



## FLOODPLAIN MAPPING PRIMER

### WHAT IS A FLOODPLAIN?

A **floodplain** is a generally flat or low-lying area of land next to a waterbody. These areas are not typically under water, but, during spring freshet conditions, or following severe weather events, they may become inundated.

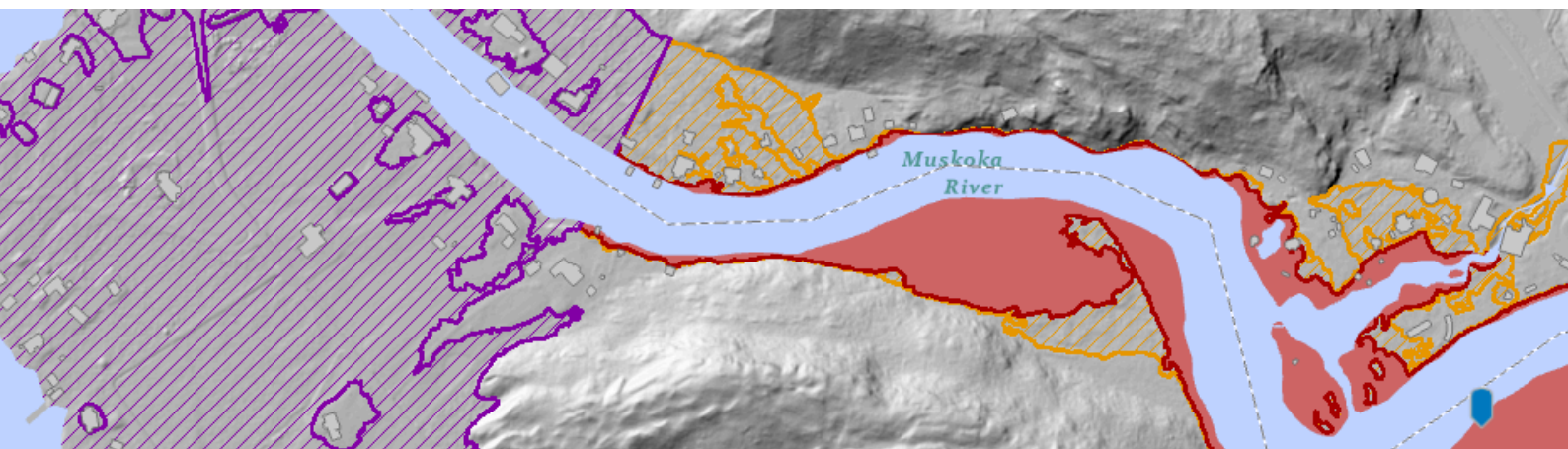
The **spring freshet** occurs every year, generally between March and May, when snow and ice melts and moves into local lake and river systems. When this melting snow and ice combines with spring rain and a still frozen ground, it can cause flooding.

### WHAT IS FLOODPLAIN MAPPING?

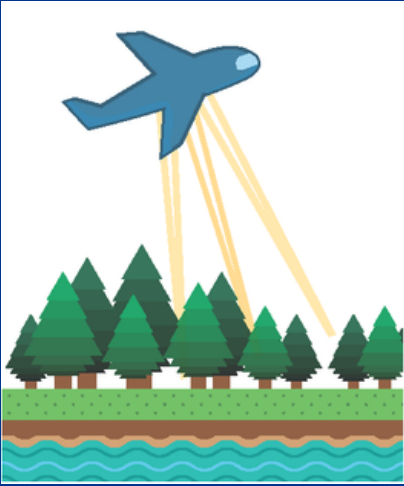
**Floodplain mapping** identifies the areas that accommodate the spring freshet and areas at risk of flooding.

Floodplain mapping is essential for effective land-use planning, emergency management response, and infrastructure decisions. Development in these areas can result in property damage if flooding or erosion occurs and, in extreme cases, could result in loss of life. New development is encouraged to be permitted only in areas beyond the floodplains.

The District of Muskoka, through external Federal and Provincial funding, is fortunate to have state-of-the-art floodplain mapping, information and tools to identify local floodplains and better understand where flood hazards exist!



## HOW ARE FLOODPLAINS MAPPED?



Floodplains are mapped using LiDAR, a remote-sensing method that uses a laser to bounce light on objects then tracks how long the light takes to return back to the sensor. This elevation information is combined with bathymetry data and water levels and flow information from water level gauges to create a 3D hydrological model that calculates where water would flow on the landscape during freshet conditions or a flood event. Information from the hydrological model is then mapped using Geographic Information System (GIS) to show where the flood hazard limits are in Muskoka.

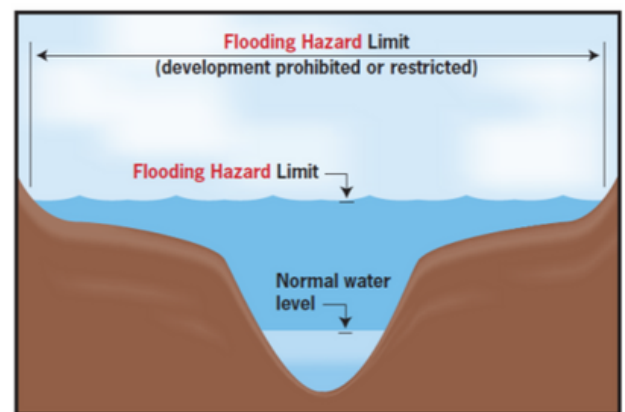
## WHAT IS THE FLOOD HAZARD LIMIT?

There are two different approaches used to describe the **Flood Hazard Limit** in Muskoka, as outlined in the *River & Stream Systems: Flooding Hazard Limit Technical Guide* produced by the Ontario Ministry of Natural Resources (2002). The approach depends on the waterbody.

For all lakes in Muskoka a **one zone concept** is required. In this approach, the flood hazard limit = the entire contiguous floodplain, defined by the static 100-year flood level. The static flood level is the same for the entire shoreline of a given lake.

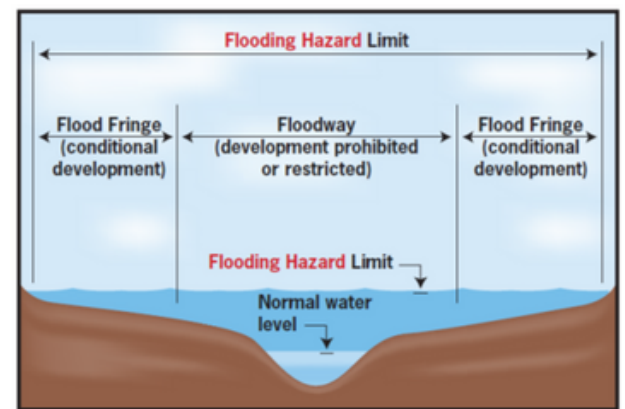
Lake Muskoka is considered a Large Inland Lake. In this case, a one zone concept is applied to Lake Muskoka; however, an additional 5 m setback from the static flood level is added to address the impacts of wind and waves during flood events – this is called the **wave uprush**.

On rivers in Muskoka, a **two zone concept** is applied where the flood hazard limit = the floodway (the area required for the safe passage of flood flow and/or the area where flood depths and/or velocities are considered to be such that they pose a potential threat to life and/or property damage) + the flood fringe (the outer area of the floodplain where flood depths and velocities are generally less severe). A two zone concept is possible on rivers and not lakes due to their hydrology.



(NOT TO SCALE)

Figure B-2 - One Zone Floodplain Concept



(NOT TO SCALE)

Figure B-3 - Two Zone Floodway - Floodfringe concept

Development and site alteration may be permitted in the flood fringe, subject to appropriate floodproofing to the flooding hazard limit. OPA 61 (Component 3: Environmental Resiliency) proposes additional policies that detail when development and site alteration is permitted in the flood fringe. Note that encroachment within the flood fringe area may result in:

- An increase in upstream flood levels;
- An increase in downstream flows;
- An increase in downstream velocities; and
- A change in the timing of flows.



## WHAT ARE THE POLICIES RELATED TO FLOODPLAINS?

As outlined by the Province of Ontario in the *River & Stream Systems: Flooding Hazard Limit Technical Guide* (2002), the management of flood susceptible lands involves a combination of three main program components:

1. Prevention, by land use planning and regulation of development;
2. Protection, by applying structural and non-structural measures and acquisition; and
3. Emergency response, by flood forecasting/warning and flood/erosion disaster relief.

Prevention is the preferred method for the management of flood prone areas. This is primarily accomplished through Official Plan policy.

Consistent with the *Provincial Planning Statement* (2024), the Muskoka Official Plan contains policies that direct development to areas outside of the flood hazard area of a waterbody, as determined above. The one zone concept is the default, except on rivers and tributaries where an evaluation of a number of factors have determined the suitability of applying the two zone concept. Floodplain maps that delineate the flood hazard area for much of Muskoka are available on the Muskoka GeoHub.

Limited development and site alteration may be permitted within the flood fringe in the two zone concept, provided that appropriate floodproofing is undertaken to the flood hazard limit and ingress/egress to new buildings for vehicles and pedestrians is not prevented during times of flooding.

The policies proposed in OPA 61 (Component 3: Environmental Resiliency) adhere to the requirements outlined in Section 5.2: Natural Hazards of the *Provincial Planning Statement* (2024) and generally reflect the current Muskoka Official Plan policies (Section I2: Natural Hazards) while providing greater details on directing development within these hazardous lands. In addition, the schedules have been updated to include the state-of-the-art floodplain mapping the District now has to more accurately define the flood hazard areas across Muskoka.

### LEARN MORE

Muskoka Official Plan Review (OPA 61) - [www.engagemuskoka.ca/muskoka-official-plan](http://www.engagemuskoka.ca/muskoka-official-plan)

Muskoka GeoHub (Floodplain Mapping) - [map.muskoka.on.ca](http://map.muskoka.on.ca)