Red Deer River Flood Study
About this study

We know you might have specific questions about the Red Deer River flood study and what it means for your community. This document provides answers to common questions about the study. We welcome you to read through all the questions and answers, or focus only on the specific questions you're most interested in learning more about as part of our public engagement.

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Questions and answers

What area does the flood study cover?

The new Red Deer River flood study assesses and identifies river-related hazards along 51 km of the Red Deer River, 33 km of Waskasoo Creek, and 20 km of Piper Creek through Red Deer, Lacombe County, and Red Deer County, including Penhold.

When was the flood study conducted?

The study started in fall 2017 and technical work on all components was completed in fall 2019.

Was the draft study shared with my local authority?

Yes. Draft reports and flood maps were provided to affected municipalities between May 2018 and December 2019, for information and to obtain feedback as the first step of the study finalization process.

What reports and flood maps are included in the study?

The main study components are outlined below. Individual draft reports document the collection of survey and base data, summarize the hydrology assessment and flood frequency analyses, describe the hydraulic model creation and calibration process, present the modelling results used to create flood inundation maps, and investigate channel stability at high level. Draft open water flood inundation maps are in a separate flood map library.

Note that flood hazard maps are not included in the current scope of public engagement. Content discussing these maps, and the maps themselves, have been removed from some reporting, but will be shared at a later date as part of our next stage of public engagement.

Classification: Public

Survey and Base Data Collection Report: Hydraulic models and flood maps require high-accuracy survey and base data. Field surveys and LiDAR remote sensing were used to collect river and floodplain elevations, channel cross section data, bridge and culvert information, and dedicated flood berm details. This report documents the collection of all foundational survey and base data for the study.

Open Water Hydrology Assessment Report: This report presents the results of the open water hydrologic assessment and flood frequency analysis at several locations along the Red Deer River and Waskasoo and Piper Creeks. It presents flow estimates for a wide range of open water floods, including the 1:2, 1:5, 1:10, 1:20, 1:35, 1:50, 1:75, 1:100, 1:200, 1:350, 1:500, 1:750, and 1:1000 floods.

Hydraulic Modelling and Open Water Flood Inundation Mapping Report: This report documents the creation of hydraulic models that simulate open water flood levels along the Red Deer River and Waskasoo and Piper Creeks within the study area. The report also includes flood history documentation, details about how the models were calibrated to previous floods and surveyed highwater marks, and flood profiles for thirteen different sized open water floods, from the 1:2 to the 1:1000 flood.

Open Water Flood Inundation Map Library: These maps show what would be flooded for thirteen different sized open water floods, from the 1:2 to the 1:1000 flood. Flood inundation maps can be used for emergency response planning and to inform local infrastructure design. These maps also show areas that would be flooded if local flood berms fail.

Channel Stability Investigation Report: This report provides insight into general channel stability along the Red Deer River and Waskasoo and Piper Creeks within the study area, by using aerial photos and channel cross sections to compare current and historic riverbank locations.

Can I view the draft flood inundation maps without reading all the reports?

Yes. The provincial Flood Awareness Map Application is the best way to view, interact with, and get more information about draft flood maps without reading through the detailed study reports.

The application can be used to view all the draft flood inundation maps from the new study, and the slider on the right side of the screen allows users to easily switch between smaller and larger floods.

Users can manually scroll or zoom to specific areas of interest, search for locations using an address, or change the default background to satellite imagery using the layer control on the left side of the screen. Users can also find out the actual river flow being used for mapping by clicking on any part of the flooded area.

Will this new study replace our existing study and flood maps?

Yes, when the draft flood study is finalized.

What causes flooding along the Red Deer River?

Flooding along the Red Deer River and its tributaries typically occurs because of high river flows. We are aware that there may be other sources of flooding in the area, including groundwater flooding or flooding caused by local drainage issues, but the focus of this study is on riverine flooding caused by high river flows.

Does this study consider ice jam flooding?

No. Although ice jams can occur along the Red Deer River and its tributaries, the risk from open water flooding is typically more significant.

Does the study include information from past floods?

Yes, the study include information from past floods, including the 2005 and 2013 floods. The survey and base data used for hydraulic modelling and flood mapping were all collected in 2017, and peak 2005 and 2013 flood flows were included in the hydrology assessment. We also collected flood highwater mark data throughout the study area after the 2005 and 2013 floods, and used this information for hydraulic model calibration to ensure our study was as accurate as possible.

Why don't the maps match the flooding we experienced in past years?

It would be unusual for a flood map to perfectly match a past flood, due to different river flows, variations in local conditions, and assumptions made as part of the flood study and it analyses. Flood inundation maps are based on theoretical floods with different chances of occurring. The draft flood inundation maps from the new study do not represent any specific recent or historic flood.

What is the purpose of Dickson Dam?

Dickson Dam was built in 1983 to help supplement adequate water supply for Red Deer and Drumheller and enhance low winter flows along the Red Deer River. Gleniffer Lake is the reservoir created by the dam and it not only provides a reliable, year-round water supply that supports industrial, regional, and municipal growth, but is also a valuable recreational and hydroelectric power generation resource.

Does the study include the impact of Dickson Dam?

While we did report on the potential impact of Dickson Dam on flood flows as part of the hydrology assessment, the study used naturalized flows for hydraulic modelling and flood mapping. Each of the mapped flood scenarios is based on a specific set of flood flows, and the mapping remains representative of the risk for those flows, regardless of the impact of Dickson Dam operations in any future flood.

What effect does Dickson Dam have on flood flows?

Even though its main purpose is managing water supply, Dickson Dam has been able to reduce Red Deer River flows for some floods in the past. This has resulted in smaller floods in Red Deer than would have occurred naturally. However, since Dickson Dam has a relatively small reservoir, its ability to help mitigate floods is not guaranteed. In general, it has a better chance of reducing flood peaks for small and moderate floods, but it is difficult, if not impossible, for it to significantly reduce extreme floods.

Did Dickson Dam make the 2005 flood worse?

No, absolutely not. Dickson Dam did not make the 2005 flood worse, and in fact, was able to reduce flood peaks and mitigate downstream flooding. Dam operators used all the available reservoir storage to reduce the peak flood flow by over 30 percent. Without the dam, downstream flooding would have been much worse than what was experienced in 2005.

What are naturalized flows?

Naturalized flows are river flows that could be expected if human-made dams and reservoirs cannot reduce flows during a flood. Naturalized flows are determined by removing the effects of regulation from the historical flow record and calculating what flood peaks would have been if dams and reservoirs were not able to store or divert water during a flood. Essentially, naturalized flows reflect a worst case situation where all of the water naturally flowing into a reservoir is simply passed through the dam.

Why are naturalized flows used to make flood maps?

We use naturalized flows for flood mapping to be cautious and help communities prepare for a worst case scenario, when a dam simply passes the flow it would naturally receive from upstream during a flood. Almost all of Alberta's large dams and reservoirs were built for water supply and hydroelectric power generation, and there aren't any today that were designed specifically for flood mitigation.

During a flood, dam operators will often do their best to try and reduce flood peaks, but unless there is enough space in the reservoir for storing floodwater, it is impossible to guarantee they can reduce flood flows or mitigate downstream flooding. Dam operators, working with provincial flood forecasters and local authorities, do their best to manage flows during floods, but it is not always possible to reduce flood peaks. For example, a reservoir may already be full when a flood occurs,

or it may become filled before a flood peak reaches the dam. If more than one flood occurs within a short amount of time, a reservoir may be full when the second or third flood happens. In these situations, the dam would have to pass the same amount of water it is receiving to prevent the dam from overtopping or failing.

Does this study consider groundwater flooding?

No, provincial flood studies focus on riverine flood hazards – the situation when high water escapes the river and inundates the floodplain. This is true for the Red Deer River and all tributaries included in the study, like Waskasoo and Piper Creeks. Although your community may also face other flood hazards, the study doesn't assess groundwater, local drainage issues, or overland flooding caused by excessive rain or snowmelt runoff.

Are you confident that the flood study results and maps are accurate?

Yes. Provincial flood maps are created using the best available tools and information available when a study is conducted, and are prepared in accordance with generally accepted engineering practices. We are confident that the flood maps are as representative as possible given the assumptions used to create hydraulic models and flood maps.

Why do flood maps change when a new study is completed?

New flood studies use new information and analyses. This includes high-accuracy survey and base data collected for the study, hydrology assessment that incorporates new techniques and longer flow records, and hydraulic models using modern 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 that those in older studies. This means that new flood maps can also be different than older flood maps, even in the same area.

What will happen if flood berms are built or upgraded in the future?

Flood studies are based on river conditions, floodplain topography, and flood mitigation infrastructure present at the time a study is conducted. If new community-level flood berms are constructed in the future, or existing flood berms are upgraded, we will assess the potential impact on

calculated flood levels and flood maps. If impacts are significant, revisions to the draft flood maps will be considered.

What will happen if the floodplain topography changes in the future?

We understand that rivers and their floodplains can change over time, whether as a result of natural processes or human development. Localized changes to topography do not typically result in significant changes to general river or flood levels, and would be captured the next time a study if formally updated. If major changes to floodplain topography were to occur and brought to our attention, we would assess whether revisions to hydraulic models and flood maps were appropriate in the interim.

How has climate change been considered?

The potential effects of climate change were assessed as part of the hydrology assessment. In general, the effect of climate change on Red Deer River and Waskasoo and Piper Creeks flows is uncertain. Increased precipitation intensity may lead to higher flood peaks but this may be mitigated by reduced snowpack and drier antecedent moisture conditions due to higher temperatures. Given this uncertain conclusion, various scenarios were not explicitly modelled. However, an assessment of potential impacts on open water flood levels was completed to characterize a freeboard that could be considered for planning purposes.

Contact us

Email us at aep.flood@gov.ab.ca for more information about the public engagement process for the Red Deer River flood study, or if you have questions about the Flood Hazard Identification Program.