

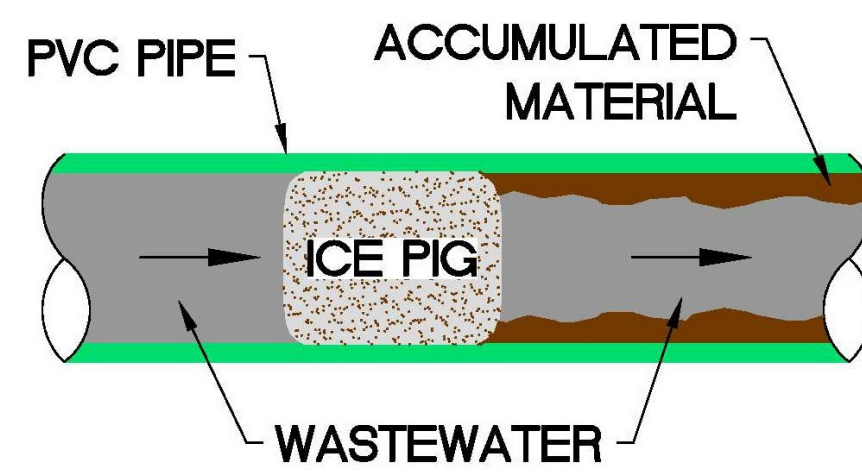
TOWN OF MIDDLEBURY

MAIN WASTEWATER PUMP STATION FORCEMAIN—ICE PIGGING PROJECT

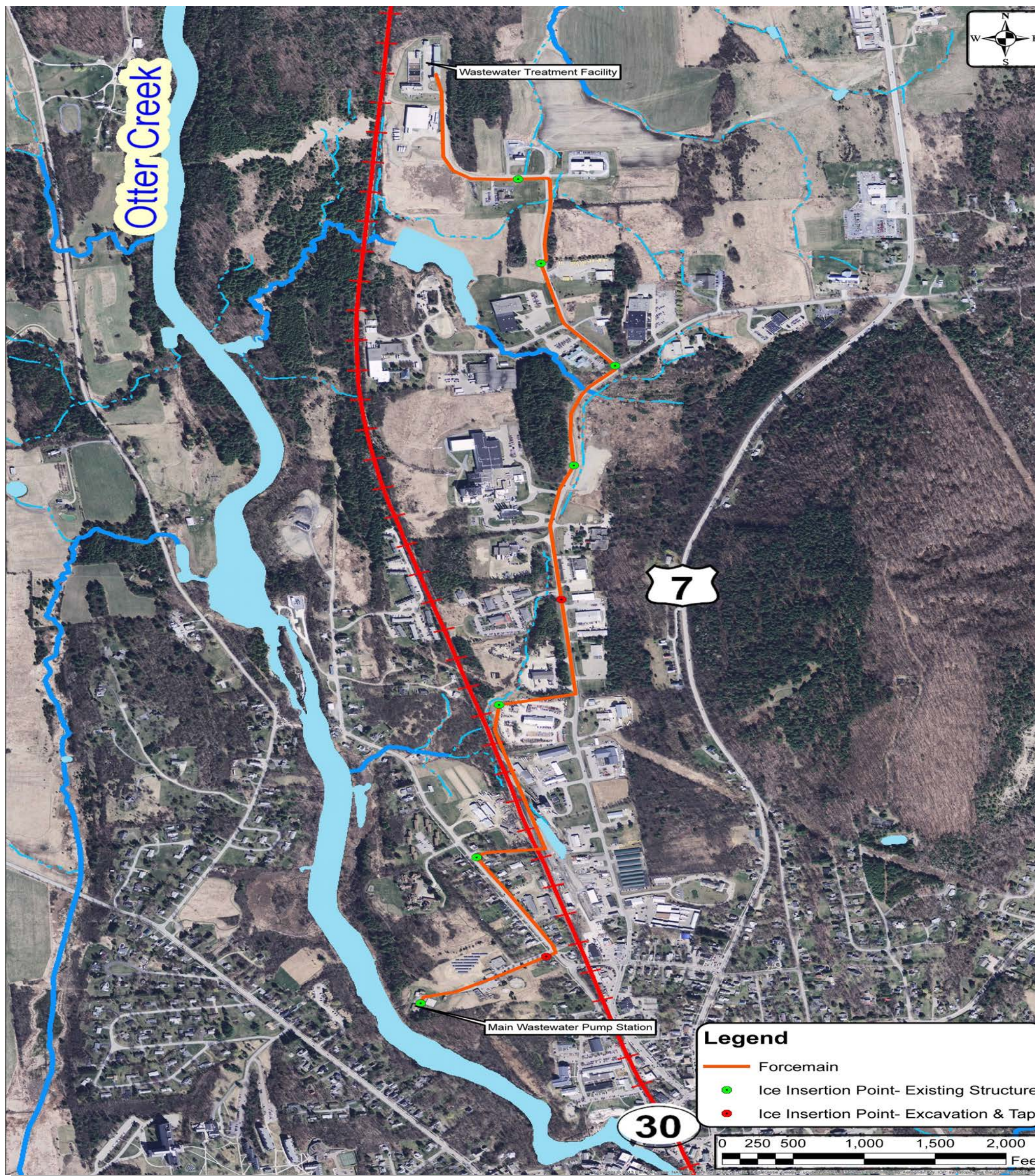


An Inside Look at Ice Pigging

Ice pigging is up to 1,000 times more effective than water flushing alone. It provides more effective cleaning, and uses significantly less water than other flushing methods. The existing pumps and wastewater push the pig through the forcemain. Because the pig is a slurry, not a solid, it will not get stuck like traditional mechanical pigs. If the pig does get stuck, it simply melts saving expensive excavation costs. The semi-solid pig can move like a liquid, around pipe bends, through diameter changes and valves. The semi-solid consistency allows the ice pig to effectively remove the buildup of sediment, sand, debris, sludge, inorganic and organic materials. The ice pig works like a glacier by incorporating debris into the ice rather than bulldozing the material like solid pigging.



Map of Forcemain and Insertion Points



Problem & Goal

The Middlebury Main Pump Station conveys wastewater through 12,000 LF of 16" and 18" ductile iron and PVC force main to the Wastewater Treatment Facility. The pumps were originally designed to discharge 6,200,000 gallons per day (gpd). Pumping rates decreased by more than 10% over time as the forcemain collected grease, grit, and sediment. During some wet weather conditions, the pump station could not keep up with incoming flows and raw sewage overflowed as Combined Sewer Overflows (CSO's) to the Otter Creek.

Middlebury's goal was to clean the forcemain by a new innovative/alternative technology called "Ice Pigging" to regain the lost pumping capacity, eliminate CSOs, improve pump efficiency, and save energy.

Solution

Meeting & Exceeding Middlebury's Needs

- Ice pigging successfully cleaned the forcemain and pump rates returned to 6,260,000 gpd.
- Removal of accumulated deposits increased capacity of the Pump Station by more than 640,000 gallons/day!
- Pump efficiency was increased, lowering pump run times, and saving energy and wear.
- Pumping program change developed to achieve scour velocity and satisfy owner's desire for continuous flow.
- The project was completed on schedule and within budget with no field changes or change orders!

Innovation at Work

- This was the first use of ice pigging techniques to clean sewer force mains larger than 8" diameter in North America.
- This project was the longest continuous run of sewer forcemain (12,000 LF) ever cleaned by ice pigging in North America!

Social & Economic Considerations

- The pump station now operates at full capacity, saving energy and eliminating CSOs, protecting public health and the environment.
- New, effective, and affordable pipe cleaning technology has been demonstrated in the US.

Overcoming Project Specific Complexity

- "Industry standard" solid poly pigging ruled out due to pipe size changes, bends, wyes, and no insert or retrieval stations.
- Number and location of insertion points was determined based on the pipe diameter, pipe length and the wastewater temperature to make sure the ice pig slurry would hold together as it traversed each pipe segment.
- Use of existing air release /cleanout manholes for insertion points (where practical) saved cost.
- Overcame Middlebury's higher than normal wastewater temperature which made this technique challenging.

Providing Technical Value to the Profession

- Proves large diameter force mains can be cost-effectively and successfully cleaned by ice pigging.
- On-site training was conducted with operators and engineers from all over New England and upstate New York.

Making the Ice Slurry



The ice-making rig produces the ice slurry by cooling and mixing a combination of water and salt to the perfect consistency.

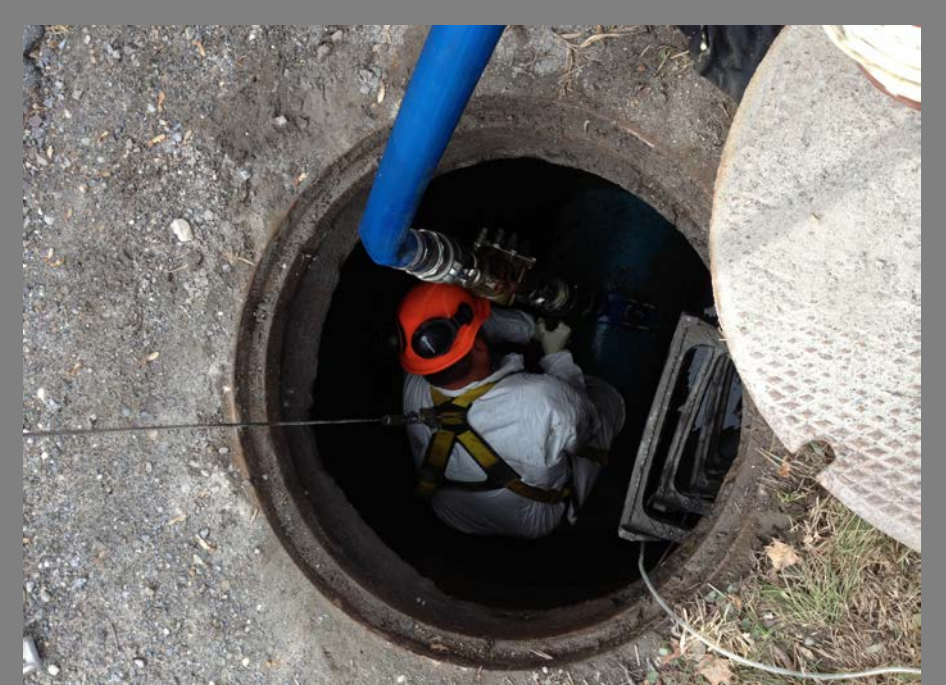


The ice slurry mixture acts as both a solid and a liquid. The consistency is very similar to a convenience store slushy.

Injecting the Ice Pig



The delivery/insertion truck brings the ice slurry to the insertion point and pumps the slurry into the forcemain.



Ice slurry being pumped into the forcemain inside an existing air release manhole.

Material Removed



The sample on the left shows influent filled with materials removed by the ice pig. The sample on the right shows normal influent.



Sand, grit, organics, and grease removed by ice pigging are discharged at the Wastewater Treatment Facility.

Sharing What We Learned



Engineers and operators from all over New England and upstate New York were invited to observe the work and learn about the new and innovative ice pigging process.

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The traditional image of an ice pig is forever changed in the minds of professionals learning this new innovative technology.

