



FORT MCMURRAY 2020 ICE JAM FLOOD WASTEWATER & STORMWATER SYSTEMS RECOVERY

Category | Water Resources

Melting ice block towers above stormwater outfall
in Syne Point Park



During April 2020, Stantec's rapid response to the Fort McMurray Ice Jam Flood Recovery efforts helped mitigate severe damage to the community's wastewater and stormwater systems. Engaged by the Regional Municipality of Wood Buffalo, Stantec mobilized protective infrastructure solutions to limit the flood damage and disruption to the underground infrastructure.

This fast-acting approach and ability to limit the disruption helped contain the cost of the damage and enable residents and businesses to return quickly.

May 5, 2020 at 3:16:20 PM

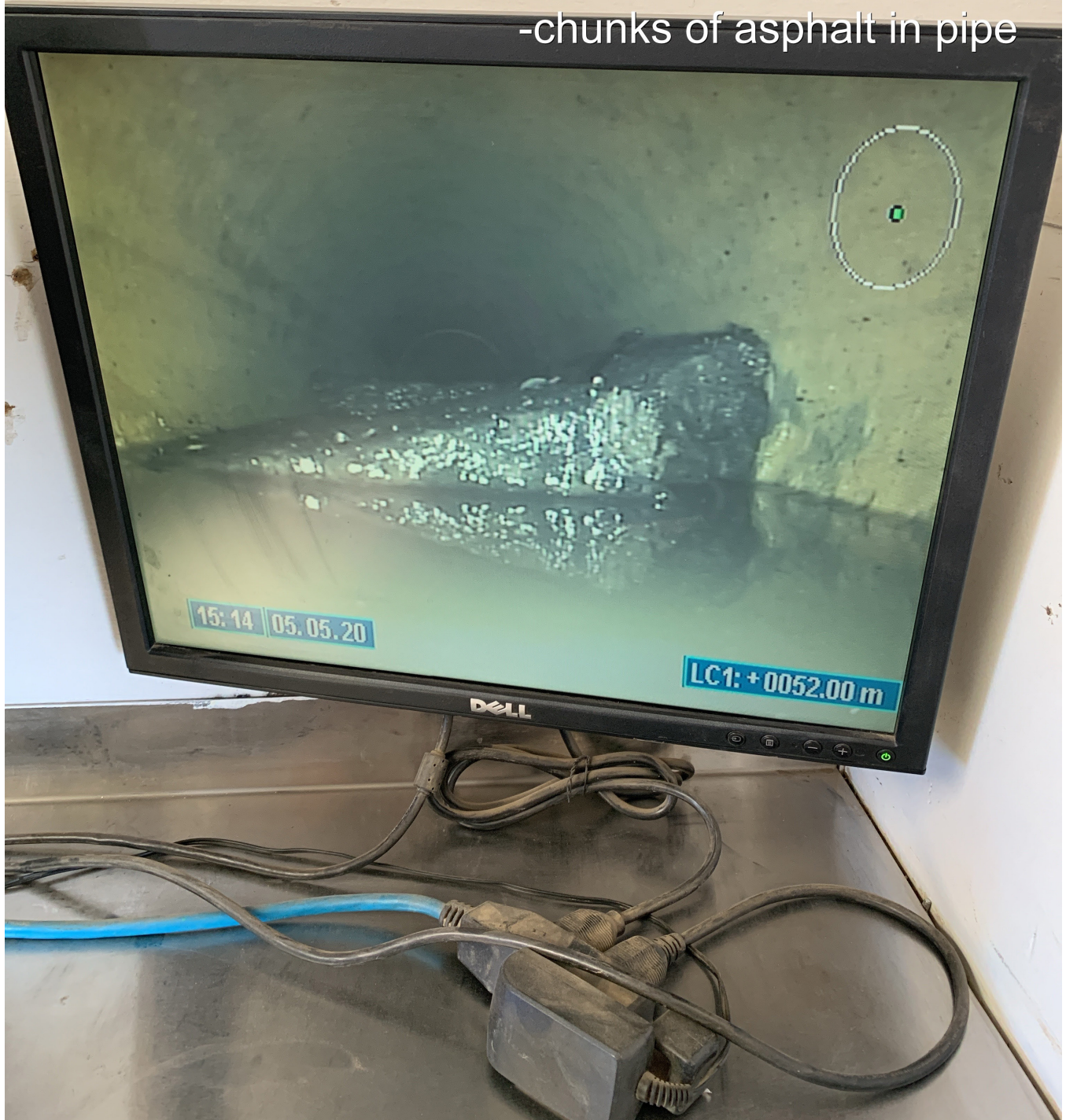
C.A. Knight Way

Fort McMurray AB T9H

Canada

52m from SA3004 towards SA4054

-chunks of asphalt in pipe



Q1 INNOVATION

In April 2020, 13,000 residents were forced to leave their homes in a matter of hours due to a 1-in-100-year flood event. Off the Athabasca River, an ice dam roughly 25 kilometres long flooded downtown Fort McMurray. Concerns arose about the full extent of the damage the flood waters had on the sanitary and storm sewers and the impacts this would have on community safety. Keeping the wastewater and stormwater systems online is crucial to ensuring drinking water remains uncontaminated. Should these systems fail, the impacts on the community are hazardous.

In a disaster, success is achieved by making efficient use of the resources available, solving problems with what is available, and leveraging contacts who can get you the materials necessary to achieve the end goal.

In the case of the Ice Jam Flood, our response and recovery work drew on leveraging our team's existing knowledge of Fort McMurray's systems and best practices related to disaster recovery, especially when access to modern technologies was limited.

Action from this knowledge included:

- Rapid deployment of dewatering pumps to limit damage
- Rapid design and construction of an access road to replace a critical lift station's flooded access points and ensure ongoing operations and ability to execute repairs
- Inspections of storm outfalls for damage as soon as the foot access was possible
- Visual sewer inspections at manholes

- Turbidity monitoring of outfalls during sewer flushing operations
- Early procurement of a Thickened Waste Activated Sludge transfer from Red Deer's Wastewater Treatment Plant (WWTP) to protect the biological process in Fort McMurray's WWTP
- 24-hour continuous sewer inspections and flushing

Going in to assess the damage of the flood was difficult given the level of the water and inability to fully access portions of the system, due to flood waters covering roads, and ice blocks covering outfalls and other structures. Geospatial data interpolated from aerial photos and TV footage was used to estimate flood levels by comparing that data to on-the-ground surveys. The completed data set was then overlaid with available Graphic Information System (GIS) data to project areas of sewer plugging. This method allowed us to recover the water and sewer system quickly, addressing concentrated areas of blockage first to lower the impact on the system and WWTP.

Throughout the entirety of the response and recovery efforts, our team was able to keep the WWTP in compliance during the flood events.

Q2 COMPLEXITY



With any project comes a certain level of unforeseen challenges and degree of difficulty—especially with Mother Nature.

At the onset of the flood events, it was difficult to gauge the full extent of the damage the flood waters had on the sanitary and storm sewers. This made for many late nights and early mornings as Stantec mobilized to fully understand the current and imminent damage.

While members of our team were working to investigate the sewers before CCTV was available, others were using heavy equipment to construct temporary access to pumping facilities. At the onset of the flood, many outfalls were blocked by the slabs of ice off the river, and manual operation of the lift stations and controls had to take place to try and keep the RMWB online during power disruptions.

Specific challenges addressed during the project included:

- Maintaining 24-hour operations while simultaneously managing the environmental monitoring and coordination of 6 different contractors to aid recovery efforts including flushing of sanitary and storm mains
- Careful coordination of sewer inspections and de-clogging to limit impacts on returning residents and traffic during the first two weeks of re-entry
- Working without utility power during the initial response activities, and providing onsite lift station operations to maintain pumping during repeated generator trips and failures
- Having to triage sewer blockages, using only visual inspections
- Starting work on stormwater outfall assessments before ice jam blocks had receded
- Limited access to materials, which had to be sourced from Saskatchewan to achieve timely delivery

Q3

SOCIAL AND ECONOMIC BENEFITS

Natural disasters create ripples through the community. As engineering consultants, we design with community in mind, and we live by our values. Our key focus was to ensure a prompt response and recovery efforts which enabled residents to quickly return to their homes, and try to restore a sense of normalcy, even while cleanup efforts were still underway through spring 2020.

One consequence of flood events is often boil water advisories to affected areas with an influx of water in the water system. While Fort McMurray was put on a boil water advisory during the floods, our quick response on clearing the impacted sewers enabled subsequent water system flushing activities to proceed quickly and use the sewers for clearing of flushing water.

Further, the economic impacts of natural disasters and flood damage are exponential on both small and large scales. Not only are residents dealing with insurance claims and costly repairs, but municipalities are too. Our approach and ability to limit the disruption to sewer servicing helped contain the cost of the damage and enable residents and businesses to return quickly.

It is through our collective efforts, our perseverance, and our sense of community that we helped Fort McMurray recover and set its residents and businesses up for success.



Fort McMurray · 1 Hospital St

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Q4

ENVIRONMENTAL BENEFITS

The end of a disaster is often just the beginning. The environmental impacts of any natural disaster are often larger than they appear, have deeper impacts, and require a unique approach to mitigation. Beyond property damage, the damage to the eco-system has far lasting impacts beyond the initial event. Erosion, sediment control, sewer blockages, lift station and outfall damage, and disruption to animal habitat can all occur during a flood event.

Stantec’s approach embodied concepts of protecting Public Health, Infrastructure and to protect the surrounding infrastructure and environment. Not only did our approach consider the current environmental impacts, but further considered the future environmental impacts on the storm and wastewater systems.

One key example was the extensive sewer flushing activities flowing the recession of flood waters. The Fort McMurray area didn’t have potable water, but extensive flushing was needed to clear both the sanitary and storm sewers of hundreds of cubic meters of accumulated rock, soil, and debris. As such, water use was reduced by capturing flush water downstream of storm sewer flushes and reusing it for sanitary sewer flushing, and debris was captured at manholes and safely disposed at the community’s hydrovac disposal station.

← *Lift Station 1A was kept in operation and called upon to deliver over 10 times its average flow for several days despite damage to the station and power interruptions.*



Q5

MEETING CLIENT'S NEEDS

Fort McMurray and the Regional Municipality of Wood Buffalo are defined by their resiliency in the face of adversity—facing crippling economic conditions and a historic wildfire in 2016, the community of Fort McMurray has survived its fair share of hardship and Stantec has been there throughout. Stantec has been completing projects with the municipality for over 50 years. Our strong relationships and familiarity with the RMWB's infrastructure allowed us to continue our level of services through high-stress situations and another natural disaster.

Stantec team members came together to assist the RMWB in getting downtown Fort McMurray back online. Stantec was brought in to triage the damage to the RMWB's wastewater and stormwater infrastructure, oversee recovery and repair, prepare the systems for the re-population of the community, and provide preliminary assessments of indoor air quality within more than 50 of the 1,200 impacted structures.

Our primary response focused on the construction of emergency access to Lift Station 1A and diversion pumping to protect Lift Stations 1A and 1B. Stantec organized the generator repairs to keep both lift stations online, and the condition assessments and operations consulting for the four lower townsite lift stations and wastewater treatment plant. We organized the re-seeding of the WWTP Bioreactors and assessments of the sewer and stormwater systems.

In any disaster situation, the need to triage the impacts to the community are top of mind. Our quick response enabled the community to get back on their feet after facing another difficult set back.





Design with
community in mind