

ND PSC Case No. PU-10-555

8-Inch Natural Gas Main & Lateral Pipeline

Environmental Mitigation Plan



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October 2010

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INTRODUCTION

This Environmental Mitigation Plan (EMP) outlines construction-related environmental policies, procedures, and mitigation measures developed by Hiland Operating, LLC (Hiland or Company) for its pipeline construction projects. The EMP was developed based on Hiland's experience implementing best management practices during construction. It is intended to mesh with applicable federal, state and local environmental protection and erosion control specifications and practices. The EMP is designed to address typical circumstances and may be amended by Hiland as necessary to address site-specific conditions. The measures described in the EMP are consistent with relevant portions of the State of Minnesota *Construction Site Erosion and Sediment Control Planning Handbook* and the Minnesota *Protecting Water Quality in Urban Areas Manual*. In addition, the EMP complies with the intent of the *Wisconsin Construction Site Best Management Practice Handbook* and Wisconsin technical standards, and North Dakota's *Guide to Temporary Erosion-Control Measures for Contractors, Designers, and Inspectors*.

This document includes the following sections:

- Section 1.0 of the EMP describes general mitigation measures, including soil erosion and sedimentation control procedures, to be implemented during construction;
- Section 2.0 discusses highway, road, and trail crossings;
- Section 3.0 discusses construction dewatering;
- Section 4.0 outlines water appropriation practices;
- Section 5.0 addresses restoration; and
- Section 6.0 addresses winter construction issues.

Alternative construction procedures implemented in lieu of EMP guidelines will provide an equal or greater level of protection to the environment, and must be approved in writing by Hiland.

Unless otherwise specified, the construction contractor (Contractor) will be responsible for implementing the requirements of this EMP. Hiland will make the requirements of the EMP and applicable environmental permits known to the contractor. If the contractor has questions concerning these environmental requirements, the contractor will contact a Hiland representative.

Hiland will provide appropriate construction oversight to confirm Company and Contractor compliance with the measures of this EMP and requirements of applicable federal, state, and local permits. Environmental Inspectors will assist the contractor in interpreting and implementing the requirements of the EMP, and verify compliance with these procedures for the Company. The Environmental Inspector will be expected to use judgment in the field to interpret environmental conditions and requirements, but will not have the authority to authorize major modifications or changes without the prior written approval of Hiland. The Environmental Inspector will have the authority to stop activities and order corrective mitigation for actions that are not in compliance with the measures in this EMP, landowner agreements, or environmental permit requirements. The Environmental Inspector will maintain appropriate records to document compliance with these and other applicable environmental permit conditions.

1.0 GENERAL MITIGATION MEASURES

1.1 TEMPORARY EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures include slope breakers, sediment barriers, trench breakers, and mulch. The goal of temporary erosion and sedimentation control measures is to prevent construction-related sediment from entering streams, wetlands, lakes, drainage ditches (dry or flowing), other water bodies, or migrating offsite. The contractor will, at all times, maintain erosion and sedimentation control structures as effectively as possible. All non-functional erosion control features will be repaired, replaced, or supplemented with functional materials as soon as field conditions allow access, but no later than 24 hours after discovery. Additional information of the project erosion control measures are provided in the applicable sections below.

1.2 RIGHT-OF-WAY ACCESS

Access to the right-of-way will be from public roadways and Hiland -approved access roads only. The contractor will be responsible for creating signs or other methods to identify approved access roads in the field and to ensure that access is confined to only the approved roads.

1.3 RIGHT-OF-WAY REQUIREMENTS

All construction equipment and vehicles will be confined to the approved right-of-way and extra workspace. Right-of-way requirements may vary between projects. For this project, construction activities will generally use a right-of-way as shown in Figure 6.1.1. This typical illustrates a Typical Right-of-Way Cross Section for the project.

Additional extra workspace adjacent to the temporary construction right-of-way may be necessary during construction in areas such as steep slopes and staging areas for stream, wetland, and road crossings, for safety reasons, to provide an area for prefabrication of sections of pipeline, or for storage of spoil material. Hiland will acquire additional extra workspace from the landowner where necessary; use of unauthorized workspace is prohibited without Hiland's approval. In all cases, the size of extra workspace will be kept to the minimum necessary to safely conduct work. Hiland will conduct a preconstruction review of the entire project area to determine specific extra workspace locations.

Construction staging will not occur in wetlands unless necessary for safe work conditions.

1.4 LINE LIST AND PERMITS

Hiland will provide the contractor with a construction line list that describes special requirements (e.g., timber salvage, topsoil segregation, restoration measures, fencing requirements, etc.) as agreed upon with Landowners. The contractor must comply with these special requirements, as well as take all appropriate precautions to protect livestock and crops affected by construction.

The line list reflects requirements and comments provided by Landowners; however it is not a comprehensive list of construction requirements. The line list must be considered in conjunction

with other project documents. Any third party agreements between the contractor and the landowner must be pre-approved by Hiland.

Hiland will obtain the necessary permits (federal, state, local, county, watershed district, stream crossing, wetland crossing, and road crossing permits) for the installation of the pipeline. Permit requirements may be more stringent than the requirements of this EMP. In all cases the more restrictive requirements will apply.

1.5 CLEARING AND GRADING

The initial stage of construction involves the clearing of brush, trees, and vegetation from the right-of-way. Clearing may be accomplished with chain saws, brush hogs, and hydraulic tree-cutting equipment. The clearing crew will typically mow, chip, mulch and/or haul off all wood. Burning of wood may be allowed only where the contractor has acquired all applicable permits and approvals (e.g. agency and landowner) and in accordance with all state and local regulations. No burning will be allowed in wetlands.

Grading generally follows clearing and involves leveling and smoothing the construction right-of-way to create an even working surface for equipment and vehicles. Tree stumps outside the ditchline shall be ground no less than four-inches below normal ground surface or removed and hauled off to an approved disposal facility. Stumps in the ditch line shall be completely removed, ground, and/or hauled off to an approved disposal facility. Topsoil and subsoil disturbed during grading operations will not be mixed with foreign material (e.g., stumps and brush).

1.5.1 Disposal of Non-Merchantable Timber

Non-merchantable timber and slash will be disposed of by mowing, chipping, grinding, and/or hauling off site to an approved disposal facility. In no case will non-merchantable timber be disposed of by placing it off the right-of-way. Woody debris that is chipped or mulched on the right-of-way that will not be hauled off site for proper disposal may be wind-rowed if approved by Hiland over the ditchline and raked along the ditchline for incorporation into the ditch spoil during excavation. No woody debris disposal will be allowed in agricultural areas or wetlands. Burning of non-merchantable wood may be allowed only where the contractor has acquired all applicable permits and approvals (e.g. Agency and Landowner) and in accordance with all federal, state and local regulations. No burning will be allowed in wetlands.

1.5.2 Disposal of Merchantable Timber

All merchantable timber will be the property of the company and the contractor will be responsible for merchandising all merchantable timber. If a commercial buyer cannot be found, the timber may be considered non-merchantable and disposed of as referenced in Section 1.5.1.

1.5.3 Fencing

Before or during clearing of the right-of-way, existing fences and livestock barriers will be cut as necessary to access the right-of-way. Existing fencing will be braced and secured prior to

cutting to prevent the slacking of wires. Temporary gates and/or fencing will be installed where necessary to maintain existing access restrictions and contain livestock. These temporary measures will remain in place until construction is complete and permanent repairs or new fencing can be installed.

1.5.4 Trees and Shelterbelts

Care will be taken to minimize tree removal. To the extent possible, wind breaks and shelterbelts will be crossed by minimizing the width of the right-of-way to that necessary for the trench line and vehicle traffic. When clearing, trees will be felled onto the right-of-way to minimize damage to off-right-of-way vegetation.

1.5.5 Irrigation Systems

If pipeline construction activities interfere with the operation of spray irrigation systems, Hiland will establish with the landowner or Tenant, an acceptable amount of time the irrigation system may be out of service. If feasible, temporary measures will be implemented to allow an irrigation system to continue to operate across the right-of-way during pipeline construction. Any damage to irrigation systems caused by construction-related activities will be repaired following backfilling.

1.5.6 Topsoil Segregation

Topsoil generally has physical and chemical properties that are conducive to good plant growth. Because subsoil properties are usually less favorable, mixing of topsoil and subsoil can result in lowering the overall productivity of soils. To prevent soil mixing during construction, topsoil will be segregated in selected areas where soil productivity is an important consideration. These areas include cropland, hay fields, pasture, golf courses, residential areas and other areas as requested by the landowner. Topsoil will not be used to construct trench breakers (see Section 1.8) or to pad the pipe.

Topsoil Segregation Methods

The following topsoiling methods may be employed during construction:

- Ditch Plus Spoil Side (see Figure 6.1.2)
- Full Right-of-Way (see Figure 6.1.3)
- Trench Line Only (see Figure 6.1.4)

Topsoil will be segregated from ditch plus spoil in active cropland unless full construction right-of-way width topsoil segregation is requested by the landowner. The trench-line-only method will be used in unsaturated wetlands or where the width of the construction right-of-way is insufficient for other methods to be used. In upland areas with a fairly thick sod layer such as hay fields, pasture, golf courses, and residential areas, the trench-line-only method will be used unless otherwise requested by the landowner.

Topsoil is not typically segregated in forested areas, saturated wetlands, and non-agricultural open areas. Segregated topsoil is usually stored on the spoil side, separate from subsoil, or on the working side of the right-of-way.

Depth of Topsoil Stripping

Topsoil will be stripped to a maximum depth of 12 inches in cultivated lands, unless otherwise requested by the landowner. Additional space may be needed for spoil storage if more than 12 inches of topsoil are segregated. If less than 12 inches of topsoil are present, every effort will be made to segregate to the depth that is present.

1.5.7 Temporary Slope Breakers

Temporary slope breakers are to be installed to minimize concentrated or sheet flow runoff in disturbed areas in accordance with the following maximum allowable spacing.

<u>Slope (%)</u>	<u>Approximate Spacing (ft)</u>
1	300
2	200
3-5	150
>5	<100

If the length of the slope is less than the distance of the required spacing, slope breakers are not required. Temporary slope breakers will be constructed according to the following specifications:

- slope breakers may be constructed using earthen material, silt fence, or hay bales;
- earthen berms will be installed with a two to eight percent outslope, with a four foot base and a height of 1.5 feet (see Figures 6.1.5 and 6.1.6);
- earthen berms will be constructed of compacted subsoil where practicable;
- the outfall of temporary slope breakers will be directed to a well-vegetated area or an appropriate energy-dissipating device (e.g., silt fence, straw bales, rock aprons) and directed off the construction right-of-way if possible;
- slope breakers will be inspected daily and repaired as necessary within 24 hours after discovery to maintain operational integrity and prevent erosion in active construction areas;
- a hard plug will be left in place where a slope breaker crosses the open trench; And
- temporary slope breakers will not be installed on agricultural land unless specifically requested by the landowner.

1.5.8 Temporary Sediment Barriers

Temporary sediment barriers may be constructed with silt fence (36 inches high or greater) and/or staked straw bales (see Figures 6.1.7 and 6.1.8). If temporary sediment barriers are removed to allow equipment access, the barriers will be reinstalled at the end of the day. Temporary sediment barriers will be installed after clearing and prior to grubbing and grading activities and maintained at the base of sloped approaches to streams, wetlands, and roads, and at the edge of the right-of-way as needed to prevent siltation of waterbodies and wetlands downslope or outside of the construction right-of-way (e.g., swales and side slopes).

When the depth of sediment reaches about one-third of the height of a sediment barrier, the barrier will be replaced and/or the sediment removed. Nonfunctional sediment-control measures will be repaired, replaced, or supplemented with functional structures as soon as possible, but no later than 24 hours after discovery.

1.5.9 Noise and Dust Control

The contractor will take all reasonable steps to control construction-related noise and dust near residential areas and other areas as directed by Hiland. Control practices may include wetting the right-of-way, limiting working hours in residential areas, and/or additional measures as appropriate based on site-specific conditions.

1.6 PIPE DELIVERY, BENDING & WELDING

Before excavating the pipeline trench, individual joints of pipe will be strung along the construction right-of-way and arranged to be accessible to construction personnel. This operation typically involves specially designed stringing trucks to deliver pipe from pipe yards to the right-of-way.

After pipe stringing is complete, the pipe will be bent, as necessary, to conform to changes in ground contour and pipeline alignment. Individual pipe joints will be welded together and the welds will be radiographically inspected. The welds will then be coated with a material to protect them from corrosion.

1.7 TRENCHING

Trenching in uplands consists of excavating the trench for the pipeline, and is typically accomplished with a backhoe excavator or a rotary wheel ditching machine. Excavated material will be sidecast within the approved construction right-of-way separate from topsoil (see section 1.4.6), and stored such that the area subject to erosion is minimized. Hiland will coordinate with Landowners to minimize disruption of access caused by the trench during construction. Where appropriate, Hiland will leave plugs of soil in the ditch or will construct bridges across the trench for the landowner to move livestock or equipment across the trench. Trenches will be sloped where started and ended to allow ramps for wildlife to escape.

1.7.1 Timing

The length of time a trench is left open will be minimized to ensure that installation of the pipe and restoration of the right-of-way occurs in a timely fashion. Typically, trenching will be conducted after pipe has been delivered and welded so that no trench location stays open more than two days, weather permitting.

1.7.2 Pipeline Depth

The pipeline will be buried in accordance with U.S. Department of Transportation regulations, which stipulate a minimum of three feet of topcover for normal excavations, and 18 to 30 inches of cover for rock excavations (depending on the location), to prevent damage to the pipeline from normal use of the land.

If a state-level agency specifies a more stringent requirement for pipeline depth, the Company may request a waiver of that requirement. Increased pipeline depth will result in greater amounts of ditch spoil and, consequently, will require additional temporary workspace for storage of the spoil.

1.8 PIPE INSTALLATION

Once the trench has been inspected for proper depth, rocks, or other obstructions, the welded pipe is lowered into the trench. The pipe may be wrapped with a protective shielding if necessary to protect the pipe coating while backfilling.

1.9 TRENCH BREAKERS

After the pipe has been lowered into the trench, trench breakers (soft plugs) will be installed as needed in sloped areas. Trench breakers protect against subsurface water flow erosion along the pipe after the trench is backfilled. Trench breakers will be constructed with bags filled with rock-free subsoil or sand. They will be placed from the bottom of the trench to near the top of the trench, completely surrounding the pipe (see Figures 6.1.9 and 6.1.10). The following conditions apply to the placement and installation of trench breakers unless otherwise directed by the Environmental Inspector:

- Trench breakers will be spaced as described for permanent berms (see section 7.3) or as otherwise specified by Hiland.
- Trench breakers will be installed on slopes greater than five percent adjacent to streams, wetlands, or other waterbodies.
- Topsoil will not be used to construct trench breakers.

1.10 DRAIN TILE REPAIR

Where drain tiles are cut during trenching, the locations will be flagged by the contractor. Prior to backfilling, drain tiles crossed by the trench will be probed with a sewer rod or pipe snake to

determine if tiles were damaged during construction. Drain tiles damaged during construction will be repaired to their preconstruction condition or better.

1.11 BACKFILLING

Backfilling follows pipe installation and generally consists of replacing the material excavated from the trench. In areas where topsoil has been segregated, the subsoil will be replaced first, and the topsoil will be spread uniformly over the area from which it was removed. Prior to backfilling, the trench shall be dewatered in accordance with the methods discussed in section 5.1. An earth crown will be left over the trench line to allow for future settling of the backfill material. No crown will be left in swales, drains, or wetlands crossed by the right-of-way.

1.12 WET WEATHER SHUTDOWN

During construction, certain activities may be suspended in wet soil conditions, based on consideration of the following factors:

- plasticity of the surface soil to a depth of approximately four to eight inches;
- extent of surface ponding;
- extent and depth of rutting and mixing of soil horizons;
- aerial extent and location of potential rutting and compaction (i.e., can traffic be rerouted around wet area); and
- type of equipment and nature of the construction operations proposed for that day.

If the above factors cannot be achieved to the satisfaction of the Environmental Inspector, the contractor shall cease work in the applicable area until such a time that conditions allow work to continue. The contractor is responsible for appropriately planning for work and considering for the potential for wet conditions, and being prepared to implement mitigative measures in the event of wet weather conditions. This is particularly important when conducting work in unsaturated wetlands. If the contractor attempts to construct through the “dry” wetland without matting or an approved equivalent, the contractor is responsible for implementing any and all such corrective measures should conditions subsequently worsen where the above described criteria cannot be met.

1.13 CONTROLLING SPREAD OF UNDESIRABLE SPECIES

Hiland will require that construction equipment be cleaned before arriving on site to prevent the introduction of undesirable species to the project area. If undesirable species such as purple loosestrife and/or others are determined to be present within the construction right-of-way, Hiland will implement the following plans:

- Hiland will make an effort to prevent the spread of noxious weed seeds during clearing and grading activities, and to use straw mulch and seed mix that are free of noxious weed seed to revegetate the right-of-way. Contractors and inspectors will receive information aiding in the identification of noxious weeds. Hiland will also provide training to its Environmental Inspectors to identify and prevent the spread of undesirable species.

- During preconstruction walkovers, the Environmental Inspectors will flag and document areas containing noxious weeds. The construction crews will be informed of these areas. Hiland will instruct the contractors to minimize the numbers of construction equipment and to limit the number of passes by this equipment through infested areas. Construction mats may be required to minimize the transport of weed seed or plant material via construction equipment.
- Equipment and construction mats will be cleaned immediately after passing through infested areas. Cleaning will consist of removing large soil clods and/or plant parts from the equipment and construction mats using shovels and brooms, and if necessary, washing the equipment with water or cleaning using compressed air. Soil and water from cleaning activities will not be allowed to flow to non-infested areas.
- Final seeding will be initiated within 24 hours of final grading, pending appropriate weather and soil conditions, to prevent the establishment of noxious weed seeds that may be present in the existing seed bed.

2.0 HIGHWAY, ROAD AND RAIL CROSSINGS

2.1 ADDITIONAL WORKSPACE

Additional workspaces for bored road and railroad crossings and open-cut road crossings will be determined on a site-specific basis. These workspaces will be adjacent to the road or railroad and limited to the size needed to contain spoil from the crossing.

2.2 MAINTENANCE

Roadway crossings will be maintained in a condition that will prevent tracking of mud onto the roadway. If mud is tracked onto a roadway, it will be shoveled or swept off the road and placed within a sediment barrier as soon as possible, but in no circumstances more than 24 hours after discovery.

In the case of mud incorporation into the aggregate road surface, the fouled surface aggregate will be removed or covered with an equal layer of new aggregate (not less than six inches compacted depth). The new aggregate will be consistent with the existing road surface and must be approved by the landowner.

2.3 SEDIMENT BARRIERS

Temporary sediment barriers (e.g., silt fence and/or double-staked straw bales) will be installed on sloped approaches to road crossings where vegetation has been disturbed (see Figure 6.2.1).

3.0 CONSTRUCTION DEWATERING

3.1 TRENCH DEWATERING

Before the pipe is lowered into the trench, dewatering may be necessary to visually inspect the trench bottom for the presence of rocks. Trench dewatering may also occur where tie-in welds are necessary, at road-boring sites adjacent to wetlands or waterbodies where groundwater has seeped into the trench, locations where set-on weights are placed over the pipe, and in other areas where increased visibility or physical access to the trench is needed. Dewatering pumps and equipment placement are discussed in Figures 6.3.1 and 6.3.2. Dewatering will be performed in accordance with applicable appropriation and discharge permits, but at a minimum, will comply with the following procedures:

- The trench will be dewatered into a well-vegetated upland area with an appropriate energy-dissipation device (See Figure 6.3.1). Whenever possible, the slope at the point of discharge will be away from any streams or wetlands.
- If the flow of a discharge cannot be kept out of streams, wetlands, drainage ditches, etc, the discharge shall be filtered by one of the methods described below. Dewatering discharge will be directed into a sediment filter bag or a straw bale/silt fence dewatering structure which discharges into a vegetated area to prevent heavily silt-laden water from flowing into wetlands and waterbodies (see Figures 6.3.1 and 6.3.2).
- Only non-woven fabric filter bags will be used for dewatering.
- Filter bags and dewatering structures must be maintained in a functional condition throughout dewatering activity (e.g., clogged or ripped bags must be replaced) and will be attended at all times during active pumping. Accumulated sediment from the filter bags shall be spread in an approved upland location.
- The contractor will assist Hiland in complying with applicable permit requirements, including tracking volumes of water pumped, obtaining water samples (if needed) for testing, and taking necessary measures to meet effluent limitations.

3.1.1 Flow Measurement

At no time will the discharge rate exceed the applicable discharge rates specified in state-issued or other discharge permits. Discharge rate must be monitored and adjusted as necessary to prevent failure of the filtration structure.

The discharge rate and total volume of water discharged will be determined with a flow meter (or equivalent), or as required by the National Pollutant Discharge Elimination System (NPDES) permit. The total volume of water discharged will not exceed the volume specified in the NPDES permit.

3.1.2 Erosion Control

Dewatering of the trench will be conducted in a manner which will prevent soil erosion.

Discharge rates will be monitored and regulated to prevent erosion. Energy-dissipation devices (i.e., filter bags or straw bale structures) will be used to prevent sediment discharge into a wetland or waterbody.

3.1.3 Regulatory Notification and Reporting

Hiland will notify appropriate state agencies prior to each discharge in accordance with its NPDES permit.

Reports regarding the volume and quality of the water withdrawn will be submitted by Hiland, as required by the state NPDES permit. The contractor will assist Hiland in collecting appropriate data and any water samples required or in determining volumes of water appropriated.

3.1.4 Water Sampling

Water discharged from trench dewatering locations may need to be sampled as required by the state-issued NPDES discharge permit. The construction contractor will assist Hiland in obtaining these samples and will be responsible for complying with the permit limitations.

3.2 HYDROSTATIC TEST DISCHARGES

Hydrostatic testing involves filling the new pipeline segments with water acquired in accordance with applicable permits (See Section 6.0), raising the internal pressure level, and holding that pressure for a specific period of time per federal Department of Transportation specifications. Hydrostatic testing will be done to verify that there are no flaws in the pipe or welds. Pre-built sections may be hydrostatically tested prior to installation at significant streams and wetland crossings. Water used for hydrostatic testing typically will be taken from, and returned to, local streams and rivers. After the hydrostatic test is completed, the line will be depressurized and the water expelled. During withdrawal and discharge, the water will be sampled as required by permits to determine if contaminants are present.

If site conditions or engineering constraints make adhering to these hydrostatic testing procedures and documentation impractical, Hiland will propose alternative provisions to the regulatory agency issuing the NPDES permit. Any such alternative will provide an equal or greater level of protection to the environment than the condition from which Hiland or its Contractor seeks relief.

3.2.1 Refueling

The operation and refueling of hydrostatic test equipment will be in accordance with the other refueling activities outlined earlier in this plan.

3.2.2 Permit Requirements

Hydrostatic testing will be conducted in accordance with applicable appropriation and discharge permits obtained by Hiland.

3.2.3 Siting of Test Manifolds

Where practicable, hydrostatic test manifolds will be located outside of wetlands and riparian areas.

3.2.4 Water Sampling

Water discharged from hydrostatic tests will be sampled as required by state-issued appropriation or discharge permits. The contractor will assist Hiland in obtaining these samples and will be responsible for complying with the permit limitations.

4.0 WATER APPROPRIATION

4.1 GENERAL

After the pipeline has been installed and the trench backfilled, the entire pipeline system will be hydrostatically tested to ensure its integrity. Water used to conduct hydrostatic testing may need to be appropriated from nearby waterbodies. The following outlines the procedures that will be performed for water appropriation. Intake hoses will be suspended off of the stream or lake bottom and will be screened to prevent entrainment of fish. During withdrawal, adequate flow rates will be maintained to protect aquatic life and allow for downstream uses.

4.2 WATER SOURCES

Water will only be withdrawn from sources approved by Hiland and in accordance with applicable permits. No additives to the water are permitted unless written approval is received from Hiland and applicable permits authorize such additives.

If appropriation is scheduled to occur during possible periods of low flow, including frozen conditions, a backup source will be identified.

4.3 FLOW MEASUREMENT

At no time will the withdrawal rate for the water source exceed the rate specified in the applicable permits.

The withdrawal rate and total volume of water appropriated for hydrostatic testing will be determined with a flow meter (or equivalent) as required by the state-issued permit.

4.4 WATER SAMPLING

Water withdrawn for hydrostatic testing may be sampled by Hiland during appropriation. The contractor will assist Hiland in obtaining these samples.

4.5 REGULATORY NOTIFICATION AND REPORTING

Hiland will notify appropriate state agencies of the time of appropriations if required by the state appropriations permits. Reports regarding the volume and quality of the water withdrawn will be submitted by Hiland if required by the state permit.

5.0 RESTORATION

Permanent soil erosion and sediment control will begin as soon as soil conditions permit seed bed preparation and seed germination. Agricultural lands will be restored but will not be reseeded unless requested by the landowner.

5.1 ROUGH GRADING AND CLEANUP

Cleanup and rough grading activities may take place simultaneously. Cleanup involves removing construction debris (including litter generated by construction crews and excess rock) and replacing fences removed during construction. Rough grading includes restoring the original contours, and installing or repairing temporary erosion control measures.

5.1.1 Timing

Every effort will be made to begin cleanup and rough grading (including installation of temporary erosion control measures) within 24 hours after backfilling.

5.2 FINAL CLEANUP AND FINAL GRADING

Permanent erosion and sediment control will begin with general cleanup of the construction area. Extraneous material that would impede seed bed preparation will be removed from the right-of-way. Final grading will restore the disturbed areas as near as practicable to the contours of the land that existed before construction.

If not previously removed during rough grading, all construction-related debris and material that are not an integral part of the pipeline (including litter generated by pipeline crews) will be removed from the landowner's property.

5.3 PERMANENT EROSION CONTROL MEASURES

After final grading, slopes in areas other than cropland will be stabilized with erosion control structures (see Figure 6.5.1). Erosion control treatments of specific physical land features are described below.

5.3.1 Slopes

Permanent berms (diversion dikes or slope breakers) will be installed on all slopes, according to the following maximum spacing requirements:

Slope (%)	Approximate Spacing (ft)
<5	125
5-10	100
10-20	75
20-30	50
>35	25

Permanent berms will be constructed according to the following specifications:

- Permanent berms will be installed with a two to eight percent outslope.
- Permanent berms will be constructed of compacted earth.
- The outfall of berms will be directed toward appropriate energy-dissipating devices, and off the construction right-of-way if possible
- Permanent berms will be inspected and repaired as necessary to maintain function and prevent erosion. Figures 6.1.5 and 6.1.6 illustrate berm specifications.
- Erosion control blankets (Curlex, jute, or equivalent) will be placed on slopes over 30 percent (see Figure 6.5.2).

5.3.2 Swales

Swales across the right-of-way will be restored during cleanup to original contours as near as practicable. Swales will be seeded and mulched with straw for the width of the right-of-way.

5.3.3 Drainage Ditches and Intermittent Streams

Drainage ditches and intermittent streams will be permanently restored and stabilized with erosion control blanket, permanent seeding, or other appropriate measures.

5.4 SOIL COMPACTION TREATMENT

Cultivated fields and any other severely compacted or rutted areas will be tilled with a deep tillage device or chisel plowed to loosen compacted soils. If subsequent construction and cleanup activities result in further compaction, additional measures will be undertaken to reduce soil compaction.

5.5 STONE REMOVAL

A diligent effort will be made to remove excess stones larger than four inches in diameter from the upper 12 inches of soil. Stone removal efforts will cease when the size and density of stones on the right-of-way are similar to undisturbed areas adjacent to the right-of-way.

5.6 OFF-ROAD VEHICLE BARRIERS AND FENCES

Off-road vehicle control measures will be installed as requested by Landowners or as directed by land management agencies. All fences and gates removed or damaged will be repaired or replaced.

5.7 REVEGETATION

General guidance regarding revegetation efforts is provided in this section.

Permanent revegetation will involve preparing the seedbed and seeding disturbed, nonagricultural areas. The right-of-way will be seeded as soon as possible after backfilling, weather and soil conditions permitting. With the exception of wetland areas, fertilizer and pH modifying agents (e.g., lime) will be applied as specified by Hiland, in consultation with appropriate state and federal agencies and Landowners.

The following steps will be taken to establish permanent vegetation in those portions of the site where the landowner does not plan to plant a crop during the next growing season.

- Seed will be purchased in accordance with Pure Live Seed (PLS) specifications for the seed mix.
- Seed will be used within 12 months of testing.
- Legume seed will be treated with an inoculant specific to the species. When hydroseeding, four times the manufacturer's recommended rate of inoculant will be used.
- Inoculated seed will not be held in a slurry with fertilizer for more than one hour.

A seed drill equipped with a cultipacker is preferred for applying seed, but broadcast or hydroseeding methods may be used at double the recommended seeding rate. When broadcast seeding, the seedbed will be firmed with a cultipacker or roller after seeding.

Specific seed mixes, application rates, and seeding dates will be specified by Hiland, and will take into account recommendations of appropriate state and federal agencies and Landowner requests as appropriate.

Mulch will not be applied to cropland unless specifically requested by the landowner. In other areas, mulch will be applied according to the following specifications:

- After seeding, slopes greater than five percent or dry, sandy areas will be mulched with two tons per acre of straw or hay or as specified by Hiland.
- All areas of dormant seeding must be mulched with two tons per acre of hay or straw or as specified by Hiland.

Mulch will be anchored after placement to minimize loss by wind and water. If soil conditions allow, a mulch anchoring tool or farm disc set in the straight position will be used to crimp the mulch to a depth of two to three inches. Liquid tackifiers may be used with advance written approval from Hiland.

Where conditions allow (e.g., unsaturated and unponded areas), wetlands will be revegetated after final grading with annual ryegrass and then allowed to revegetate naturally. The natural revegetation process will be encouraged by the seeds and rhizomes in the topsoil spread back over the right-of-way after pipe installation.

Permanent revegetation at stream crossings will be as specified by Hiland, and will take into account recommendations of appropriate state and federal agencies and Landowner requests.

5.8 ROAD REPAIR

The contractor will repair private roads and lanes damaged when moving equipment or obtaining access to the right-of-way.

5.9 REPAIR OF DAMAGED CONSERVATION PRACTICES

All soil conservation practices (such as terraces, grassed waterways, etc.) that are damaged by the pipeline construction will be restored to preconstruction conditions to the extent practicable.

5.10 LAND LEVELING FOLLOWING CONSTRUCTION

Following the completion of the installation of the pipeline, the right-of-way will be restored to its preconstruction elevation and contour as practical. Should uneven settling or documented surface drainage problems occur following the completion of pipeline construction, Hiland will take appropriate steps to remedy the issue.

6.0 WINTER CONSTRUCTION

6.1 EROSION CONTROL

During frozen conditions, the following procedures will apply to construction in uplands, unless otherwise directed by Hiland:

- Temporary slope breakers will not be installed unless snow melt and runoff are likely during construction.
- Installation of temporary sediment barriers (silt fence and staked straw bales) will be delayed until final grading and cleanup, unless snow melt and runoff are likely during construction.
- If final grading and/or cleanup is not completed until the following spring, temporary slope breakers and sediment barriers will be installed during rough grading and subject to the same inspection and repair requirements.

- Mulch will be applied and anchored to all slopes greater than eight percent. The mulch will be applied as soon as practical after the last grading operation of winter construction. Mulch can be applied to snow covered ground. Mulch will not be applied by hand, nor will the application rate exceed two tons per acre, as it may have to be removed the following spring during preparation of a seed bed.
- Steel reinforcing rods will be used to stake straw bales if frozen conditions make wooden stakes impractical.
- Topsoil will be segregated from the trench line only.

6.2 RESTORATION

During frozen conditions, the following procedures will apply, unless otherwise directed by Hiland:

- Permanent revegetation of the right-of-way after winter construction will be accomplished by dormant seeding or seeding during the next growing season.
- Temporary bridges will be removed before spring break up.