

Grand River Conservation Authority

Report number: GM-09-22-74

Date: September 23, 2022

To: Members of the Grand River Conservation Authority

Subject: Current Watershed Conditions as of September 14, 2022

Recommendation:

THAT Report Number GM-09-22-74 – Current Watershed Conditions as of September 14, 2022 be received as information.

Summary:

After a slight reprieve in August, dry conditions returned to the watershed in September. The first two weeks were especially dry with over half of the watershed recording less than 10 millimeters of rain. Temperatures are high with some daytime temperatures closer to typical summer rather than the start of the fall. Overnight low temperatures are starting to drop across the watershed.

The large reservoirs are under strain with high augmentation pressures and low inflows. Water levels are below normal at Guelph, Shand and Woolwich reservoirs. Throughout much of the summer 85% of the flow through Kitchener was from water stored in the reservoir, while about 50% of the flow at Brantford was from the reservoirs. Operational low flow targets will continue to be met through the remainder of the summer season.

Lake Erie continues to be above the long-term average and is below level for this time last year. Levels have decreased over the last month and are expected to follow a decreasing trend over the next several months. The long-term forecast is for warm temperatures to continue over the next three months.

Report:

Precipitation

Most of the watershed received above normal rainfall in August, breaking the trend for dry conditions from the previous 4 months. The most rainfall was recorded at Conestogo Dam with 146 millimeters, largely from two storm events; one early in the month and one late in the month. The southern watershed did not receive the same storm events and only 41 millimeters was recorded at the Brantford Airport for the entire month.

In contrast, September has been very dry to date with most of the watershed receiving less than 20 millimeters of rain in the first two weeks. Five of the eight climate station shown in Table 1, recorded less than 10 millimeters of rain and only the Brantford station in the south recorded over 25mm. Not included on this table is the rain gauge at Byng Island in Dunnville which has received more than normal rainfall with almost 70 millimeters so far 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 September 14, 2022 including the long term average precipitation for half of September.

Climate Station	Current Month Precipitation (mm)	Long Term Average Precipitation (mm)	Percentage of Long Term Average (%)
Shand	4.8	42.9	11%
Conestogo	8.0	45.5	18%
Guelph	2.4	41.5	6%
Luther	11.0	47.8	23%
Woolwich	5.0	33.9	15%
Laurel	8.6	47.5	18%
Shades	13.5	43.3	31%
Brantford	26.6	38.5	69%

Long term trends in precipitation are provided in Table 2. Dry conditions in parts of the spring followed by the prolonged period of dry conditions from June to the end of July are shown in trends of lower than normal precipitation over the long term. Over the past three months the watershed received about 73% of normal precipitation. Over the past 6 months that amount raises to 80% and over the 12 months to 100% before dropping just under 100% over the past 18 months. 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	139%	85%	85%	105%	95%
Conestogo	166%	90%	97%	108%	100%
Guelph	148%	77%	86%	108%	105%
Luther	110%	85%	83%	103%	98%
Woolwich	119%	68%	77%	82%	85%
Laurel	90%	52%	65%	98%	99%
Shades	117%	69%	70%	104%	105%
Brantford	60%	61%	75%	107%	100%

Air Temperatures

Temperatures in August 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 20.2 degrees Celsius, which is a little over one degree above the long term average. Daily high temperatures were in the high twenties, while the overnight low temperatures were in the mid-teens.

The average temperature in the first half of September was well above seasonal. Daytime high temperatures have dropped a bit compared to August, but are higher than normal with some very hot days early in the month. Overnight lows are generally staying in the double digits and are dropping gradually through the month.

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

Lake Erie Water Levels

During August, the average lake level was approximately 0.28 meters above the long-term average, which was approximately 0.23 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 174.44 meters, which is about 0.27 meters above the long-term average.

Lake Erie levels may start to trend near to the long term average by the end of the year, but will likely stay above average. Figure 3 shows the range of water levels that is expected over the next six months.

Reservoir Conditions

Dry conditions over the summer has put strain on the reservoirs to continue to augment flows downstream with little inflow to help maintain water levels. Conestogo and Luther reservoirs are at normal operating levels, while the other large reservoirs including 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. 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. On the Speed River approximately 60% of the water downstream of Guelph is from reservoir discharges. Operational low flow targets will continue to be met through to the end of September at present levels. In October, a number of the operational flow targets drop as cooler water temperatures help to maintain water quality in the river system.

Low Water Response

The Grand River Low Water Response Team met on September 8th to discuss continued dry conditions in the watershed. The watershed continues to be in a Level 2 condition with a request to reduce water use by 20 percent. 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 September to November period.

The Weather Network is predicting above normal temperatures for most of the fall with a return of late fall like weather in November. Precipitation will be near normal, but fewer fall storms are predicted.

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 September 14, 2022

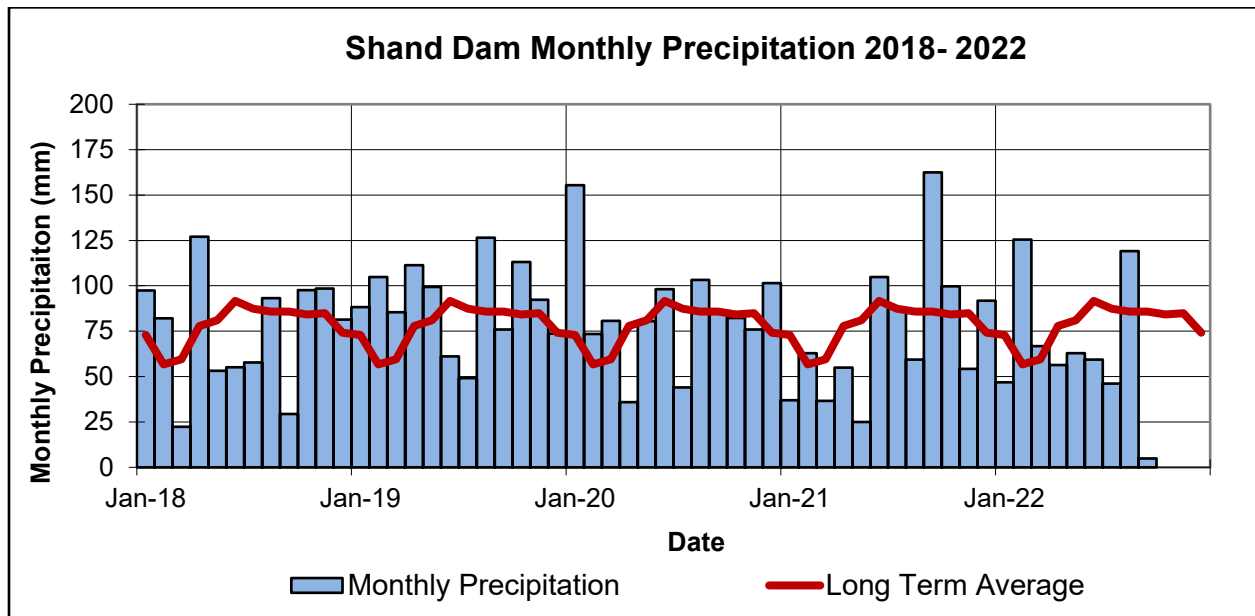


Figure 2: Monthly Average Air Temperatures at Shand Dam from 2018 to September 14, 2022

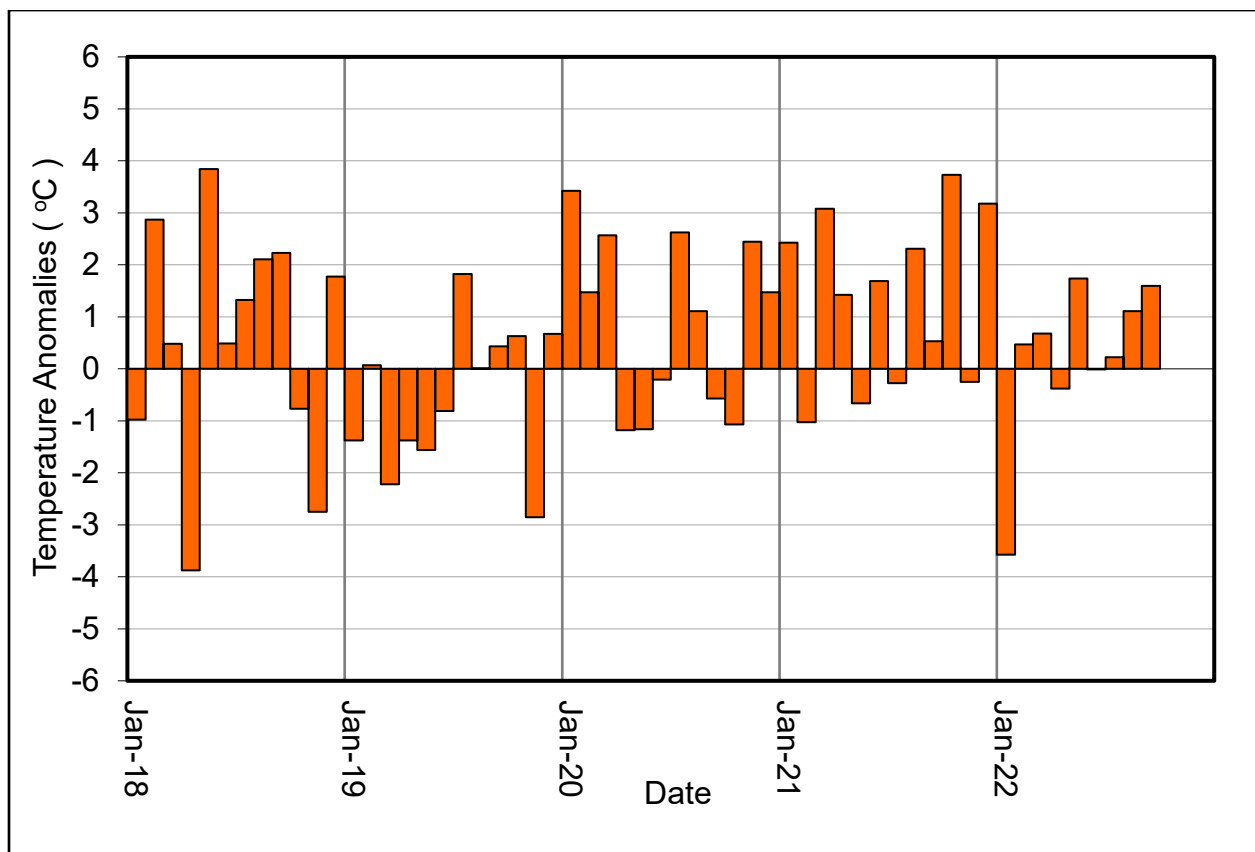


Figure 3: Water levels for Lake Erie at Port Colborne

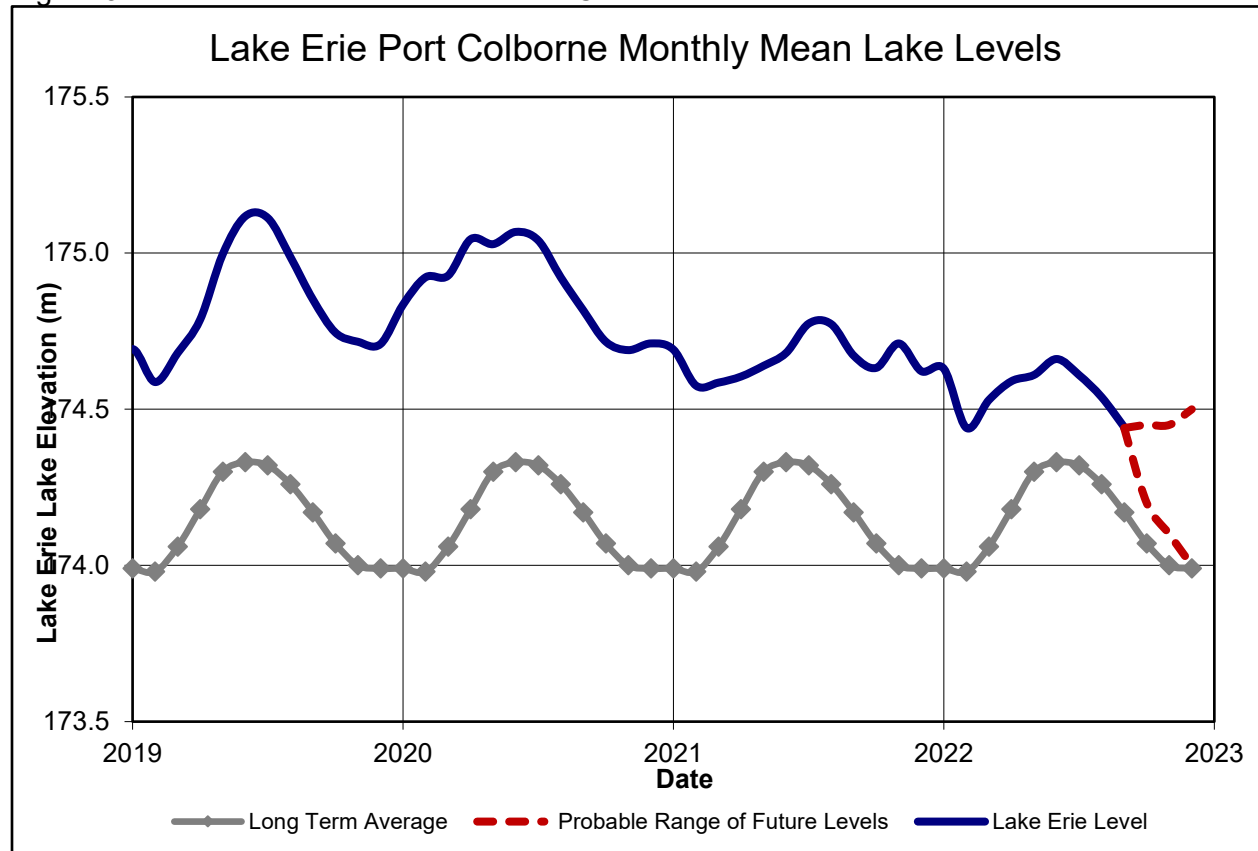


Figure 4: Shand and Conestogo Reservoir Elevation Plots for 2022

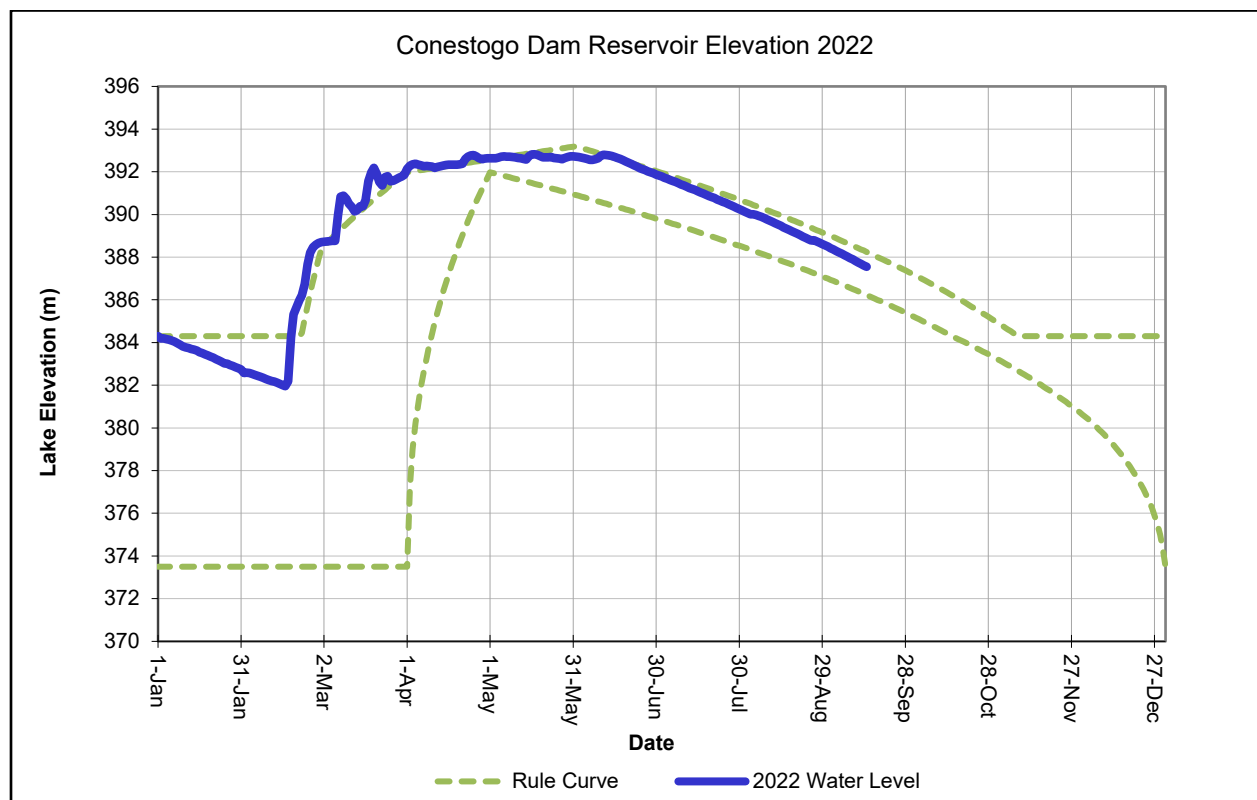
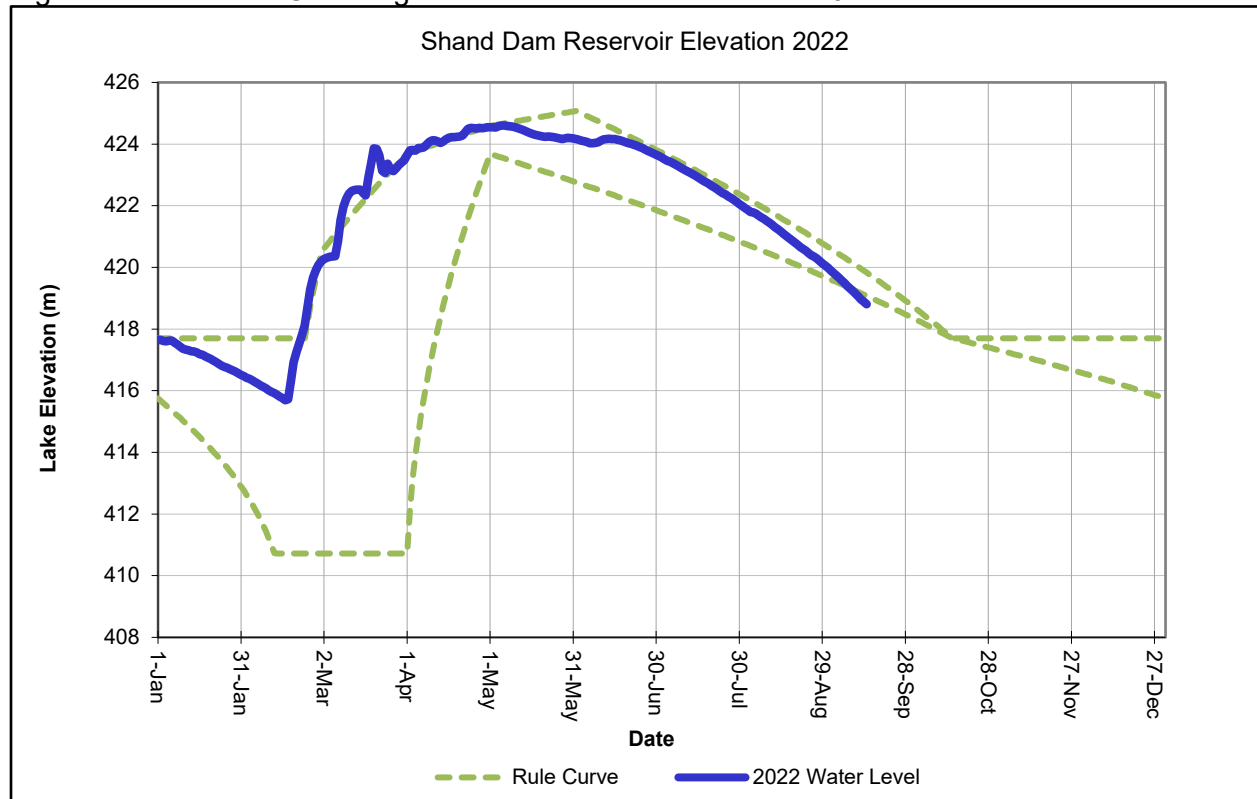


Figure 5: Guelph and Luther Reservoir Elevation Charts for 2022

