Ducks Unlimited Canada Project Infrastructure Inspections for 250 Sites in Ontario

CLIENT

Ducks Unlimited Canada

FIRM

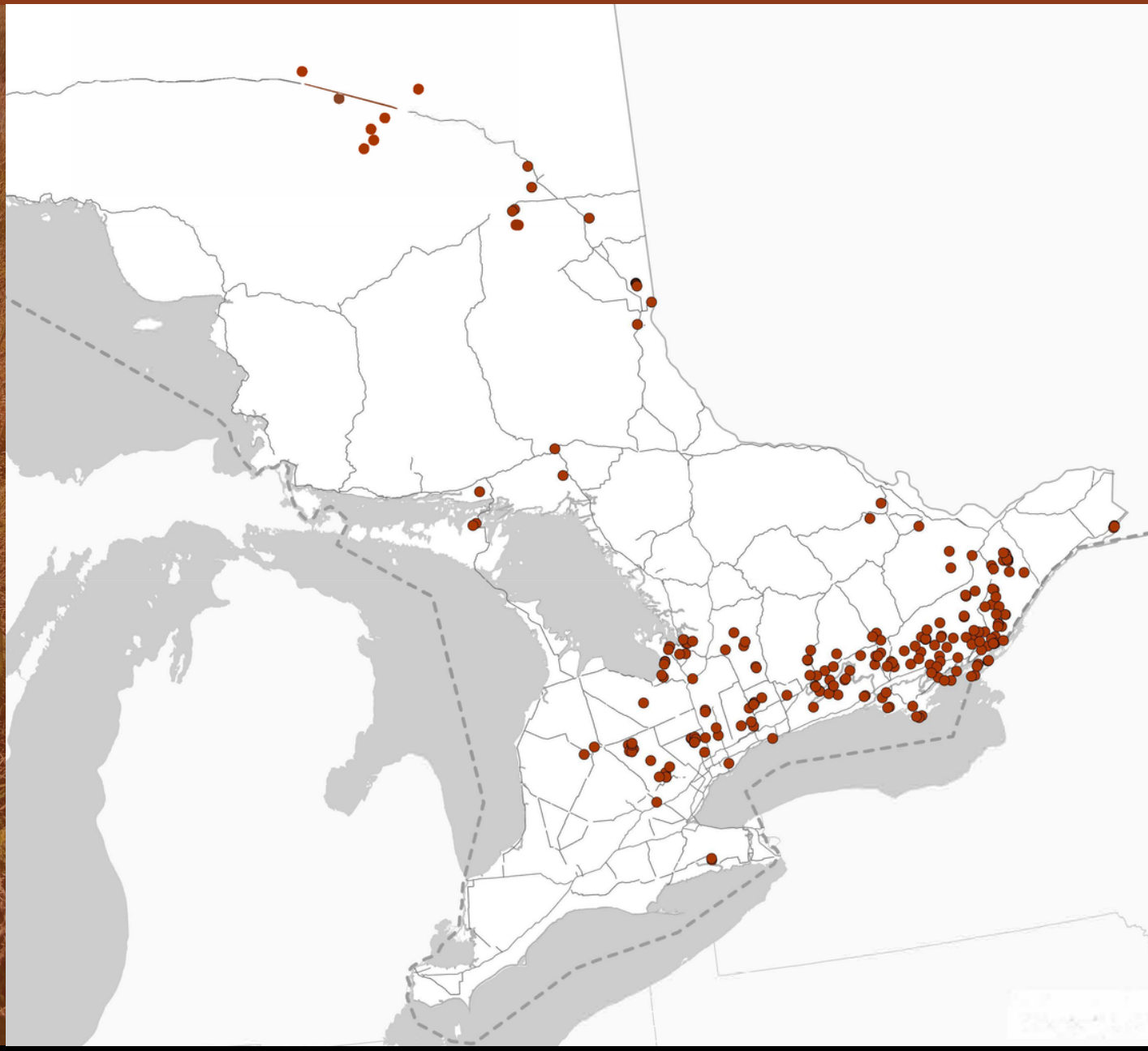
McIntosh Perry Consulting Engineers Ltd.

PROJECT DESCRIPTION

Ducks Unlimited Canada entrusted McIntosh Perry to complete the Project Infrastructure Inspections for 250 wetlands across Ontario, which provide crucial habitats and benefits to local wildlife.

The objective was to classify the condition and potential hazard of each dam if they failed. The large-scale analysis required the coordination of multiple departments to conduct field and desktop investigations.

Through engineering analysis and effective project management techniques, McIntosh Perry provided confirmation that the existing infrastructure are safe.



PROJECT HIGHLIGHTS

The main objective for this project was to assess and classify the condition of 250 Ducks Unlimited Canada wetland infrastructure across Ontario. This included assessing the physical condition of the dams, conducting cost estimates, and prioritizing the structures in need of rehabilitation. Confirmation of the hazard potential classification (HPC) as “low” was required to ensure that the dams would have minimal impacts on the downstream area if they were to fail.

A high-level assessment was first conducted to determine which wetlands have little to no impact on the downstream surroundings in the case of a dam breach and which required further investigation to confirm their HPC. Due to the project’s large scale, multiple team members were involved in this stage to increase the efficiency and provide an additional level of internal review, quality control, and quality assurance. Four impact categories, including life safety, property losses, environmental losses, and cultural-built heritage losses could be classified as having either a low, moderate, high, or very high hazard potential. The HPC was first done qualitatively using public information to identify and assess the downstream features that could be impacted by a dam failure, including residential, institutional, commercial, recreational, and industrial properties, major roads, trail routes, the presence of species of interest, and finally any cultural-built or heritage sites. Each dam was conceptually analyzed using engineering judgement to determine the overall impacts, level of destruction, and the potential costs of repairs warranted if each dam were to fail. Any wetland with concerning impacts to the four categories were flagged for further analysis

Once the wetlands were narrowed down to those with higher hazard potentials, a detailed quantitative assessment was used to confirm their classifications. The volume of water in the wetlands were calculated based on the original detailed design drawings. For each downstream feature where concerning impacts were identified, the peak flow rates of water leaving the wetlands were calculated under normal weather conditions (assumed dam breach in the summer months, not coinciding with a storm event) and flooding conditions (assumed that the dam breach coincided with a 100-year storm event) for both pipe failure and dam failure events. The results were compared to the criteria set out for each category to determine the final HPC for these wetlands and confirm that there would be no detrimental impacts downstream. Therefore, McIntosh Perry successfully provided confirmation that the existing infrastructure are safe.

COMPLEXITIES

- **Site Accessibility:** Often due to remote locations of the wetlands, or if access roads and foot trails to the dam structures were found to be damaged or overgrown with vegetation.
- **Scheduling With Landowners:** The private and/or public landowner(s) were consulted to gain permission to access the site. Interactions with landowners were conducted in accordance with health and safety guidelines due to COVID-19 restraints.
- **Internal Coordination of Site Visits:** Several of the field investigations were grouped based on their proximity to one another, and frequent communication between field inspectors helped to ensure that there was consistency among the site reviews.
- **Outdated Information:** Many of the design drawings provided were scans of the original plans made in the 1970s and 1980s and could be difficult to read finer details. Some standards at the time of the original design vary from current standards.
- **Limited Information:** While analyzing the potential for property damage caused by wetlands in the northern region, allocating reasonable cost estimates was challenging since information on existing northern infrastructure was not always readily available.
- **Budget Constraints:** DUC is a non-profit organization that relies on the support of external funding sources to carry out its conservation mission. As a result, there are budget constraints and projects must be prioritized.

ENVIRONMENTAL BENEFITS

Wetlands attract more wildlife to the area and provide stable habitats for several species, including birds, fish, amphibians, mammals, insects, plants, fungi, and microbes. ·A wide range of biodiversity increases the resilience of the ecosystem to threats such as disease or natural disaster events, making it a more sustainable habitat for decades to come.

The addition of plan and microbial species have a significant role in carbon sequestrian.

Wetlands naturally filter water, which improves the overall water quality within a watershed.

Wetlands can help mitigate the impacts of floods and droughts by providing extra storage for rainfall runoff, making them a key climate-resilient stormwater management solution.

SOCIAL BENEFITS

Wetlands possess recreational purposes, such as fishing, hunting, birdwatching, kayaking/canoeing, hiking, skating, etc. Providing opportunities for the surrounding communities to reconnect with nature and value other sustainability projects.

Some of the wetlands are in conservation areas, where they are used for educational purposes. The public can visit them to learn more about the importance of wetlands to the environment, ·and can inspire future generations to participate in conservation efforts.

The locations of the DUC wetlands range far across Ontario. Therefore, in addition to the positive impacts the project provides to local communities, its large scale and span allows for there to be positive impacts to the communities across the entire province.

MEETING OUR CLIENT'S NEEDS

Our client had one main project objective - to assess and classify the condition of their infrastructure for 250 wetlands across Ontario. This included inspecting the physical condition of the dam and dyke structures, collecting all contact information for landowners, compiling background information on the dam structures, performing cost estimates, and prioritizing the structures in need of restoration. Finally, confirmation of the Hazard Potential Classifications (HPCs) was required to ensure that the dams were classified as "low" for all 250 wetland locations and considered safe for rehabilitation.

Due to the large number of wetland sites and their geographically wide span across the province, significant project management and collaboration among staff and stakeholders were required to coordinate the field inspections. The scheduling was completed by grouping sites located in proximity to one another to limit travel time and costs, and communication with landowners was maintained to reduce accessibility issues.

McIntosh Perry made use of the digital online software SharePoint, which enabled efficient document sharing with DUC, allowed multiple staff to use the same documents simultaneously, and permitted quality control on the document in real-time.

Lastly, a master spreadsheet was used to organize the compiled information used in the HPC analysis. This task was divided among multiple team members to increase efficiency and provide an additional level of internal review, quality control, and quality assurance. The wetlands with higher hazard potentials were identified and provided to Ducks Unlimited to help prioritize future rehabilitation projects.