# **Grand River Conservation Authority**

# Report number: GM-06-23-53

Date: June 23, 2023

To: Members of the Grand River Conservation Authority

Subject: Current Watershed Conditions as of June 14, 2023

# **Recommendation:**

THAT Report Number GM-06-23-53 – Current Watershed Conditions as of June 14, 2023 be received as information.

# Summary:

May was a relatively dry month with average temperatures, starting with low temperatures and average rainfall. The watershed experienced warmer temperatures and minimal precipitation in the second half of May, resulting in an average monthly temperature with below normal rainfall. Due to the low precipitation through May the reservoirs were not able to be filled to their June 1 targets.

The first half of June has been dry with temperatures above or near the long term averages. One rainfall event on June 12 resulted in an average of 30 millimeters of rainfall across the watershed which has brought the mid-month precipitation for June back to normal levels after the dry end of May.

Groundwater levels are still recovering from all-time lows experienced in 2022. Lake Erie continues to be above the long-term average, but below the levels in 2022. The long-term forecast over the next three months is for above normal temperatures and near normal precipitation.

# **Report:**

## Precipitation

The precipitation over the month of May was below normal across the watershed. The month began with several low volume rainfall events over the first week followed by a week and a half without any rainfall throughout the watershed. On May 20, 2023 a band of precipitation crossed the watershed with total rainfall ranging from 11.0 millimeters to 29.0 millimeters with the highest amounts observed in the middle of the watershed. The watershed then experienced an extended warm and dry period for three weeks through the end of May and into June. Consequently, flow augmentation to meet the low flow targets downstream of the reservoirs began approximately mid-May and continued into June.

Precipitation over the first two weeks of June has returned to normal due to a 30 millimeters rainfall event occurring on June 12, as shown in Table 1. With the exception of the Brantford gauge where observed rainfall has been slightly above normal, almost everywhere else in the watershed has received rainfall slightly lower than long-term averages, ranging from 74 percent in Cambridge to around 95 percent in Waterloo (Laurel Area).

Trends in precipitation, Table 2, show that over the short-term the watershed has experienced less rainfall than normal. During the month of May, the watershed received rainfall totals which ranged from 43 to 77 percent of the normal long-term averages. Over the mid-term, the watershed is showing signs of recovery from dry conditions in 2022. Over the long term, the precipitation levels appear to be closer to normal averages; however, they are still slightly below

the long-term average values, specifically for 12 to 18 month periods. In other words, the watershed is still in a precipitation deficit over the long-term. This has been reflected in groundwater levels sampled to the end of May which show the groundwater is still recovering from the all-time lows experienced in 2022. Over the past 12 months the watershed has averaged 87 percent of normal precipitation. A prolonged period of at or above normal precipitation is needed for the watershed to fully recover from the extended dry period in 2022. A visual representation of these trends for the Shand climate station is also provided in Figure 1.

Climate Station	Current Month Precipitation (millimeters)	Long Term Average Precipitation (millimeters)	Percentage of Long Term Average Percent (%)
Shand	44.0	45.8	96%
Conestogo	38.0	47.2	81%
Guelph	39.2	43.6	90%
Luther	42.2	45.9	92%
Woolwich	33.8	38.2	88%
Laurel	41.0	43.4	95%
Shades	31.2	42.4	74%
Brantford	35.3	33.1	107%

Table 1: Current monthly precipitation for climate stations across the watershed up to June 14, 2023 including the long term average precipitation for half of June.

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	54%	112%	114%	89%	94%
Conestogo	56%	111%	109%	90%	94%
Guelph	69%	117%	118%	86%	92%
Luther	68%	119%	128%	98%	99%
Woolwich	40%	107%	106%	81%	85%
Laurel	43%	108%	109%	76%	83%
Shades	77%	121%	114%	83%	85%
Brantford	48%	130%	128%	90%	93%

#### Air Temperatures

May was a slightly cooler than normal month. Cooler temperatures at the beginning of the month and warmer temperatures over the last three weeks of the month resulted in a monthly temperature consistent with the long-term average at the Shand Dam climate station. The average temperature across the watershed during the month of May was 0.6 degrees below the long-term average. At the Shand Dam climate station, daily maximum temperatures exceeded 20 degrees Celsius for 14 days during the month of May and daily averages ranged

between 4.0 to 21.3 degrees Celsius with an average daily temperature of 12.5 degrees Celsius.

The first half of June was warmer than May with temperatures peaking from mid-twenties to low thirties across the watershed. The average temperatures at the Shand Dam climate station over the first two weeks of June was 17.6 degrees Celsius which is 1.1 degrees warmer than the long-term average for the first half of the month of June.

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

#### Lake Erie Water Levels

During May, the average lake level was approximately 0.32 meters above the long-term average. Levels remained elevated during the first half of June and are approximately 0.23 meters above the long-term average. The forecast for Lake Erie is for lake levels to continue to remain elevated over the spring and summer 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 three years.

#### **Reservoir Conditions**

Although the rainfall from January through April provided sufficient runoff to fill the reservoirs to May 1 targets, the watershed is still recovering from the dry conditions experienced through 2022. The rainfall in early May to mid-May allowed the reservoirs to continue the spring filling cycle. Insufficient precipitation through the end of May and into early June meant the reservoirs could not be filled to their June 1 targets. However, there is sufficient storage to maintain flows at downstream target locations for augmentation. The reservoirs have been used for augmentation to meet low flow targets since approximately mid-may with approximately 70 percent of the flows in the Grand River through Kitchener and approximately 30 percent of the flows in the Grand River through Brantford having been augmented from the reservoirs.

Reservoirs will be used to manage flows during late spring and summer rain events over the next couple of months as well as to augment the flows above the low flow targets. The amount of flood storage available will be balanced with the amount of runoff expected from precipitation. 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 average probability of near normal precipitation (low confidence) and high probability of above normal temperatures (high confidence) over the next 3 months.

#### Low Water Response

Due to low precipitation in May, a Low Water Conditions Report was prepared June 6, 2023 with two potential recommendations: Option 1 maintain Level 1 low water condition and reassess week of June 19, 2023 or Option 2 elevate watershed to Level 2 condition and reassess at the end of June. The Low Water Response team will be meeting in the afternoon of June 14, 2023 to discuss the two potential recommendations. Given the recent 30 millimeters of precipitation observed across the watershed, the recommendation will be to maintain the watershed in the current Level 1 condition and reassess at the end of June.

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.

#### **Flood Preparedness and Flood Centre Activities**

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

Training sessions on the flood program and emergency management are being conducted frequently for new staff and for staff in new roles.

### **Financial Implications:**

Not applicable

## **Other Department Considerations:**

Not applicable

## Prepared by:

## Approved by:

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# Figures:



Figure 1: Shand Dam Monthly Precipitation 2019 to June 14, 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