



How the industry protects Canada's rivers, streams and lakes during a pipeline crossing.

KEY FACTORS

An ecosystem to protect



THE HABITAT

- Water.
- Fish.
- Wildlife.
- Vegetation.



THE ENVIRONMENT

- Terrain and soils.
- Surface water.
- Ground water.
- Water movement, distribution and quality.



THE AREA

- Air quality and noise.
- Land use, including traditional land use.
- Historical or heritage site.

Canada is home to over 8,500 rivers and two million lakes, and they cover approximately nine per cent of our country's landscape.* With that many bodies of water, pipelines may need to cross them to transport the oil and gas Canadians use in their daily lives.

Keeping our lakes and rivers protected during these crossings is important to Canadians, and it's a priority for pipeline operators.

When pipelines cross rivers, streams, lakes and other bodies of water, operators take special care to protect the area during all stages of the pipeline's life cycle – from planning, construction and operations to maintenance and retirement.

Each phase of the cycle is closely monitored by regulators, and the industry uses established practices and procedures for water crossings to preserve soil, wildlife, vegetation and water quality.

Before the crossing

Pipeline companies carry out expert environmental and technical assessments before finalizing a pipeline route or beginning construction.

One of the most important considerations is choosing the best location for the pipeline to cross. It's critical the selected route maintains

the stability and quality of the pipeline to protect the surrounding environment. Soil erosion, the stability of the slopes and banks, and even the bends in a river or stream, are just some of the factors pipeline operators analyze when choosing the route. Allowing operators to access the pipeline to do maintenance and inspections is also important.

* Environment Canada, *Everybody's Talking About Water* bit.ly/1sm57K5



DESIGNED FOR THE ENVIRONMENT

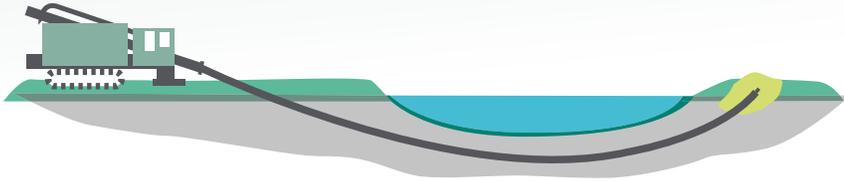
Pipelines installed in water are designed to have thicker walls and special coatings.





About Pipelines CROSSING BODIES OF WATER

BY DESIGN Drilling innovations (trenchless)



Horizontal directional drilling is one trenchless method the industry uses. It involves drilling a path underneath a river or other obstacle (like a road) and basically threading the pipeline underneath. This method eliminates the need for equipment to enter the water, meaning fish habitats are not disturbed and there's no effect on the stability of the river bank. Read the blog post: bit.ly/1v9THKs

To choose the most effective, least impactful route, pipeline operators may have to study the location of the route for several seasons before construction begins, especially if the watercourse has a seasonal flow or there is the potential for impact on the environment.

During the crossing

Two main methods are used for installing a pipeline across water: digging a trench or using trenchless methods. When conditions are right, operators try to use trenchless methods.

Whichever method is selected, operators carefully review the potential impacts to wildlife, vegetation and soil and try to avoid any disruption during construction. This includes reviewing the environmental risk, considering alternative crossing methods and meeting with landowners and the local stakeholders to understand any additional risks.

The installation of a pipeline in a watercourse is carefully monitored to maintain the surrounding environment. For instance,

operators must minimize the use of equipment within the perimeter of the crossing to avoid transferring noxious weeds or invasive plant species into the area.

Protecting the crossing

For pipelines crossing bodies of water, operators use thicker pipe walls, special pipeline coatings, and in some cases, special cables, bolts and weights to secure the pipeline.

For major bodies of water, such as a lake, operators also use block valves (which stop the flow of the product in the pipeline) on either side of the water crossing to reduce the risk of an accidental leak or spill.

Like all pipelines in Canada, pipelines going through water are constantly monitored, and if there is a change in pressure in the pipeline, specialized leak detection systems immediately trigger alarms notifying the operator.

To be prepared for the rare case of an incident, pipeline operators have fully implemented Emergency Management

Letting nature take its course

Many animals and fish rely on bodies of water for their home and food, which is why pipeline operators follow strict practices to avoid disrupting species and plant life, including times when:

-  Fish and/or their eggs are present in the waters.
-  Migratory birds are breeding and nesting.
-  The ground is wet due to seasonal conditions, such as muskeg or swamp.

Plans. That includes making sure emergency response personnel and equipment are at locations along the pipeline route. And local emergency responders receive special training on responding to spills in or around a body of water.

Protecting the crossing also means the surrounding area will be returned to the same state as before the pipeline was installed.

Pipeline operators use many techniques to reduce or eliminate the pipeline's footprint in these areas, and bring the site back to its natural condition – from using special reclamation practices to prevent erosion to the banks, to re-establishing and enhancing the fish population.



GET ANSWERS

View The Life Cycle of Watercourse Crossings in Canada publication: bit.ly/1DaklzR

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