

Grand River Conservation Authority

Report number: GM-10-22-82

Date: October 28, 2022

To: Members of the Grand River Conservation Authority

Subject: Current Watershed Conditions as of October 19, 2022

Recommendation:

THAT Report Number GM-10-22-82 – Current Watershed Conditions as of October 19, 2022 be received as information.

Summary:

September was a warm and very dry month. It was the 3rd driest September in the last 30 years. By contrast, the first half of October was cooler and a bit wetter, but still drier than a normal for most of the watershed. The southern tip of the watershed still remains the wettest catching precipitation from storms over Lake Erie.

The large reservoirs continue to be under strain from high augmentation pressures and low inflows, with all but Luther below their normal operating levels. Operational low flow targets through Guelph and Kitchener dropped to fall levels on October 1st. The summer flow target at Brantford is normally maintained through to the end of October. To preserve water in storage the Brantford target was reduced early after consultation with water treatment plant operators at the City of Brantford and Six Nations.

Lake Erie water levels continue to drop, but stay above the long-term average. There is a lot of uncertainty regarding lake water levels into next year, but they are likely to stay below the very high levels in 2020. The long-term forecast is for warm temperatures and dry conditions to continue over the next three months.

Report:

Precipitation

September was a very dry month with the watershed receiving less than half of the normal precipitation. The southern part of the watershed received near or above normal precipitation due to a few large systems on Lake Erie. For the rest of the watershed it was the 3rd driest September in the last 30 years and very similar to conditions during the early stages of the drought in the late nineties.

In contrast, so far in October the watershed has received about 75% of normal rainfall. Most precipitation was recorded over the past week with small amounts almost each day, but no large rainfalls. Small amounts of rain absorb into the ground and very little runoff is produced.

Climate stations in the watershed recorded, on average around 30 millimeters of precipitation so far in October, Table 1. Exceptions include the Brantford station, which only recorded 17 millimeters and the Luther station, which recorded close to 45mm. Not shown in Table 1 is the station at Byng Island in Dunnville which recorded over 77 millimeters of rain during the first half of October. As in September, there were a number of large rain events over the Lake Erie shore that did not spread up into the rest of the watershed.

Table 1: Current monthly precipitation for climate stations across the watershed up to October 19, 2022 including the long term average precipitation for half of October.

Climate Station	Current Month Precipitation (mm)	Long Term Average Precipitation (mm)	Percentage of Long Term Average (%)
Shand	29.1	42.1	69%
Conestogo	28.7	46.5	62%
Guelph	30.5	39.0	78%
Luther	43.9	44.6	98%
Woolwich	27.8	34.1	82%
Laurel	32.0	42.6	75%
Shades	35.3	40.0	88%
Brantford	17.1	34.8	49%

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% of normal precipitation. Over the past 6 months that amount raises slightly to 71% and over the 12 months to 88%. It is not until the past 18 months, that precipitation totals are close to 100%. 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	41%	77%	74%	92%	94%
Conestogo	56%	87%	87%	92%	99%
Guelph	25%	66%	74%	91%	102%
Luther	47%	75%	74%	90%	96%
Woolwich	40%	66%	70%	81%	85%
Laurel	45%	48%	58%	80%	96%
Shades	33%	57%	59%	83%	101%
Brantford	89%	68%	74%	95%	100%

Air Temperatures

Temperatures in September were above average in the middle of the watershed and near average in the northern and southern climate stations. The average monthly temperature at Shand Dam in August was 16 degrees Celsius, which is a little under one degree above the long term average. Many days in September reached temperatures in the mid to high twenties, while overnight lows stayed in the teens until the last week.

Temperatures dropped the last week of September and have remained a bit below normal in early October. The average temperature in the first half of October was slightly below seasonal. Frost and below freezing temperatures were recorded early in the month, but generally temperatures have remained above freezing.

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

Lake Erie Water Levels

During September, the average lake level was approximately 0.29 meters above the long-term average, which was approximately 0.21 meters below the same month in 2021. Lake levels continue to decrease. In the first two weeks of September, the average lake level was approximately 174.38 meters, which is about 0.31 meters above the long-term average, but below the average lake level in September.

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. 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.

Augmentation levels have stayed high since June, but dropped over the past week from a combination of lower flow targets and more precipitation. At the start of October, approximately 85% of the water in the Grand River through Kitchener was from water stored in the reservoirs, while at Brantford nearly 50% of the water was from reservoirs. These values dropped to 60% and 30%, respectively by October 19th. On the Speed River augmentation dropped from approximately 50% to 20% of the water downstream of Guelph over the first part of the month.

Operational low flow targets through Guelph and Kitchener dropped from summer targets to lower fall targets at the start of October. The summer flow target at Brantford is normally maintained through to the end of October. To preserve water in storage the Brantford target was reduced early after consultation with water treatment plant operators at the City of Brantford and Six Nations to ensure lower flows did not impact their operations.

Low Water Response

The Grand River Low Water Response Team did not meet in October, but updates on conditions were sent out to the Team on October 4th and 19th. 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 below normal precipitation for the October to December period.

Seasonal forecast from the Ministry of Natural Resources and Forestry forecasters is for near normal temperatures and below normal precipitation. With the Great Lakes warmer than normal there is a good chance of lake effect precipitation this fall and into the winter.

Flood Preparedness

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

Planning continues for a pre-winter meeting with municipal flood coordinators in late November.

Flood personnel will be attending a series of webinars over the fall 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

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Figures:

Figure 1: Shand Dam Monthly Precipitation 2018 to October 19, 2022

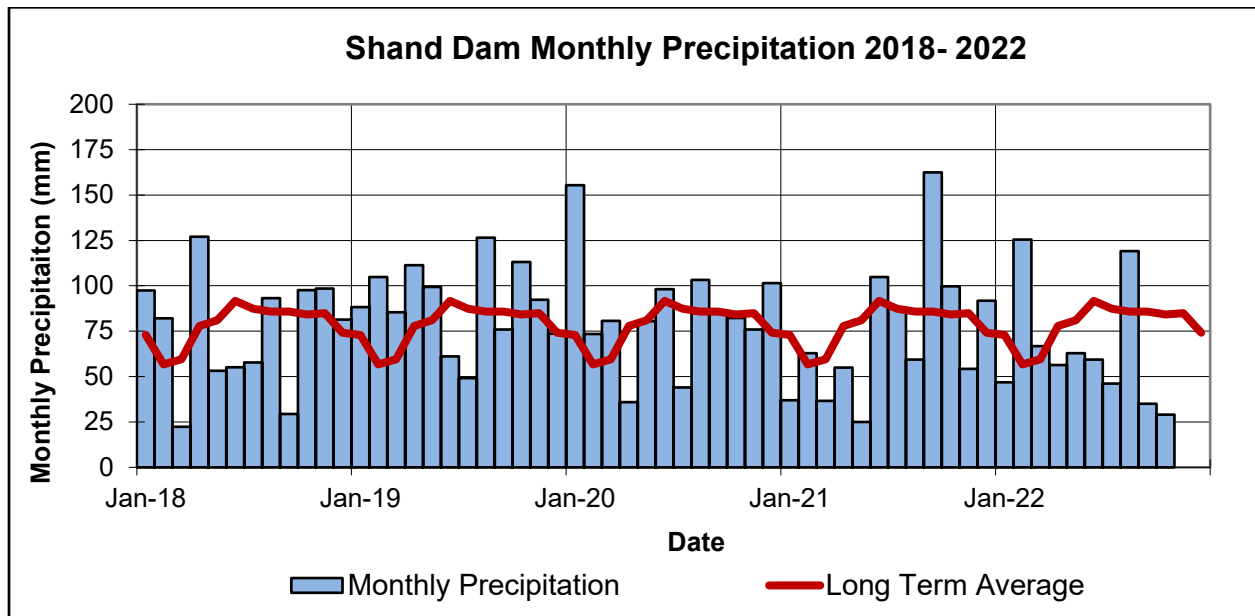


Figure 2: Monthly Average Air Temperatures at Shand Dam from 2018 to October 19, 2022

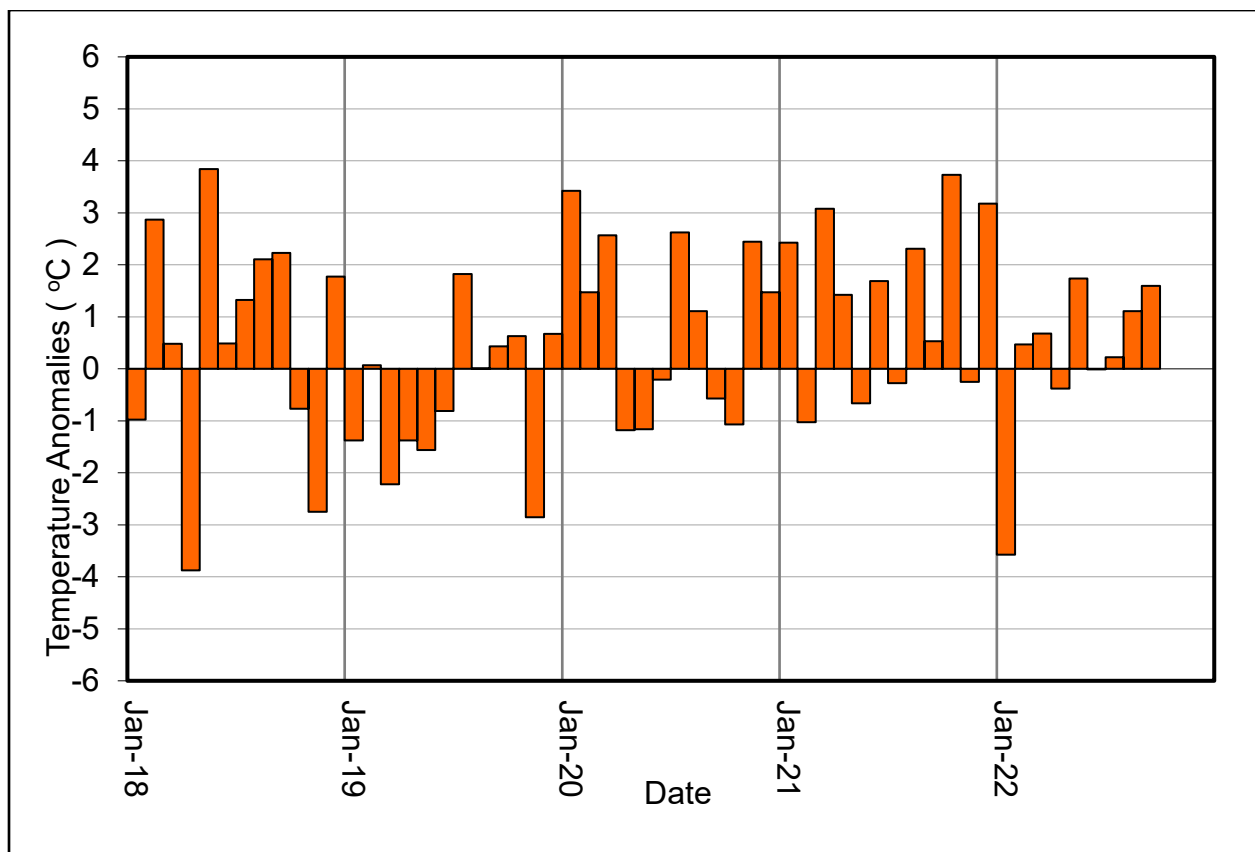


Figure 3: Water levels for Lake Erie at Port Colborne

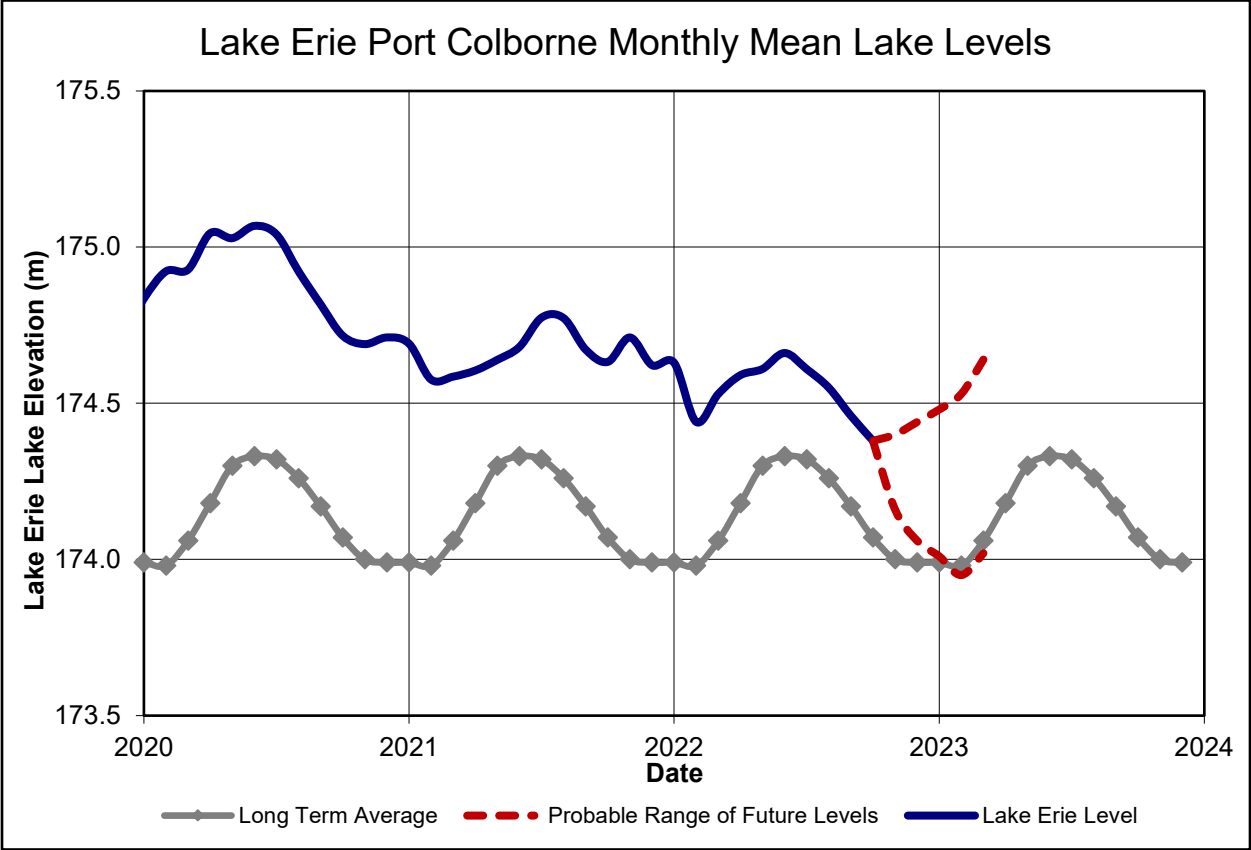


Figure 4: Shand and Conestogo Reservoir Elevation Plots for 2022

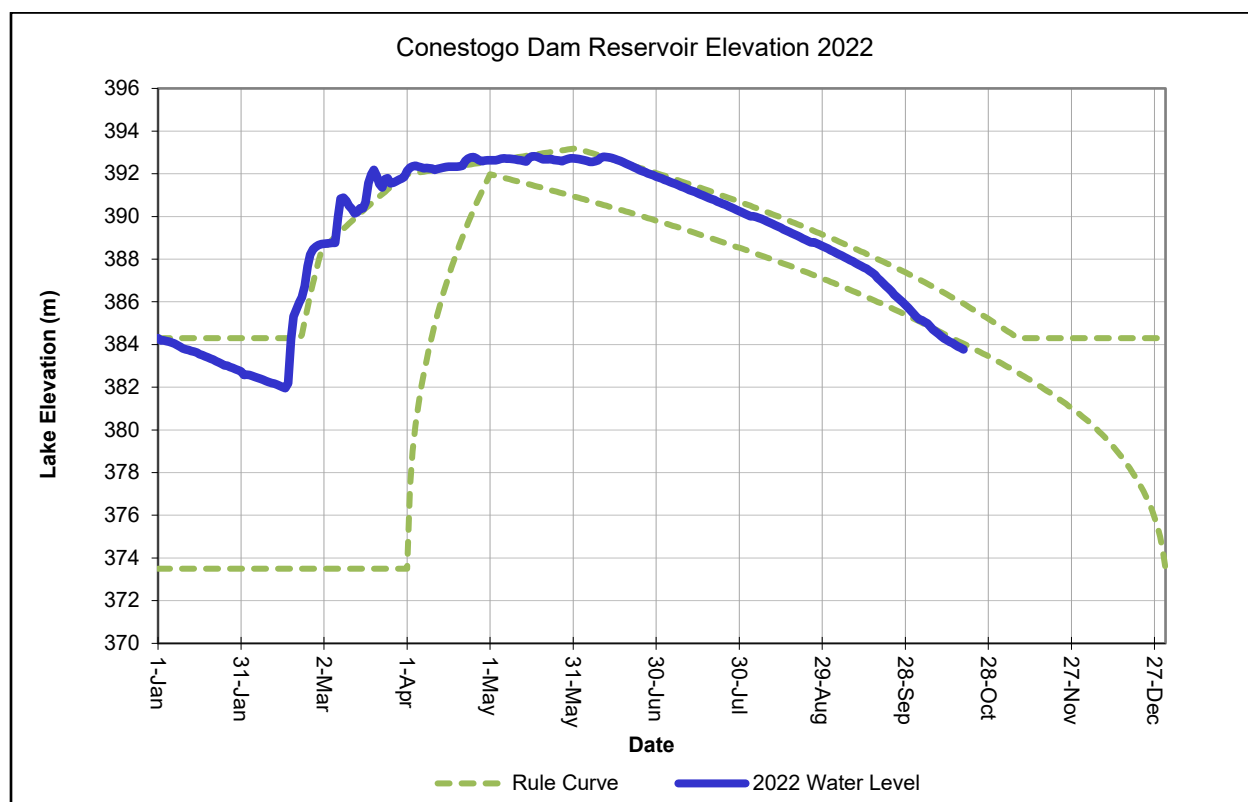
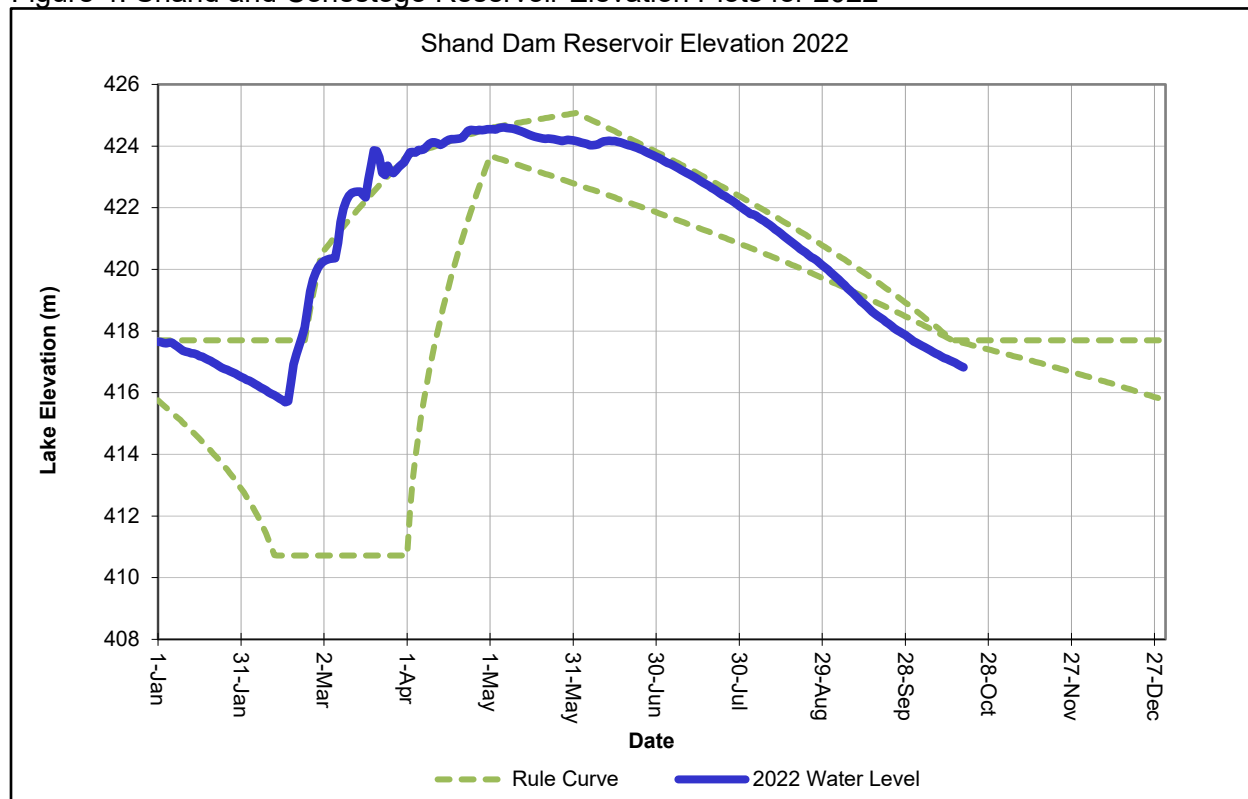


Figure 5: Guelph and Luther Reservoir Elevation Charts for 2022

