

Flood studies

This document provides information about provincial flood studies, including how flood maps are developed, how flood inundation and flood hazard maps are used, and how to view flood maps.

Flood studies

Flood studies are detailed assessments of flood risk along a specific length of river. They include flood maps that identify where water will flow during a flood and what land could be flooded for different sized floods. Flood studies can include both open water and ice jam flood maps.

Flood studies include engineering reports and flood maps. The engineering reports document the data, assumptions, and results of the hydrologic and hydraulic analyses needed to create flood maps. Larger studies can include more than one report and multiple flood map libraries, while smaller studies often combine everything into a single report.

Flood maps serve various purposes. Some flood maps, like flood inundation maps, support emergency response during a flood. Other flood maps, like flood hazard maps, can be used to help build more resilient communities over the long term.

Flood risks have not been mapped along all rivers or through all communities in Alberta, and it is important to remember that risk exists in areas without provincial flood maps.

How to view flood maps

Visit floods.alberta.ca to access the online [Flood Awareness Map Application](#). It is the best way to view, interact with, and get more information about draft and final flood maps.

Switch between different types of flood maps by clicking on the buttons at the top of the screen, manually scroll and zoom to specific areas of interest, or use the search button on the left side of the screen to search for a specific location using a street address, postal code, latitude and longitude coordinates, or legal land description.

Location specific information, including river flow, flood zone, flow regime, water level and flood depth, are available by clicking on any part of a flooded area. When in the flood inundation and flood range map views, switch between smaller and larger floods using the slider on the right side of the screen.

Developing flood maps

Provincial flood maps are prepared using the best tools and information available when a study is conducted and in accordance with generally accepted engineering practices.

We are confident in the work of our consultants, and that the flood maps are as representative as possible given the assumptions used to create hydraulic models and flood maps. New survey and base data used for flood mapping is collected for a study, and hydraulic modelling is calibrated using information from previous floods. Draft reports and flood maps undergo multiple levels of quality control and assurance and meet or exceed minimum accuracy requirements laid out in provincial Flood Hazard Identification Program guidelines.

New flood studies use new information and analyses, and flood maps can change when a new study is conducted. This includes new high-accuracy survey and base data collected for a study, hydrology assessment that incorporates new techniques and longer flow records, and hydraulic models that use new modelling platforms. In addition to reflecting changes to the river and floodplain that have occurred since a previous study was conducted, the flood levels calculated using new information and analyses can be different than those in older studies. This means that new flood maps can also be different than older flood maps, even in the same area.

Rivers and their floodplains can also change over time, whether due to natural processes or human development. Localized changes to topography do not usually significantly impact flood levels and would normally be captured the next time a study is updated. If major changes to floodplain topography occur, Environment and Protected Areas assesses whether revisions to hydraulic models and flood maps are appropriate in the interim.

Provincial flood studies focus on the situation where high water escapes the river and inundates the floodplain. Although communities throughout Alberta may also face other flood hazards, provincial flood studies don't assess groundwater, local drainage issues, or overland flooding caused by excessive rain or snowmelt runoff.



Determining the 1:100 flood

Flood maps can show areas at risk for different sized floods. Many people are familiar with the 1:100 flood, which has a 1% chance of occurring each year. Although it is commonly referred to as a 100-year flood, this does not mean that it will only occur once every 100 years. Although it is less likely from a statistical point of view, a 1:100 flood can occur more than once over a multi-year period, in back-to-back years, or even twice in a single year.

Different sized floods

The terms 1:100 flood, 100-year flood, and 1% annual exceedance probability flood are all different ways of describing the same flood.

Similar terminology is used to describe floods that have different chances of occurring. Smaller floods are statistically more likely to occur in any given year than larger floods. For example, a 1:50 flood is smaller than a 1:100 flood, and has a higher (2%) chance of occurring each year. Similarly, a 1:200 flood is larger than a 1:100 flood, and has a lower (0.5%) chance of occurring each year.

The smallest flood we typically map is a 1:2 flood, which is considered somewhat common and has a relatively high (50%) chance of occurring each year. The largest flood we typically map is a 1:1000 flood, which is exceeding unlikely and has a relatively low (0.1%) chance of occurring each year.

Determining the magnitude of a 1:100 flood starts with an assessment of river flows or water levels, using available flow or water level records for a specific location and standard statistical calculations. The records are usually a list of highest recorded flows each year at a hydrometric gauge, but recorded lake or ice jam levels can also be used depending on the type of flooding being assessed.

Because the 1:100 flood is calculated using recorded or historic flow or water level records, the calculated value can change over time when more data becomes available. Typically, the calculated value of the 1:100 flood – or floods with different chances of occurring – doesn't change dramatically year-to-year, but it can vary over time. The most significant changes usually occur after a large flood changes our understanding of flood risk, or after long periods of low flows without any floods.

Flood inundation maps

Flood inundation maps show areas at risk for different sized floods, including ice jam floods in some communities, and identify areas protected by flood berms. Because they map a wide range of floods, they are most often used for emergency response planning and to inform local infrastructure design.

Older flood studies include maps for as many as three flood scenarios, including the 1:100 flood. Newer studies include maps for as many as thirteen scenarios, from the 1:2 flood to the 1:1000 flood.



Flood berms

Flood berms reduce flood risks for those behind them. Engineered flood berms that are owned, maintained, and operated by provincial or municipal owners are typically included in provincial flood maps. A berm that is not operated and maintained by either the province or the local government is normally treated as a land feature and not as a flood berm. When flood waters are not higher than a flood berm, the area that would have been flooded is shown as a protected area and is considered differently than directly flooded areas that are not protected. Some of our flood reports and printed flood maps use the term potential flood control structure failure areas for these protected areas. Our website uses the term “Protected by Flood Berm” instead.

Although we do not anticipate flood berms failing, it is important that everyone is aware that there is still some risk behind them in a worst-case scenario.

Flood hazard maps

Flood hazard maps define floodway and flood fringe areas for the 1:100 design flood and are typically used by communities for planning or to help make local land use and development decisions. While the flood hazard area is divided into two main zones, it can also include flood fringe sub-zones.

Although statistically less likely, it is important to be aware that flood risks exist outside the 1:100 flood hazard area. Flood hazard maps show information for floods larger than the 1:100 design flood for public education and safety reasons. However, larger floods, like the 1:200 and 1:500 floods, are not part of the flood hazard area, and the information is only provided for awareness or for communities to consider if desired.

Floodway

When flood hazard maps are produced for the first time, the floodway typically represents the area of highest hazard where design flood flows are deepest, fastest, and most destructive. When flood hazard maps are updated, the new floodway might not change and can be the same size as the previous floodway even when the flood area gets larger, to help maintain regulatory certainty for landowners.

Flood fringe

The flood fringe is the part of the flood hazard area outside of the floodway. When flood hazard maps are produced for the first time, water in the flood fringe is typically shallower and flows more slowly than in the floodway. Depending on when a flood study was conducted, the flood fringe can also include high hazard flood fringe or protected flood fringe sub-zones.

High hazard flood fringe

The high hazard flood fringe identifies areas within the flood fringe with deeper or faster moving water than the rest of the flood fringe. High hazard flood fringe areas may be more prevalent in communities with updated flood hazard maps, but they are included in flood hazard maps from all newer flood studies.

Protected flood fringe

The protected flood fringe identifies areas that could be flooded if dedicated flood berms fail or do not work as designed during the 1:100 design flood. These areas are not expected to be flooded but reflect areas of residual risk. Protected areas can be different for floods smaller or larger than the design flood.



Using flood maps

Provincial flood maps are available for use by all levels of government, consultants, industry, non-government organizations, and the public. Flood maps can support emergency response during a flood and help build resilient communities over the long term. Flood maps can also inform local land use planning decisions, emergency management operations, and sustainable floodplain function initiatives.

Flood hazard maps, which define floodway and flood fringe areas, are often used by municipalities and community administrations for regulating development. Provincial flood hazard maps are important tools for local authorities to use for long term planning and to help regulate future development to help protect Albertans and their properties from flooding.

In almost all circumstances, development regulation is within the jurisdiction of local authorities. There may be local development restrictions for properties in a flood hazard area, and regulation may be different depending on the flood hazard zone. Floodway areas may be regulated differently than the flood fringe, and, taking local risk tolerances into account, there may be differences between how protected flood fringe and high hazard flood fringe areas are regulated versus the rest of the flood fringe. Please contact your municipality or community administration for more information about development restrictions in your area.

Although provincial flood maps are public resources that are available to the insurance industry, insurers typically determine flood risks using proprietary flood maps that may consider other flood mechanisms and factors. Please contact your insurer for more information about how your flood risk was assessed for insurance purposes.

Learn more

Visit www.floodhazard.alberta.ca for more information about the Flood Hazard Identification Program.

The website includes more details on different types of flood maps and how to view them using our online flood map viewer, as well as individual web pages listing our draft and final flood studies.

Contact

Email us at epa.flood@gov.ab.ca for more information or if you have questions about the Flood Hazard Identification Program.