

**CASE STUDY:**  
**Cold-Climate Wastewater Treatment – Naskapi Nation of Kawawachikamach, QC**

## AERATED LAGOON PROVIDES WASTEWATER TREATMENT FOR A REMOTE NORTHERN COMMUNITY

### BACKGROUND

The Naskapi Nation of Kawawachikamach, in northern Quebec, is typical of many remote communities. Over 500 km north of Sept-Îles QC, ground access to the community is by rail only, and winter temperatures regularly approach lows of -40°C.



*"Smokestacks" formed by air venting through lagoon ice cover*

Building and operating a reliable treatment plant in such a remote, extreme climate location poses unique challenges. Long periods of very low air and water temperatures can reduce treatment retention volumes through ice build-up, damage floating equipment, and slow biological processes to a crawl. Low system maintenance requirements are a necessity, as bringing in urgently needed parts by air can be prohibitively expensive, and training operators can be a challenge. As an additional challenge, these communities can have high population growth rates, requiring a system that is flexible and provides for ease of future expansion.

The community had constructed a two cell lagoon in 1996 which by 2006 was no longer meeting the required effluent standards. The existing surface aerators were not suitable to the cold northern climate, and were prone to damage due to freezing into the ice. The entire system was in need of an upgrade.

### IN-HOUSE DESIGN / BUILD CAPACITY

Nelson Environmental Inc. designed, supplied and installed an OPTAER treatment system for the community. The two-cell, fine bubble aerated continuous discharge system utilized the existing lagoon basins to keep new construction costs to a minimum. The system was designed to provide full secondary treatment of 274 m<sup>3</sup> / day, meeting limits of:

- 25 mg/L of BOD in summer
- 30 mg/L of BOD in winter.

To ensure consistent treatment throughout the winter, volume loss due to ice cover of up to 1.2m was taken into account. Provision was also made for the system to be expanded to treat 400 m<sup>3</sup> / day by adding one additional row of aeration diffusers, and increasing the speed of the blowers.

Equipment for the upgrade was shop assembled in Winnipeg, Manitoba to the greatest extent possible, and shipped by rail to the community, allowing for easy installation by Nelson Environmental technical field staff.

### COLD CLIMATE RELIABILITY

Floating high density polyethylene (HDPE) air supply laterals with MAT fine bubble diffusers were chosen for this application. With careful design, the laterals can be frozen directly into the lagoon ice in winter, without sustaining damage or impairing their function. The tough HDPE material will not crack or otherwise deteriorate in cold temperatures or from direct exposure to UV. All piping connections are thermally fused, resulting in joints as strong as the pipe material itself.

The MAT aeration diffusers are individually ballasted and suspended below the floating laterals, ensuring a consistent diffuser depth, regardless of uneven bottom contours or sludge accumulation. The floating lateral system allows all system maintenance to be performed from a light boat without dewatering the lagoons.



*Summer operation, showing floating HDPE lateral*

### SUMMARY

Through careful design, in-house construction expertise, and cold-climate experience, Nelson Environmental was able to provide a robust, simple to operate treatment solution in this remote, extreme climate community.



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