

Grand River Conservation Authority

Report number: GM-11-22-94

Date: December 16, 2022

To: Members of the Grand River Conservation Authority

Subject: Current Watershed Conditions as of November 16, 2022

Recommendation:

THAT Report Number GM-11-22-94 – Current Watershed Conditions as of November 16, 2022 be received as information.

Summary:

The watershed continues to be very dry. Over the last 3 months, the watershed has received below 70% of normal precipitation. The last time the fall months were this dry was in 1998. By contrast the extreme southern part of the watershed continues to receive above normal precipitation from large storm systems that pass over Lake Erie. Through the first half of November snow was recorded as much as rain at Shand Dam.

Average air temperatures in October were close to normal across the watershed, but there was a lot of variability on a day to day basis. Daytime high temperatures ranged over 20 degrees, while low temperatures were more moderate. The first half of November was unseasonably warm with an average air temperature 4 degrees above normal. The long term forecast is for temperatures to stay above normal over the next three months.

The large reservoirs continue to be under strain from high augmentation pressures and low inflows, with all but Luther below their normal operating levels. To preserve water in storage and save some water for possible winter augmentation, reservoir discharges have been minimized as much as possible and as a result some low flow targets are not being met at all times. Lake Erie water levels continue to decrease and may start to track near the long term average sometime next year.

Report:

Precipitation

Conditions continue to be very dry. Over the last 3 months, the watershed has received below 70 percent of normal precipitation. The last time the fall months were this dry was in 1998 during the start of a very severe two year dry period.

October was dry everywhere, except the extreme south, and received approximately half of the normal precipitation. By contrast, the rain gauge at Byng Island Conservation Area received 120 percent of normal precipitation. The southern part of the watershed continues to receive above normal precipitation from large storm systems that pass over Lake Erie, while the rest of the watershed is facing one of the driest years in recent memory.

Precipitation in the first half of November is provided in Table 1 for the regular long term climate stations in the watershed. Precipitation ranges between 13 millimeters in Brantford to 34 millimeters at Luther Marsh. The average of the regular climate stations is near half of the normal precipitation for the month. Both rain and snow has been recorded so far, with equal amounts of snow as rain at the Shand Dam climate station.

Table 1: Current monthly precipitation for climate stations across the watershed up to November 16, 2022 including the long term average precipitation for half of November.

Climate Station	Current Month Precipitation (millimetres)	Long Term Average Precipitation (milometers)	Percentage of Long Term Average percent (%)
Shand	25.8	42.4	61%
Conestogo	28.4	47.6	60%
Guelph	15.8	40.2	39%
Luther	33.5	46.2	72%
Woolwich	18.4	34.8	53%
Laurel	19.2	41.8	46%
Shades	21.6	38.9	56%
Brantford	13.1	36.8	36%

Long term trends in precipitation are provided in Table 2. Continued dry conditions since early spring are shown in the long term trends. Over the past three months the watershed received about 68 percent of normal precipitation. Over the past 6 months that amount raises slightly to 72 percent and over the 12 months to 81percent. As the dry period gets longer and longer, the recovery period will also be long to bring the watershed back into normal conditions. A visual representation of these trends for the Shand climate station is also given in Figure 1.

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	46%	75%	70%	85%	92%
Conestogo	46%	88%	81%	88%	96%
Guelph	52%	74%	72%	82%	99%
Luther	62%	72%	72%	87%	94%
Woolwich	54%	73%	69%	79%	86%
Laurel	51%	61%	56%	72%	94%
Shades	61%	68%	62%	74%	100%
Brantford	44%	65%	71%	81%	96%

Air Temperatures

Average air temperatures in October were close to normal across the watershed, but there was lots of variability on a day to day basis. Daytime high temperatures ranged from 3.5 to 24 degrees at Shand Dam, while low temperatures were more moderate and only ranged between -2 and 9.5 degrees.

Temperatures during the first two weeks of November were unseasonably warm. Across the watershed the average temperature was 4 degrees above normal. There was a period with daytime high temperatures over 20 degrees and overnight low temperatures well above freezing. Temperatures in the later part of the first half of the month have dropped back to near seasonal.

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

Lake Erie Water Levels

During October, the average lake level was approximately 0.25 meters above the long-term average, which was approximately 0.3 meters below October 2021. Lake levels continue to decrease. As of November 14th, the average lake level was approximately 174.26 meters, which is about 0.26 meters above the long-term average, but below the average lake level in October.

The long term forecast for Lake Erie varies from an increase to a decline in levels over the next few months. Levels are forecast to stay below high levels in 2020 and may start to track closer to the long term average by early next year. Figure 3 shows the range of water levels that is expected over the next six months as well as the observed water levels over the last three years.

Reservoir Conditions

Dry conditions over the summer and early fall have put strain on the reservoirs; which continue to augment flows downstream while inflows stay low. Only the Luther reservoir remains at a normal operating level. The other large reservoirs including Conestogo, Guelph, Shand and Woolwich are below normal operating levels. Reservoir levels and operating rule curves are shown in Figures 4 and 5 for the four largest reservoirs.

To preserve water in storage reservoir discharges have been minimized as much as possible and as a result some low flow targets are not being met at all times. Augmentation levels decreased this month from a combination of lower discharges and reduced flow targets. By the middle of November, approximately 45 percent of the water in the Grand River through Kitchener was from water stored in the reservoirs, while at Brantford nearly 25 percent of the water was from reservoirs. On the Speed River augmentation accounts for approximately 10 percent of the water downstream of Guelph.

Low Water Response

The Grand River Low Water Response Team did not meet in November, but an update on conditions including low reservoir levels was sent out on November 15th. The watershed continues to be in a Level 2 condition with a request to reduce water use by 20 percent. The watershed will likely stay in a Level 2 condition until reservoir water levels return to normal. The Low Water Response Team will continue to monitor the situation.

The Grand River Low Water Response Team is comprised of representatives from municipalities, agriculture, golf course operators, aggregate operations, water bottlers, and provincial ministries. It meets as needed to carry out the Ontario Low Water Response Program in the Grand River Watershed.

Long Range Forecast

Environment and Climate Change Canada is forecasting above normal temperatures and near normal precipitation for the November to January period.

The winter forecast from the National Oceanic and Atmospheric Administration for the Great Lakes region is for near normal temperatures and above normal precipitation and that La Nina is forecast to continue through the winter period.

Flood Preparedness

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

The fall Flood Coordinators Meeting is scheduled for November 22nd and will be held virtually this year. In addition to information on the Flood Warning system, Mark Robinson from The Weather Network will give a presentation on severe weather in the Grand River Watershed.

Flood personnel continue attending a series of webinars as part of the Ontario Flood Forecasting and Warning committee's training sessions. Topics include forecasting, emergency management, advances in technology and learnings from past floods.

Financial Implications:

Not applicable

Other Department Considerations:

Not applicable

Prepared by:

Stephanie Shifflett, P. Eng.
Water Resources Engineer

Approved by:

Katelyn Lynch, P. Eng.
Manager of Water Infrastructure

Figures:

Figure 1: Shand Dam Monthly Precipitation 2018 to November 16, 2022

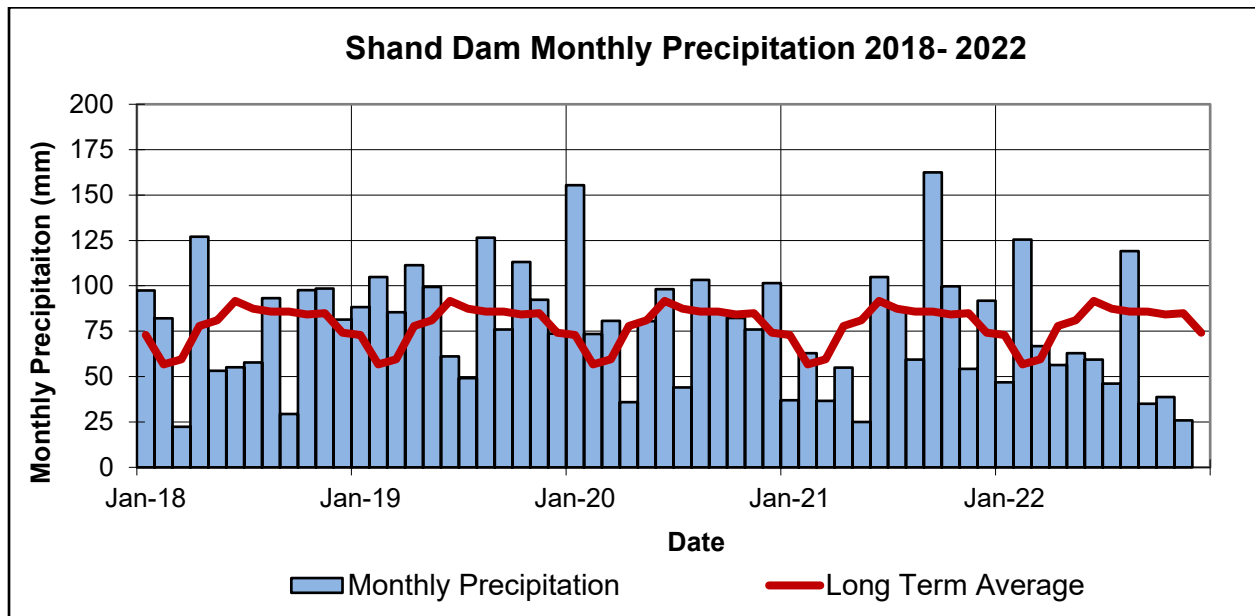


Figure 2: Monthly Average Air Temperatures at Shand Dam from 2018 to November 16, 2022

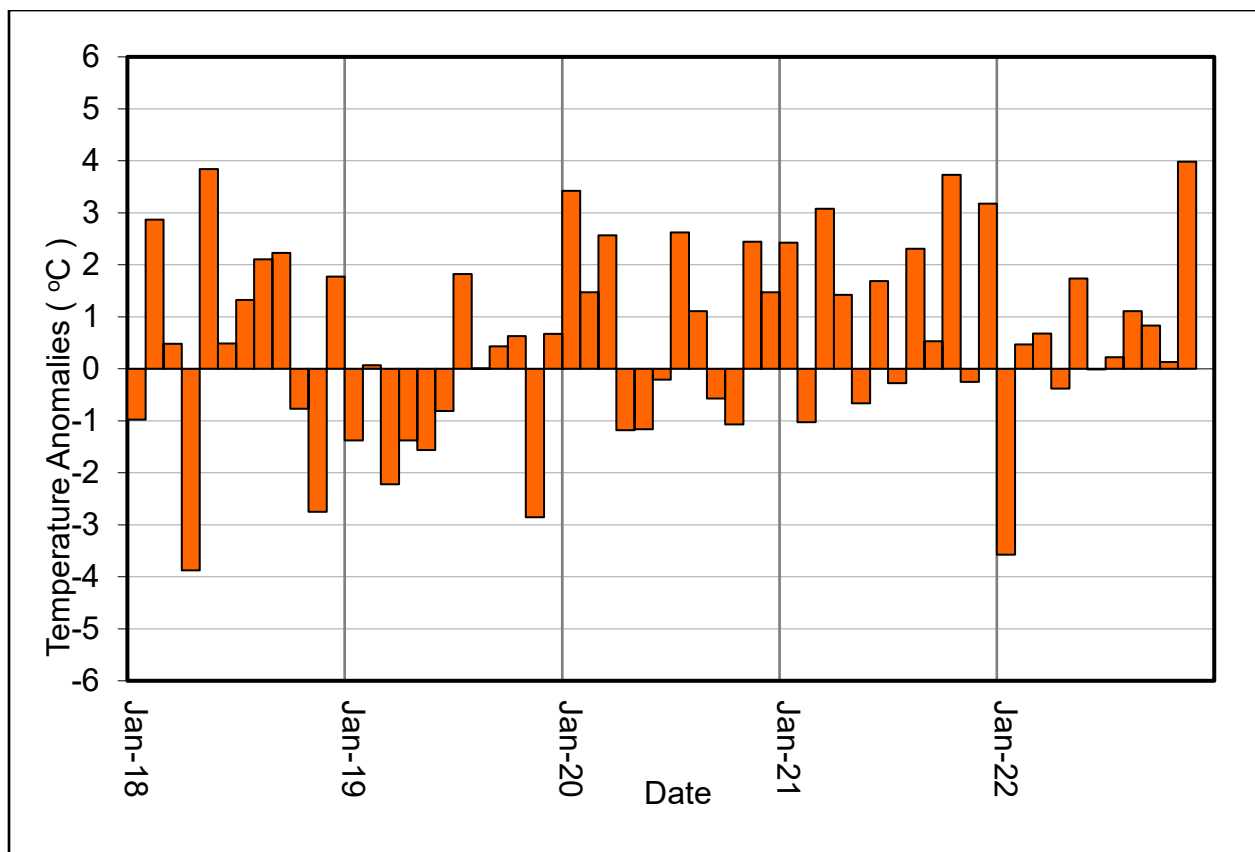


Figure 3: Water levels for Lake Erie at Port Colborne

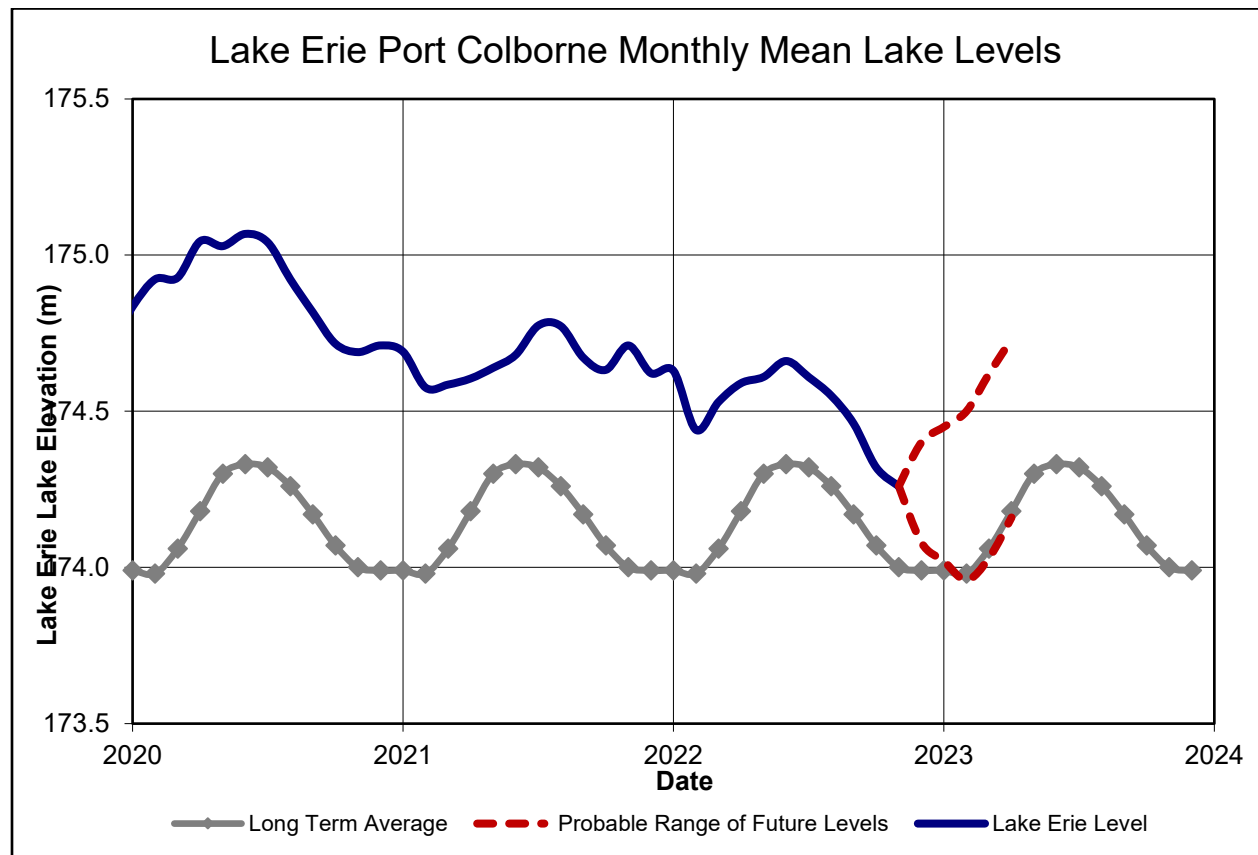


Figure 4: Shand and Conestogo Reservoir Elevation Plots for 2022

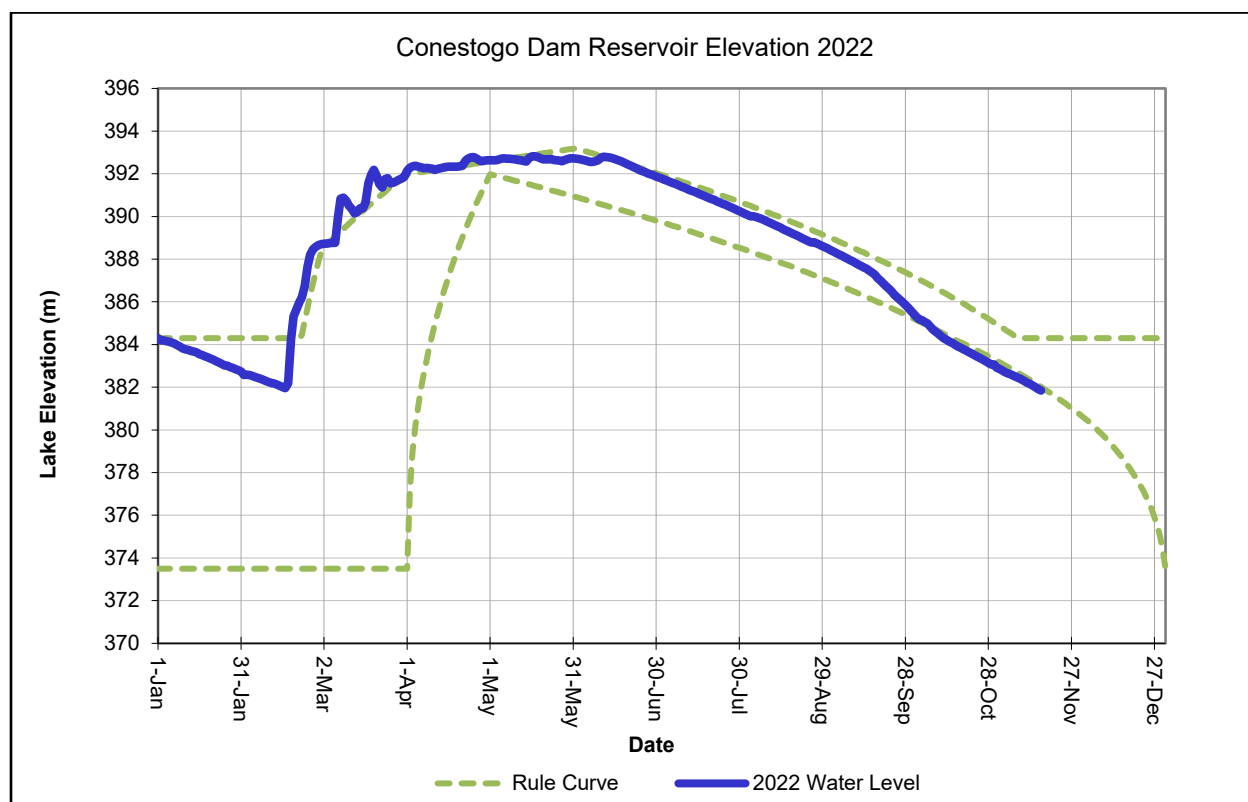
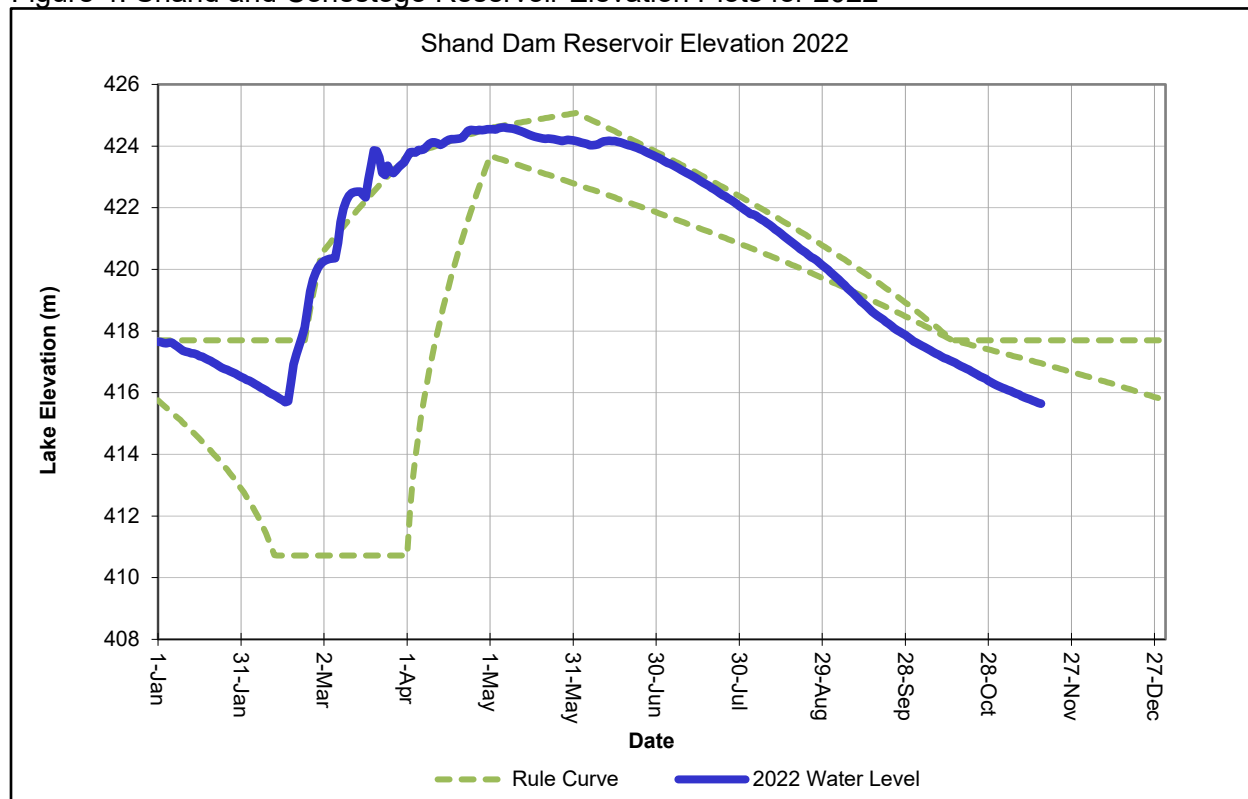


Figure 5: Guelph and Luther Reservoir Elevation Charts for 2022

