remediation plan is implemented;
- Inspect all new permanent water crossing structures (culverts and bridges) and roadside drainage features to ensure they work properly; and
- Monitor water quality, sediment quality and streamflow conditions at sensitive waterbodies to check for any changes that could affect fish habitat, species at risk, channel stability, drainage patterns or other environmental factors.





Want to learn more?

If you are interested in learning more about this topic, please review the technical report available in the appendix of the Final Environmental Assessment / Impact Statement.

Contact Info

You are welcome to contact the Marten Falls First Nation Community Access Road Project Team at any time with questions or comments.

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