



HORIZONTAL DIRECTIONAL DRILL GUIDELINES

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Horizontal Directional Drilling (HDD) is intended to be a less intrusive construction method than the traditional open cut for crossing a watercourse or wetland with a pipe, cable or other underground service. However, there is a possibility of surface (water, riparian, wetland) disturbance if a 'frac-out' (inadvertent release of drilling fluid or a release of sediment laden groundwater into the wetland or watercourse. There is also the potential for sediment laden water or other deleterious substances to enter a surface water feature as the result of grading, drilling excavations, equipment washing, or other construction related activities during directional boring.

Frac-out releases are typically caused by the pressurization of the drill hole beyond the containment capability of the near surface geologic materials (soil and/or rock). Therefore the type and depth of these materials, as well as the drilling pressure, are key factors in preventing and managing frac-outs.

TRCA aims to minimize ecological risk, which is accomplished by effective siting of the project, collection of detailed information to understand environmental constraints/sensitivities, proactive mitigation of potential ecological impacts, environmental monitoring during HDD construction, and detailed contingency measures.

Minimizing Ecological Risk

These guidelines are intended to provide direction to minimize the potential ecological risks associated with HDD for the installation of services under watercourses or wetlands. The preferred order for dealing with potential releases of drilling fluid is first to prevent them from occurring, second to contain them if such an incident occurs, and third is site restoration/remediation.

Sediment entering a surface water feature may result in a temporary increase in turbidity or siltation that can negatively impact aquatic life, by covering spawning/feeding areas and clogging fish gills. These effects may be a violation under the *Conservation Authorities Act*, *Fisheries Act*, or the *Endangered Species Act*.

The proponent needs to indicate whether or not they are using the Department of Fisheries and Oceans Operational Statement for High Pressure Directional Drilling, which can be downloaded from the Operational Statements web site at http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp. Please ensure that the most recent version of the operational statement is used, as they may be revised periodically. It is the proponent's responsibility to use the most recent version.

Understanding Site Conditions

When designing HDD projects in or around natural areas, such as watercourses and wetlands, it is important to clearly understand the ecological sensitivities and the potential risk of inadvertent releases of sediment or sediment-laden water during HDD operations. This understanding is based upon detailed information, provided by the proponent, on existing site conditions, including a geotechnical study supporting the type of construction methodology proposed, hydrogeology data including shallow

groundwater levels, upwellings, seeps and other discharge zones, and all ecological sensitivities that may be at risk from the proposal. The absence of any of this information with respect to the natural heritage features, functions and the construction methodology within the work area reduces TRCA's ability to effectively review the site plans and determine whether the proposed mitigation measures are appropriate to reduce risks to the natural environment. It is recommended that prior to designing a HDD project within a TRCA regulated area; proponents consult with TRCA staff to scope detailed requirements, particularly natural heritage features and functions, geotechnical requirements, construction timing, etc., for their projects.

A geotechnical report should support the selection of HDD as the technology chosen to install underground servicing through natural heritage features. Similarly, the design details for the HDD should reflect the findings and recommendations in the geotechnical report. The information obtained in the geotechnical report, in terms of stratigraphy, soil material best suited for the bore path, and groundwater levels, are all critical elements in designing a successful project and limiting the risks to the environment. The geotechnical report should also identify any hydrogeologic or surface water constraints the contractor should be aware of during the drilling process, such as artesian groundwater pressure, ground conditions that may limit construction, etc. One key point to consider when obtaining any geotechnical data, is the location of investigative test pits or boreholes in relation to the bore path. Test pits and boreholes should not be located directly on, or extend through, the proposed alignment, as these weak points may serve as conduits where inadvertent fluid returns or frac outs occur. It is recommended that at least a 3 m offset be provided between the boreholes and pipe alignment.

If there are particular ecologically sensitive features or functions that require enhanced protection at the project location, the following alternatives may need to be considered, in order of preference:

- routes along other existing roads or rights-of-way that avoid sensitive areas entirely;
- other alignments (including crossing above a culvert/creek within a road bed, or locating the pipe/cable on a bridge);
- other trenchless construction methods, such as augering, tunneling, pipe ramming, etc.
- or additional mitigation measures to minimize ecological impacts, if HDD is still proposed. This may include installing pressure relief wells to minimize a potential frac-out, isolating the creek in the area of the tunnel alignment, or other mitigation measures during drilling operations.

Detailed Design Requirements

Once the route has been determined, the following information will be required on the detailed site plans:

- the proposed HDD alignment in both plan and profile views;
- borehole data including the stratigraphy in relation to the proposed bore path, and the elevation of groundwater resources;
- the exact location of all watercourses, including accurate surveys of creeks, clearly identifying the location of banks, and bed invert elevations;
- the exact location of all wetlands, including accurate surveys of wetland boundaries as determined by either the MNR or TRCA, wetland invert elevations, the location of standing water, and water elevations;
- an accurate cross-section of the watercourse/wetland at the crossing location in relation to the HDD trajectory;
- all tree/vegetation removals, access points, entry and exit points, erosion and sediment controls, dewatering/depressurization requirements, details for working in the dry, and site restoration;
- if dewatering of work areas is required, additional clarity on water treatment and disposal should be provided on the plans. Please note that all dewatering discharge locations should be located

within a well vegetated area, outside of the work area, a minimum of 30 m from a watercourse or wetland;

- confirmation of adequate treatment of any dewatering from the work area prior to release of this water to the environment. Treatment methods should ensure that only clean water be released to the environment, and that adequate dissipation methods be employed to minimize erosion at the outlet. Contingency methods of treating sediment laden water and details on monitoring the effluent should be provided, in the event that treatment is ineffective at removing suspended clays and silts from the water column. Please note that filterbags are not effective at removing silts and clays.
- all existing/proposed ditches should be clearly identified, so that water conveyance (during rain events, and dewatering) in and around the work site is clearly understood;
- fisheries timing windows must be identified on the plans;
- contingency/mitigation methods for frac outs, or inadvertent returns of drilling fluids
- notes outlining environmental monitoring and reporting.

Environmental Monitoring

An environmental monitor will be required on site during the HDD construction. Notes regarding environmental monitoring need to be provided on the plans. Please note that the environmental monitor should be experienced with an understanding of the ecological objectives and sensitivities of the site, and in identifying/anticipating potential ecological concerns/risks in a proactive manner in an attempt to avoid impacts before they occur. It is our preference that environmental monitors be qualified, in that they have a college or university degree in environmental science or equivalent, and have experience in managing and mitigating environmental issues on construction sites. Information on how environmental monitoring is to be conducted for the project is required, and should be determined in consultation with TRCA staff. A detailed environmental monitoring/contingency plan is requested, and should describe, among other things, the following:

- how potential ecological issues will be identified,
- how often the monitoring is to be undertaken,
- the environmental monitor be on site for the duration of the HDD operation in and adjacent to natural heritage features,
- protocol for how the environmental monitor is to manage situations that are likely to cause environmental damage,
- ability of the environmental monitor to provide advice to the contractor, as needed in the event of emergencies, etc.

Contingency Plans

TRCA will also require that the proponent provide a Contingency Plan to effectively address inadvertent releases of sediment through frac-outs, or other releases of sediment laden water from the project site.

The environmental monitoring and contingency plan should clearly outline the steps that the contractor is to take in the event of a sediment release or other type of spill. The plan should clearly outline the steps involved to mitigate an inadvertent return or frac out after it occurs, and should not rely solely on the contractor to take all necessary steps to minimize the impacts. Ultimately, the responsibility lies with the proponent. The TRCA Enforcement Officer should be contacted immediately if an environmental emergency arises.

Contingency Plans may include the provision of a vacuum truck, or alternative means of containing or cleaning up a sediment release, at the time of construction in sensitive areas. If vacuum trucks are to be utilized, they should be on-site during construction, and be ready to contain any spill, as it occurs, before it

enters a surface water feature. If a sediment spill occurs within the watercourse, adequate isolation of the release should be provided to contain the sediment, and the vacuum truck be ready to remove the drilling fluid and any other frac out soil.

Additional measures may include having a supply of products that can be used to stop a frac-out, such as 'Poly Swell', or equivalent. All products used on site are to be environmentally safe. Frac mitigation wells may also be considered to relieve drilling pressures.

The Contingency Plan should indicate if, and when, HDD activities are to resume. For example, when mitigation measures have been implemented are deemed to be effective at mitigating potential ecological impacts.