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Smileys Provincial Park Flood Study – Executive Summary

This letter summarizes the assessment which investigated the flooding event of July 21st – 22nd, 2023 in the Smiley' park, which caused significant damage to park infrastructure, significant erosion, and placed public safety at risk.

The objective of this assessment was to understand the flood event, be able to reproduce it through modelling, in order to then evaluate the potential benefits of various flood mitigation options. This can then support future decisions for the management of the park given the known risks of flooding.

The assessment involved setting up a hydrologic and hydraulic model of the watershed, the Meander river and the park area. Although no government climate or flow gauging station was able to capture the flow event, a private rainfall gauge measured the extreme rainfall amount of the event, which exceeded a 1 in 100 year event. The model was able to reproduce a flood with characteristics of fast rising waters and peak water levels, as well as high velocities, consistent with the accounts provided by NS Parks staff.

Once calibrated, the model was used to evaluate the impact of a 1 in 100 year event, which was found to have similar peak water levels and erosion potential as the July 21st – 22nd event. Flood mitigation options were then considered, in order to estimate whether it would be feasible to provide flood protection to the vulnerable areas of the park.

The three options considered included the following:

- **Option 1**: Construction of a berm along the river to prevent floodwaters from inundating low-lying park areas.
- **Option 2**: Modifying the river channel by doubling its width to increase the river's flow capacity.
- **Option 3**: Implementation of Egress Routes that connect the lower and higher sections of the park for emergency evacuation.

The modelling results showed that a berm (Option1) constricts the overall capacity of the drainage path, and causes water levels to increase, to the point that a 5m high berm would be necessary. Significant erosion protection measures would be needed, since water velocities would be very high. The Mckay road and bridge would have to be raised by more than 1m, possibly 2m, and there would still be some flooding risks present in the lower parts of the park. Those would involve more than 1m of flooding, and velocities reaching up to 2m/s, which would still place public safety at risk.

For Option 2, which involves doubling the width of the river bed to increase its drainage capacity, the modelling results indicate that only a very limited amount of flood reduction would result. This was found to be a result of the fact that the flood waters use the lower areas of the park as a wide channel to carry the flood waters during extreme flood events. Widening the river channel therefore does not change how the water flows through the area.

Option 3 was developed as an approach to improve emergency management, by providing more accessible egress routes during a flood emergency. Those would consist of elevated roadways, rising above the peak flood levels, with regular access points along the low-lying areas of the park. The model results show that the flood waters are not decreased, and even though the surface of the roads are above the flood waters, gaining access to the roads from the low areas of the park may be unsafe, since the flood water velocities are highly increased (up to 7 m/s) in the roadway access areas, since the roadways constrict the flow of water.

The modelling exercise therefore shows that unfortunately, none of the options explored are feasible, since they would not be able to reduce risks to public safety and infrastructure to an acceptable level. Given that the water levels at the site tend to rise very rapidly, the risk to public safety is very high. Finally, all the options investigated were associated with opinions of probable construction costs that were very high ($6M to $10M), which only reduces the feasibility of the options considered.

Given these findings, we are recommending that the lower area be allowed to flood during extreme rainfall events, and that public safety be protected by only allowing day-time use of the lower areas of the park. Warning signs should be visibly placed to make sure that campers staying there for the day are aware of the exit points and ready to leave within a few moments' notice. It is also recommended that an emergency management plan be developed for this park that includes considerations for communication with the park users and emergency services prior to, during and following flood events, safe access into and out of each area of the park, safe gathering and sheltering areas, as well as keeping emergency supplies of water and food, with safe access to power to provide light to the park during power outages.