ATTACHMENT 4

Algonquin Best Drilling Practices, Monitoring, and Clean-up of Horizontal Directional Drilling Inadvertent Returns Plan

CAPE COD CANAL PIPELINE RELOCATION PROJECT

Best Drilling Practices, Monitoring and Clean-up of Horizontal Directional Drilling Inadvertent Returns

June 2025

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 BEST AVAILABLE DRILLING PRACTICES 1

2.1 DESCRIPTION OF THE WORK 1
2.2 BACKGROUND 1
2.3 DRILLING FLUID COMPOSITION 1
2.4 DRILLING FLUID DISPOSAL 2
2.5 HDD WORKING PROCEDURES 2
2.6 HDD CONTINGENCY PLAN 3

3.0 DRILLING AND MONITORING PROCEDURES 4

3.1 PERSONNEL AND RESPONSIBILITIES 4
3.2 TRAINING 4
3.3 MONITORING PROCEDURE FOR FULL CIRCULATION 5
3.4 MONITORING PROCEDURE FOR LOSS OF CIRCULATION 5
3.5 MONITORING PROCEDURE FOR INADVERTENT RETURNS 6

4.0 RESPONSE TO INADVERTENT RETURNS 6

4.1 UPLAND LOCATION 7
4.2 WETLAND LOCATION 7

5.0 NOTIFICATIONS 7

6.0 CLEAN-UP 8

1.0 INTRODUCTION

Algonquin Gas Transmission, LLC ("Algonquin") developed the enclosed Best Drilling Practices Plan for monitoring and clean-up of the horizontal directional drilling ("HDD") inadvertent returns ("HDD Plan"). This HDD Plan will be kept on-site at HDD locations and will be available and implemented by all proposed personnel described in the following sections of this HDD Plan. All drilling during each pipeline installation will be managed in accordance with this HDD Plan. In addition, prior to initiation of the HDD activities, Algonquin will provide timely notification to the appropriate regulatory agencies, landowners, and FERC, as applicable, of the planned activities and estimated timeframes.

2.0 BEST AVAILABLE DRILLING PRACTICES

2.1 Description of the Work

The HDD method typically involves establishing land-based staging areas along both sides of the proposed crossing. The process commences with the boring of a pilot hole beneath the feature (e.g., waterbody, roadway) to the opposite side of the crossing and then enlarging the hole with one or more passes of a reamer until the hole is the necessary diameter to facilitate the pull-back (installation) of the pipeline.

Once the reaming passes are completed, a prefabricated pipe segment is then pulled through the hole to complete the crossing. While the HDD method is a proven technology, there are certain impacts that could occur as a result of the drilling such as the inadvertent return of drilling fluid, which is a slurry of bentonite clay and water and is classified as non-toxic to the aquatic environment and is a non-hazardous substance. Drilling fluids that are returned typically contain a lower concentration of bentonite when they surface because the bentonite is filtered out as it passes through existing sediments of varying types. The following sections provide the process of HDD and procedures to be implemented in the case of drill failure or the inadvertent return of drilling fluid.

2.2 Background

The HDD process uses bentonite-based drilling fluids. The drilling fluids are tested for specific engineering properties to ensure a successful HDD installation. An environmental impact associated with HDD is the inadvertent return of drilling fluids to the surface along the drill alignment during drilling operations.

2.3 Drilling Fluid Composition

The major component of drilling fluids used in HDD pipeline installation is fresh water, which will be obtained from municipal sources. In order for water to perform the required drilling functions, it is generally necessary to modify its properties by adding a viscosifier, which is used almost exclusively in HDD drilling fluids and is a naturally occurring bentonite clay typically mined by "open pit" methods.

Bentonite is soft clay, formed by the weathering of volcanic ash, with the unique characteristic of swelling to several times its original volume when mixed with water. It is not a hazardous material as defined by the U.S. Environmental Protection Agency's ("USEPA") characteristics of ignitability, corrosivity, reactivity, or commercial chemicals. It can also be used to seal earth structures (e.g., ponds or dams), and as a suspending component in livestock feeds. The

properties of bentonite used in drilling fluids are often enhanced by the addition of polymers. Enhancement typically results in increasing the yield, reducing the amount of dry bentonite required to produce a given amount of drilling fluid and augmenting its rheologic properties to maximize the effectiveness within a given formation. Non-treated bentonite yields in excess of 85 barrels (3,570 gallons) of drilling fluid per ton of material. The addition of non-toxic polymers to produce high yield bentonite can increase the yield to more than 200 barrels (8,400 gallons) per ton of material. Typical HDD drilling fluids are made with high yield bentonite and are composed of less than 4 percent viscosifier by volume, with the remaining components being water and drilled spoil. Drilling fluid consists of non-toxic bentonite, but, depending on the drilling conditions, may also contain drilling fluid additives. The bentonite and any additives must meet the National Sanitation Foundation International/American National Standards Institute ("ANSI") Standard 60 for safe drinking water requirements. This is the same drilling fluid used for drilling drinking water wells, so there is no risk to drinking water from its use.

Typically, the drilling fluid contains no more than 5 percent bentonite (95 percent fresh water). The slurry is designed to:

- Stabilize the hole against collapse;
- Lubricate, cool, and clean the cutters;
- Transport cuttings by suspension and flow to entry and exit points; and
- Reduce soil friction and required pull loads.

2.4 Drilling Fluid Disposal

Waste drilling fluid and cuttings will be collected, temporarily stored in the construction workspace, and then disposed of off-site at an approved facility. Disposal of excess drilling fluid will be the responsibility of the selected HDD contractor. Prior to beginning HDD operations, the HDD contractor will be required to submit its proposed drilling fluid disposal procedures and disposal facility to Algonquin for approval. Algonquin will review these procedures and verify that they comply with all environmental regulations, easement and workspace agreements, and permit requirements.

2.5 HDD Working Procedures

Prior to drilling operations, site-specific HDD Procedures will be prepared by the HDD contractor and submitted to Algonquin for review and approval. As a minimum, the HDD Procedures will address the following:

Annular Pressure or Return Mitigation – Once it is indicated to the driller that annular pressures are abnormally high or that a return has occurred (via use of a downhole annular pressure monitoring tool), the driller has the following options (or any combination of these options):

- Decrease pump pressure;
- Decrease penetration rate;
- Retract the drill string a distance to restore circulation ("swab" the hole);
- Introduce additional flow along the borehole using "weeper" subs; and
- Modify the drilling mud with lost circulation additives.

2.6 HDD Contingency Plan

Several possible scenarios and/or conditions exist that could prevent the successful completion of a pilot hole, reaming or pipeline pullback operation. Examples of these possible scenarios and/or conditions are as follows:

1. Inability to maintain mud circulation during pilot drilling due to uncontrolled fluid loss into subterranean voids or fissures.
2. Inability to steer the down hole pilot assembly on the prescribed drill profile due to deflection that could occur when geological obstructions such as boulders and cobble are encountered.
3. Inability to steer the down hole pilot assembly on the prescribed drill profile due to deflection that could occur in areas where a geologic formation is encountered that will not provide adequate resistance to support the weight of the down hole pilot assembly.
4. Inability to complete reaming due to geological obstructions such as boulders or cobble that could migrate into the path that has already been piloted or reamed.
5. Inability to retrieve drilling or reaming equipment components and/or drill pipe that could be left down hole due mechanical failure.
6. Inability to pull the entire product pipeline section through the bore hole due to the collapse of the completed bore hole.

In the unlikely event that an HDD bore hole profile must be abandoned, Algonquin will implement one the following alternate installation procedures:

1. The pilot hole will be offset and drilled on a different profile from the same location;
2. Algonquin will relocate the HDD to another location on the existing permanent easement; or
3. Algonquin will acquire additional permanent easement to perform the HDD in an alternate location (the necessary clearance and permit amendments will be obtained prior to the initiation of this option).

In the event that a bore hole must be abandoned, the following remedial steps will be implemented:

1. The HDD contractor will fill the abandoned hole with a drilling mud/grout mixture. Once this is accomplished, Algonquin would offset to another location and resume the HDD process as specified in steps 1-3 above.
2. Drilling mud from the pit at the abandoned location will be pumped into a tank for reuse or disposal and the pit will be backfilled.

3.0 DRILLING AND MONITORING PROCEDURES

3.1 Personnel and Responsibilities

The actions in this HDD Plan are to be implemented by the following personnel:

Chief Inspector – Algonquin will designate a Chief Inspector ("CI") for the Project. The CI will have overall authority for construction activities that occur on the Project.

Environmental Inspector – At least one Environmental Inspector ("EI") will be designated by Algonquin to monitor the HDD activities. The EI will have peer status with all other activity inspectors and will report directly to the CI who has overall authority. The EI will have the authority to stop activities that violate the environmental conditions of the FERC certificate (if applicable), other federal and state permits, or landowner requirements, and to order corrective action.

HDD Superintendent – is the senior on-site representative of the HDD contractor. The HDD Superintendent has overall responsibility for implementing this HDD Plan on behalf of the HDD contractor. The HDD Superintendent will be familiar with the aspects of the drilling activity, the contents of the HDD Plan and the conditions of approval under which the activity is permitted to take place. The HDD Superintendent will make available a copy of this HDD Plan to the appropriate construction personnel. The HDD Superintendent will ensure that workers are properly trained and familiar with the necessary procedures for response to an inadvertent return.

HDD Operator – is HDD contractor's driller operating the drilling rig and mud pumps. The HDD Operator is responsible for monitoring circulation back to the entry and exit locations and for monitoring annular pressures during pilot-hole drilling. In the event of loss of circulation or higher than expected annular pressures, the HDD Operator must communicate the event to the HDD Superintendent and HDD contractor field crews. The HDD Operator is responsible for stoppage or changes to the drilling program in the event of observed inadvertent returns.

HDD Contractor Personnel – during HDD installation, field crews will be responsible to monitor the HDD alignment along with the Algonquin's field representatives'. Field crews in coordination with the EI are responsible for timely notifications and responses to observed returns in accordance with this HDD Plan. The EI ultimately must sign off on the action plan for mitigating the return.

3.2 Training

Prior to drilling, the HDD Superintendent, CI and the EI will verify that the HDD Operator and field crew receive the following site-specific training but not limited to:

- Project specific safety training;
- Review provisions of this HDD Plan and site-specific permit requirements;
- Review location of sensitive environmental resources at the site;
- Review drilling procedures for return prevention;
- Review the site-specific monitoring requirements;
- Review the location and operation of return control equipment and materials; and
- Review procedures for reporting observed inadvertent returns.

To ensure that HDD operations are conducted in accordance with established requirements and standard HDD industry practice, Algonquin will provide an inspector experienced in HDD construction (HDD Superintendent, see Section 4.0 below) to monitor the HDD contractor's performance at the HDD site. Established requirements to which the HDD contractor must conform include, but are not limited to, the construction drawings, technical specifications, permits, easement and workspace agreements, and HDD contractor submittals. The drilling fluid monitoring procedures to be applied will vary depending upon the following operational conditions: full circulation; loss of circulation; and inadvertent returns.

3.3 Monitoring Procedure for Full Circulation

When HDD operations are in progress and full drilling fluid circulation is being maintained at one or both of the HDD endpoints, the following monitoring procedures will be implemented:

- The presence of drilling fluid returns at one or both of the HDD endpoints will be periodically documented;
- Land-based portions of the drilled alignment will be periodically walked and visually inspected for signs of inadvertent drilling fluid returns as well as surface heaving and settlement.
- Waterways will be visually inspected from the banks for a visible drilling fluid plume; and
- Drilling fluid products present at the jobsite will be documented.

If an inadvertent drilling fluid return is detected during routine monitoring, the monitoring procedure described below will be implemented immediately.

3.4 Monitoring Procedure for Loss of Circulation

When HDD operations are in progress and drilling fluid circulation to the HDD endpoints is lost or severely diminished, the following monitoring procedure will be implemented. Lost circulation is common and anticipated during HDD installation and does not necessarily indicate that drilling fluid is inadvertently returning to a point on the surface.

- The HDD Superintendent will notify Algonquin if drilling fluid circulation to the HDD endpoints has been lost or severely diminished.
- The HDD Superintendent will document steps taken by the HDD contractor to restore circulation. If the HDD contractor fails to comply with the requirements of the HDD specification, the HDD Superintendent will notify Algonquin so that appropriate actions can be taken. If circulation is regained, Algonquin’s inspector will inform Algonquin and resume the monitoring procedure described herein.
- If circulation is not re-established, the HDD Superintendent will increase the frequency of visual inspection along the drilled path alignment as appropriate. Additionally, Algonquin’s Superintendent will document periods of HDD contractor downtime (during which no drilling fluid is pumped) and the HDD contractor’s drilling fluid pumping rate should it become necessary to estimate lost circulation volumes.

3.5 Monitoring Procedure for Inadvertent Returns

If an inadvertent return of drilling fluids is detected, the following monitoring procedure will be implemented:

- If the HDD Operator observes an increase in annular fluid pressure or loss of circulation, the Operator will notify the HDD Superintendent and field crews of the event and approximate position of the cutting head;
- Where practical, a member of the field crew will visually inspect the ground surface near the position of the cutting head;
- If an inadvertent return is observed:
    - Field crew will notify (via hand-held radio or cell phone) the HDD Operator;
    - The HDD Operator will temporarily cease pumping of the drilling fluid and notify the HDD Superintendent and CI;
    - The CI will notify and coordinate a response with the EI;
    - The EI will notify appropriate permit authorities as necessary of the event and proposed response and provide required documentation within 24 hours; and
- The CI will prepare a report that summarizes the incident.

4.0 RESPONSE TO INADVERTENT RETURNS

Typically, inadvertent returns are most often detected in an area near the entry or exit points of the drill alignment when the pilot bore is at shallow depths, above bedrock, and in permeable/porous soils. In these occurrences the return will be assessed by the HDD Superintendent, EI and CI to determine an estimated volume and footprint of the return. They will also assess the potential of the return to reach adjacent waterbodies, wetlands, or other types of infrastructure.

The HDD Superintendent will assess the drilling parameters (depth, annular pressures, fluid flow rate and drill fluid characteristics) and incorporate appropriate changes.

The HDD Superintendent, EI, and CI will implement installation of appropriate containment structures and additional response measures. Access for personnel and equipment to the return site is a major factor in determining the methods used for containment and disposal. Typically, containment is achieved by excavating a small sump pit (5 cubic yards) at the site of the return and to surround the return with hay bales, silt fence and/or sandbags. Once contained, the drilling fluid is either collected by vacuum trucks or pumped to a location where vacuum trucks can be accessed. The fluids are then transported either back to the HDD Drilling Rig or to a disposal site.

If the return is mitigated and controlled, forward progress of the drilling will be approved by the EI in coordination with the HDD Superintendent and CI.

The site-specific response will follow these guidelines:

4.1 Upland Location

- Evaluate the amount of return to determine if containment structures are warranted and if they will effectively contain the return.
- Promptly implement appropriate containment measures as needed to contain and recover the slurry.
- If the return is within 50-foot of a wetland or waterbody, silt fence and/or hay bales will be installed between the return site and the wetland or waterbody.
- If the return cannot be contained, then the HDD Operator must suspend drilling operations until appropriate containment is in place.
- Remove the fluids using either a vacuum truck or by pumping to a location where a vacuum truck is accessible.
- After the HDD installation is complete, perform final clean-up (see Section 6).

4.2 Wetland Location

- Evaluate the amount of return to determine if containment structures are warranted and if they will effectively contain the return.
- Promptly implement appropriate containment measures to contain and recover the slurry;
    - Efforts to contain and recover slurry in wetlands may result in further disturbance by equipment and personnel, and possibly offset the benefit gained in removing the slurry.
    - If the amount of the slurry is too small to allow the practical collection from the affected area, the fluid will be diluted with fresh water or allowed to dry and dissipate naturally.
- If the return cannot be controlled or contained, immediately suspend drilling operations until appropriate containment is in place.
- Remove the fluids using either a vacuum truck or by pumping to a location where a vacuum truck is accessible.
- After the HDD installation is complete, perform final clean-up (see Section 6).

5.0 NOTIFICATIONS

In the event of an inadvertent drilling fluid return within a waterway, wetland, or sensitive environmental resource area, Algonquin will contact FERC, and or the FERC representative, and the applicable federal and state agencies that regulate returns according to permit reporting requirements, but no later than 24 hours after detection. Once Algonquin selects it's HDD contractor, a more specific notification system will be developed to comply with permit conditions. Details of the inadvertent return will contain, at a minimum:

- The location, nature of the return and estimated volume;

- Take immediate corrective actions that may include, but are not limited to, installation of erosion control devices to contain the return, determination of any permit reporting limits, a temporary shutdown of the drilling operations to determine the cause of the return, and coordination with Algonquin's HDD Superintendent and CI and contractor to determine if there are other drilling techniques that can be used to eliminate the return such as the use of additives or lower drilling pressures.

Once a return has been identified, the appropriate agency notifications will be made. Notification protocols will be determined during the permitting process with state and federal agencies, and these protocols will be provided to the drilling contractor, the Algonquin inspection staff, and will be part of the environmental training to be conducted prior to construction. During the permitting process, it will be determined if agency approval is needed to commence drilling operations after a return. If so, a detailed communication protocol will be established in consultation with the contractor, Algonquin staff, and the agencies. The protocol will include agency contact names, Algonquin contacts, reporting limits, reporting time schedules, reporting tracking, and approval tracking.

6.0 CLEAN-UP

After completion of the HDD installation, site-specific clean-up measures will be developed by the CI, HDD Superintendent, for approval by the EI. Potential for secondary impact from the clean-up process is to be evaluated and benefits of clean-up activities.

The following measures are considered appropriate:

- Drilling mud will be cleaned up by hand using hand shovels, buckets and soft bristled brooms minimizing damage to existing vegetation.
- Fresh water washes may be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the ground surface scraped to bare topsoil minimizing loss of topsoil or damage to adjacent vegetation.
- The recovered drilling fluid will be recycled or disposed of at an approved upland location or disposal facility. No recovered drilling fluid will be disposed of in streams or storm drains.
- All containment structures will be removed.
- Recovered materials will be collected in containers for temporary storage prior to removal from the site.
- Disturbed areas will be stabilized by seeding and mulching as approved by the EI.