

Grand River Conservation Authority

Report number: GM-09-23-71

Date: September 22, 2023

To: Members of the Grand River Conservation Authority

Subject: Current Watershed Conditions as of September 11, 2023

Recommendation:

THAT Report Number GM-09-23-71 – Current Watershed Conditions as of September 11, 2023 be received as information.

Summary:

August was a wet month with slightly cooler than average temperatures. The month started with average temperatures and above normal rainfall. The temperatures across the watershed remained slightly cooler than the long-term average throughout the month with no days above 30 degrees Celsius. The above normal precipitation continued throughout the month resulting in a slightly cooler than normal monthly temperature with above normal rainfall. Rainfall in August exceeded 100% of the long-term average at all climate stations in the watershed with stations ranging from 101% to 157%.

Groundwater levels at select locations are showing signs of recovery from the all-time low levels experienced throughout most of 2022. The Low Water Response Team met on September 6, 2023 to discuss removing the watershed from Level 1 conditions. The result of the meeting was to place the watershed back to normal conditions the week of September 11, 2023.

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

The watershed received significant rainfall in the latter half of June and through July and August. Precipitation over the first two weeks of September has varied across the watershed between 12% and 64% of the long-term averages for the first half of the month as shown in Table 1. This is largely attributed to the localized nature of summer thunderstorms which result in high intensity events occurring in portions of the watershed.

Trends in precipitation, Table 2, show that over the short-term the watershed has experienced more rainfall than normal with between 101% to 157% of the rainfall typical for August occurring across the watershed. Over the mid-term, the watershed has recovered from dry conditions in 2022 with above normal precipitation at all locations. Over the long term, the precipitation levels appear to have returned to 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 September 11, 2023 including the long term average precipitation for half of September.

Climate Station	Current Month Precipitation (millimeters)	Long Term Average Precipitation (millimeters)	Percentage of Long Term Average Percent (%)
Shand	17.4	42.9	41%
Conestogo	17.2	45.5	38%
Guelph	18.2	41.5	44%
Luther	10.4	47.8	22%
Woolwich	21.6	33.9	64%
Laurel	15.4	47.5	32%
Shades	10.1	43.3	23%
Brantford	4.5	38.5	12%

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	126%	134%	124%	103%	97%
Conestogo	118%	141%	127%	103%	101%
Guelph	131%	139%	129%	103%	98%
Luther	119%	143%	132%	114%	104%
Woolwich	101%	141%	126%	102%	94%
Laurel	121%	120%	115%	95%	85%
Shades	157%	156%	140%	108%	95%
Brantford	124%	134%	132%	111%	99%

Air Temperatures

August was a cooler month for temperatures across the watershed. Warmer temperatures at the beginning of the month and cooler temperatures over the last two 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 August was 1.1 degrees below the long-term average. At the Shand Dam climate station, daily maximum temperatures exceeded 25 degrees Celsius for 6 days during the month of August and daily averages ranged between 11.8 to 21.5 degrees Celsius with an average daily temperature of 18.1 degrees Celsius.

The first half of September was warmer than August with temperatures peaking in the low thirties across the watershed in the first week of September. The average temperature at the Shand Dam climate station over the first two weeks of September was 19.1 degrees Celsius which is 2.4 degrees warmer than the long-term average for the first half of the month of September.

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

Lake Erie Water Levels

During August, the average lake level was approximately 0.30 meters above the long-term average. Levels remained elevated during the first half of September and are approximately 0.36 meters above the long-term average. The forecast for Lake Erie is for lake levels to continue to remain above the long-term average over the summer and fall 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

. The large reservoirs are within their normal operating levels with the exception of Luther Dam. The Luther Dam reservoir has been above the upper rule curve throughout July and August due to the relatively high inflows resulting from above-normal precipitation this year. Reservoir operations will be made to drawdown the Luther reservoir to the fall flood control targets. The Conestogo reservoir will be drawn down more than normal over the month of September to allow for regular maintenance on the gates. Flows through the watershed continue to be above the flow augmentation targets.

Reservoirs will be used to manage flows during fall rain events over the next couple of months as well as to augment the flows above the low flow targets as needed. 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.

The reservoirs have been used for augmentation to meet low flow targets between summer thunderstorms. Approximately 30% to 70% of the flows in the Grand River through Kitchener and approximately 10% to 30% of the flows in the Grand River through Brantford having been augmented from the reservoirs during periods without rainfall during the month of August (ref. Figure 6). On the Speed River approximately 10% to 30% of the water downstream of Guelph has been augmented from reservoir discharges during the month of August (ref. Figure 7). The first two weeks of September have seen an increase in the augmentation on the Speed River up to approximately 70% of the water downstream of Guelph has been augmented from reservoir discharges.

Blue-green algae blooms were observed in the Woolwich and Belwood reservoirs on August 28th. Warning signs have been posted at both areas advising visitors to avoid contact with blue-green algae when it is present. Downstream drinking water intakes, the MECP and local public health units have been notified and will be updated, if conditions change.

Groundwater

Groundwater levels in the Provincial Groundwater Monitoring Network and Grand River Conservation Authority monitoring wells across the watershed were analyzed to the end of June and are shown in Figure 8 as previously presented in Report Number GM-08-23-61 and provided again for reference. Select monitoring wells have been assessed to the end of August and are shown in Figure 9 and Figure 10.

Water levels in monitoring wells were low going into the summer with historic lows observed at several wells within the watershed in 2022. As of the last watershed wide sampling, water levels in monitoring wells had improved slightly due to moderate precipitation in June. Significant precipitation in July and August is anticipated to have improved groundwater conditions back to normal ranges across the watershed. The targeted sampling of select monitoring wells in the watershed shows signs of recovery in the central and southern portion of the watershed at wells in Burford and Cambridge.

Long Range Forecast

Environment and Climate Change Canada is forecasting average probability of near normal precipitation (low confidence) and moderate probability of above normal temperatures (moderate confidence) over the next 3 months.

Low Water Response

The Low Water Response Team met to discuss the potential of returning the watershed from a Level 1 condition to a normal condition on Wednesday September 6, 2023. The result of the meeting was to remove the watershed from the Level 1 low water condition the week of September 11, 2023. An updated Low Water Conditions Report is being prepared to return the watershed to normal conditions for September 13, 2023.

A Low Water Conditions Report was prepared September 6, 2023 which summarized that due to significant rainfall through July and August the precipitation and streamflow indicators show that the watershed has returned to a normal range. The groundwater network analyzed at targeted monitoring wells has been assessed to the end of August with results showing signs of recovery sufficient remove the watershed from the Level 1 condition.

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.

The Annual Ontario Flood Forecasting and Warning Workshop will be held in-person on September 18 and 19. The workshop will cover a range of topics related to flood forecasting and warning. Staff from GRCA help organize the workshop along with other members on the provincial flood forecasting and warning committee.

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

Staff are receiving invitations to participate in emergency planning exercises later this fall. Participation in these emergency preparedness exercises is an important opportunity to explain the flood warning system to emergency response staff and improve overall preparedness for flood emergencies.

Financial Implications:

Not applicable

Other Department Considerations:

Not applicable

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Figures:

Figure 1: Shand Dam Monthly Precipitation 2019 to September 11, 2023

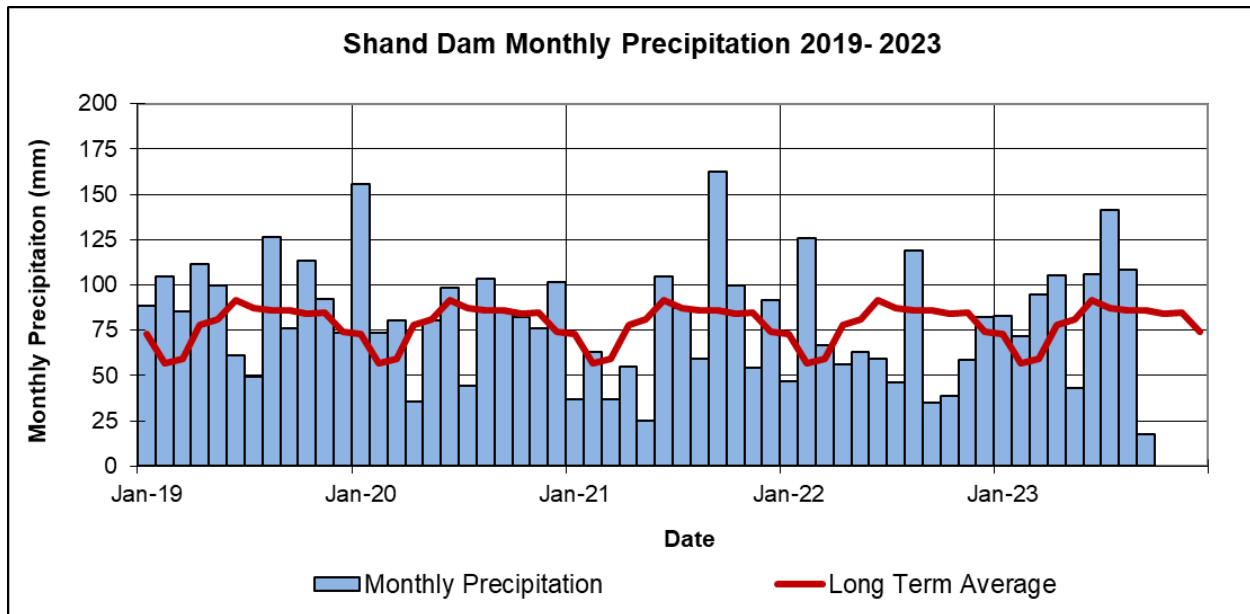


Figure 2: Monthly Average Air Temperatures at Shand Dam from 2019 to August 15, 2023

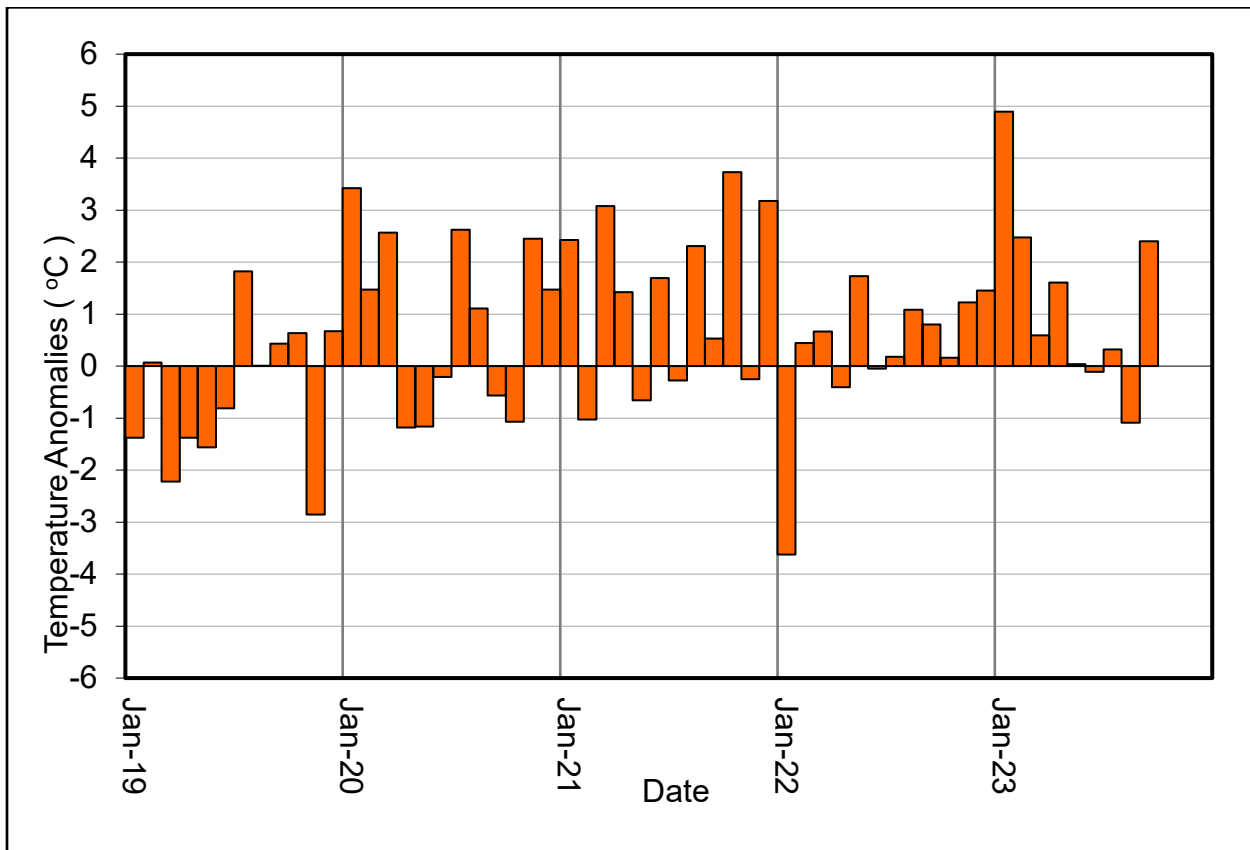


Figure 3: Water levels for Lake Erie at Port Colborne

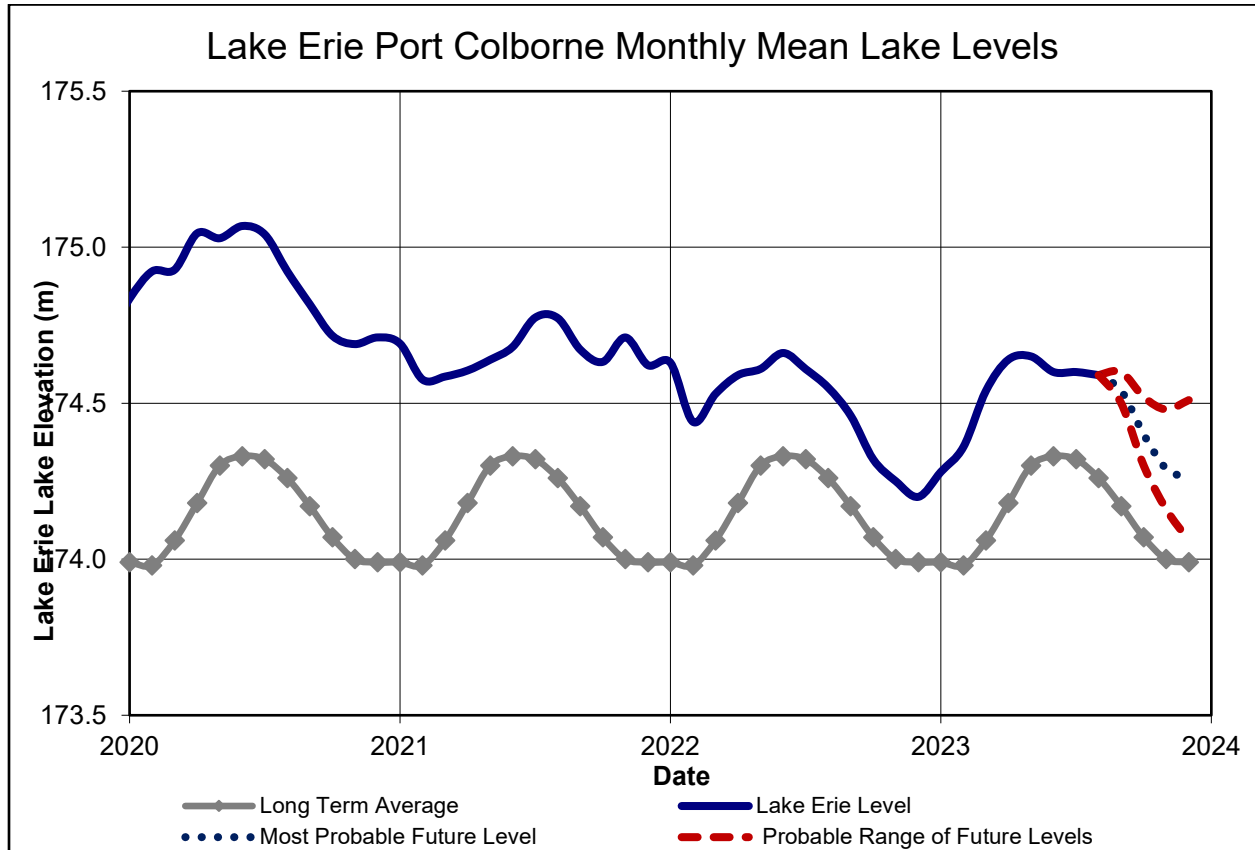


Figure 4: Shand and Conestogo Reservoir Elevation Plots for 2023

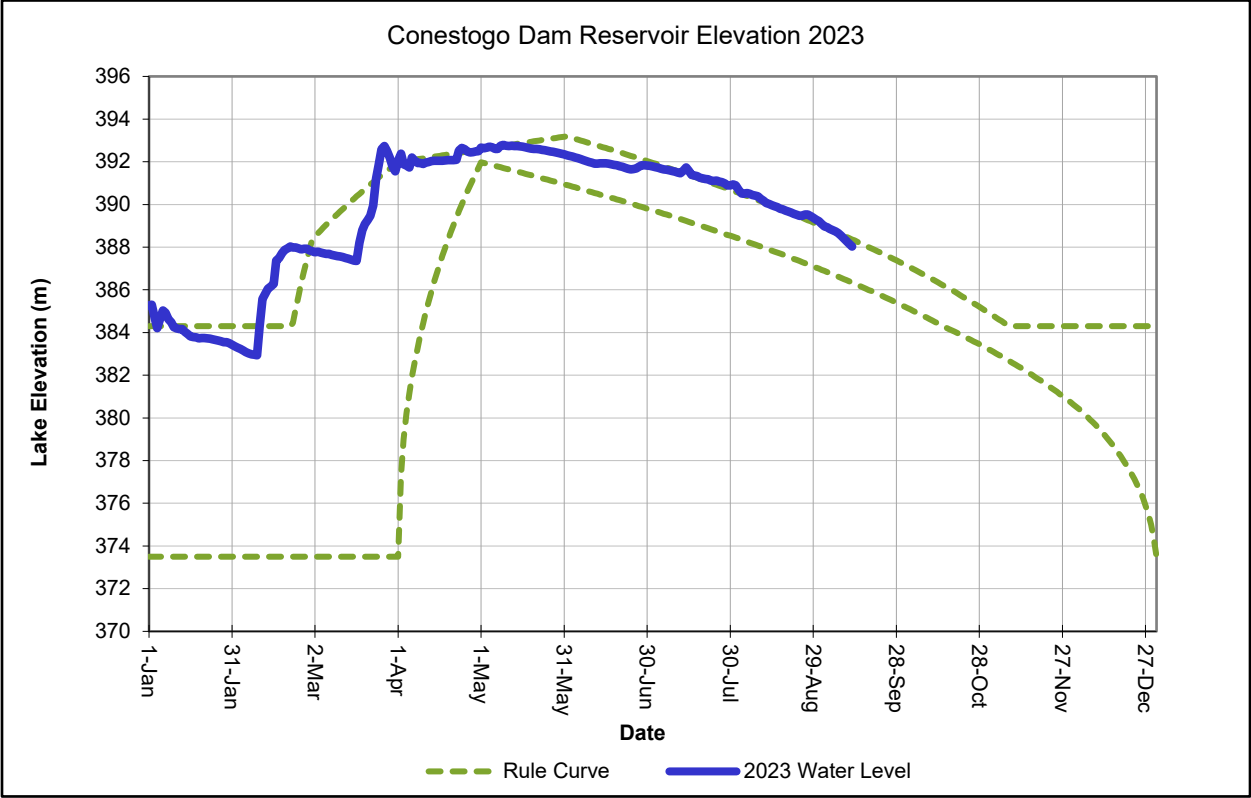
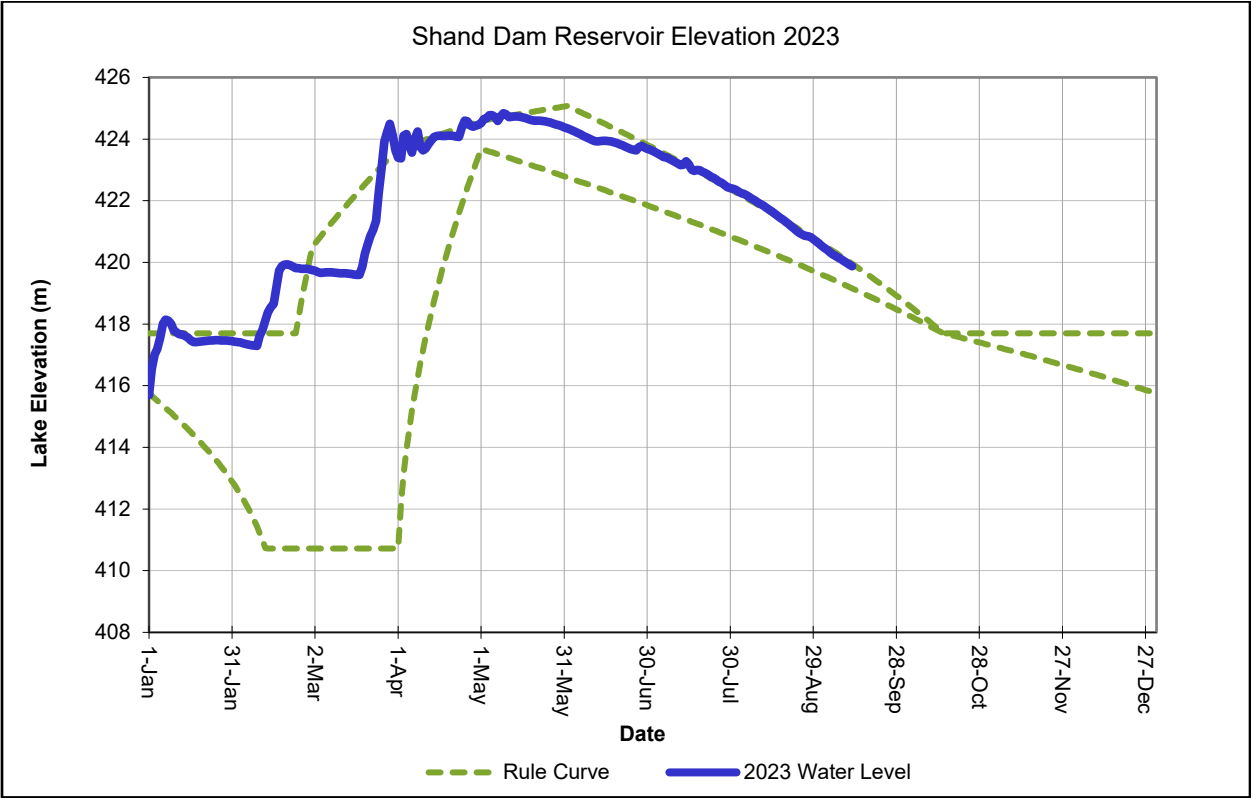


Figure 5: Guelph and Luther Reservoir Elevation Charts for 2023

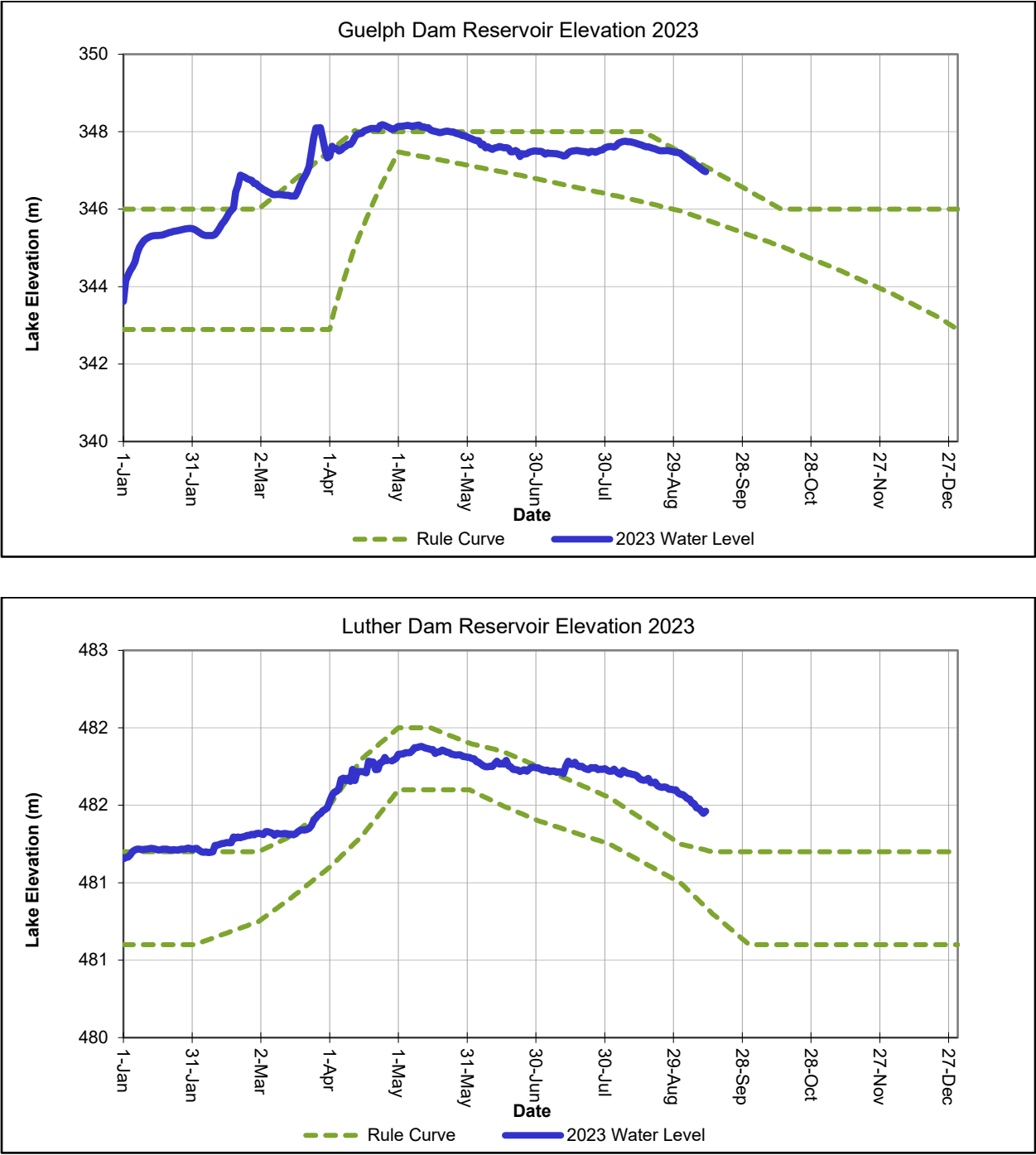


Figure 6: Grand River augmentation Chart showing percent augmentation at Doon, Galt and Brantford for 2022

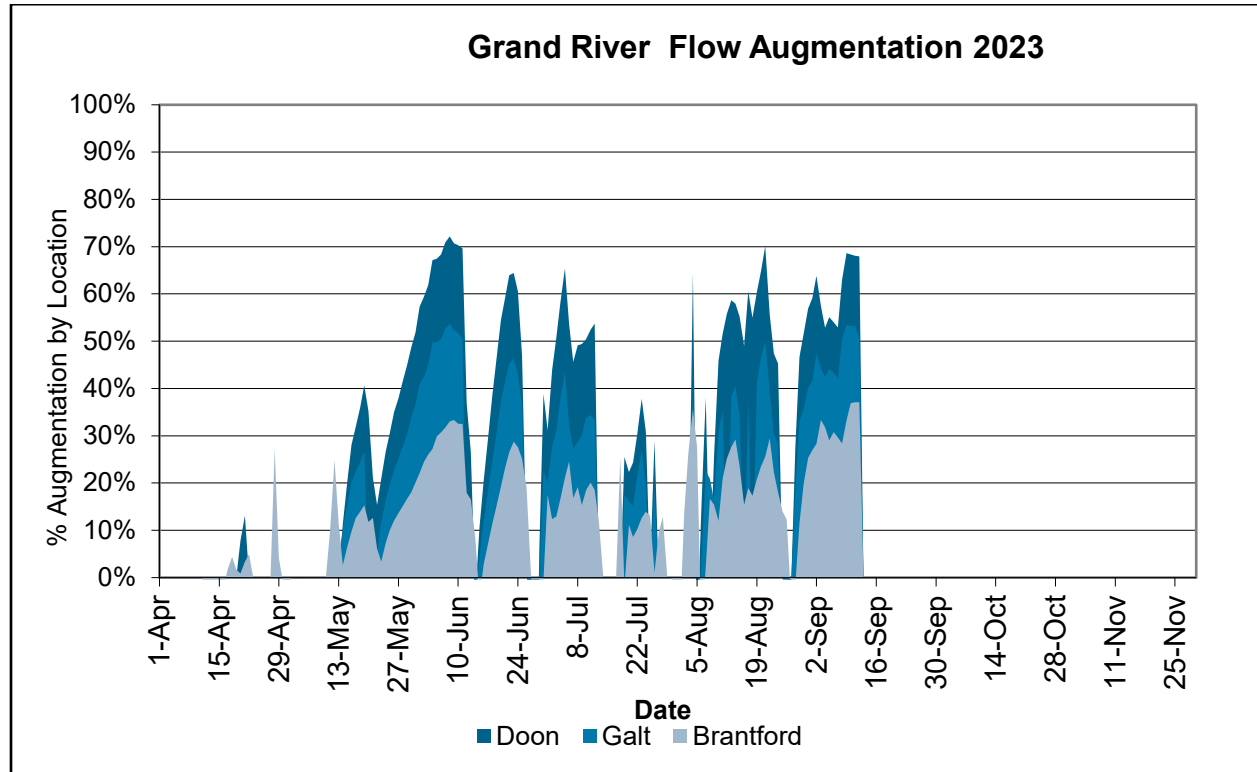


Figure 7: Speed River Flow Augmentation for 2023

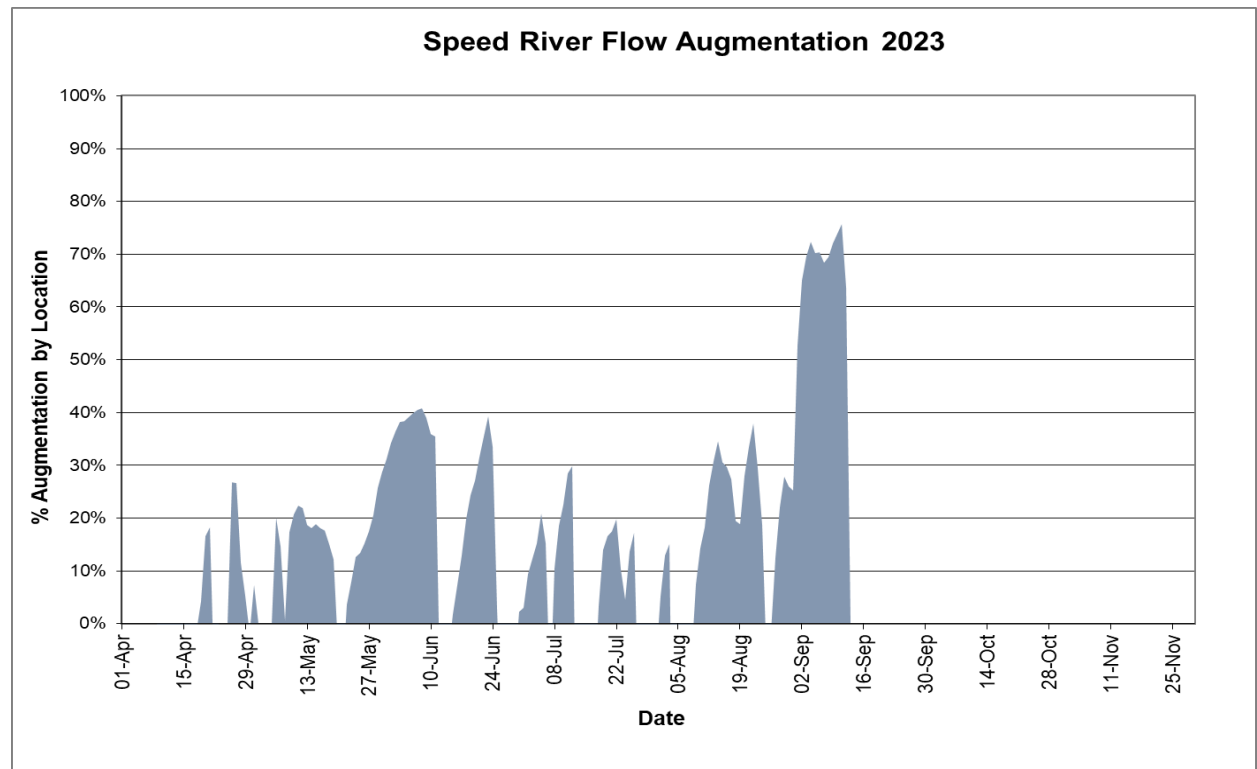


Figure 8: Groundwater Conditions as of June 2023

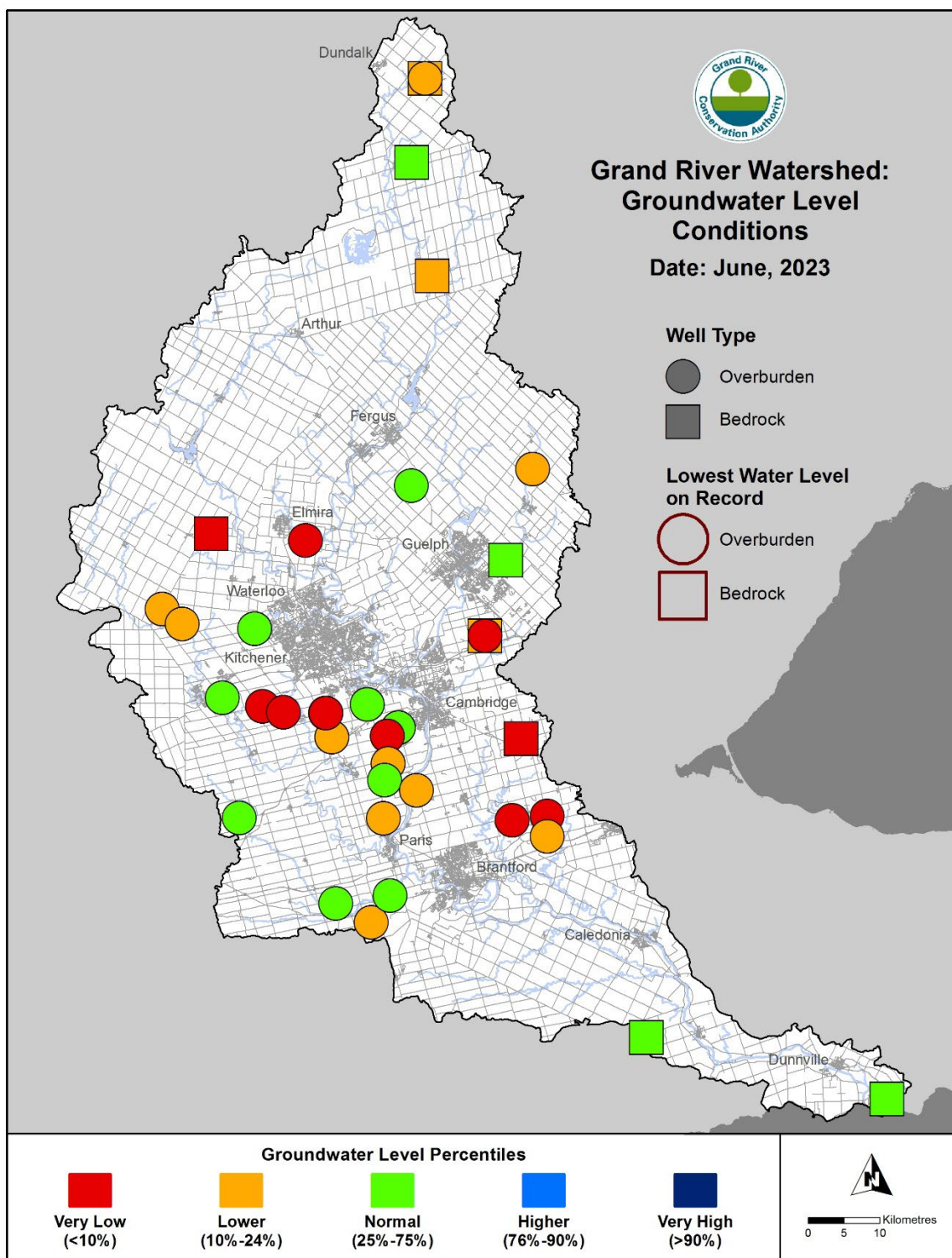


Figure 9: Groundwater Conditions at Select Monitoring Wells as of July 2023

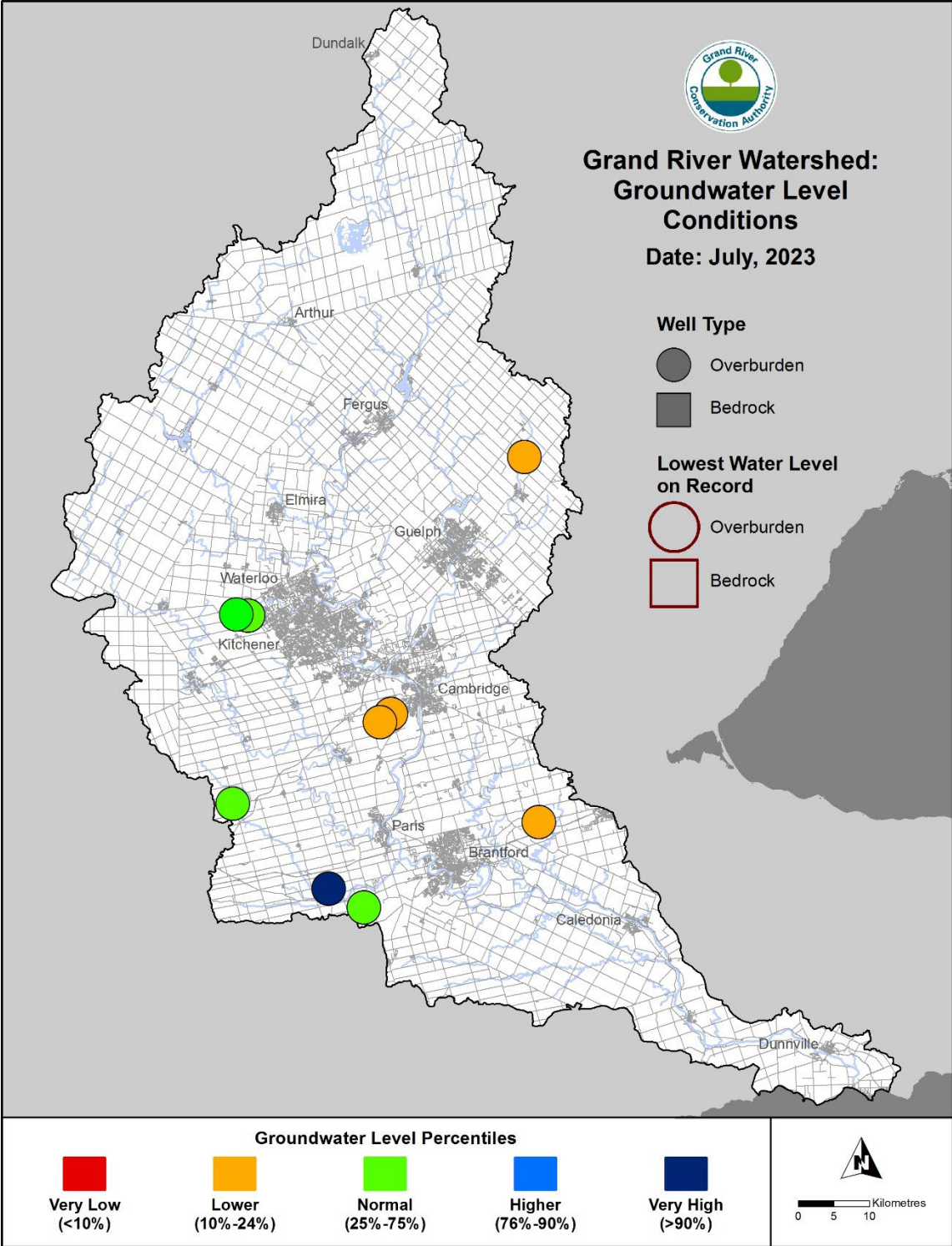


Figure 10: Groundwater Conditions at Select Monitoring Wells as of August 2023

