WEBEQUIE SUPPLY ROAD (WSR) PROJECT

GROUNDWATER AND SURFACE WATER STUDY PLAN SUMMARY

OBJECTIVES:

- Identify and consider the potential effects on groundwater and surface water resources as a result of the Project
- Provide recommendations for minimizing negative environmental, health, social and economic effects related to groundwater and surface water effects during the construction and operation/maintenance of the Project

WHAT WILL BE ASSESSED AND HOW WILL THE ASSESSMENT BE DONE?

Groundwater Quantity

- Assessing potential changes to groundwater recharge and discharge areas, groundwater level (including seasonal changes) and groundwater flow/movement by:
  - Understanding the soil (including peatland/muskeg) and bedrock geology, groundwater level and saturated thickness, and significant recharge areas
  - Defining the potential zone of influence that the Project, including supportive infrastructure, may have on groundwater quantity or flow movement

Groundwater Quality

- Assessing the physical, chemical and biological properties of groundwater that can change as a result of the Project by:
  - Determining the proximity of sensitive groundwater features, such as drinking water supply wells and springs, and highly vulnerable aquifers, to the supply road and its supporting infrastructure (e.g., aggregate quarries/pits)

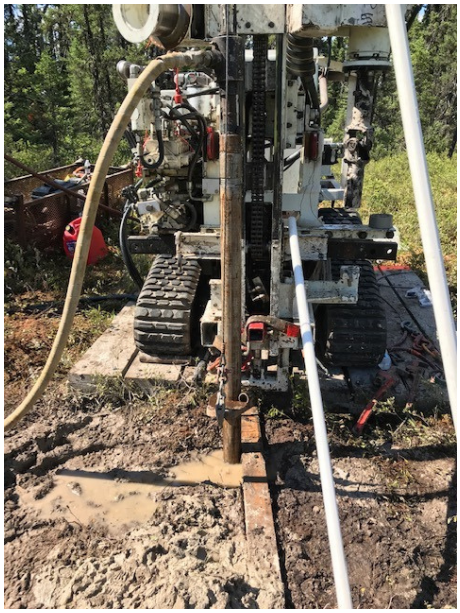
Surface Water Quantity

- Assessing potential changes to stream flows, water levels, and erosion and sedimentation processes at waterbody crossings, as well as overall drainage patterns in the project area by:
  - Determining the number of and type of waterbody crossings affected by the Project, the magnitude of changes to stream flow, water levels (modelling and field measurements), runoff rates and portion of catchment area for a given waterbody disturbed by a specific physical activity; and
  - Understanding and describing changes to drainage patterns and land cover as an indirect means for potential erosion and sedimentation.

Surface Water Quality

- Assessing potential changes to biological or chemical properties of surface water in the project area by:
  - Examining potential increases in the concentration of suspended solids or chemical constituents in receiving waterbodies due to potential discharges (e.g., fuel spills) associated with construction and operations of the road

WHAT INFORMATION IS NEEDED AND HOW WILL IT BE COLLECTED?



Groundwater Field Monitoring & Sampling

- 12 groundwater monitoring wells will be installed along the preliminary preferred corridor for the supply road and near potential aggregate extraction areas
- Groundwater level monitoring and water quality sampling will be conducted in the spring, summer and fall periods to characterize seasonal variations in existing conditions
- Groundwater quality parameters will be analyzed for: physical parameters including pH and temperature, general chemistry including hardness, turbidity, total suspended solids and total dissolved solids, metals, organic and inorganic compounds, cations (including methylmercury), nutrients, and radionuclides.

Surface Water Field Monitoring & Sampling

- Surface water samples will be collected from each of the 26 identified waterbody crossing sites. Samples will be collected in spring, summer and fall to establish seasonal variations in existing conditions
- Water quality parameters for the surface water sampling program will be the same as those identified above for groundwater

Waterbody Information

- Where feasible, water depth and flow data will be collected at waterbodies to characterize existing hydrology. Otherwise, flow will be estimated by pro-rating or estimating flows from previously collected flow data in local and regional study areas for the Project

Indigenous Knowledge, Traditional Uses & Sensitive Receptors

- Indigenous Knowledge from First Nation communities will help to: understand existing conditions and sensitivities; Indigenous peoples use of groundwater and surface water; identify potential effects; and assist in developing mitigation measures and monitoring commitments, where necessary. Based on engagement and consultation with communities, domestic or communal water wells and springs that provide consumable water or that have Indigenous cultural importance will also be identified, including the collection of background information where available, or potential sampling of these sources to characterize existing conditions. Methods to seek this input from communities will include surveys, community meetings, key informant interviews with knowledge keepers, focus groups and formal requests to share land use data and Indigenous Knowledge.

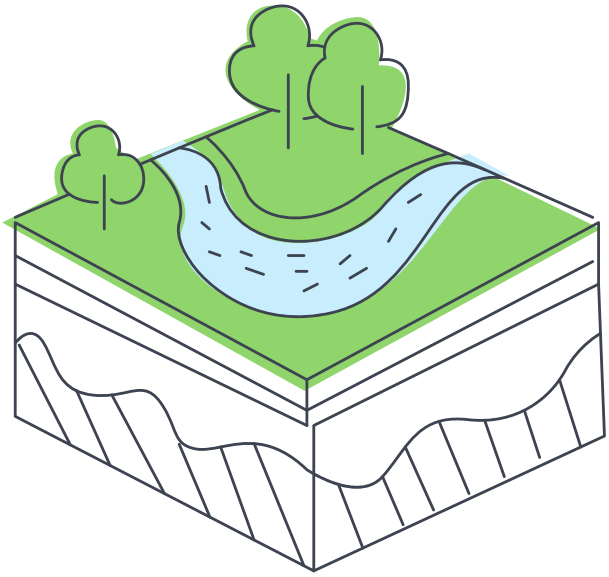
WHAT ARE SOME OF THE POSSIBLE WAYS TO REDUCE ANY POTENTIAL NEGATIVE EFFECTS OF THE PROJECT?

- To avoid provincial and federal groundwater and surface water criteria being exceeded during the construction phase, protective measures will be implemented to limit potential negative effects, and may include:
  - Selecting the locations for equipment, materials and discharge points a safe distance away from waterbodies and any other sensitive environmental features
  - Treatment or removal of suspended solids (silt/sediment) from surface runoff during grading operations and from temporary groundwater dewatering activities during construction
  - Use of erosion and sediment controls, including filter bags, silt fence, erosion control blankets, etc.
  - Monitor and test groundwater and surface water qualities during construction to ensure compliance with applicable water quality criteria
- Identifying sites for temporary and/or permanent aggregate extraction pits and production facilities needed for construction and operation of the road that minimizes and/or avoids adverse effects to surface water and groundwater resources
- Identifying sites for supportive infrastructure (temporary laydown and storage areas and construction camps, including access roads) that minimizes and/or avoids adverse effects to surface water and groundwater resources
- Identifying best suited structure types (culverts, bridges), span length, lifecycle, and construction staging methods at waterbody crossings
- Design watercourse crossings to account for potential future increases in flood intensities based on future projections from climate change models
- Design permanent watercourse crossing drainage inlets/outlet locations with rock protection to mitigate potential erosion during operations
- Implement operations and maintenance grading techniques and material storage best management practices to minimize erosion of potential transport of sediment laden runoff

Reference: SNC-Lavalin. 2020. Webequie Supply Road- GROUNDWATER AND SURFACE WATER WORK PLAN

STUDY AREAS FOR GROUNDWATER AND SURFACE WATER

Spatial boundaries define the geographic extent to consider potential project effects on groundwater and surface water. As such, these boundaries define the study areas for the effects assessment. The study areas to be used in the assessment will be refined and validated with input and feedback from Indigenous communities, as well as guidance from federal and provincial regulators, and other stakeholders.



To capture the potential direct and indirect effects of the Project for each valued component, general study areas have been established (i.e., Project Footprint, Local Study Area and Regional Study Area). The proposed study areas identified for the groundwater and surface water valued components are described below and presented in Figures 1 and 2.

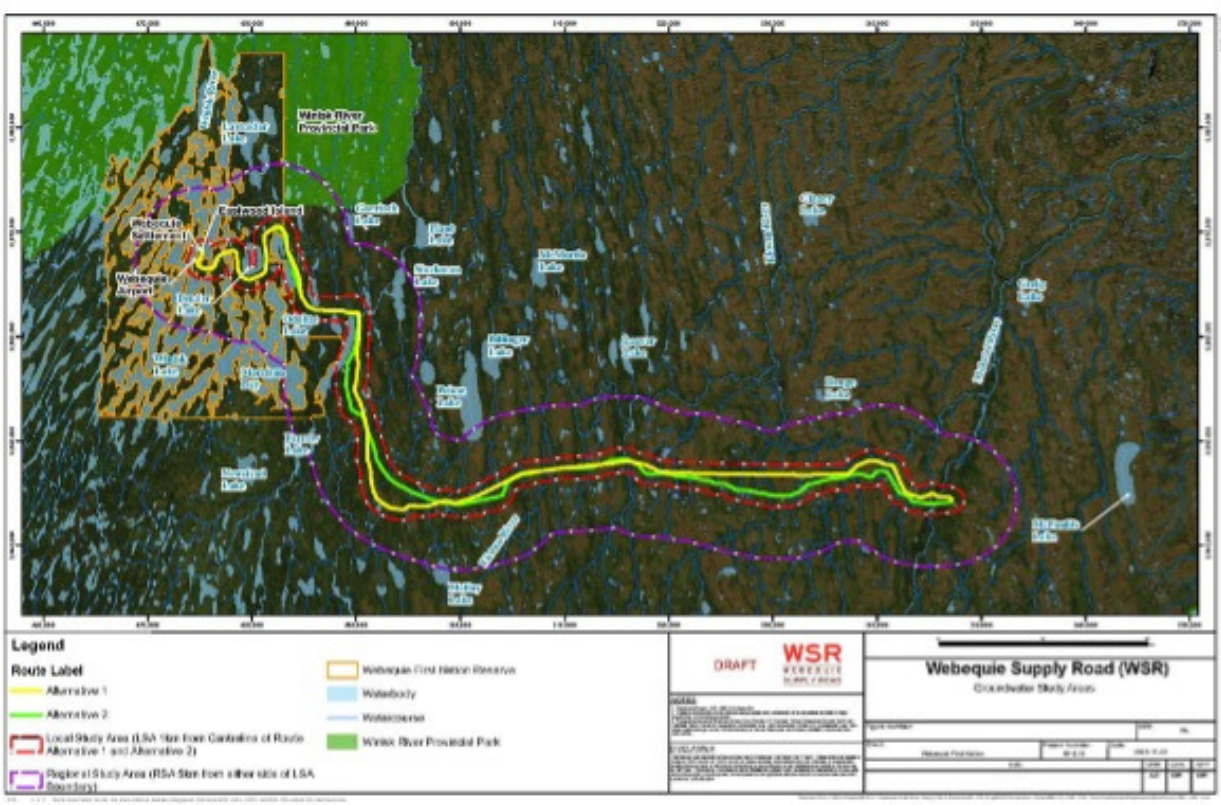


Figure 1 - Groundwater Study Areas

STUDY AREAS FOR GROUNDWATER AND SURFACE WATER

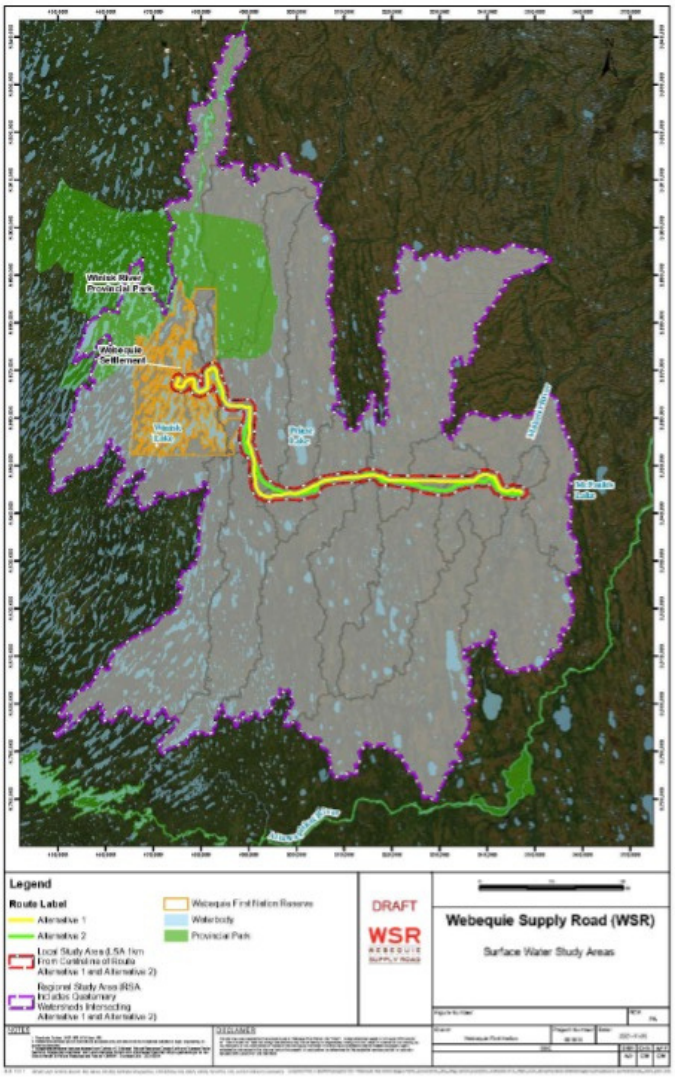


Figure 2 - Surface Water Study Areas

- **Project Footprint (PF)** – The area of direct disturbance (i.e., the physical area required for Project construction and operation). The PF is defined as the 35 m right-of-way (ROW) width for the WSR and temporary or permanent areas needed to support the Project, including laydown/storage yards, construction camps, access roads and aggregate extraction sites.
- **Local Study Area (LSA)** – The area where largely direct, and indirect effects of the Project are likely to be measurable.
  - For groundwater and surface water the LSA extends 1 km buffer from either side of the centreline of the supply road Alternative 1 and Alternative 2, and 500 m from supportive infrastructure (camps, aggregate/rock source areas, access roads).
- **Regional Study Area (RSA)** – The area where potential, largely indirect and cumulative effects of the Project in the broader, regional context may occur.
  - For groundwater the RSA extends 5 km on either side of the LSA boundaries
  - For surface water the RSA is the combined area of the quaternary watersheds of rivers crossed by route Alternative 1 and Alternative 2 for the Webequie Supply Road.

CRITERIA AND INDICATORS FOR GROUNDWATER AND SURFACE WATER

To determine project effects to groundwater and surface water, evaluation criteria and indicators are developed that represent the resource, feature or issue where measurable changes can be identified. Criteria, also known as valued components, are elements or conditions of the natural and human environment that may be affected by the Project and are of concern or value to the public, Indigenous peoples, federal/provincial authorities and interested parties. Indicators represent a resource, feature, or issue related to the criteria that, if changed, may demonstrate an effect on the environment. The table below identifies indicators for the proposed groundwater and surface water valued components, which are also referred to as criteria (interchangeable term) based on the Ontario Environmental Assessment terminology.

Valued Component/Criteria

Indicators

Groundwater

Absolute sound level and changes to sound levels (quantitative) for Noise Sensitive Areas (NSA):

- Overall sound levels during the daytime (Ld) (7 a.m. to 11 p.m.) and night-time (Ln) (11 p.m. to 7 a.m.) periods (dBA)
- Overall "day-night" sound levels over the entire day (Ldn) (dBA)
- Maximum sound levels from vehicle pass-by and the number of events during the night-time period (Lmax) (10 p.m. to 7 a.m.) (dBA)
- Change from existing "no-build" background sound levels, and the "future build" sound levels with the Project in place (background sound levels + Project)
  - Number of NSA with 0-5 dBA increase
  - Number of NSA with >5 dBA increase
- Percent highly annoyed (%HA) at each NSA

Surface Water

Number of waterbodies (i.e., lakes, ponds, rivers) crossed

Changes to physical surface water level (e.g., potential for upstream flooding)

Changes to chemical characteristics of surface water quality

Changes to surface water quantity (velocity – metre/sec, flow pattern, volume – cubic metres/sec)

Changes to physical and chemical characteristics of sediment