

## 2.10 Lower Junction Creek Subwatershed



### General Description

- **Total Area :** 97.17 km<sup>2</sup>
- **Drainage:** Beginning at the outlet of Kelly Lake, this lower end of Junction Creek drains in a southwesterly direction through several warm water lakes, including Mud Lake, Simon Lake and McCharles Lake, where it discharges to the Vermilion River.
- **Topography:** The subwatershed is characterized by rock outcrops, with a maximum elevation of 320m.a.s.l., surrounding the valley of the Junction Creek system and the various surrounding lakes and wetlands sitting at elevations between 240 and 260 m.a.s.l. The minimum elevation of the subwatershed is 228 m.a.s.l.
- **Geology:** Junction Creek's course is typical of the Precambrian Shield in that the creek flows southeast from the outlet of Kelly Lake to the Simon Lake sandy glacio-fluvial complexes where it joins the Vermilion River.
  - **Bedrock Geology:** Precambrian bedrock mainly of the Huronian Province, with a granite intrusion of the Superior Province, in the area north of Lively.
  - **Quaternary Geology:** Bedrock makes up the main material of this subwatershed, with glaciolacustrine deposits of silt and clay, as well as glaciofluvial outwash deposits of gravel and sand found in some of the low-lying areas around Junction Creek and surrounding waterbodies.
- **Soils:** The primary surface substrate is stable bedrock. The flat valley areas associated with Junction Creek and area wetlands are almost entirely of glacial origin, with large areas of fine sand north of Simon and McCharles Lake while sandy loams and silt loams are present between Kelly Lake and Mud Lake and organic soils are found in the wetlands associated with area lakes.
- **Groundwater:**
  - There are areas of Highly Vulnerable Aquifers located mostly around the low-lying areas of Junction Creek.
  - Significant Groundwater Recharge Areas (SGRA) occur mostly along the western extent, from Kelly Lake and moving west toward Simon Lake as well as in the Lively area and the less developed south-western portion of the subwatershed.
- **Land Cover:**
  - Forest covers an area of 57.9 km<sup>2</sup>, 59.6 % of the subwatershed.
  - Lakes cover an area of 13.7 km<sup>2</sup>, 14.1 % of the subwatershed.
  - Community/Infrastructure covers 10.8 km<sup>2</sup>, 10.7 % of the subwatershed.
  - Exposed bedrock covers an area of 8.7 km<sup>2</sup>, 8.6 % of the subwatershed.
  - Wetlands cover an area of 7.7 km<sup>2</sup>, 7.9 % of the subwatershed.
  - Mining and Extraction Operations cover an area of 6.5 km<sup>2</sup>, 6.4 % of the watershed.

- **Land Use Type:**
  - **Zoning:** 51.3 km<sup>2</sup> (53 %) of this subwatershed are subject to the City of Greater Sudbury's Zoning By-law. Of this area, 30.11 km<sup>2</sup> (58.6%) is rural, 10.4 km<sup>2</sup> (20.3%) is industrial, 3.8km<sup>2</sup> (7.5%) is residential and 2.3km<sup>2</sup> (4.5%) is park space. The remainder are small areas designated as future development, open space, commercial, institutional, and environmental protection.

### Indigenous Communities and Traditional Territories

- This subwatershed falls within the Robinson-Huron Treaty Area #61, of 1850.
- The community of Atikameksheng Anishnawbek First Nation is located within this subwatershed, covering an area of approximately 39 km<sup>2</sup> over much of the downstream landcover extending south of RR 55 and west of Black Lake Rd in Lively. These indigenous lands make up 40% of this subwatershed.
- This subwatershed also lies within the traditional territory of both the Atikameksheng Anishnawbek First Nation and Wahnapiatae First Nation.

### Development Pressure

**Overall:** Moderate; though the area has more developed lands than some of the northern subwatersheds, mainly relating to communities and industrial activities, there remains large areas of undeveloped land throughout.

- **Settlement Area:** 10.7 km<sup>2</sup> (11.0 %) is designated as settlement area under the City of Greater Sudbury's Official Plan. This includes the communities of Lively and Naughton.
- **Wastewater Facilities:** Lively-Walden Wastewater System includes 2 wastewater treatment plants; the Lively wastewater treatment plant (WWTP) and the Walden WWTP. Together they service the areas of Lively, Walden, Naughton and Mikkola.
- **Forestry:** Located within the Sudbury Forest, there are no areas identified for harvest within this subwatershed in the 2020-2030 Sudbury Forest Management Plan.
- **Aggregates:** There are currently 3 active and 3 inactive aggregate operations, covering an area of 0.58 km<sup>2</sup>.
- **Mining:**
  - Currently, there are no producing mines within this subwatershed. Some areas associated with the Creighton Mine complex and Vale properties fall within this subwatershed, northwest of Lively.
  - Historically, one producing quartz mine was in operation in the early 1900s and was known as the Naughton Quarry.
  - Within the last year, there have been no reported exploration activities.
  - There are currently no active Mining Plans and Permits registered to this subwatershed.

## Recreational Use

- The various lakes within this subwatershed are used for boating, canoeing, kayaking and fishing activities. The undeveloped forested areas are used for hiking, hunting, camping, trail-riding, snowmobiling and other recreational activities. Blueberry picking is a common activity in this subwatershed because of the history of acidification on the landscape and the many exposed rocky areas.
- There are groomed snowmobile trails that travel along the subwatershed, north of Hwy 17 to Lake Wanapitei.
- There is one golf course within this subwatershed: Lively Golf Course.

## Water use

- There are currently 2 active Permits to Take Water, both permitted to the Lively Golf Course.

## Notable Waterbodies

- **Mud Lake** is a small urban lake with an area of 47.8 ha and is the first lake in a sequence of lakes resulting from the widening of Junction Creek. There are 71 permanent and no seasonal residents on this lake.
- **Simon Lake** is the next lake resulting from the widening of Junction Creek and is categorized as a medium sized urban lake, with an area of 102.0 ha and a maximum depth of 12m. This lake has 154 permanent residents and 1 seasonal residence.
- **McCharles Lake** is the final lake in the chain of lakes and is categorized as a medium sized urban lake, with an area of 150.1 ha and a maximum depth of 15 m.
- **Other Lakes:**
  - Nemog, Wakemi and Whitefish Lakes are also large lakes within this subwatershed, with very little developmental pressure. They all drain into Junction Creek before it becomes Mud Lake.

## Previously Identified Management Issues

- Flooding of residential properties along the shores of McCharles Lake is a regular occurrence, generally resulting from increased water volumes during the spring freshet, and backwater flows from the Vermilion River.

## Natural Hazard Identification and Regulation

Hazards and features regulated by Conservation Sudbury include flood and erosion hazards, wetlands, unstable soils, rivers, streams, creeks, and small inland lakes. More on these regulations can be found in the Conservation Authorities Act, O. Reg. 686/21 that addresses the risks of natural hazards.

- **Floodplain mapping:** Flood Line Mapping was developed for Junction Creek, originally in 1980, to the Timmins and 100-year flood levels.
  - In the absence of floodplain mapping, flood hazards are estimated based on site conditions. Typically, the extent of the flood hazard is estimated at 1.2 m above the bankfull or high-water elevation.
- **Erosion hazard mapping:** Currently, erosion hazards are evaluated based on the general guidance from the MNRF for confined and unconfined systems.

### Water Control Structure

- **Kelly Lake Weir:** Owned by Conservation Sudbury to manage water levels in Kelly Lake, this concrete weir is about 18.3m long and 1.22 m high and is located within Fielding Park. It marks the boundary between the Upper Junction Creek and Lower Junction Creek subwatersheds.

### Drinking Water Source Protection

- There are no municipal drinking water sources located within this subwatershed.

### Water Quality Indicators

#### Surface Water:

- The lower half of Junction Creek is characterized as a warm water feature likely due to lack of shade, limited groundwater inputs and an increased urban impact downstream (Junction Creek Subwatershed Study, 2019).
- Historically, Junction Creek was found to be polluted with high levels of nutrients and sulfates, indicative of organic waste inputs (NDCA Watershed Inventory, 1980).
- Elevated sodium was found in 4 stations along Junction Creek, below Kelly Lake, all of which remained well within the aesthetic objective of 200 mg/L (Vermilion River Watershed Surface Water Quality Report, 2017).
- Total phosphorus in Junction Creek was found to be elevated, exceeding provincial water quality objectives by up to four times in some cases. Higher values were also observed in Mud Lake, Simon Lake and McCharles Lake (Vermilion River Watershed Surface Water Quality Report, 2017).
- Metal concentrations, such as nickel, copper, cadmium, and other heavy metals, often exceeded provincial objective in Junction Creek, Mud Lake, Simon Lake and McCharles Lake. (Vermilion River Watershed – Surface Water Quality Report, 2017).
- **Lakes:** The City of Greater Sudbury's Lake Water Quality Program has identified Mud Lake, Simon Lake and McCharles Lake, as eutrophic lakes. This data is supported by data collected through the volunteer-based Lake Partner Program (MECP).

**Groundwater:** There are currently no known sources of groundwater data within this subwatershed.

## Significant Features

- There are no provincial parks, conservation reserves or ANSI ecological areas of interest.
- There is one identified Great Blue Heron nesting site/colony.
- Candidate Provincial ANSI identified in the CGS OP are:
  - Lively-Elsie Mountain Formation
  - Naughton A – Pecors Formation
  - Naughton B – Ramsey Lake Formation

## Management and Stewardship

- **Wahnapitae First Nation** and **Atikameksheng Anishnawbek First Nation**: Their traditional territories include the area within this subwatershed. They are land holders of the area and, as such, are stewards of the land.
- **Junction Creek Stewardship Committee**: Has collected a variety of biological data, including angling surveys, benthic surveys and amphibian surveys.
- **City of Greater Sudbury Regreening Program and VETAC**: The City of Greater Sudbury's regreening program has completed regreening work on 13.8 km<sup>2</sup> (14.2 %) of this subwatershed.
- **Simon Lake Community Stewardship Group**

## Data available

- **Provincial Stream Water Quality Monitoring Network**: Conservation Sudbury, in partnership with the Ministry of Environment, Conservation and Parks, has collected surface water quality at one site within this subwatershed, located just downstream of the mouth of Kelly Lake. This site acts as a good baseline for the water quality as it leaves the Upper Junction Creek subwatershed and flows into the Lower Junction Creek subwatershed.
  - Past PWQMN sites included Meatbird Creek (Golf Course Rd), Meatbird Creek (Hwy 17 south of Lively), Meatbird Creek (Old Soo Rd), McCharles Lake
- **Water Survey of Canada** – Active Stream Gauging Stations monitoring water level and discharge:
  - Junction Creek below Kelly Lake – St. 02CF012 – active 1958-1987, 2006-present
- **Conservation Sudbury** – Active Gauging Station monitoring water level at Simon Lake
- **The Vermilion River Stewardship** group funded the collection of water quality samples from 27 sites within the Vermilion River watershed between 2013 and 2015, 6 of which were located within the Lower Junction Creek subwatershed.
- **City of Greater Sudbury**: The Lake Water Quality Program collects spring total phosphorus data from Mud Lake, Simon Lake and McCharles Lake.
- **Lake Partner Program**: Mud Lake, Simon Lake and McCharles Lake have been sampled for total phosphorus and occasionally secchi depth as part of this provincially run, volunteer-based program.

- **Vale** has several groundwater wells and surface water monitoring locations within this subwatershed.

### **Supporting Documents**

Vale, **Vale Sudbury Update**, April 2024.

City of Greater Sudbury, **Junction Creek Subwatershed Study and Stormwater Master Plan**, December 2019.

Conservation Sudbury, **Vermilion River Watershed Surface Water Quality Report on Current Conditions**, March 2017.

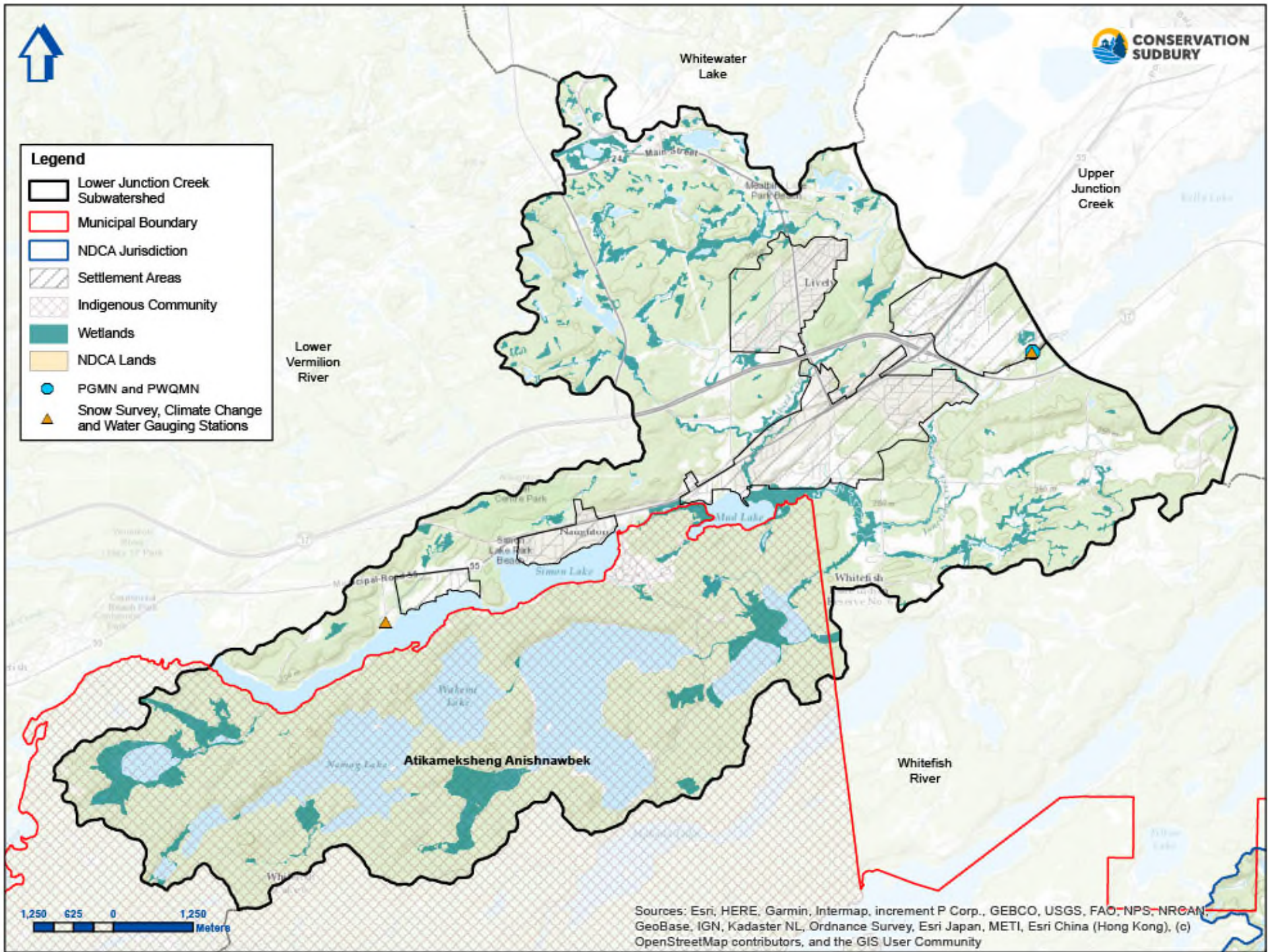
Kilborn Ltd, **Flood Plain Mapping of Junction Creek** - Tech Report & Summary Report, 1980

Nickel District Conservation Authority, **NDCA Watershed Inventory**, September 1980.



**Legend**

- Lower Junction Creek Subwatershed
- Municipal Boundary
- NDCA Jurisdiction
- Settlement Areas
- Indigenous Community
- Wetlands
- NDCA Lands
- PGMN and PWQMN
- Snow Survey, Climate Change and Water Gauging Stations



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community