Federal Gas Tax Fund Project Spotlight
The Town of Lockeport's
Dune Revetment Project – Draft

The Town of Lockeport

Incorporated: 1907

Population: 588

Project: Dune Revetment Project

National objective: Stronger communities

Project outcomes: By securing the dunes that safeguard the causeway from extreme weather events, this project protects vital municipal infrastructure and strengthens the Town of Lockeport's resilience to the impacts of climate change.

Gas Tax Fund contribution to project: $25,000

Total project cost: $50,000 for revetment and $2,700 for lobster trap initiative

Other Gas Tax Fund projects underway or completed:

- Access road upgrades
- Development of Municipal Climate Change Action Plan
- Bridge assessments and upgrades

The Town of Lockeport

The Town of Lockeport is situated along the southwestern coast of Nova Scotia in Shelburne County. Founded in the 1760's, early settlers created a thriving fishing industry which soon resulted in the establishment of various trading companies in the area. In time, Lockeport became a bustling hub for importing and exporting basic commodities. By the early 1900's, it was an important port-of-call, sending daily steamers to other ports, including Halifax and New York.

Historic buildings and homes are dispersed throughout present-day Lockeport, providing evidence of its earlier fishing and trading successes. Still a traditional fishing town, it is renowned for its natural resources and beautiful coastal features and is an important hub for recreational activities in Shelburne County.

DUNE REVETMENT PROJECT

The 1.5 km causeway along Crescent Beach, which connects the Town of Lockeport to the mainland of Nova Scotia, was built to hold back tidal waters that once flowed freely into the Back Harbour. As the main transportation, power and communication corridor for the Town, access to and protection of the causeway is paramount. This narrow isthmus also serves to protect valuable town-owned infrastructure, including Locke Street (which runs the length of the causeway), in-ground telephone cables and sewer lines, a boardwalk (situated only one metre above the high-water mark) and lighting. As well, an ecologically significant saltmarsh, home to nests of endangered Piping Plovers and many other shore birds, lies protected behind the causeway.

The dunes of Crescent Beach play a critical role in safeguarding the causeway from the open Atlantic Ocean and impacts from extreme weather events. Over the years however, the protective dunes have been damaged and the causeway breached by a number of storms, including two significant and relatively recent storms: Hurricane Hortense (1996) and Hurricane Bill (2009). A storm surge brought on by Hurricane Bill not only cut-off the Town's access to the mainland for a brief period of time, but flooded infrastructure, including one if its museum buildings located inland from the causeway.

Revetments were built to repair the damage to the dunes caused by these storms - 370 metres extending eastward in 1996 and 390 metres extending westward in 2009. Used as protective barriers, revetments are sloping structures built into the dunes. Typically constructed of wood, concrete or rock, they are used to prevent coastal erosion by absorbing the energy of incoming waves.

Despite this previous revetment work, the Town acknowledged in its 2013 Municipal Climate Change Action Plan (MCCAP) that 90 metres of the dunes remained weakened and in need of reinforcement. By chronicling historical storm damage and detailing climate change projections of more extreme weather events, the MCCAP emphasized the importance of taking preventative measures to reinforce the dunes to ensure they were able to provide ample protection to causeway and other Town assets. So Lockeport's council and staff began the process of planning and budgeting to strengthen the weakened area to prevent further impairment from significant storm surges.

With support from the federal Gas Tax Fund, this revetment work on the remaining 90 meters of dune was completed in the fall of 2014. Shortly following this project, the Town began to explore ways to encourage the development of beach berm along the revetment as a way to further strengthen the area. The natural berm, or fore-dune, had been destroyed over the years in previous storms. A fore-dune is a horizontal plateau that runs parallel to the ocean and serves to protect the larger dunes further up the beach, thus strengthen the overall integrity of the coastal ecosystem. If the Town could create conditions to encourage the development of a berm, sand deposited from wind and wave action would eventually build up enough to create a plateau and support the growth of vegetation, such as marram grass. This would help to stabilize the dunes and provide further protection from wind erosion and storm surges.

Lockeport's past attempts to strengthen this fragile coastal area with snow fencing were unsuccessful (as were it efforts using cars, Christmas trees and dead horses) and research did not uncover *a tried-and-true* option for protecting the dunes. So when two local residents, Bil Atwood and Peter Swim, proposed using lobster traps (as originally suggested by a seasoned fisherman) to encourage the development of a berm along the revetment, the Town was intrigued and open to exploring this innovative idea.

The openings in the metal frames of the lobster traps would allow wind and water to flow through, thus permitting sand to accumulate in and around them. Over time, the traps would become filled with sand, securing them in place. Wave and wind action would continue to deposit sand in the area and the traps would eventually become buried. This would create a plateau of sand that would stay in place and

encourage the growth of vegetation. Once secured by the vegetation, this berm created by the covered traps would provide a protective barrier to further help stabilize the area.

Left-hand photo: The lobster traps put in place late in 2015 have yet to be covered in sand and marram grass.

Right-hand photo: Marram grass and sand have begun to cover the lobster traps put along the revetment in 2014.

As a working fishing village, there is no shortage of lobster traps in Lockeport. So in the spring of 2013, the Town decided to test a 40-foot area along the beach (parallel to the revetment), by placing 20 traps salvaged from the local material recovery facility. Over the next several months, staff monitored the traps and was pleased to witness a slow build-up of sand in and around them. As the dynamic motion of moving sand slowly began to cover the traps and create an area stable enough to support the growth of vegetation, Town Council made a decision to extend the test area. In April 2015, staff laid approximately 400 more traps along the revetment, covering an area of approximately 800 feet.

Although the line of traps along Crescent Beach elicited curious and sometimes sceptical comments, they stayed in place over the winter of 2015. However, on Feb. 8, 2016, this experimental project was put to a real test when a significant winter storm hit the area. Upon initial inspection to assess the storm damage the next morning, staff was discouraged to discover over 100 traps strewn along the beach. However, further examination uncovered that a number of the traps left behind did not belong to the dune reinforcement project but were those owned by local fishers brought in with the waves and left stranded on the beach. The Town also found that all of the traps installed during the pilot phase of the project in 2013

remained firmly in place. So although the storm managed to dislodge some of those recently put in place, the more establish traps were able to weather the storm.

Encouraged that the pilot-phase traps were able to withstand the wind and wave action from this significant storm, the Town plans to reintroduce the dislodged traps with the hope that Mother Nature stays at bay long enough to allow them to become secured by the build-up of sand and the growth of vegetation. So although it is still uncertain if this experimental project will work to create a berm to protect the fragile dunes, the Town remains committed to their innovative approach. As it continues to witness the disappearance of the first 20 traps put in place as they slowly become covered by sand and vegetation, it remains hopeful that with time, all of the traps will become a stronghold against the constant force of the Atlantic Ocean to protect the dunes, the Town's valuable infrastructure and its access to the mainland.

"No matter how large a project, being willing to seek innovative solutions to municipal challenges such as this can have very significant and beneficial impacts for small communities", said former Mayor Darian Huskilson

One of the unintended outcomes from this project, and to a great extent the development of the Town's MCCAP, has been to raise awareness among Lockeport's council, staff and residents about the impacts of climate change and the value of taking proactive steps. In recent years, Lockeport has been making concerted efforts to both adapt to projected changes in climate and mitigate the amount of greenhouse gases it produces from its daily operations. These efforts involve a range of initiatives, including the Town's revetment work and willingness to use discarded lobster trap to help further secure the dunes, to replacing old windows with more energy-efficient ones.

"With the development of the MCCAP and from the awareness the dune reinforcement project has generated, the Town has taken a number of incremental steps to make its operations more efficient and its infrastructure less vulnerable to extreme weather events. As a community, we have become more motivated to do what we can with the resources available to us. In doing so, we are using our energy more efficiently and becoming a more resilient community" says Bil Atwood, Project Manager and local resident.