2.6 Whitson River Subwatershed

General Description

- **Total Area**: 334.3 km^2

- **Drainage**: The Whitson River is a main tributary to the Vermilion River. The headwaters of the Whitson River originate in the townships of Garson and Capreol and flow in a westerly direction through the communities of Hanmer, Val Caron, Blezard Valley and Chelmsford. The river has a main channel length of 70.7 km, dropping from 350.3 m to 257.6 m, with a channel slope of 1.31 m/km causing the river to meander significantly. It is joined by numerous lakes, tributaries, and wetlands throughout.

- **Topography**: The subwatershed has a mean elevation of 295.6 m.a.s.l with a maximum elevation of 377.6 m.a.s.l. and is characterized by 2 distinct areas: a flat area, known as the Valley, and a hilly area, found mainly along the subwatershed boundary. The flat area, which covers the Valley East area, is home to some of the deepest overburden deposits in the city and makes up some of the only agricultural lands available to the Sudbury Area.

- **Geology**:
  - **Bedrock Geology:** The Sudbury Igneous Complex makes up a large portion of the southeast side of the subwatershed, through Blezard and Garson townships. The largest portion of the subwatershed, to the north and east falls within the valley of the Sudbury Structure, which is underlain with Precambrian bedrock of the Superior Province.
  - **Quaternary Geology:** The main formation, within the valley of the Sudbury Basin, is made up of glaciolacustrine deposits of silt, clay, sand, gravelly sand and gravel. A small area of glaciofluvial outwash deposits is present near the northeastern and eastern borders. The remainder is bedrock, exposed or covered by a thin layer of drift.
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- **Soils:** The surface substrates present within this subwatershed are numerous and variable throughout. The flat valley area is almost entirely of glacial origin, with large areas of sandy loam and fine sandy loam changing to silty loam moving westward. Stable bedrock is found along the southern range of most of the subwatershed, with pockets of clays, organic soils, gravelly sandy loams, loams and sands as well.

- **Groundwater:** A huge sub-surface reservoir, covering the entire Valley, makes up a vital part of this drainage system. Groundwater flow within the Valley is southwesterly, exiting the Valley as surface water flow into the Vermilion River. Because of the size and nature of this aquifer, almost the entirety of this subwatershed is identified as both a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer (Source Protection Plan, 2014).

- **Land Cover :**
  - Forest covers an area of 125.8 km^2, 37.6 % of the subwatershed.
  - Agricultural land covers an area of 68.2 km^2, 20.4 % of the subwatershed.
  - Wetlands cover an area of 54.8 km^2, 16.4 % of the subwatershed.
  - Community/Infrastructure covers 43.6 km^2, 13.0 % of the subwatershed.
  - Exposed bedrock covers an area of 28.6 km^2, 8.5 % of the subwatershed.
  - Lakes cover an area of 9.46 km^2, 2.8 % of the subwatershed.

- **Land Use Type:**
  - **Zoning:** 318.4 km^2 (95.2%) of this subwatershed is subject to the City of Greater Sudbury's Zoning By-laws. Of that area, 171.2km^2 (53.8 %) is zoned rural, 53.8km^2 (16.9%) is agricultural, 50.6 km^2 (15.9%) is industrial, 18.1 km^2 (5.7%) is park land and 14.6km^2 (4.6%) is residential. The remainder are small areas designated as future development, commercial, open space and institutional.

Indigenous Communities and Traditional Territories

- This subwatersheds falls within the Robinson-Huron Treaty Area #61, of 1850. It also lies within the traditional territory of both the Wahnapitae First Nation and the Atikameksheng Anishnawbek First Nation.

Development Pressure

Overall: High. This subwatershed has most of the agriculturally viable lands of the Sudbury area. As a result, most of its lands are covered by a patchwork of agricultural fields. It also houses several urban and rural developments throughout.

- **Settlement Area:** 28.1 km^2 (8.4%) of the subwatershed is identified as settlement area and includes the communities of Valley East (18.2 km^2), Chelmsford (6.8 km^2), McCreigh Heights (1.43 km^2), Old Skead Rd. (0.92 km^2), Blezard (0.52 km^2), Azilda (0.06 km^2) and Falconbridge (0.05 km^2).
  - The city's Official Plan has designated an area within this subwatershed, known as the 'Urban Expansion Reserve', to support future urban growth.
- **Municipal Wastewater Facilities:** The Valley East Wastewater Treatment Plant, Azilda Wastewater Treatment Plant and the Chelmsford Wastewater Treatment Plant are all within this subwatershed.
- **Forestry:** Located within the Sudbury Forest, this subwatershed has no areas identified for harvest in the 2020-2030 Sudbury Forest Management Plan.
- **Aggregates:** There are currently 20 active and 2 inactive aggregate operations, covering a combined area of 6.5 $km^{2.}$

- **Mining:**
  - Currently there are no active producing mines.
    - In July of 2024, Vale Base Metals announced plans to operate an open pit mine at the site of the old Stobie Mine.
  - Within the last year, there has been no active exploration.
  - There are currently no active Mining Plans and Permits registered to this subwatershed.
  - Historically, there were 8 producing mines that operated in this subwatershed: Thayer-Lindsley Mine, Blezard Mine, Mound Nickel Mine, Stobie Mine, Frood-Stobie Mine, Little Stobie Mine, Errington Mine and Errington Mine No. 3.

Recreational Use

- The natural and undeveloped areas of this subwatershed are frequently used for hiking, fishing, hunting, blueberry picking, trail-riding and other recreational activities. There are several groomed snowmobile trails within this subwatershed, managed by the Valley Trail Masters Snowmobile Club.
- There are several municipal parks and groomed trails, including Langdon Park, a Rainbow Routes walking trail on Conservation Sudbury owned land.
- There are 2 operating golf courses in the area: Chelmsford Golf Course and Monte Vista Golf
- Kalmo Beach is a municipal beach, located on Whitson Lake.

Water use

- There are currently 20 active Permits to Take Water within this subwatershed, held by Vale, City of Greater Sudbury and the 2 golf courses.

Notable Waterbodies

- **Whitson Lake**: located in Blezard township, Whitson Lake measures 473.4 ha and has a maximum depth of 17m. The lake has 40 permanent and 21 seasonal residents.
- A few smaller lakes are also present within this subwatershed:
  - **McCrea Lake** - located in Blezard township, it covers an area of 15.7 ha in size and has a maximum depth of 4m. The lake has 84 permanent residents and no seasonal residents.
  - **Garson Lake** – located in Garson township, it covers an area of 127 ha and has no permanent or seasonal residents.

Previously Identified Management Issues

- **Erosion:** In the NDCA's 1980 watershed inventory, Whitson River was found to have many sites where erosion has taken place.
  - Severe erosion damage was identified along the west bank of the Whitson River in the stretch south of Main St., Chelmsford and erosion protection work was recommended for this area. (Flood Protection – Whitson River, Chelmsford, 1992).

- **Flooding:** The Whitson River subwatershed was noted to have extensive flooding in past reports, a situation typical of areas with glacial lake origins, low conveyance characteristics and a flat topography along the watercourse. This has been observed by significant flooding events over the years, often linked to the spring freshet.
    - In Chelmsford, an area prone to flooding along the Whitson River south of Main St. was identified, most notably during the spring of 1985, resulting in the construction of an earth berm to help protect the area from future flooding events.
- **Water Quantity:** In the 2014 Source Protection Plan Assessment Report, a significant water quantity risk was identified for the Valley Groundwater System. "Analysis of the Valley Wells concluded that there would be sufficient capacity to service the population growth to the year 2031; however, an additional 432 m^3/day would be required to service growth to 2041."

Drinking Water Source Protection

- The Valley Well Supply water system is sourced from groundwater. This aquifer is characterized as a non-GUDI, shallow, sand and gravel aquifer. There are 10 municipal wells located within the Whitson River subwatershed (and 3 more near Capreol) that supply water to the communities of Azilda, Blezard Valley, Capreol, Chelmsford, Hanmer, McCrea Heights, Val Therese, Val Caron, and portions of the rural community that have water servicing only.
    - Because of the size and nature of this aquifer, almost the entirety of this subwatershed is identified as both a Significant Groundwater Recharge Area and a Highly Vulnerable Aquifer.
- The entirety of both subwatersheds fall within the headwaters of the Vermilion River Water intake, a municipal drinking water source. As such, all watercourses within this subwatershed and the lands immediately around them are classified as Intake Protection Zone 3 as the water ultimately drains towards the Vermilion River drinking water intake.

Water Control Structure

- The **Whitson Lake Dam** is owned and operated by Vale and is located at the north end of the lake, where it discharges to the Whitson 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.

- **Floodline Mapping:** Completed for the Whitson River in 1978. In 1988 a new study was conducted specific to the Whitson River reaches and tributaries extending through Val Caron

and Chelmsford. Conservation Sudbury is currently in the process of updating the floodplain maps for the entire Whitson River subwatershed.
    - 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 bank full 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 Quality Indicators

Surface Water:

- Historically, the Whitson River has received sewage effluent from the municipal sewage treatment plants in Azilda, Chelmsford and ValCaron. No industrial effluent has been discharged into the Whitson River, but calcium levels, in excess of the provincial objectives were noted for the river (NDCA Watershed Inventory, 1980).
- Long-term data collected through the PWQMN program (see Data available section) at 2 locations along the Whitson River, indicate that concentrations of metals are regularly above provincial objectives for nickel and iron, and occasionally for copper as well as total phosphorus.
- The City of Greater Sudbury's Lake Water Quality group has classified McCrea Lake as mesotrophic, while Whitson Lake is oligotrophic.

Groundwater:

- Several of the Valley wells have higher than average levels of water quality parameters and other operational concerns. These include higher than average sodium levels at Pharand Well, elevated turbidity level at Michelle Well and elevated levels of iron at Kenneth and Linden Wells (CGS Water and Wastewater Master Plan, 2017)

Significant Features

- The Garson Forest Conservation Reserve occupies 2.07 km^2 on the east end of the subwatershed.
- Wildlife Values:
    - There is 1 moose related wildlife value area, covering 0.09 km^2.
    - There is 1 Great Blue Heron nesting site/heronry.
- Candidate Provincial ANSI identified in the CGS OP are:
    - Sudbury A- Norite, Sudbury B-Norite and McCrea Heights South Range Norite (Earth Science ANSI)
- Candidate Regional or Local ANSIs identified in the CGS OP are:
    - Chelmsford – Chelmsford Formation (Earth Science ANSI)
- Sites of Geological Interest identified in the CGS OP are:
    - Bailey Corners Glacial Striae

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.
- **City of Greater Sudbury Regreening Program and VETAC**: The CGS's regreening program has completed regreening work on 35.1 km^2 (10.5%) of this subwatershed.
- **Ministry of Environment, Conservation and Parks:** Conservation Reserves are managed by MECP.

Data available

- **Valley Groundwater Monitoring:** In 2012, the City of Greater Sudbury (CGS) initiated a groundwater monitoring program for the Valley drinking water system made up of 12 recommissioned monitoring wells and 2 newly drilled wells. These wells are monitored continuously for water quantity and annually for water quality, by Conservation Sudbury, on behalf of CGS.
- **City of Greater Sudbury – Water and Wastewate**r: Raw water and treated water from the Valley Drinking Water System are sampled and tested regularly, as required by O. Reg. 170/03.
- **Provincial Groundwater Monitoring Network:** Conservation Sudbury, in partnership with the Ministry of Environment, Conservation and Parks, have collected water quantity and quality data on 3 wells. The Hanmer well has been monitored since 2006, while the two Val Caron wells have been monitored since 2012.
- **Climate Change Station:** Additionally, the Val Caron PGMN station is also home to a 'climate change monitoring station' where environmental data is collected on air temperature and precipitation.
- **Provincial Stream Water Quality Monitoring Network:** Conservation Sudbury, in partnership with the Ministry of Environment, Conservation and Parks, have collected surface water quality at 2 locations on the Whitson River, since 1970 (Whitson River, Val Caron) and 1972 (Whitson River, Stobie Dam).
- **Water Survey of Canada** – Active Stream Gauging Stations monitoring water level and discharge:
    - Whitson River at Val Caron (Station 02CF008) 1985-1987, 2005-present
    - Whitson River at Chelmsford (Station 02CF007) 1985-1987, 2005-present
- **City of Greater Sudbury:** Lake Water Quality Program collects spring total phosphorus data from Whitson Lake and McCrea Lake.
- **Public Health Sudbury and District:** Collects water samples from public beaches in the Sudbury area to identify any health hazards.

Supporting Documents

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

City of Greater Sudbury, **Water and Wastewater Master Plan – Existing Water Systems,** 2017.

Conservation Sudbury, **Greater Sudbury Source Protection Area - Assessment Report**, September 2, 2014.

S. A. Kirchhefer Ltd. **Engineering Report on Drainage Analysis - Hanmer Area**, September 2006.

S. A. Kirchhefer Ltd, **Flood Protection – Whitson River Chelmsford**, December 1992.

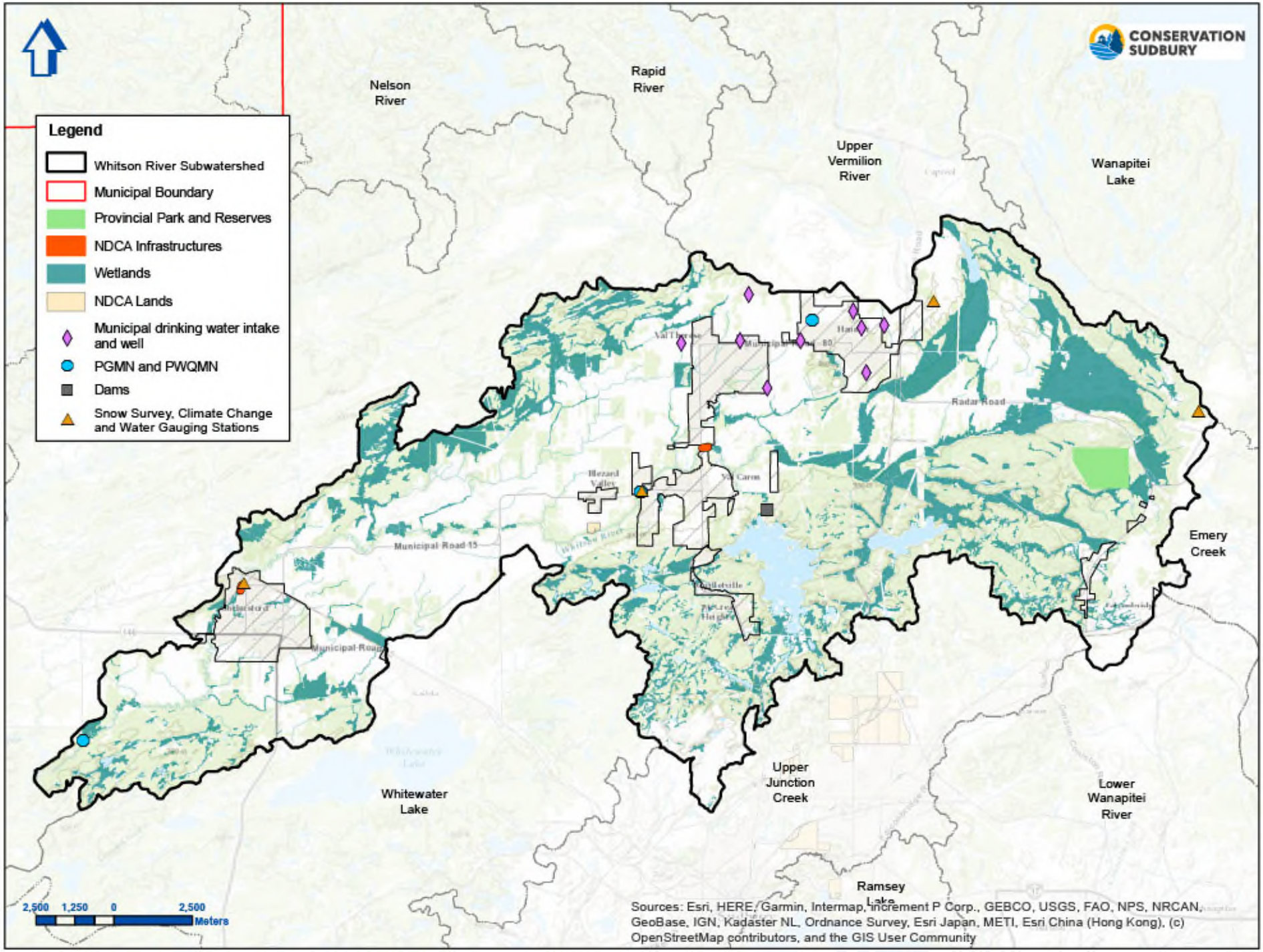
S. A. Kirchhefer Ltd, **Whitson River Floodline Mapping – Technical Report on the Hydraulic Analysis**, June 1988.

Dennis Consultants Ltd. **Whitson River Watershed Management Study**, April 1982.

S. A. Kirchhefer Ltd, **Val Caron Tributary – Flood Plain Analysis**, February 1981.

Kilborn Engineering Ltd, **Flood Plain Mapping - Whitson River**, July 1978.

Kilborn Engineering Ltd, **Report on Floodline Mapping in the Whitson Valley**, March 1974.


CONSERVATION SUDBURY
Legend
Whitson River Subwatershed
Municipal Boundary
Provincial Park and Reserves
NDCA Infrastructures
Wetlands
NDCA Lands
Municipal drinking water intake and well
PGMN and PWQMN
Dams
Snow Survey, Climate Change and Water Gauging Stations
Nelson River
Rapid River
Upper Vermilion River
Wanapitei Lake
Emery Creek
Whitewater Lake
Upper Junction Creek
Lower Wanapitei River
Ramsey Lake
Municipal Road 15
Radar Road
2,500 1,250 0 2,500
Meters
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