Grand Forks Floodplain Naturalization

Natural Asset Management Case Study

Case at a Glance

Community	City of Grand Forks, B.C. (pop. ~4,300)
Service	Flood protection and Emergency Management
Primary issue	Severe overland flooding
Case period	2016 (Pilot project begins); 2026 (Flood Mitigation Program complete)

The Story Begins

In May 2018, the City of Grand Forks, along with other communities along the Kettle and Granby rivers, were hit by a 200-year flood event that resulted in at least $38 million in losses. Snowpacks about 240% of late Spring averages and heavy rain led to massive snowmelts that overtopped dikes and threatened critical infrastructure. Over 400 homes suffered moderate to major damage, and more than 50 were beyond repair, many in the North Ruckle neighbourhood.

What makes this case an asset management story is **informed decision making**. Before the flood, the City and the Natural Assets Initiative (NAI) had begun asking traditional asset management questions about the floodplain: what service does it support, what are the risks, and what is the floodplain worth as flood infrastructure? That pilot project became part of the evidence base for managing the floodplain alongside dikes and roads as part of their critical infrastructure.

What Created the Need to Act

The flood required immediate action, especially in the hard-hit North Ruckle neighbourhood where flood depth and duration were some of the greatest in the community. Rebuilding and protecting were not realistic options as the neighbourhood sat in a floodplain with sand and gravel substrates, making disaster recurrence almost unavoidable. Considering increasing severity of flood risk due to climate change and developed floodplains, Grand Forks' council sought options to build back better to avoid future flood risk.

Applying an Asset Management Lens to a Floodplain

The pilot project came because of the City's interest in understanding the flood management services provided by the Kettle River floodplain, particularly considering the increasing number of residential developments being built along its shoreline.

The pilot project team valued one ecosystem service — flood damage avoidance — for one stretch of Kettle River's floodplain, using the same logic a traditional asset management valuation would apply to a grey asset: quantify the service, value the service, and consider the risks associated with the service. Finally, compare alternative methods for delivering the service. Five scenarios of increasing encroachment were modelled to estimate the floodplain's value in terms of avoided damage to downtown buildings.

Grand Forks already had an asset management strategy for its traditional assets, so the valuation offered a way to bring the floodplain into the same framework. Council was also supportive of green-grey solutions to build climate resilience.

After the flood, the Regional District of Kootenay Boundary's flood response expert analyzed recovery options, including a buyout survey and public meetings. Grand Forks then needed an updated floodplain and hazard risk assessment to inform bylaws, and cost estimates comparing dike reconstruction with floodplain naturalization for the City's application to the federal Disaster Mitigation and Adaptation Fund (DMAF).

Why this Case Matters

Natural asset management is a growing practice in Canada, and Grand Forks is an example of how treating nature as an integrated part of an asset management strategy help support cost-effective, climate-resilient infrastructure solutions. The City previously built an asset management system for traditional assets and trained staff with NAMS Canada. The pilot project results showed the Kettle River floodplain within Grand Forks provided between $500 and $3,500/ha in flood damage reduction for downtown buildings during high-flow events. In the aftermath of the flood, Grand Forks was able to use these values to compare natural asset versus built asset solutions based on costs and risks. This formed an important part of the evidence used to develop, fund and implement their Flood Mitigation Program (FMP).

Expert lens: Name the Trigger

> *"Having seen a variety of planning efforts, some of the more effective ones had some kind of major trigger like drought or flooding that provided a reason to do more integrated planning for resilience," Graham Watt, Grand Forks.*

The underlying driver of the FMP was the cumulative increase in exposure of homes and assets on the floodplain to flood losses. The experience of flood response and recovery led directly to the DMAF and created the political conditions for a managed retreat from North Ruckle, which would have been difficult to propose absent a disaster. The natural asset valuation supplied the evidence, but the flood brought about large-scale action.

Flood Mitigation Program: Decision to Delivery

Grand Forks' FMP combined built and natural infrastructure:

- Four new dikes to protect the downtown core and safeguard critical infrastructure (an electrical switchyard, two industrial plants and a wastewater treatment plant)
- Floodplain naturalization and restoration in North Ruckle and riparian areas, including rural areas upstream

The ~$20 million DMAF grant was awarded in 2019. The entire FMP cost greater than $72 million; $44 million was provided by the Province of B.C. and Grand Forks contributed the additional $9 million. While hydrological analysis and dike design proceeded, the City negotiated buyouts with property owners. 97% agreed to a voluntary buyout, and 16 of the 66 properties were relocated instead of being demolished. A development partnership with the Osoyoos Indian Band relocated 11 of the North Ruckle houses and created a new subdivision on the city's west side.

North Ruckle Design Concept



The naturalization design reflected multiple stakeholders: a floodable natural park area on the west side for public use and recreation, and a riparian restoration area on the east side that also met fish habitat offsetting requirements. The completed FMP protects 117 ha of residential, commercial and industrial land (combined property value of $200 million) and over 400 residents, and adds 1.8 ha of fish and riparian habitat, bank stabilization and recreation areas.

2023 Flood Preparation Tests FMP:

When the Province forecasted another large flood in 2023, the City's dike construction was only partially complete and houses were being removed from the floodplain. In their preparations, emergency staff estimated about 500 fewer people would have had to evacuate and almost two kilometres less of temporary flood protection was needed.

Making Natural Asset Management Routine: Official Community Plan

The 2022 Official Community Plan (OCP) update provided an opportunity to integrate natural asset considerations into wider decision-making, allowing the City to develop bylaws and guide growth without undermining the natural systems they rely on.

The environment was established as a foundational priority in Grand Forks' land use strategy, with an extensive area of natural assets and floodplains identified in the OCP. The first layer of every development review now evaluates environmental conditions, natural hazards, and other development constraints.

- Development, building inspection and bylaw services staff have a first screening tool that helps people identify the best places to build.
- Developers often avoid projects in sensitive areas rather than spending time engineering ways to build on a wet site.
- The OCP allows more density outside the floodplain, using buildable space within the developed footprint (e.g., garden suites and other accessory units).

What Grand Forks Learned

Completing a natural asset assessment before a disaster is more useful than commissioning one after. The valuation supported Grand Forks informed decisions based on risks, level of service, and cost comparing natural assets to flood protection, rather than defaulting to rebuilding dikes. Proactively gathering information, whether on the condition, service provision or ecosystem values of key natural assets means a community has more knowledge to act on.

Know what your ecosystem valuation represents, and what it doesn't. NAI's valuation was a minimum estimate; it excluded damage beyond buildings (i.e., streets, sidewalks, storm sewer systems, business losses and social impacts) and only accounted for one service. The figure was useful to inform the context for planning Grand Forks' FMP, but should be updated and context-specific for future applications.

Dollar figures tell us nothing about nature's intrinsic value; the most important thing for a community, before valuation, is to understand what ecosystem services they depend on. What valuations can do is provide insight into decision making when comparing against alternatives that have a clear market value like a commercial building.

Determining ecosystem service, replacement cost, and other values are not synonymous with natural asset management, but when used carefully, can be an important component.

Next Steps

NAI recommended replacing single-event (large-scale flood) estimates with annual average damage and benefit figures. The City followed the pilot assessment with more detailed damage and benefit figures and decision analysis in support of the FMP. Similarly, communities will need to show natural assets as part of more comprehensive options analyses for flood mitigation planning to support community risk objectives and funding outcomes.

Following completion of this phase of the FMP, the City is formalizing constructed and natural infrastructure into its asset management system to ensure its ongoing performance and sustainability across the various infrastructure lifecycles.

Practical Steps for Communities

Start	Take stock of natural assets in or near your jurisdiction: where they are, their condition, and identify a priority service they provide. Natural asset management includes these due diligence steps; this typically happens before even discussing values and costs.
Convene	Bring together technical experts with finance and asset management staff to discuss the wider range of infrastructure assets and priorities, rather than leaving the "green team" separate from AM.
Define	Define the service and level of service goal that the valuation needs to inform before commissioning the work and decide if a valuation is needed. There are multiple approaches to ecosystem valuations; ensure it is scoped to the asset management decision you need to make.
Connect	With an understanding of the services depended on for a resilient and liveable community, apply the valuation as evidence / to support the needed decision (e.g., funding application, capital plan, bylaw).
Test	State what the valuation does and does not cover and check it against real conditions. Grand Forks' figure was a minimum estimate, and the 2023 flood forecast showed the restored floodplain at work.
Improve	Identify and address data gaps and ongoing operations/lifecycle needs as you would with a built asset. Asset management is an iterative process, so the most effective path is to progress towards integration of natural assets into your overall asset management strategy.