



# FLOOD MITIGATION PROGRAM

SUMMER 2021 UPDATE

**GRAND FORKS**  
— BC —



# BACKGROUND

Grand Forks lies at the confluence of the Granby River and the Kettle River. Every spring, the rivers rise as snow melts and seasonal rains begin. Mostly, the rivers stay between their banks. Some years the rivers come higher than others. In a normal minor flood year, some basements might get wet, or City Park might see some water seep into it. Other years higher waters cause more extensive damage. This is why the dikes in North Ruckle and Riverside were built in the 1970s and the 1990s. Before 2018, water high enough to cause damage hadn't happened for a long time. But in 2018, more than twice the normal amount of flood water flowed through Grand Forks, devastating residents, and causing millions of dollars of damage.



The spring of 2018 was different from previous years because a lot more water came all at once out of the hills and into the rivers - more than ever recorded. It was what is called a “one in two-hundred year” flood. That doesn’t mean “once in two hundred years”. It means an amount of water calculated by engineers as being really rare and unlikely to occur—0.5% chance of happening in any year. Dike construction standards use this risk level as a basis for design.





# IMPACT AND MITIGATION

The water damaged at least four hundred homes throughout the Boundary and destroyed another fifty. It tore through downtown businesses, caused a massive power outage, and plugged up the sewer system. All of this despite hundreds of thousands of sandbags filled and placed by community members.

Looking at all of the damage caused by the flood, the City wanted to figure out a way of mitigating future floods. It focused on public safety first and foremost, but also on the social and financial impact. Even if no one lost their life during the flood, houses were destroyed, and businesses could no longer operate. Grand Forks needs to be prepared for the floods of the future.

The City consulted experts with experience from around the world to find the right tools. Some big things came up:

- Both the depth of the water and how fast it moves endanger lives and damage property.
- The rivers used to move naturally around the floodplains, but we do not want them to change course anymore within the city.
- Riverbanks can be stabilized to stop the river from changing its course in specific areas.
- Some parts of the city were built on an old wetland or floodplain making it difficult to defend against flooding and rising groundwater.
- Engineering projects can be built to keep the river from flooding the city where population, infrastructure, and economic activities are concentrated.
- A new stormwater system can be built to help drain the downtown during spring storms.
- Increases in flows due to climate change add height to the flood defences.
- These projects cost millions of dollars each to build.

The Flood Mitigation Project will protect core neighbourhoods in the City of Grand Forks from future floods like the one in 2018. The City is building protective works such as dikes, flood walls, and rip rap over the next couple of years, and restoring the North Ruckle Floodplain to provide room for the river during floods. A new stormwater system downtown will help to drain the heavy spring rains.

The City of Grand Forks reached out to the federal and provincial governments for money to help build the flood protection projects. The federal government suggested accessing funding by applying to their existing Disaster Mitigation and Adaptation Fund. The provincial government did not have an existing program like that, so they instead asked the BC Treasury Board for spending authorization. Together they committed more than \$50 Million to help the City in specific ways.

## **FEDERAL FUNDING:** \$20,000,000

**GOALS:** The Federal government Disaster Mitigation and Adaptation Fund money can be spent on big infrastructure projects and natural infrastructure. This includes dikes and floodplain restoration.

## **PROVINCIAL FUNDING:** \$31,500,000

**GOALS:** The Province asked the City to propose a long-term solution to make people safe from floods and then worked with the City to support and complement the Federal DMAF goals.

## **CITY FUNDING:** \$3,500,000

**GOALS:** To protect the community of Grand Forks and the Boundary Region against current and future over-land flood and land erosion risk for the next 100+ years.





## SHEET PILE WALL

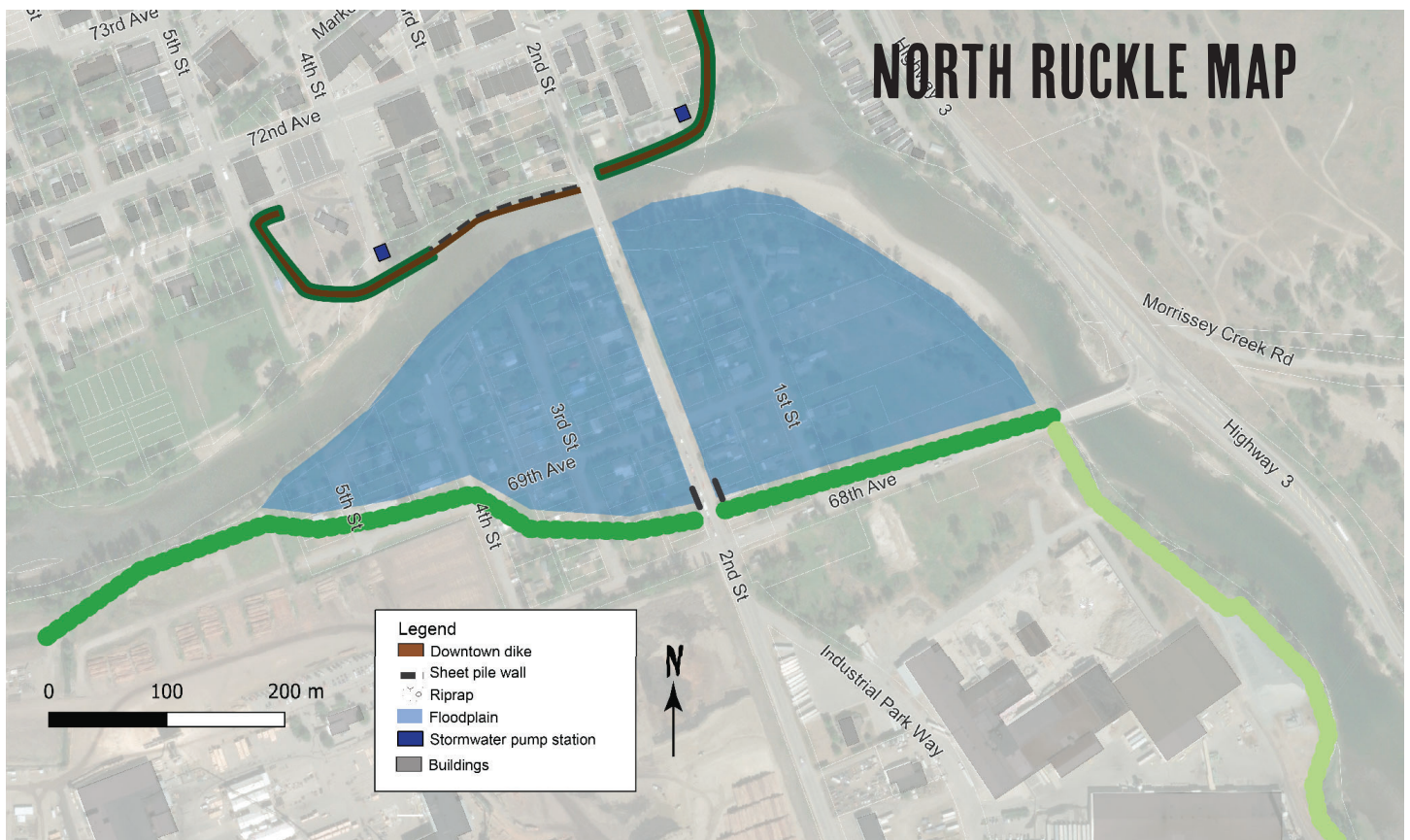
- Flanged metal sheets driven deep into the ground.
- Used when you don't have room to build a dike.
- Minimal maintenance.



## RIPRAP

- Large rocks on top of geotechnical fabric.
- Stops fast water from eroding river banks.
- Careful design can improve fish habitat.
- Does not allow for large trees in the river bank.





## EARTH BERM DIKE

- Compacted earth and gravel embankment.
- Can be covered with grass and topped with gravel.
- Large footprint, needs lots of room to be built.
- Less expensive to build and upgrade in the future.
- Can be built with trail on top.
- Needs annual mowing and tree cutting.



## RESTORED FLOODPLAIN

- Large areas of low lying land designed to flood when needed - “room for the river”.
- Reduces water speed and river levels and prevents downstream damage.
- Improves habitat and water quality.
- Much lower cost over time than protecting low floodplain.



# FLOOD MITIGATION PROJECT TIMELINES



## LEGEND

PLANNING & DESIGN ★

PERMITTING ★★

CONSTRUCTION ★★★

**DOWNTOWN**

**NORTH RUCKLE**

**SOUTH RUCKLE**

**GRANBY ROAD**

**JOHNSON FLATS**

2020

2021

2022

2023



## DOWNTOWN

A combination of sheet pile walls, riprap, and earth berm dikes will be built downtown. Where the space is too limited, sheet pile walls will be used instead of an earth berm dike. The best and least expensive option is the earth berm dike, but it cannot be used in all areas due to lack of space. And when the alignment gets too close to a river, an earth berm dike needs to be protected by riprap down the bank so that it does not get eroded. An upgraded stormwater system will also be built downtown to make sure that water trapped in the city by the dikes can be pumped out. Detailed design is complete and permitting approvals are underway for construction this winter.

## NORTH RUCKLE

Three projects will be built in North Ruckle. The low-lying residential area will be converted into a flood-plain to let the river expand during a flood. A new earth berm dike will be built and set well back from the river. A special feature will be “demountable stop-logs” where the dike alignment bisects 2nd St. During most of the year it will look like a concrete wall next to the road. During a flood, special inserts will be installed across the road to stop the water from overflowing. Detailed design will be underway in late summer 2021 for construction this winter and next spring.

## 19TH ST EROSION PROTECTION

Riprap was installed in a critical section on the east side of Johnson Flats in the spring of 2021.

## SOUTH RUCKLE

An earth berm dike is planned to protect South Ruckle. The alignment will be set in a future project phase.

## GRANBY ROAD

A dike is planned for the east side of the Granby River north of Highway 3. The alignment will be finalized during a future project phase.

# PHASES OF CONSTRUCTION

## FIRST NATIONS ENGAGEMENT

The City of Grand Forks has taken the opportunity to extensively engage regional First Nations about the project and its potential impacts on the traditional territories of the Syilx (Okanagan) and Secwepemc Peoples. The City is holding ongoing consultation and engagement with First Nations who indicated an interest in being engaged on the Flood Mitigation Project.

## PLANNING AND DESIGN

The design stage of a large construction project takes time because engineers want to make sure they're getting things right and have all the information they need. Existing data about a location is gathered and analyzed to see where the gaps are. Then new reports and studies are completed to support their decisions. Sometimes writing those reports means waiting for environmental conditions or times of the year to gather the right data. Among other tools, the engineers working on the Flood Mitigation Project are using:

- hydraulic modelling
- post-flood technical reports
- aquifer and groundwater monitoring
- new environmental, archaeological, and hydrologic assessments
- new climate change assessment to get peak flows

The engineers considered different dike designs and locations to see how they should protect the community. Several options would have worked, but one was selected to be the best for Grand Forks. They scored the options based on technical, environmental, economic, and social factors. City Council drove the overall priorities and provided direction to City staff at key decision points. City staff were deeply involved in the decision-making process to make sure that local knowledge and perspectives were used.

## PERMITTING AND APPROVALS

After the best engineering option is picked, it needs to be approved by the Federal and Provincial governments because they regulate work being done on dikes and in rivers. At a minimum, these are the approvals that the project needs to pass:

- Fisheries Act
- Dike Maintenance Act
- Water Sustainability Act
- Permit Authorizing the Occupation of Crown Land
- Heritage Inspection Permit
- Fish Collection Permit
- Wildlife Permit

Some government timelines are faster than others, but in general approvals take several months..

## TENDER AND CONSTRUCTION

Once all the permits are approved, the project moves on to the stage where construction companies bid on the work to be done. The design is put out to as many construction companies as feasible to get the best prices. They send back different ideas on how to do the work and what it would cost. These ideas and prices are evaluated to pick the best value and performance. This doesn't mean the lowest price all the time because an idea might cost more but be better than the others. Once the construction company is picked, they are given the go ahead to start building the project.



# THE CONSTRUCTION PROCESS - WHAT TO EXPECT

Building large flood protection projects impacts the area around it by making noise, closing roads, increasing truck traffic, and being generally disruptive.

## NOISE

Machines will be moving construction materials like fill and big rocks around all day. There will be backup alarms, grinding excavator tracks, and compactors vibrating away.

## TRAFFIC

Some streets may be closed during construction. Dump trucks and other large vehicles will be coming and going from the construction sites.

## VISUAL

Construction sites look messy. Construction fencing will surround any excavations or be used to shut down streets. Materials will be piled up around the area and there will be lots of dirt.

## EXCAVATION

There will be lots of digging and earth shaping during construction. The earth berm dikes are quite wide and take up a large area. Expect to see a different view after construction is done with berms that are around 2-2.5m (6-8ft) above ground level and at least 10m (30 ft) wide across the base.



## GET IN TOUCH

Ask us questions or sign up for email updates at [fmp@grandforks.ca](mailto:fmp@grandforks.ca) / 250-442-8266

## THE NEXT PROJECT UPDATE IS SCHEDULED FOR THE FALL OF 2021.

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