MWNS Read Me

Updated: 2026-02-06

Please review this Read Me for important details on data nuances and quality control. It should be used together with the Summary document when working with this dataset.

Water Sensor Data

Water Flow Data

The water flow data set for the Multi-Watershed Nutrient Study are provided in 5-minute flow intervals. These values were determined by recording stage (water level) readings by both Water Survey of Canada (WSC) using a SonTek FlowTracker, and Ministry of the Environment, Conservation and Parks (MECP) using a Sutron Accubar bubbler at all MWNS sites except Garvey Glenn. The Larches Creek site data prior to late 2017 was collected using a Solinst Levelogger before WSC monitoring began. A stage-discharge rating curve was developed by WSC for these sites and was used to calculate 5-minute discharge (water flow) values from stage readings.

Water level readings can be requested at high frequency directly from WSC.

WSC values are provided where possible, with MECP derived flow values included to fill data gaps as appropriate. Data source and Quality Control (QC) level are identified in each data file under the QualityControlLevelID field. The values are as follows:

> 11: Data provided by Water Survey of Canada, approval level 4. Best available data

> 12: Value derived based on WSC rating curve and level values collected by MECP using Sutron Accubar bubbler.

> 2: Specific to Larches Creek site. Level was monitored prior to 2018-04-11 18:55 using a standalone level logger in the stream. These level data then had the WSC-generated stage-discharge rating curve applied to estimate discharge.

> 3: Specific to Garvey Glen site. The Garvey Glen site's level monitoring and stage-discharge rating curve were developed by the Maitland Valley Conservation Authority and have been shared with MECP as a courtesy for including with this dataset. Garvey Glen stage (level) data were collected using a Solinst Levelogger. Flow measurements were collected using a Marsh-McBirney Flo Mate meter and top set wading rod. The manual measurements were used to calculate discharge and develop and maintain a stage-discharge rating curve.

Data provided are the highest quality available. Level data collected by MECP using the Sutron Accubar was checked against the WSC level values regularly to confirm alignment.

The Solinst Levelogger at Larches Creek was not calibrated as frequently and is thus more prone to error/drift. The stage-discharge rating curve calculated by WSC from late 2017 onwards was used to back-calculate the flow using the Solinst Levelogger data. These derived products require scientific and technical interpretation and may include multiple-sensor data.

Turbidity Data

Turbidity data was collected at 15-minute intervals using an FTS DTS-12 logger. The turbidity data went through extensive QC using the Turbidity Cleaner, a sensor-data quality assurance software, developed in-house at the MECP (Yousif et al, 2022). Program code available here: https://github.com/mayousif/Turbidity-Cleaner

Turbidity sensor data are marked with the following QualityControlLevelID:

> 4: Knowledge products that require researcher driven scientific interpretation and multidisciplinary data integration and include model-based interpretation using other data and/or strong prior assumptions. An example is percentages of old or new water in a hydrograph inferred from an isotope analysis.

Reference for the Turbidity Cleaner methodology and modeling is provided below:

Yousif, M., Burdett, H., Wellen, C., Mandal, S., Arabian, G., Smith, D., & Sorichetti, R. J. (2022). An innovative approach to correct data from in-situ turbidity sensors for surface water monitoring. Environmental Modelling & Software, 155, 105461 https://doi.org/10.1016/j.envsoft.2022.105461

Turbidity Data are provided until the furthest date that data could be QCed.

Water Temperature

Water temperature data was collected using an FTS DTS-12 logger, The data has not been quality controlled and is provided in raw format.

Meteorological Data

Meteorological data at 8 monitoring sites were collected using Onset HOBO data loggers.

Most parameters have not been quality controlled and are provided in raw format.

Soil moisture data has been QCed at a high level and anomalies have been removed. Readings of 0 have been removed that indicate errors in sensor readings. Data has been marked with a QualityControlID of 1 to indicate the QC.

Some soil moisture readings show negative numbers. The sensor uses dielectric constant to calculate the volumetric water content. Negative dielectric constant readings are typically caused by poor

contact between the sensor and the soil, which creates air gaps, or by using a standard calibration on soils with a high organic content or that are extremely dry.

Precipitation Data was QCed in certain instances where clear data anomalies occurred. Data has been marked with a QualityControlID of 1 to indicate the QC.

Water Quality Data

Water quality data were collected through a combination of a temperature-controlled automated sampled and through grab samples.

The autosampler was equipped with 12 or 24 bottles and progressively filled during high-flow events.

Additional grab samples were collected throughout the study period, primarily during antecedent or base-flow conditions, either pumped directly from the automated sampler or obtained using a sampling pole, particularly during summer low-flow conditions.

After collection, each bottle was capped, shaken, and rapidly decanted into sample containers for laboratory submission. A portion of each sample was filtered through a 0.45 μm nylon filter for dissolved parameters. Filtered data are indicated with a Y in the FILTERED_SAMPLE column.

Blank samples and replicate samples were included in the sampling process to QC laboratory results. The blank and replicate sample analytical results have been removed from the MWNS Open Data water quality dataset for clarity but can be provided on request.

Microbiology samples were also taken at certain sites at opportune times. These samples can be found in the dataset provided. Method variance holding time was permitted, extended from 48 hr to a 60 hr.

Uncertainty and negative concentrations may be found in the data. Concentrations by definition can only be zero or greater. However, reported analytical results are not "true" concentrations but estimates of concentrations that include analytical error. The error (i.e. uncertainty) is larger (in relative terms) when the analyte concentration is closer to zero. Metal results are difficult to interpret where the uncertainty is large relative to the concentration. In repeated measurements at zero concentration, approximately half of the responses will be above the average and half below the average. Negative results generally imply that concentrations are below analytical detection limits.

Method detection limits can be found in the summary document.

Additional QC has been conducted to correct for human errors (ex. incorrect sample-date time on field forms). Laboratory value qualifiers and remark codes have also been provided in the dataset.