HOW WE CROSS RIVERS AND STREAMS

State-of-the art planning and construction to protect rivers and streams
Oversight from state and federal regulators to ensure minimal impact

Categories of Bodies of Water

<table>
<thead>
<tr>
<th>Minor</th>
<th>Intermediate</th>
<th>Major</th>
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<tbody>
<tr>
<td>Includes all streams less than or equal to 10 feet wide at the water’s edge at the time of construction.</td>
<td>Constitutes perennial stream crossings greater than 10 feet wide but less than 100 feet wide at the water’s edge at the time of construction.</td>
<td>Includes crossings of more than 100 feet at the water’s edge at the time of construction.</td>
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Water Resources

As discussed in Resource Report 2 (available at www.PennEastPipeline.com under the “Official Filings” tab), avoiding and/or minimizing impacts on water resources is a PennEast priority.

Though temporary impacts on water resources might occur during construction activities, PennEast will minimize these impacts through adherence to the FERC Plan and Procedures, as well as implementation of erosion and sedimentation control best management practices. These practices are outlined in the Erosion and Sediment Control Plan (E&SCP), available at www.PennEastPipeline.com, Appendix E under the “Official Filings” tab.
Stream crossing methods will be determined by individual stream conditions during the final engineering design. The E&SCP will be followed for construction, as well as for any specialized techniques required at stream crossings. PennEast will use the procedures outlined in the E&SCP to minimize the impact on waterbodies and aquatic resources.

By following the adopted waterbody crossing procedures, PennEast will minimize potential temporary impacts from construction-related sedimentation and turbidity. Once construction is complete, PennEast also will restore streambeds and banks to pre-construction conditions to the fullest extent possible, helping to ensure there are no long-term impacts related to pipeline construction.

Operation and routine maintenance of the Pipeline and associated facilities will not affect fishery resources within the Project area. While PennEast expects no permanent ecological losses to water resources, changes to vegetative cover are anticipated. This is common when establishing a new right of way (ROW) and will be addressed through approved mitigation plans.

Additionally, PennEast has evaluated numerous specialized pipeline construction methods for crossing waterbodies. This evaluation is summarized in Resource Report 2, and includes consultations with:

- U.S. Fish and Wildlife Service (USFWS);
- Pennsylvania Department of Environmental Protection (PADEP);
- New Jersey Department of Environmental Protection (NJDEP); and
- U.S. Army Corps of Engineers (USACE), among others.

PennEast proposes to cross waterbodies using a combination of trenchless (horizontal directional drilling and bores) and dry-crossing methods. In Pennsylvania, PennEast will follow the timing restrictions identified by the Pennsylvania Fish and Boat Commission (PFBC) for dry crossings, and in New Jersey, will follow the NJDEP timing restrictions set forth by the rules of the New Jersey Flood Hazard Area Control Act.

Generally during crossings, the full width of the construction ROW will be used on either side of the waterbody for construction staging and pipeline fabrication. Additional temporary workspace might be required in some situations and will be located a minimum of 50 feet from the waterbody, when possible.

Learn more about existing groundwater resources (including aquifers, wells and springs), surface water resources, water withdrawals, wetlands and mitigation in Resource Report 2, at www.PennEastPipeline.com under the “Official Filings” tab.
**Equipment**

During clearing and grading activities, PennEast will construct temporary bridges over waterbodies to enable construction equipment to cross. If bridges are not installed at state-designated fishery streams, equipment will be required to move around the waterbodies to gain access to the other side.

Construction equipment operators will be required to use the bridges. In general, equipment refueling and lubricating will take place in areas more than 100 feet from the edges of streams and rivers and their associated wetlands.

Following restoration activities, PennEast will ensure that bridges and supports are removed.

**Clearing**

Clearing will involve the removal of trees and brush from the construction ROW and temporary construction workspace. PennEast crews will clear woody vegetation to the edge of the waterbodies. To provide a natural sediment filter and minimize the potential for erosion immediately adjacent to the waterbodies, PennEast will leave a 10-foot-long vegetation buffer, which will be removed immediately before construction begins. Initial grading of the vegetative buffer will be limited to the extent necessary to install bridges and in areas where large-grade cuts are required to help construct the Pipeline safely.

Where possible during clearing and grading, PennEast will install and maintain sediment barriers adjacent to waterbodies and within temporary construction workspaces. In lieu of silt fence or straw bales, drivable berms also may be installed and maintained across the ROW.

**Pre-construction and Ditching for Streams**

It is important to determine if PennEast will encounter rock formations that will require special measures to lay the pipe safely. Pre-construction activities also will reduce the duration of the actual construction activities involving streams, expediting restoration.

Prior to construction, PennEast will conduct test bores along the stream banks with a rock drill. If PennEast encounters solid rock during test boring, PennEast will prepare the ditch line area for blasting.

PennEast will file applicable permits and plans with regulatory agencies. Qualified and highly trained crews will conduct the approved blasting activities, which are common in a variety of development projects. PennEast will notify nearby residents, business owners and law enforcement at least 24 hours in advance of beginning any blasting activities.

**Methods of Crossing**

PennEast proposes to cross waterbodies using a combination of horizontal directional drilling (HDD) and dry-crossing methods.

**Flume Crossing Method**

A flume is a human-made channel that leads the water to the desired location. In pipeline construction, the first step of the flume crossing method involves placing a sufficient number of adequately sized flume pipes in the stream to accommodate the highest anticipated flow during construction.

After placing the pipes in the stream, sand or pea gravel bags will be placed upstream and downstream of the proposed trench. The bags create a dam and divert the stream flow through the flume pipes. This isolates the stream flow from the construction area (see E&SCP). A trench then will be excavated under the flume pipe, and a pre-fabricated segment of pipe is installed. Once the pipe is placed, the trench will be backfilled.

**Dam-and-Pump Crossing Method**

The dam-and-pump crossing method involves constructing temporary sand or pea gravel bag dams upstream and downstream of the proposed crossing site. Using a high-capacity pump, stream flow from the upstream side is diverted around the construction area to the downstream side. At the discharge point, PennEast will place steel plates on the downstream side. Once a dry construction area is achieved, PennEast will dig the trench.
After trenching across the streambed is completed, PennEast will install a pre-fabricated segment of pipe and immediately backfill the trench. Once restoration of the streambed is complete, the dams are removed and normal flow is re-established in the stream.

**Horizontal Directional Drilling (HDD) Method**

Installation of a pipeline by HDD is generally accomplished in three stages:

1. The first stage consists of drilling a small diameter pilot hole along a planned directional path. The path of the drilling string is tracked and directed using surface monitoring systems. The surface monitoring system determines the location of the drill bit in the hole by taking measurements from a grid or point on the surface. This allows the operator to follow the designed directional path.

2. The second stage involves enlarging the pilot hole to a diameter that will accommodate the Pipeline. The enlargement process involves the use of hydraulic cutting with drill bits and jet nozzles and hydraulic motors (also called “mud motors”) used to cut harder soils. It can take several passes to enlarge the hole to the required diameter, which is typically 12 inches larger than the Pipeline being installed.

3. The third stage begins once the pilot hole is enlarged to the correct size. The section of pipe, prepared in advance, is pulled through the hole using the horizontal-directional drilling unit.

**Major Waterbody Crossings**

There are six major waterbody crossings associated with the Project: the Susquehanna River; the Lehigh River (in two locations); Wild Creek and Pohopoco Creek (Beltzville Lake), and the Delaware River.

PennEast’s team of engineers, environmental scientists, construction personnel and land agents conducted joint field investigations and reviewed each of the major waterbody crossing areas. They evaluated the different construction methods for each crossing. As a result of these investigations, as well as consultations with state and federal regulatory agencies, PennEast is proposing to cross one of the two locations of the Lehigh River; Wild Creek; Pohopoco Creek; and the Delaware River using the HDD boring method. PennEast plans to cross the Susquehanna River and the second location of the Lehigh River at MP 23 using a dry, open-cut construction method.

For additional information on site-specific plans, please see PennEast’s Resource Report 2 (available at www.PennEastPipeline.com under the “Officials Filings” tab).

**For Additional Information:**

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