

# Grand River Conservation Authority

**Report number:** GM-12-23-103

**Date:** December 6, 2023

**To:** Members of the Grand River Conservation Authority

**Subject:** Current Watershed Conditions as of December 6, 2023

---

## Recommendation:

THAT Report Number GM-12-23-103 – Current Watershed Conditions as of December 6, 2023 be received as information.

## Summary:

Following a dry September, precipitation in October and November was closer to average. Temperatures were slightly cooler than average in November and warmer in December so far. Several rain events occurred throughout October and November, with the total depth generally lower than 25 mm. The temperatures across the watershed remained slightly below the long-term average throughout the month of November and observed precipitation levels have been around 70 percent of the long-term average. Major reservoirs are all within their normal operating levels and downstream low flow targets are being consistently met.

The Low Water Response Team removed the watershed from a low water condition on September 13, 2023 but conditions have been very dry during the months of September, October and November. As of December 5, 3-month indicators for precipitation show several areas of the watershed are below the threshold for Level 1 low water condition.

Lake Erie continues to be above the long-term average, and between the levels in 2021 and 2022. The long-term forecast over the next three months is for above normal temperatures and near normal precipitation.

## Report:

### Precipitation

Following a significantly dry September, watershed has seen slightly higher precipitation levels through the months of October and November, but the observed rainfall levels are still below long-term averages. The watershed received around 70 percent of its long-term average rainfall in the Month of November, ranging from around 54 percent in the middle portion of the watershed to around 84 percent in Bellwood area, as shown in Table 1. This may potentially be the result of the El Nino phenomena observed this fall.

Trends in precipitation, as presented in Table 2, show that during the past 3 months, the watershed has experienced dryer than normal conditions, mostly due to significantly dry September, with precipitation levels ranging from around 70 percent in Cambridge to 73 percent in Bellwood area with an overall average of around 59 percent. Over the mid-term, the watershed shows signs of recovery from dry conditions in 2022 with above normal precipitation at most locations. Over the long term, the precipitation levels appear to approach normal long-term averages. A visual representation of these trends for the Shand climate station is provided in Figure 1.

**Table 1:** Current monthly precipitation for climate stations across the watershed up to November 30, 2023

Climate Station	Current Month Precipitation (millimeters)	Long Term Average Precipitation (millimeters)	Percentage of Long Term Average Percent (%)
Shand	71.5	84.9	84%
Conestogo	67.8	95.1	71%
Guelph	54.5	80.4	68%
Luther	65.6	92.5	71%
Woolwich	52.4	69.7	75%
Laurel	47.6	83.5	57%
Shades	41.7	77.7	54%
Brantford	50.2	73.6	68%

**Table 2:** Precipitation trends as a percentage (%) of the long-term average over the last 18 months

Climate Station	Last Month	Last 3 Months	Last 6 Months	Last 12 Months	Last 18 Months
Shand	92%	73%	104%	109%	94%
Conestogo	79%	64%	102%	105%	94%
Guelph	74%	56%	98%	107%	90%
Luther	78%	57%	100%	113%	99%
Woolwich	78%	67%	106%	106%	90%
Laurel	96%	56%	88%	80%	84%
Shades	69%	49%	104%	108%	90%
Brantford	79%	51%	93%	109%	91%

### Air Temperatures

November was a typical month with respect to temperature across the watershed. At the beginning of the month, multiple days with maximum temperatures exceeding 10 C were observed across the watershed. The average temperature across the watershed during the month of November was approximately 0.6 degrees below the long-term average. At the Shand Dam climate station, daily maximum temperatures exceeded 10 degrees Celsius for 7 days during the month of November and daily averages ranged between -6 to 8 degrees Celsius with an average daily temperature of 1.6 degrees Celsius.

The average temperature at the Shand Dam climate station over the first week of December was 0.5 degrees Celsius which is over 3 degrees warmer than the long-term average for the first half of the month of December.

A visual representation of these trends for the Shand climate station is provided in Figure 2.

## **Lake Erie Water Levels**

During November, the average lake level was approximately 0.29 meters above the long-term average. Levels are declining following their seasonal pattern but still remain 0.25 meters above the long-term average in early parts of December. The forecast for Lake Erie is for lake levels to continue to remain above the long-term average over winter and spring months following regular seasonal patterns. Figure 3 shows the range of water levels that are expected over the next six months as well as the observed water levels over the last four years.

## **Reservoir Conditions**

The large reservoirs are generally closer to the top of their normal operating levels for this time of the year, with the exception of Shand dam which is at the middle of normal operating level, mainly due to drier conditions in the fall, specifically September. Flows through the watershed continue to be above the flow augmentation targets.

Reservoirs have been used to augment river flows during the fall. Through Kitchener, augmentation levels dropped from around 40 percent at the beginning of November to less than 10 percent at the end of the month. In Brantford, augmentation levels dropped from around 15 percent in early November to almost zero at the end of the month. On Speed River, augmentation levels dropped from around 25 percent at the beginning of November to almost zero percent at the end of the month. These declines may be attributed to the increase in rainfall in October and November, compared to September. Year to date reservoir levels and operating rule curves are shown in Figures 4 and 5 for the four largest reservoirs.

## **Long Range Forecast**

Environment and Climate Change Canada is forecasting above normal temperatures and closer to normal precipitation for the watershed over the 3 months of December, January and February.

## **Low Water Response**

After observing above normal precipitation during the summer months and observed signs of groundwater recovery in targeted monitoring locations, the watershed was removed from level 1 low water conditions and returned to normal as of September 13, 2023.

The dry conditions over the three months of September, October and November and potential consequences of the El Nino phenomena have resulted in precipitation indicators to point to level 1 low water conditions for the watershed. The low water response team will closely monitor the conditions and assess the watershed's status based on observed precipitation, stream flow and groundwater conditions in first half of December and will likely recommend moving the entire watershed into a Level 1 low water condition based on the 3-month precipitation indicator, reduced stream flow, and increased augmentation levels needed to maintain low flow targets.

## **Flood Preparedness**

Reservoir conditions are being monitored closely and staff continue to hold weekly meetings as part of planning initiatives, dam operations and flood emergency preparedness.

Senior Operators, Duty Officers and Communications staff attended the Incident Management System Training by City of Cambridge on November 14, 15 and 21. This system is used to manage many types of incidents, especially those requiring an emergency response and is used by our municipalities and emergency services (police, fire, paramedics). Staff received two training sessions on November 14 and 15 and participated in a practical exercise on November 21.

The fall 2023 Flood Coordinators Meeting was scheduled for December 5, 2023, and held in-person at the administration office. In addition to information on the Flood Warning system, Trudy Kidd, Operational Meteorologist from Environment Canada, provided a presentation on

climate change and extreme weather in Grand River Watershed. The meeting was well attended and described in a separate board report.

**Financial Implications:**

Not applicable

**Other Department Considerations:**

Not applicable

**Prepared by:**

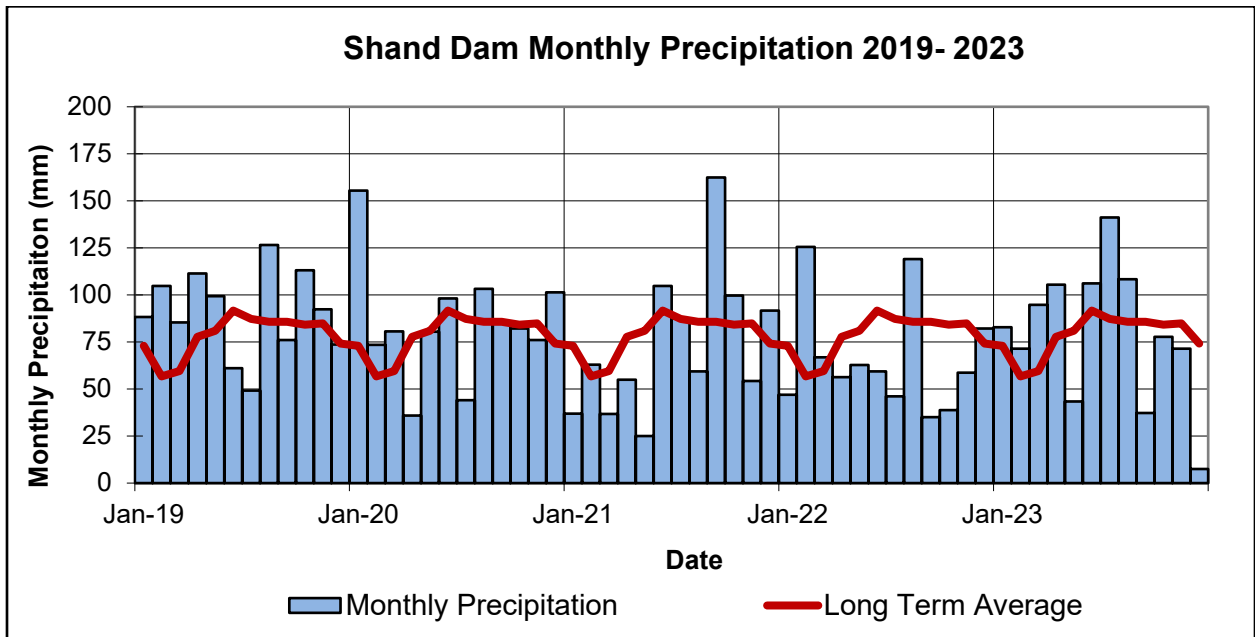
Vahid Taleban, M. Sc., P. Eng.  
Manager of Flood Operations

**Approved by:**

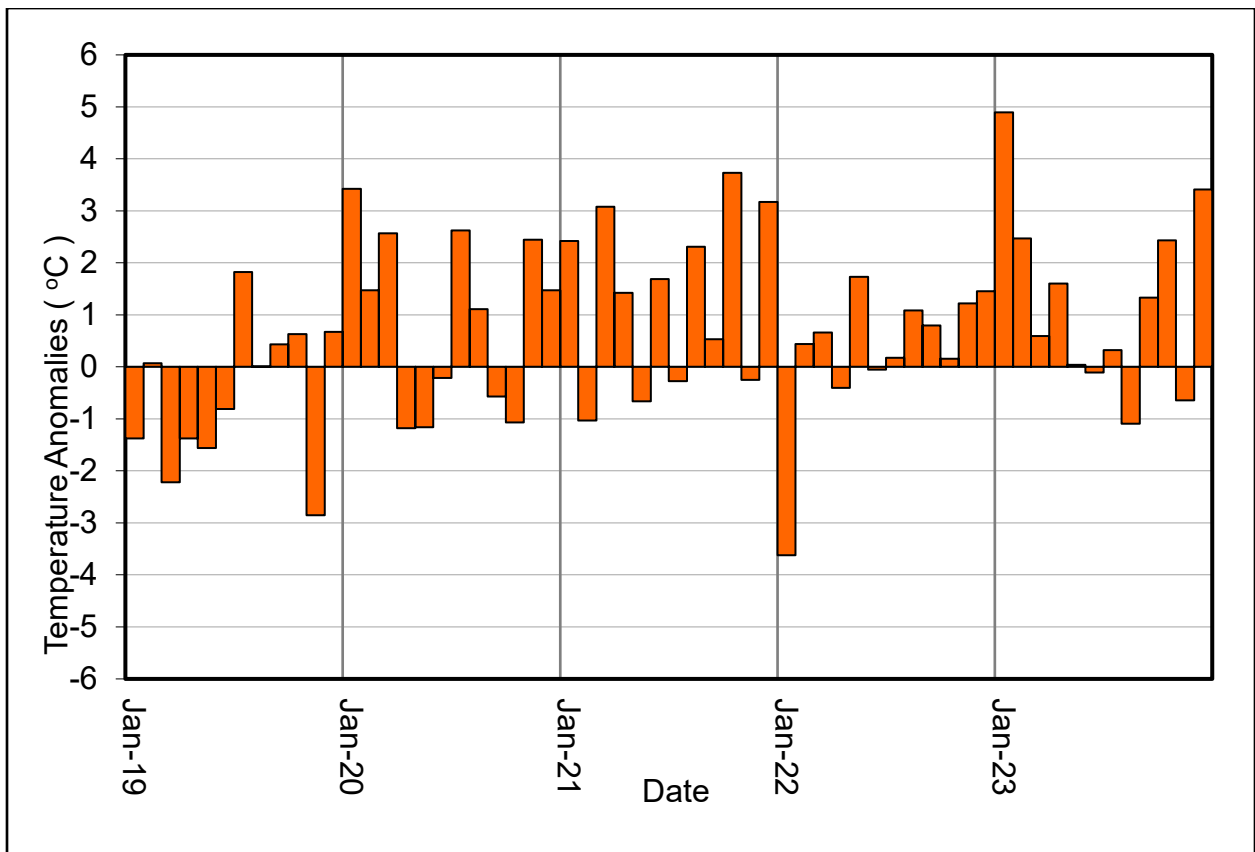
Samantha Lawson  
Chief Administrative Officer

**Figures:**

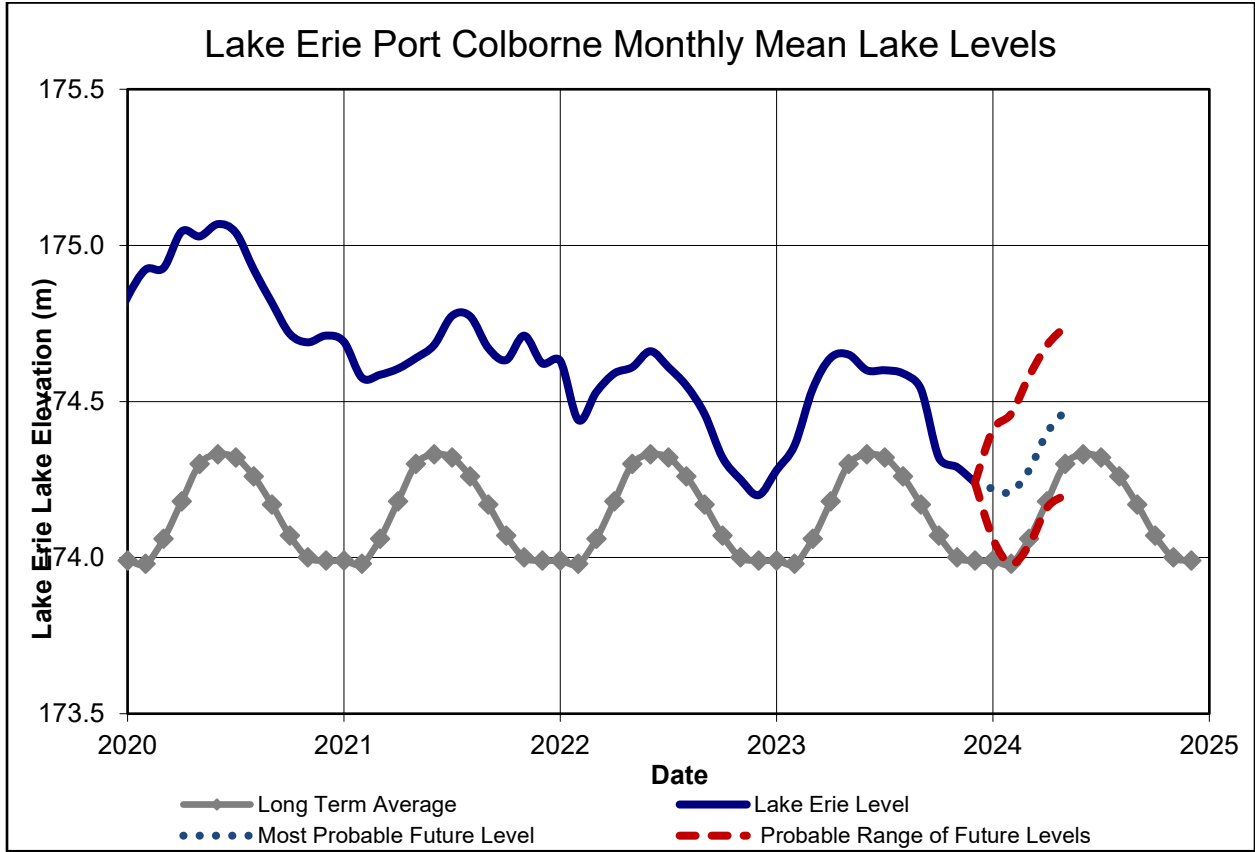
**Figure 1:** Shand Dam Monthly Precipitation 2019 to December 6, 2023



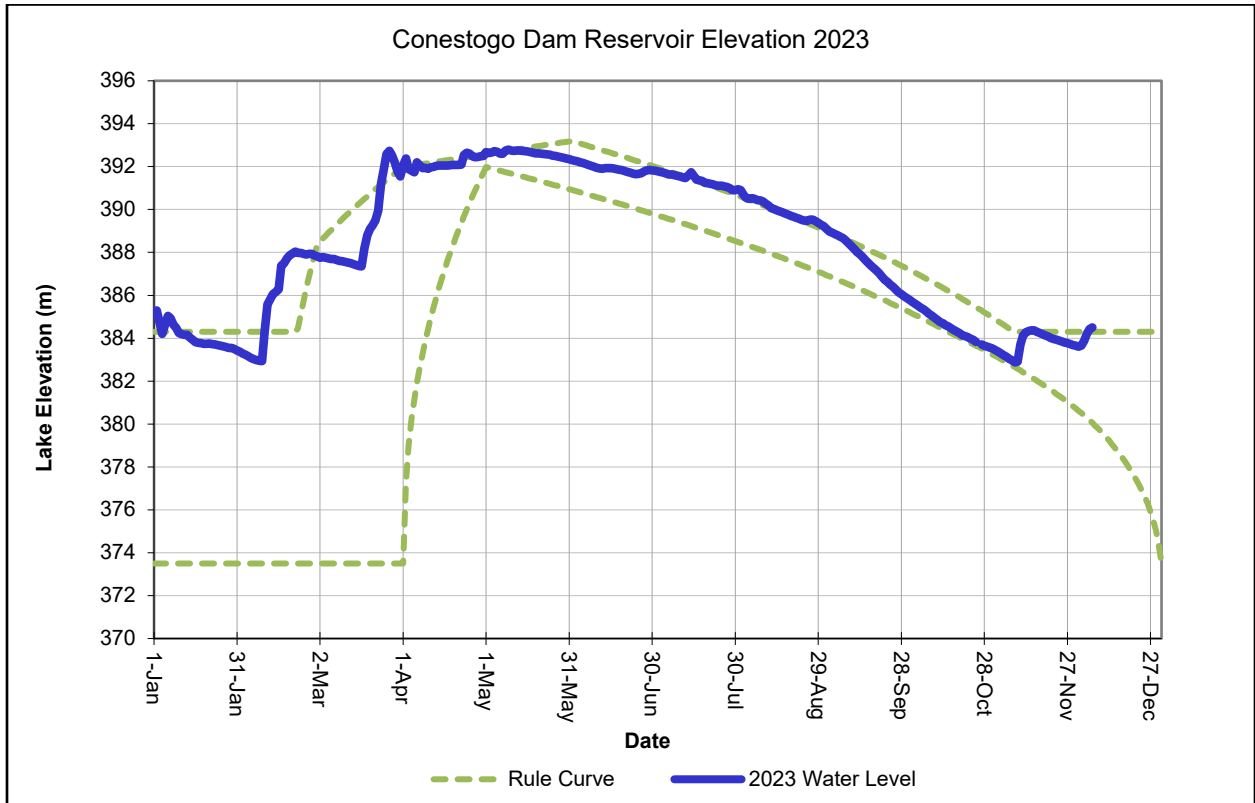
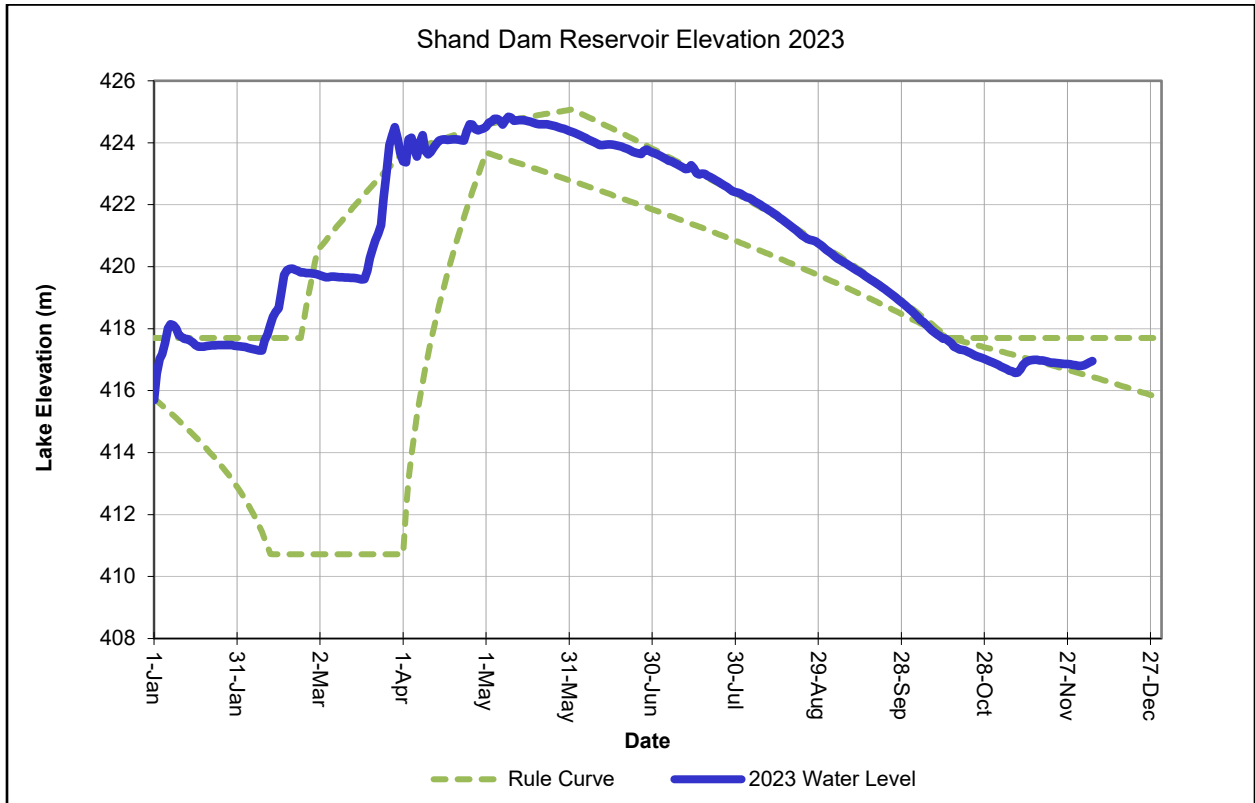
**Figure 2:** Monthly Average Air Temperatures at Shand Dam from 2019 to December 6, 2023



**Figure 3:** Water levels for Lake Erie at Port Colborne



**Figure 4:** Shand and Conestogo Reservoir Elevation Plots for 2023



**Figure 5: Guelph and Luther Reservoir Elevation Charts for 2023**

