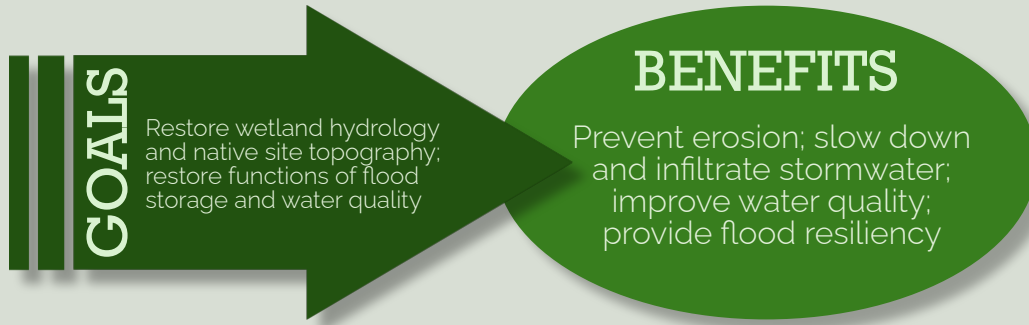


### 3.5 Fill Drainage Ditches

Ditches confine water, lower the water table, and route water quickly through wetlands. Wetlands with artificial drainage patterns have diminished capacity to slow down and store flood waters. Completely filling a ditch can provide permanent restoration of hydrology and allow for recontouring and restoration of site topography. Ditch backfilling is intended for artificial drainageways, not stream channels.



- 1 Identify Backfill Material
- 2 Identify Staging and Access
- 3 Construct and Recontour
- 4 Stabilize Site
- 5 Monitor for Success

### DEFINITIONS

**Compaction:** Pushing soils together so tightly that there is little air between particles. Compaction is obtained by traveling over thin layers of soil a number of times with heavy equipment.

**Ditching:** Excavating a channel in a wetland to drain water.

### Drainage Ditches

The United States lost over 50% of its wetlands since the early 1600s, and Vermont lost as much as 35%. Wetlands were seen as obstacles to development, agriculture, and travel, and were systematically drained and altered. Conversion of wetlands was an accepted practice as recently as the 1950s, and was even incentivized by government policies. Restoration is essential for rehabilitating wetlands that have been degraded. (VTDEC, website)



Historic Ditching in Bennington County, NRCS



Filling a Ditch to restore wetland function, Shayne Jaquith, The Nature Conservancy



## Pre-Construction Planning

### Identify Backfill Material

Look for spoils from the original ditching along either side of the ditch. Additional sources of on-site material can come from other restoration practices (i.e. depression excavations). If importing soil, use clean fill from a location where non-native invasive species (NNIS) are not found.

### Identify Staging Location

Find an onsite upland staging location for temporary storage of imported soils (as needed) and parking of equipment.

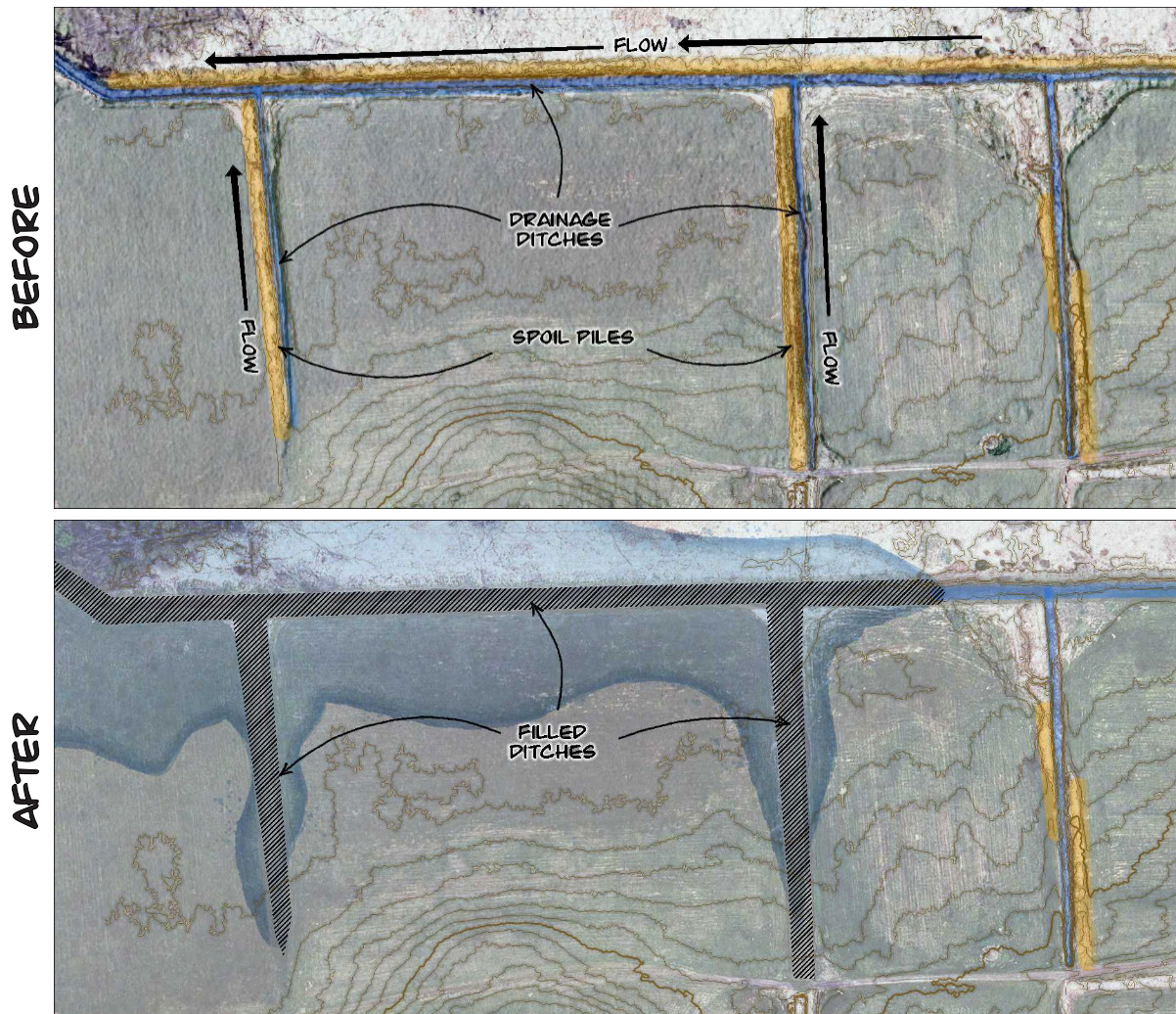
### Identify Access Routes

Use of existing roads and trails without improvement is allowed. Temporary use of swamp mats is also allowed if removed within one growing season, provided their use meets the US Army Corps of Engineers General Permit conditions ([see Chapter 5](#))

### Select a Contractor & Equipment

Choose a contractor with previous experience working in wetlands and who has low ground pressure equipment such as an excavator with wide tracks. Meet with the contractor to review project details including site access and staging location, the specifications for fill material and fill installation, and NNIS control/management procedures ([see Invasive Species Control and Management](#)). Plan work for dry field conditions with no/minimal flow present in the ditch.

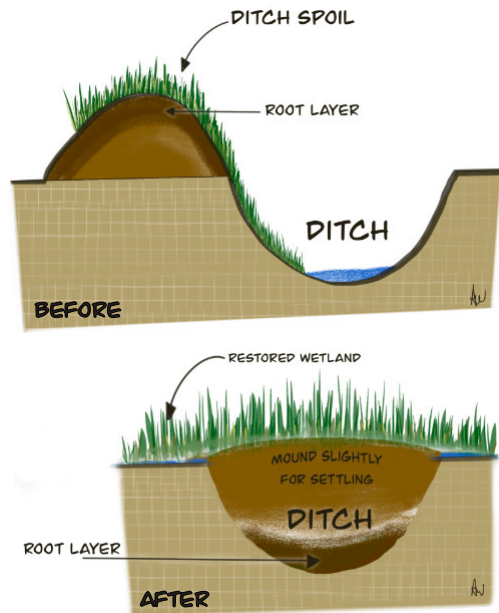
### Ditch Fill Illustration






### Construction Sequencing

1. Stockpile imported soils in staging area. Use erosion control measures if storing for more than a week, or heavy rain is predicted.
2. Stake out extent of ditch fill. Stakes at both ends of the fill area will guide the contractor and prevent over/under filling.
3. Stripping of existing vegetation, roots, organic matter and sediments in the ditch is not necessary, existing ditch spoil material can be pushed into the ditch without preparing the ditch. If NNIS are present in the fill material, have the contractor remove and push the surface layer first to form the bottom layer of the filled ditch.
4. Compaction of soils is important to prevent excessive settling. It may be difficult to compact the first few feet, especially if the ditch is wet. General guidance is to compact in 12" lifts after a base is established.
5. Build fill up 10%-20% over the level of the ground to allow for settling. This is particularly important in sloped wetlands. The slightly higher ditch fill will help spread surface runoff and prevent erosion of the backfill area.
6. Securely stabilize the site through appropriate erosion control measures. Seed and mulch all disturbed soils. ([see Erosion Control](#)).



### Challenges and Solutions

- Completely filling ditches can take a lot of material and is not feasible at all sites: Targeted ditch filling with ditch plugs can accomplish many of the same goals.
- Settling of fill material: Overfilling the ditch seeks to offset the settling but addition of fill may be necessary over time.
- Erosion of ditch fill before vegetation reestablishment: Timing construction during low flow conditions and quick attention to seeding and mulching when construction is complete will assist with vegetation establishment and stability of the site.
- Introduction of invasive species: If work crews are used, ask them to clean tools and boots and to power-wash equipment before entering the restoration site. Work with your contractor to minimize soil disturbance.
- Controlling impacts to upslope and downslope ditch property owners: If the subject ditch is not confined to the project property do not fill within 25' of the property line. This will buffer the neighboring property from any unanticipated impacts from the ditch filling.

 Additional permitting may be required for the construction of new access roads or trails, or for the stockpiling of soil in a wetland or wetland buffer, or for the addition of fill to a floodplain.

### Complementary Practices:

