8. Utilities

Projects may include: gas, water, sewer, electric, telephone, cable, or other fiber optics

Utility installations are similar to other long and linear projects that DEM permits, such as trails or roads. Utility lines can be installed either underground or above ground in pipes or overhead as wires (such as an electric line). After the line is installed, an easement area remains. Although all utility easements need to be accessible for maintenance purposes, they are not subject to continual human disturbance like trails or roads. As a result, many easements can be at least partially revegetated. Even overhead utility easements can be restored as long as the vegetation does not interfere with or compromise the stability of the poles or the utility wires. Utilities are also unique in that a variety of construction methods are available, which can greatly reduce wetland impacts.

Common Construction Installation Methods

- Horizontal directional drilling
- Elevation over wetland
- Trench method
- Overhead poles
- Attachment to bridge or other structure
- There may be others or variations on these common methods.

Planning and Design

One of the first steps in the design of an underground utility that will cross a wetland area is to consider how to install the piping. The most wetland-friendly methods are by horizontal directional drilling or another type of trenchless technology. These methods, while expensive, will avoid or greatly minimize impacts to wetlands. In some situations it is possible to elevate the utility line over a wetland. This method might be unsightly and is only appropriate to reduce impacts in certain situations. A better solution may be to attach the piping to a bridge or other structure that spans the wetland. The trench construction method is common and often very invasive, but has been used depending on the type and sensitivity of the wetland. For overhead utilities, the installation is fairly standard. The location of the poles is the most important aspect to limiting wetland impacts and excessive clearing.

During the planning and design stages, it is vital to identify techniques to protect wetland functions and values. These techniques can be implemented before, during, or after construction. Although a technique may be employed post-construction, it should still be part of the original planning and design process. For example, construction sequencing and post-construction maintenance scheduling (including means for emergency repairs) should be considered during the design stage and must be part of a final application submitted to and reviewed by DEM.

It is important to follow these basic **Avoidance and Minimization** techniques:

- Avoid both above and below-ground wetland crossings unless absolutely necessary.
- If a crossing is unavoidable, take advantage of already disturbed areas such as easements, roads, roadway shoulders, bridges, or old railroad beds.
- Try to avoid disturbing stream beds; if they must be disturbed, utilize a straight and narrow section with low banks.

- Consider spanning a wetland by locating utility poles on either side of the wetland, instead of disturbing the interior.
- Zig-zag utility poles across roadways to keep overhead lines within the roadway corridor and to keep the Limits of Clearing and Disturbance out of the wetland (See Example 26).
- If attaching utility lines to a bridge or other structure, be aware of possible floodplain constraints.
- If underground piping cannot be avoided, consider installing it in a crack-proof casing so that the area above the piping can be replanted with larger woody vegetation.
- Keep the size of cleared maintenance areas above and around utility lines to a minimum.
- For electric lines, consider suspending the wires above the wetland tree canopy.
- Avoid diversion of surface water and groundwater sources, which could affect nearby wetlands. Subdraining effects from trench installation must be especially guarded against.

Construction Tips

The following Construction Best Management Practices help limit wetland impacts. A complete application package will include details for these practices, which should be considered during the initial planning and design phases even though they may not be utilized until during or after project construction.

Before Construction

- Ensure that soil erosion and sediment controls are properly installed and maintained.
- Avoid disturbing soils, especially on steep slopes.
- Stabilize exposed soils by seeding and applying a thick mat of spread hay mulch.
- Use erosion control blankets, such as jute or other types of non-plastic matting to prevent erosion on steep slopes.
- Have all necessary materials on hand before beginning work.
- Especially for house lots, try to plan for driveway and utility installation to occur within close time proximity to limit the length of disturbance to nearby wetlands.

During Construction

- Limit construction to outside the breeding and migratory seasons of wetland wildlife.
- Limit construction activities to the low flow period (July - October) or to when the soil is frozen.
- Preserve existing tree canopies and natural areas in and around wetlands as much as possible.
- Use structures or devices to prevent subdraining or groundwater movement along pipelines such as anti-seepage collars, intermittent clay barriers, trench plugs, or clay saddles.
- If cutting of wetland vegetation cannot be avoided, complete the work by hand (chain or hand saw) instead of using large equipment.

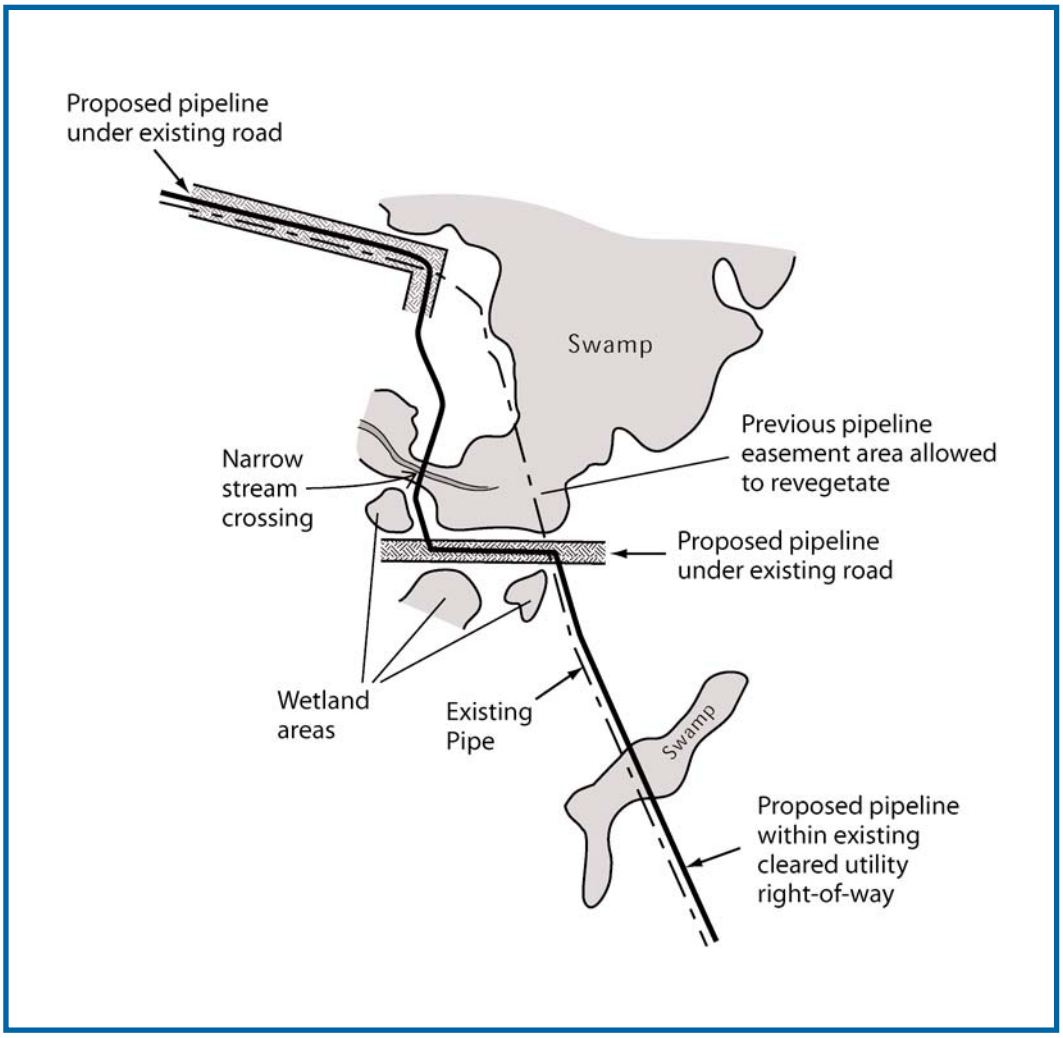
- For underground utilities through wetlands, install pipe sleeves that wires or smaller pipes can be placed within to allow for easy access for future utility maintenance and repair.
- Use wide-tired vehicles when working in or near wetlands to cause less rutting and soil disturbance.
- Use timber mats when working in or near wetlands.
- If dewatering of trenches is necessary, water must be pumped to an acceptable, properly designed dewatering basin - please see the *Rhode Island Soil Erosion and Sediment Control Handbook*.

Restoration and Maintenance efforts must also be considered during the initial planning and design phases and must be included in the application submittal.

- Plan for restoration to be completed before the end of the growing season and as soon as possible after laying the pipeline.
- Utilize a wildlife conservation seed mix on all disturbed surfaces within wetlands.
- Stabilize all disturbed areas outside of the cleared maintenance zone with grasses, and restore them with trees, shrubs or other vegetation.
- Restore wetland soils and hydrology to existing conditions or grades.
- Restore disturbed stream channels to original width and substrate.
- Maintain the area by hand cutting or mowing.
- Avoid the use of fertilizers, pesticides, herbicides, or pollutants - chemical or organic - within wetlands.
- Include a detailed maintenance schedule and a responsible entity for cutting/trimming/mowing and use of chemicals or prescribed burning.
- Include methods for completing regular and emergency repairs to utility lines.

Example 25: Enlarged Pipeline Avoidance and Minimization

This overhead view of a proposed enlarged pipeline illustrates several avoidance and minimization techniques that were used in the initial project design, as well as additional techniques proposed to further minimize wetland impacts.



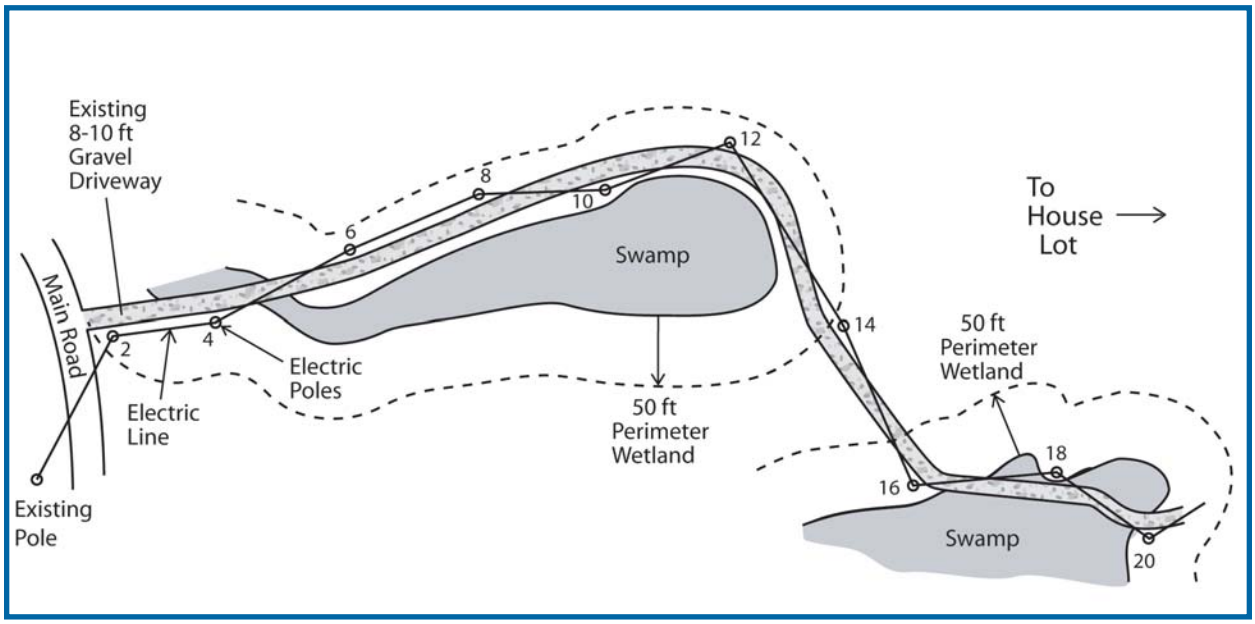
Example 25

How wetland impacts were further minimized:

- ✓ Existing utility easements and already disturbed road corridors were used to install new pipe.
- ✓ A narrow Stream area was crossed to avoid bisecting the large Swamp.
- ✓ Several other small wetland areas near the Swamp were skirted to reach the narrow crossing.
- ✓ The existing utility easement through the large swamp was allowed to revegetate.

Example 26: **Above-Ground Installation**

This example shows the installation of an overhead utility to a single-family house. The electrical wiring follows an existing gravel driveway that was constructed over 30 years ago. The electric poles were installed at the same time that the driveway was upgraded, to limit construction disturbance.



Example 26

How wetland impacts were minimized:

- ✓ The electric wires cross at narrow sections or skirt the edge of the Swamps.
- ✓ None of the approved poles were located in the Swamps, but several were installed in the Perimeter Wetlands.
- ✓ The proposed electric lines were located along an existing disturbed area.
- ✓ The electric lines zigzag back and forth across the driveway, which limits the amount of wetland and buffer area disturbance.
- ✓ Most guy wires were installed further outside of the wetland areas.
- ✓ Wooden mats were used to reduce disturbance to wetland soils in especially sensitive areas when needed.
- ✓ The existing tree canopy was maintained along both sides of the gravel driveway.
- ✓ The approved tree cutting and brush cutting were completed by hand to limit disturbance to the wetland.

Construction Methods

There are a variety of methods that can be utilized to install utility pipes. DEM needs to know what method will be utilized to determine the amount of impact a project will have on wetlands. The majority of utilities, with the possible exception of overhead electrical or phone cable wires, are installed below ground. The below-ground piping is covered by soil, and much of the area (outside of the maintained zone) is replanted. The following examples show various ways to avoid and minimize wetland impacts.

Example 27: Trenching

The diagram on the following page illustrates a proposed natural gas pipeline through a wetland area. The applicant has proposed the trenching method* to install the pipeline. Often the trenching method requires a wide construction right-of-way - sometimes over 100 feet for equipment and staging areas outside of the wetland. In order to minimize impacts in this project, the proposed width of the disturbed area was limited to less than 20 feet. This was accomplished by using one small machine to dig, lay the pipe and backfill, instead of a larger machine that requires a greater width to operate.

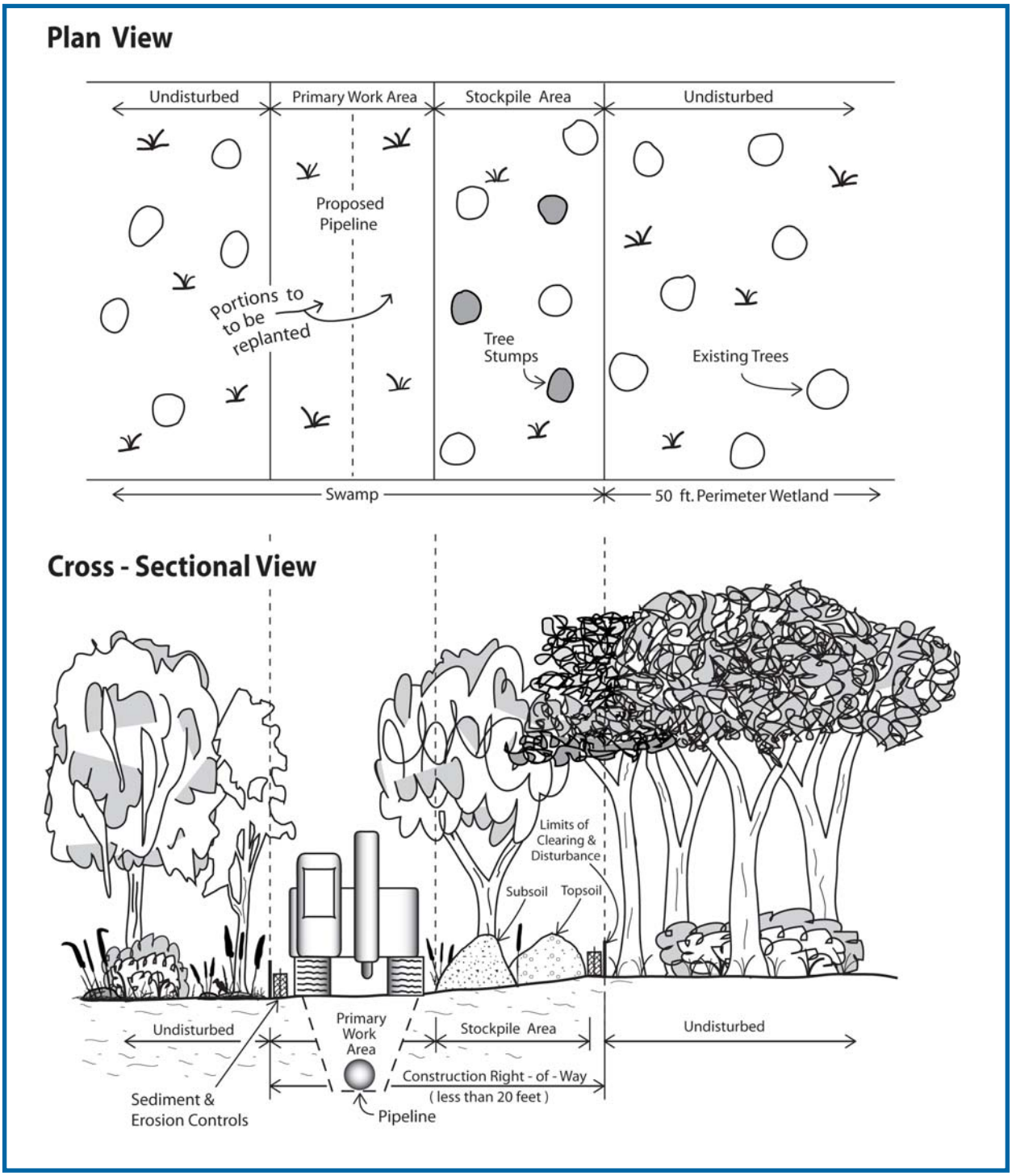
How wetland impacts were minimized:

- ✓ The primary work and stockpile areas were narrow.
- ✓ Limited vegetation was cleared for the stockpile area.
- ✓ Tight Limits of Clearing and Disturbance on either side of the construction right of way were maintained.
- ✓ The existing tree canopy was maintained.
- ✓ The amount of overall disturbance was reduced by the use of small machinery in the wetland area.
- ✓ Tree stumps were left in place to allow for re-growth after the completion of the project.
- ✓ Separation of excavated topsoil from subsoil allowed for easy and correct replacement after the pipe was installed.

The stockpile area was completely replanted upon completion of the project. The primary work area was lightly revegetated (no large woody vegetation), thereby allowing a narrow corridor to be maintained for access to the pipeline.

***Variation:** A variation of the trench method can be used when installing pipe across large bodies of water. Often if a trench is dug up to the wetland area, then the pipe can be floated into place across the wetland by attaching buoyant devices to the pipe. Once these are removed the pipe will sink into place.

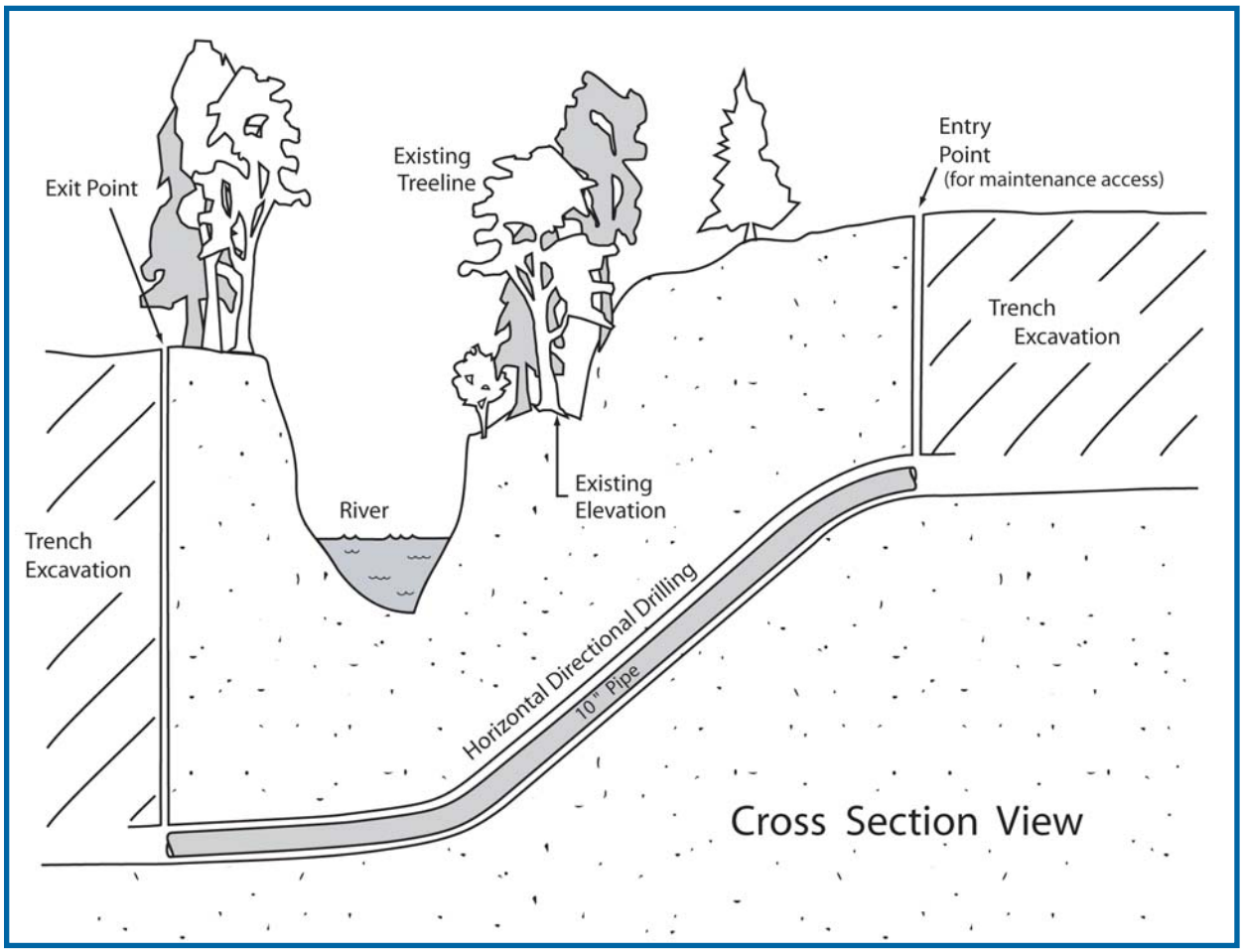
Example 27: **Trenching**



Example 27

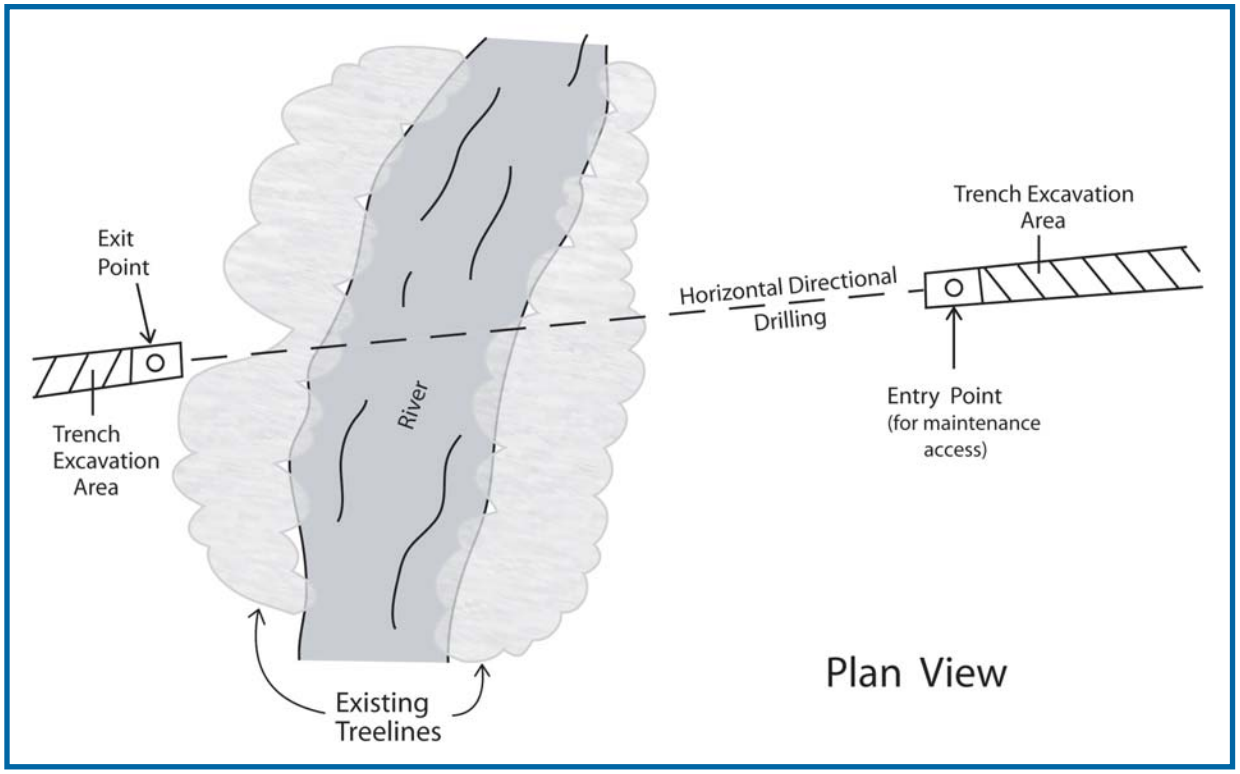
Example 28: **Horizontal Directional Drilling**

This example shows a cross section of land where the horizontal directional drilling method was used to install piping. Although expensive, this method was completed with the least amount of wetland impact. A guided drillhead bore down horizontally under roads, wetlands, vegetation and buildings. This method is most commonly used for short spans under wetlands. Boring machines are able to drill through nearly any type of soil; however, the pipe installation method depends on the substrate, as well as the season. Once installed, the pipeline will be maintained in the same way using a guided drillhead (often with a camera attached) to find the problem area. A broken pipe may be replaced with a new pipe or sealed with chemical compounds.



Example 28a

Example 28: Horizontal Directional Drilling Continued



Example 28b

How wetland impacts were minimized:

- ✓ There was no disturbance to wetland, wildlife, habitat or vegetation because entry and exit points were located outside of wetland areas.
- ✓ The pipe was installed a minimum of 10 feet below the river bottom to avoid impacts to the River.
- ✓ A small work area was required for the initial hole, and limited equipment was used.
- ✓ The work area was located outside of the 100-year Floodplain Wetland.
- ✓ There is no cleared corridor to maintain.

Sometimes a pipe-bursting technique is used to destroy an old pipe, then a new (sometimes larger) pipe is installed through a push and pull method.