

**Lower Trent Conservation Flood Contingency Plan – 2023**

**LOWER TRENT CONSERVATION**  
**2023 FLOOD CONTINGENCY PLAN**



**LOWER TRENT**  
**C O N S E R V A T I O N**

**PROTECTING LIVES & PROPERTY**

# Lower Trent Conservation Flood Contingency Plan – 2023

## TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	ROLES AND RESPONSIBILITIES OF AGENCIES.....	4
2.1	Municipal Role .....	4
2.2	Conservation Authority Role .....	4
2.3	Provincial Role (Ministry of Natural Resources and Forestry - Surface Water Monitoring Centre) .....	5
3.0	TYPES OF FLOOD COMMUNICATIONS.....	6
3.1	Watershed Conditions Statement .....	6
3.2	Flood Watch.....	6
3.3	Flood Warning .....	7
3.4	Coordinating Issuance of Messages .....	8
4.0	FLOOD RESPONSE PROCEDURES .....	9

## LIST OF FIGURES

Figure 1	Lower Trent Conservation Watershed .....	2
Figure 2	Trent River Watershed .....	3

## APPENDICES

**APPENDIX A** - Flood & Weather Terminology

**APPENDIX B** - Sand Bagging Techniques & Suppliers

**APPENDIX C** - Lower Trent Conservation Staff Directory

**APPENDIX D** - Operational Procedures

**APPENDIX E** - Emergency Telephone Numbers

**APPENDIX F** - Communications Procedures / Media Contacts

**APPENDIX G** - Ice

# Lower Trent Conservation Flood Contingency Plan – 2023

## 1.0 INTRODUCTION

A flood is defined as a situation where water levels in a river, lake or stream rise and exceed the lake or channel banks and overflow onto the surrounding shore and neighbouring lands. This type of flooding is referred to as riverine or fluvial flooding. Coastal flooding along the Lake Ontario shoreline (including the Bay of Quinte) occurs from high water levels in Lake Ontario and/or storm surges created from extreme weather conditions. Riverine (fluvial) and Coastal flooding are included in the flooding definitions in this document.

Flooding along local waterways and Lake Ontario can also cause erosion. However, as the two are linked, this plan will only refer to the flood hazard. This Flood Contingency Plan is intended to outline the roles of the parties affected by, and responsible for, the anticipation of potential flood situations.

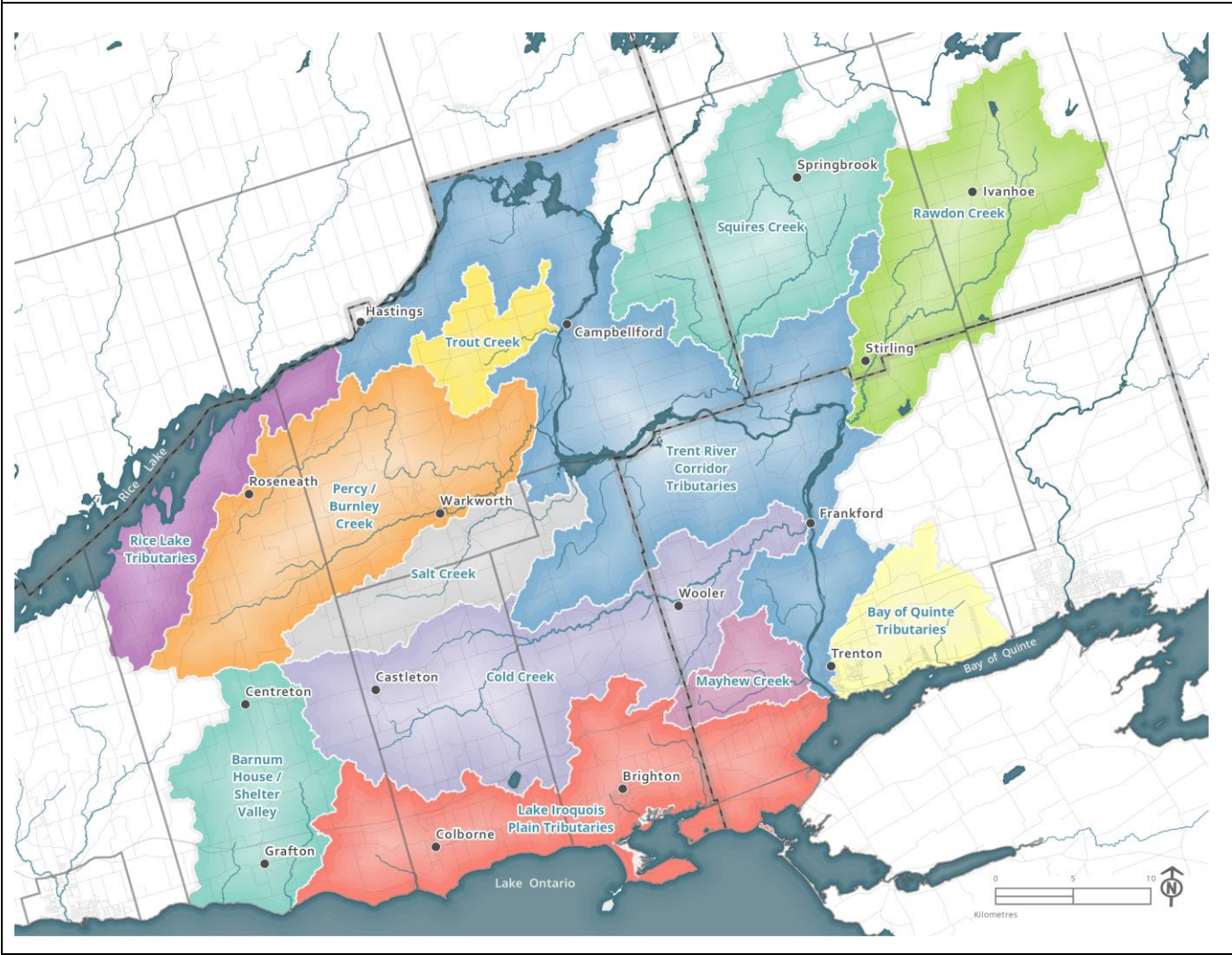
The responsibility for dealing with flood contingency planning in Ontario is shared by Municipalities, Conservation Authorities and the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNR), on behalf of the province. As with all emergencies, municipalities have the primary responsibility for the welfare of residents and should incorporate flood emergency response into municipal emergency planning. The Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNR) and Conservation Authorities are primarily responsible for operating a forecasting and warning system, and the province may coordinate a response in support of municipal action. The purpose of this service is to reduce risk to life and damage to property by providing local agencies and the public with notice, information and advice so that they can respond to potential flooding and flood emergencies.

This Flood Contingency Plan is intended for all public officials and agency staff likely to play a role in flood warning, mitigation, or emergency relief.

NOTE: Pluvial flooding, or urban flooding as it is sometimes known, occurs when an extreme rainfall event creates a flood independent of an overflowing water body. These floods typically occur when an urban drainage system is overwhelmed and water flows out into streets and nearby structures. Urban (pluvial) flooding is the responsibility of the municipality and is NOT covered under this document.

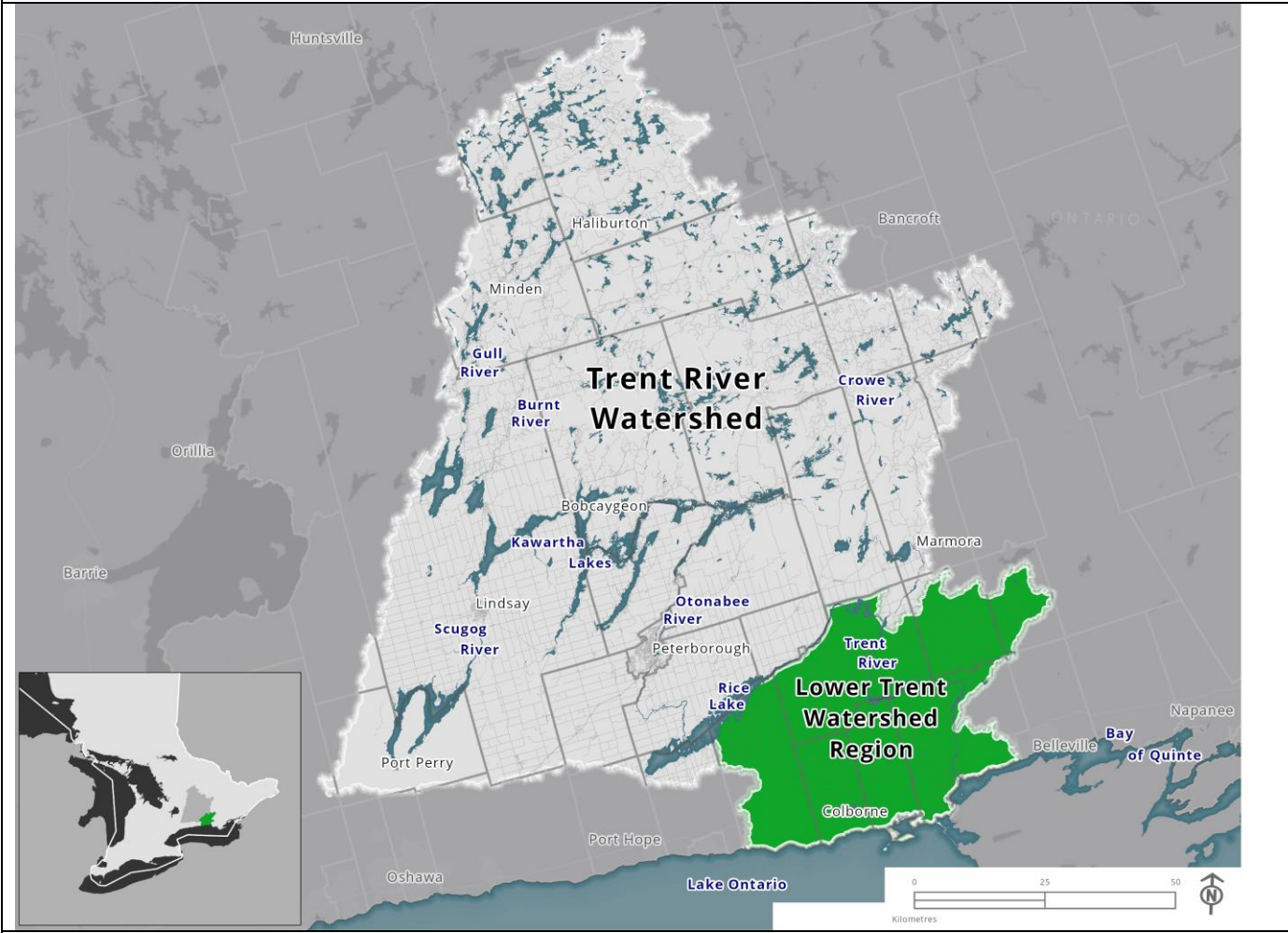
# Lower Trent Conservation Flood Contingency Plan – 2023

**Figure 1 Lower Trent Conservation Watershed**



# Lower Trent Conservation Flood Contingency Plan – 2023

Figure 2 Trent River Watershed



# Lower Trent Conservation Flood Contingency Plan – 2023

## 2.0 ROLES AND RESPONSIBILITIES OF AGENCIES

### 2.1 Municipal Role

Municipalities have the primary responsibility and authority for response to flooding and flood emergencies, and also for the welfare of residents and protection of property. In order to fulfill this responsibility, municipalities should ensure that emergency plans are kept current and tested on a regular basis.

Upon receiving a Flood Watch or Flood Warning, municipalities are responsible for:

- Notifying appropriate municipal officials, departments and agencies in accordance with their municipal emergency plan.
- Determining the appropriate response to a flood threat and, if warranted, deploy municipal resources to protect life and property.
- If required, declaring a flood emergency and implementing their Emergency Procedures Plan.
- Requesting Provincial assistance under the Emergency Plan Act, if municipal resources are inadequate to respond to the emergency.
- Maintaining liaison with the Conservation Authority.

### 2.2 Conservation Authority Role

Conservation Authorities have several areas of responsibility for flooding and flood emergencies:

- Monitoring watershed and weather conditions and operating a flood forecasting system in order to provide warning of anticipated or actual flood conditions.
- Issuing Water Level Notices to municipalities and other appropriate agencies to advise of potential changes in water levels.
- Providing advice to municipalities in preventing or reducing the effects of flooding.
- Maintaining communications with municipalities, the Surface Water Monitoring Centre (SWMC) of the Ministry of Natural Resources and Forestry (MNRF), local Health Units, Emergency Management Ontario, and Parks Canada - Ontario Waterways during a flood event.

## **Lower Trent Conservation Flood Contingency Plan – 2023**

### **2.3 Provincial Role (Ministry of Natural Resources and Forestry - Surface Water Monitoring Centre)**

- Operating and maintaining a Provincial Warning System to alert Conservation Authorities of potential meteorological events that could create changes in current water levels.
- Maintaining communications with MNRF district offices regarding the status of flood situations.

# Lower Trent Conservation Flood Contingency Plan – 2023

## 3.0 TYPES OF FLOOD COMMUNICATIONS

When conditions warrant, Lower Trent Conservation will communicate with local agencies using one of the following types of messages.

### 3.1 Watershed (or Shoreline) Conditions Statement

A Watershed Conditions Statement is a general notice of potential for flooding or other conditions that pose a risk to personal safety, such as high flows, unsafe ice, or high lake levels. There are 2 types of statements:

A Water Safety Statement would indicate that high flows, melting ice, or other factors could be dangerous for such users as boaters, anglers and swimmers, but flooding is not expected.

A Flood Outlook Statement gives early notice of the potential for flooding based on weather forecasts calling for heavy rain, snow melt, high winds, or other conditions.

Similarly, Shoreline Conditions Statements are issued for potential high water, storm surge or wave activity that could pose risk to personal safety or potential property damage along the Lake Ontario and Bay of Quinte shorelines.

A Shoreline Water Safety Statement would indicate that high winds creating large waves or storm surge, melting and shifting ice conditions, or other factors could be dangerous for shoreline users or shoreline owners, but flooding is not expected.

A Shoreline Flood Outlook Statement would indicate that forecasted water levels from Lake Ontario St. Lawrence River Board (LOSLRB) are indicating 50% probability of exceedance of 75.30 metres in one month's time. Note that these Lake Ontario water levels are measured from the International Great Lakes Datum 1985 (IGLD 1985).



### 3.2 Flood Watch

A Flood Watch is defined as a notice of the potential for flooding to occur in the near future. The Flood Watch is based on information received by the Conservation Authority's monitoring systems, and is intended to provide notice to municipalities and emergency services that measures should be taken to prepare for a possible flood emergency.



## Lower Trent Conservation Flood Contingency Plan – 2023

A Flood Watch for Lake Ontario / Bay of Quinte will be issued when the Static Water Level of Lake Ontario at Cobourg reaches 75.30 metres. Note that these Lake Ontario water levels are measured from the International Great Lakes Datum 1985 (IGLD 1985).



A Flood Watch may be updated depending on weather and runoff conditions, and will be followed by a notice of cancellation once the potential for flooding has passed.

The standard content of a Flood Watch includes:

1. the date and time of issuance
2. identification of sender (Conservation Authority and person)
3. recipient list
4. summary of weather forecast (precipitation, temperature, timing)
5. description of potential flood magnitude and a general assessment of flooding implications, including specific sites and issues (e.g. ice jamming), if relevant
6. date and time of next update
7. Conservation Authority contact for additional information.

### 3.3 Flood Warning

A Flood Warning is defined as a notice that flooding is imminent or occurring. The Flood Warning is based on information received by the Conservation Authority's weather monitoring systems, and is intended to provide notice to municipalities and emergency services that action is required on their part.

A Flood Warning for Lake Ontario/Bay of Quinte will be issued when the Static Water Level at Cobourg is 75.5 metres or higher. Note that these Lake Ontario water levels are measured from the International Great Lakes Datum 1985 (IGLD 1985).



Flood Warnings may be updated depending upon weather and runoff conditions, and will be followed by a notice of cancellation once the potential for flooding has passed.

The standard content of a Flood Warning includes:

1. the date and time of issuance
2. identification of sender (Conservation Authority and person)
3. recipient list

## **Lower Trent Conservation Flood Contingency Plan – 2023**

4. summary of weather forecast (precipitation, temperature, timing)
5. description of potential flood magnitude and a general assessment of flooding implications
6. specific information regarding the magnitude and timing of the forecasted flooding, and the locations of anticipated problem areas
7. date and time of next update
8. Conservation Authority contact for additional information.

### **3.4 Coordinating Issuance of Messages**

Messages are issued by phone, fax, or electronic transmission to municipalities and other local agencies. They, in turn, are responsible for relaying the bulletin to other relevant individuals and departments within their organizations, and activating their role as defined by this Flood Contingency Plan and their organization's Emergency Response Plan.

Municipalities, local agencies, and residents requiring information on local conditions should contact the Conservation Authority.

# Lower Trent Conservation Flood Contingency Plan – 2023

## 4.0 FLOOD RESPONSE PROCEDURES

During an actual flood, the primary responsibility for the welfare of residents and protection of property rests with the municipality. Upon receiving a Flood Watch or Flood Warning message from the Conservation Authority, municipalities should monitor their local conditions and determine the appropriate action.

During a flood, Lower Trent Conservation will continue to provide updated information as well as technical advice on flood mitigation.

During major floods, municipalities should implement their Emergency Plan. Where a municipality declares an Emergency, the LTC, if requested, will assign a representative to the Emergency Operations Center to represent the Conservation Authority, when possible.

Where a flood emergency is beyond the capacity of a municipality, provincial assistance can be requested in accordance with the municipality's Emergency Plan.

During the emergency, the Conservation Authority representative will continue to advise the Surface Water Monitoring Centre (SWMC) of the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) of the status of the situation. The SWMC will be responsible for updating and relaying information related to the emergency to the Ministry's district offices.

**Note:** Sandbags may be made available by the municipality in the event of a flood emergency. Lower Trent Conservation does not supply sandbags, nor do they assist in sandbagging operations. Refer to Appendix B for sandbagging procedures and suppliers for flood emergencies.

# Lower Trent Conservation Flood Contingency Plan – 2023

## APPENDIX A

---

### Flood and Weather Terminology

---

# Lower Trent Conservation Flood Contingency Plan – 2023

## A.1 Standardized Description of Flood Magnitude

In order to improve the understanding of flood messages sent by the Conservation Authority, all Flood Watch and Flood Warnings should include the following terminology to describe the magnitude of anticipated flooding.

*No Flooding:* Water levels remain within channel banks.

*Nuisance Flooding:* Flooding of low lying lands. However, road access remains available and no structures will be flooded.

*Minor Flooding:* Potential for some structural flooding and sections of road access may be impassable. No evacuation is required.

*Major Flooding:* Potential for significant basement flooding, some 1st floor flooding, and significant road access cuts. Evacuation possibly required.

*Severe Flooding:* Potential for many structures to be flooded, major disruption of roads and services. Evacuation is required due to risk to life and major damages to residential, industrial, commercial and/or agricultural sites. The event may produce negative environmental impacts caused by spills of hazardous substances such as sewage, oils, chemicals, etc., that pose a threat to public safety and/or to the eco-system.

## A.2 Weather Forecast Terminology and Definitions

A key component of Conservation Authorities' flood forecasting systems is the ability to interpret weather forecasts. To facilitate this, a report has been compiled containing explanations of the most commonly used weather forecasting terms.

Since the flood warning systems operator is primarily concerned with flooding, this section will only cover those terms relating to precipitation.

Terms such as *drizzle*, *rain*, or *snow* are used to indicate the occurrence of precipitation. The various forms of precipitation are defined as follows:

*Drizzle:* Fairly uniform precipitation composed exclusively of fine drops with diameters of less than 0.5 mm, falling very close together. Drizzle appears to flow while following air currents.

*Rain:* Precipitation in the form of drops larger than 0.5 mm.

*Snow:* Precipitation of snow crystals, predominantly in the form of six-pointed stars.

These terms may be accompanied by qualifying words and numbers to provide further detail regarding the intensity, amount, and proximity of the precipitation. Qualifiers may be used in various combinations to describe weather phenomena.

## Lower Trent Conservation Flood Contingency Plan – 2023

The intensity qualifiers that are used are: *light*, *moderate*, or *heavy*, in accordance with the following charts.

<b>Intensity</b>	<b>Criteria</b>
Light	Up to 2.5 mm/hr
Moderate	> 2.5 mm/hr to 7.5 mm/hr
Heavy	> 7.5 mm/hr

<b>Intensity</b>	<b>Criteria</b>
Light	from scattered drops that, regardless of duration, do not completely wet an exposed surface, up to a condition where individual drops are easily seen.
Moderate	individual drops are not clearly identifiable; spray is observable just above pavement and other hard surfaces.
Heavy	rain seems to fall in sheets; individual drops are not identifiable; heavy spray to heights of several inches is observed on hard surfaces.

It is often difficult to accurately forecast the amount of rain expected, due to the subjective nature of computer model interpretation, and the large areas for which computer models are applied.

The actual amounts of precipitation received are dependent on how the system reacts to the conditions and topography as it crosses a specific location. The presence of water bodies in particular will cause the weather to differ over relatively short distances.

For example, when a forecaster predicts that South Central Ontario will receive 25 mm today, this **does not** mean that a specific area will receive exactly 25 mm, or even a maximum quantity of 25 mm. What this **does** mean is that, generally, over the area of south central Ontario, and given that current conditions remain the same, 25 mm are *likely* to fall over the location.

When a range is given, such as 10-20 mm, this implies a degree of uncertainty on the part of the forecasters with respect to the exact tracking of a system. The various computer models used may not be in agreement with regards to the estimated rainfall. Therefore, the forecaster is

## Lower Trent Conservation Flood Contingency Plan – 2023

covering each possibility by using a range.

The terms *showers* and *thunderstorms* are used to further qualify the type of precipitation and weather phenomena that are expected.

*Showers:* Precipitation that stops and starts again abruptly, changes intensity rapidly, and is usually accompanied by rapid changes in the appearance of the sky.

*Thunderstorm:* A local storm produced by cumulonimbus clouds, and is accompanied by lightning and/or thunder. Thunderstorms are essentially overgrown showers that produce thunder and lightning.

The probability of precipitation is another qualifier frequently used in forecasts. The probability of precipitation represents the likelihood of the occurrence of measurable precipitation at any point in the region. Thus, a probability of 30 percent means that out of 100 similar situations, precipitation should occur 30 times.

Rain, snow, periods of rain, or intermittent rain or snow will normally appear with probabilities of 90 or 100 percent, and indicate that a major weather system will affect the region. The amount of precipitation may vary.

The terms showers, flurries or occasional rain (or snow) imply that the precipitation will not be continuous, and any point in the region is likely to get a measurable amount. These terms are normally combined with probabilities in the 60 to 80 percent range.

The term *scattered* is used to qualify the terms showers and flurries when only a portion of the region is expected to get measurable precipitation. The probabilities associated with *scattered showers* are in the 30 to 50 percent range.

When *isolated thunderstorms* are forecast, a probability of precipitation of 10 or 20 percent is normally applied. Only a small part of the region is likely to get rain, but those areas that do are likely to get intense heavy rain for short periods. Thunderstorms may occur during a continuous rain (i.e., embedded thunderstorms). Hail, strong winds, and even tornadoes can result from severe thunderstorms.

### A.3 Weather Terminology in Water Level Notices

When issuing a Water Level Notice to our clients (i.e., the municipalities), the Conservation Authority does not expect our partners to remember all these definitions or expect them to locate these definitions quickly in an emergency situation.

Therefore, we will try to use enough detail in the Water Level Notices to make any technical terms self-explanatory. For example, the term “heavy rainfall” should be accompanied by the estimated quantity as well as the estimated duration (i.e., over the next 12 hours). A sufficient number of qualifiers should be used to make the message clear to the intended reader.

# Lower Trent Conservation Flood Contingency Plan – 2023

## APPENDIX B

---

### Sand Bagging Techniques & Suppliers

---



## Lower Trent Conservation Flood Contingency Plan – 2023

### B.1 SANDBAG – SUPPLIERS

<p><b>Bag Supplies Canada Ltd.</b>            90 Linton Ave,            Stratford, ON N5A 0B1            Phone: (519) 271 2040 or (519) 271-5393  <a href="http://bagsupplies.ca/">http://bagsupplies.ca/</a></p>	<p><b>Burtex Industries</b>            66 Bartor Road            Weston, ON M9M 2G5            Phone: 1-800-268-0908  <a href="http://www.burtexburlap.com/">http://www.burtexburlap.com/</a></p>
<p><b>Endurapak Inc.</b>            360 Mountain Street            Sudbury, ON P3B 2T7            Phone: 1 (800) 665-8083 or (705) 673-7777  <a href="http://www.endurapak.com">www.endurapak.com</a></p>	<p><b>GX Packaging</b>            4159 Breen Rd            Putnam, ON N0L 2B0            Phone: 1-866-857-7143 or 519-686-1669  <a href="http://www.gxpackaging.ca/HOME.html">http://www.gxpackaging.ca/HOME.html</a></p>
<p><b>KT Canada Corp.</b>            2644 Windjammer Road            Mississauga, ON L5L 1T5            Phone: 1 (866) 542-3024 or (905) 828-0873  <a href="http://www.ktcanada.ca">www.ktcanada.ca</a></p>	<p><b>Lloyd Bag Co. Ltd.</b>            P.O. Box 208, 114 St. Clair Street            Chatham, ON N7M 5K3            Phone: 1 (800) 549-2247 or (519) 352-9300  <a href="http://www.lloydbag.com">www.lloydbag.com</a></p>
<p><b>Polytarp Products</b>            11 Lepage Court            Toronto, ON M3J 2A3            Phone: 1 (800) 606-2231 or (416) 633-2231  <a href="http://www.polytarp.com">www.polytarp.com</a></p>	<p><b>Premier Poly Products</b>            3530 Laird Road. Unit 1            Mississauga, ON L5L 5Z7            Phone: (905) 820-6565  <a href="http://www.premierpolyproducts.ca">www.premierpolyproducts.ca</a></p>
<p><b>The Sandbagger LLC</b>            765 South IL            Route 83            Elmhurst, IL 60126-4228            P: 630-876-2400  <a href="https://thesandbagger.com/">https://thesandbagger.com/</a></p>	<p><b>Vince Products Inc. / Harnois Shelters</b>            507 Route 158            St-Thomas, QC J0K 3L0            P: 866-661-6646 x 203            F: 450-755-6878  <a href="http://www.abrisharnois.com/en/">http://www.abrisharnois.com/en/</a></p>

# Lower Trent Conservation Flood Contingency Plan – 2023

## B.2 SAFETY TIPS FOR LEADERS AND VOLUNTEER WORKERS

- Individuals with a medical condition that would make it dangerous for him/her to participate should avoid taking part.
- Register all persons involved and deliver the registration sheet to the community Emergency Coordinator.
- Wear protective gear such as steel toed boots, hat, safety glasses, gloves, sunscreen, etc.
- Ensure there are sufficient potable water and bathroom facilities. Take regular water breaks.
- Be attentive of large equipment moving in the area.
- Be aware of floodwater dangers:
  - Contamination
  - Varying water flow and strong undercurrents
  - Floating debris
- Adhere to proper sandbag handling technique:
  - Do not bend more than 20 degrees in any direction while handling sandbags.



- Keep heavy weights below shoulder height, above knees and close to the body. Limit reaching with arms when passing the sandbags.



- Pivot feet and do not twist through the back while handling sandbags.
- Do not throw sandbags.

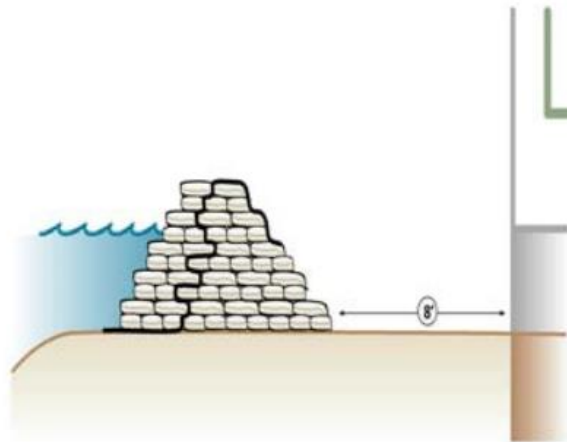
# Lower Trent Conservation Flood Contingency Plan – 2023

## B.3 FILLING SANDBAGS

- Fill sandbag to half its capacity (no more than 40 lbs) with sand, clay or silt.
- Fold or tie the flap (tying or sewing is not necessary).
- Do not drag the bags (this could cause lower back injury and bag to weaken).
- When forming a line to pass sandbags, face each other and stand no more than one to two feet apart. If there are not enough people to form a continuous line, use a wheelbarrow to move sandbags.

## B.4 BUILDING A SANDBAG DIKE

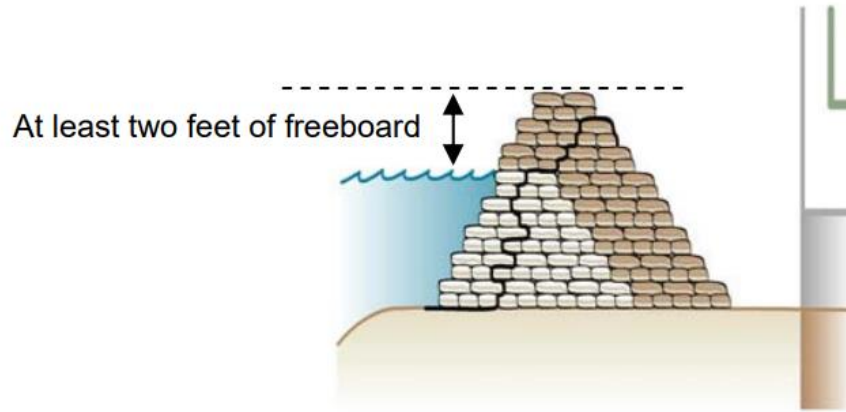
- Location:
  - Base area of dike should be clear of snow and ice.
  - To avoid flood water moving under a dike, do not build a dike on porous land or on a septic field.
  - The dike should be at least eight feet from building foundation. This prevents foundation damage and allows room for people and equipment to move. As well, this space allows more dike base width to be constructed should additional dike height be required.



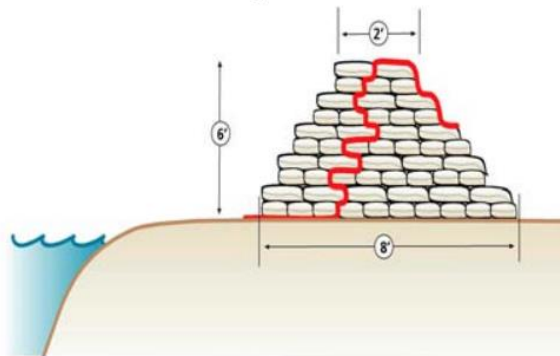
- To create a more secure dike, when possible, create a trench in the soil that is one sandbag deep by two sandbags wide.
- Construction:
  - Dike size:
    - Height: Sandbag dikes require at least two feet of freeboard. Freeboard is the area of the dike between the highest floodwater level and the top of the dike:  
**predicted floodwater rise above ground level + two feet of freeboard = required dike height**

## Lower Trent Conservation Flood Contingency Plan – 2023

For example, if floodwater is predicted to rise four feet above ground level, the required dike height is at least six feet. (4' + 2' of freeboard = 6' high dike)



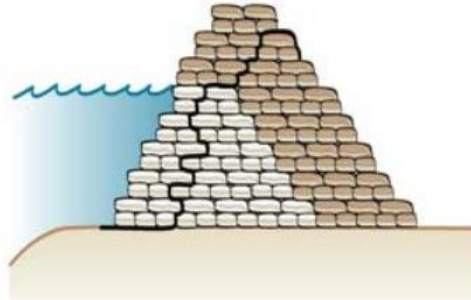
- Sandbag dikes will compact when they get wet, which can reduce the available freeboard. The amount of compaction due to wetting increases with the size of the dike. Add at least five per cent to the required height of the dike to account for compaction. For example, add three to four inches for a six foot dike to account for compaction due to wetting.
- Width: The base of a sandbag dike is two feet wider than it's required **height: height + two feet = width at base**  
For example, a dike with a required height of six feet would have to be eight feet at its base. ( $6' + 2' = 8'$  wide at base)



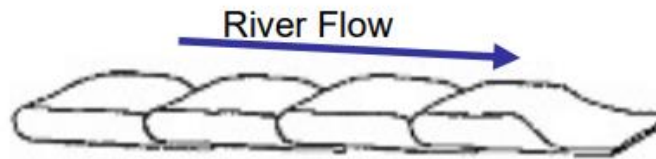
- Sandbag dikes must be at least two feet wide across the top of dike.
- Due to the high pressure water can exert, consult your local authority for additional advice for dikes higher than six feet. At least two feet of freeboard
- Polyethylene sheets
  - Proper use and placement of polyethylene sheets is important to reduce the rate of water seeping through the dike. Use six mil polyethylene in three meter wide rolls on the river side of the dike. Have the polyethylene sheet protrude over the ground on the river side of the dike. Be careful

## Lower Trent Conservation Flood Contingency Plan – 2023

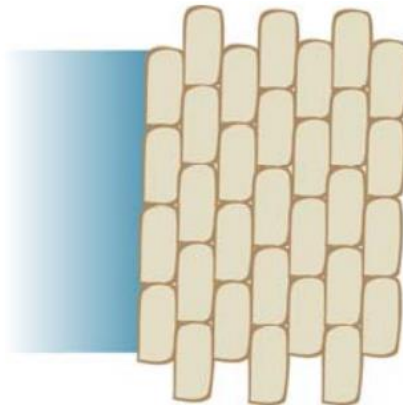
not to puncture the polyethylene sheet. (The polyethylene sheet will be weaved between the courses of sandbags.)



- First course/bottom layer:
  - Lay first course/bottom layer of bags parallel to river/water with the closed side of bag against river flow direction.
  - The filled portion of the second bag sits over the empty portion of the previously placed bag. This is known as lapping.

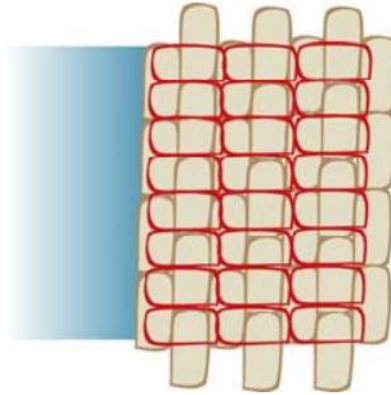


- Drop the bags into place and tamp bags with feet to lodge them into place.
- Offset the bags from the previous row in the same course to form a brick pattern.

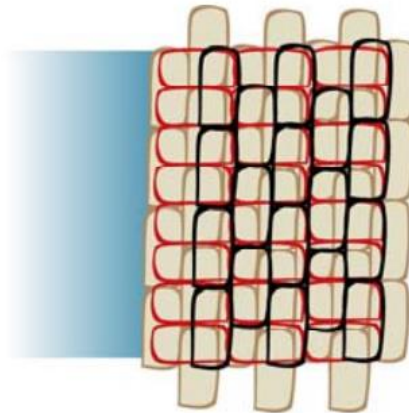


- Second and remaining courses:
  - Rotate bags 90 degrees when laying second course of sandbags. Keep seal side of bag towards water/river. Ensure sandbags are well packed against each other and firmly in place.

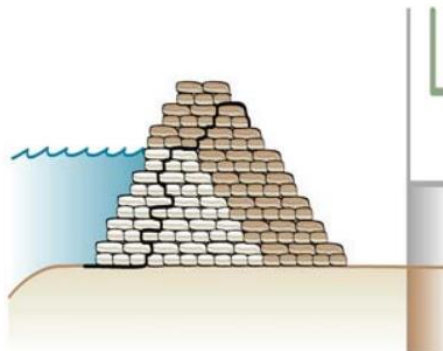
## Lower Trent Conservation Flood Contingency Plan – 2023



- Change direction of bag from parallel to perpendicular to the river for each course of bags.
- Every second course of sandbags should be set back a quarter ( $1/4$ ) of a sandbag width, both on the river side and the land side of the dike, producing a step-like appearance.



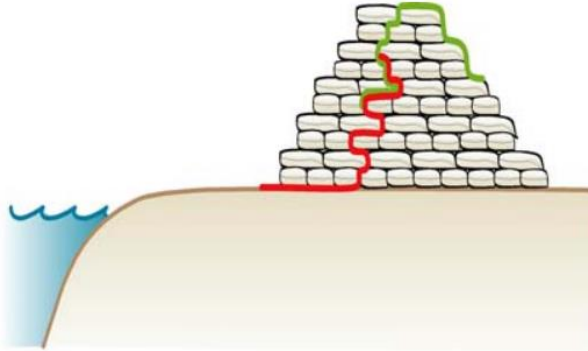
- Weave the polyethylene sheet between the courses of sandbags as to have at least two layers of sandbags protecting the polyethylene sheet from debris punctures. Maximum depth of the polyethylene sheet should be three sandbags or a quarter ( $1/4$ ) of the cross section of the dike, whichever is less.



- If more height of polyethylene sheet is required, make polyethylene

## Lower Trent Conservation Flood Contingency Plan – 2023

sheets overlap at least two feet.



- No matter how well you build a dike, extreme water pressure may cause water to seep through the dike or bubble up through the ground. It is advisable to have pumps with sufficient fuel and oil readily available to last the duration of the flood event and an escape plan.

### B.5 SANDBAG DIKE REMOVAL

- Sandbags should be removed with the same precautions as they were laid.
- Sand from sandbags should not be used for children’s sand boxes or play areas, but could be used for landscaping purposes.

**Number of Sandbags Required for the following Lengths of Dike (Feet)**

Height of Dike (ft)	Length of Dike (ft)								
	50	100	150	200	250	300	350	400	450
0.5	210	430	640	850	1070	1280	1500	1710	1920
1	470	950	1420	1900	2370	2850	3320	3800	4270
1.5	780	1570	2350	3130	3920	4700	5480	6270	7050
2	1100	2300	3400	4600	5700	6800	8000	9100	10300
2.5	1500	3100	4600	6200	7700	9300	10800	12300	13900
3	2000	4000	6000	8000	10000	12000	14000	16000	17900
3.5	2500	5000	7500	10000	12500	15000	17500	19900	22400
4	3000	6100	9100	12200	15200	18200	21300	24300	27400
4.5	3600	7300	10900	14500	18200	21800	25400	29100	32700
5	4300	8500	12800	17100	21400	25600	29900	34200	38500
5.5	5000	9900	14900	19800	24800	29800	34700	39700	44700
6	5700	11400	17100	22800	28500	34200	39900	45600	51300