

3.8 Tile Drain Blocks

Underground drainage systems remove water from saturated soils, usually through a network of perforated tubes, or pipes commonly called tile drains. Drainage tiles are often buried (typically 2 to 5 feet below ground) in wetlands to improve their use for farming. Restoration of wetland hydrology involves rendering the drainage system ineffective by strategically removing or plugging some of the tiles. This is referred to as tile "blocking," and may result in less ground disturbance and reduced construction costs compared to removing the full tile drain system.



GOALS

Restore hydrology to a drained wetland system

BENEFITS

Improved water quality;
increased flood storage;
improved erosion control

DEFINITIONS

Tile Blocking: Excavating and then removing or plugging a length of tile at strategic locations, followed by capping the exposed tile ends, and then backfilling and compacting the trench.

Tile Probe: A long, small diameter steel rod with a pointed tip mounted on a handle. Used to locate buried drainage structures.

- 1 Map Tile Network
- 2 Map Out Plug/Block Locations
- 3 Acquire Plug/Block Materials (i.e. caps, grout)
- 4 Locate Backfill Material
- 5 Identify Staging and Access
- 6 Construct Blocks and/or Plugs
- 7 Backfill Trench
- 8 Stabilize Site
- 9 Monitor for Success



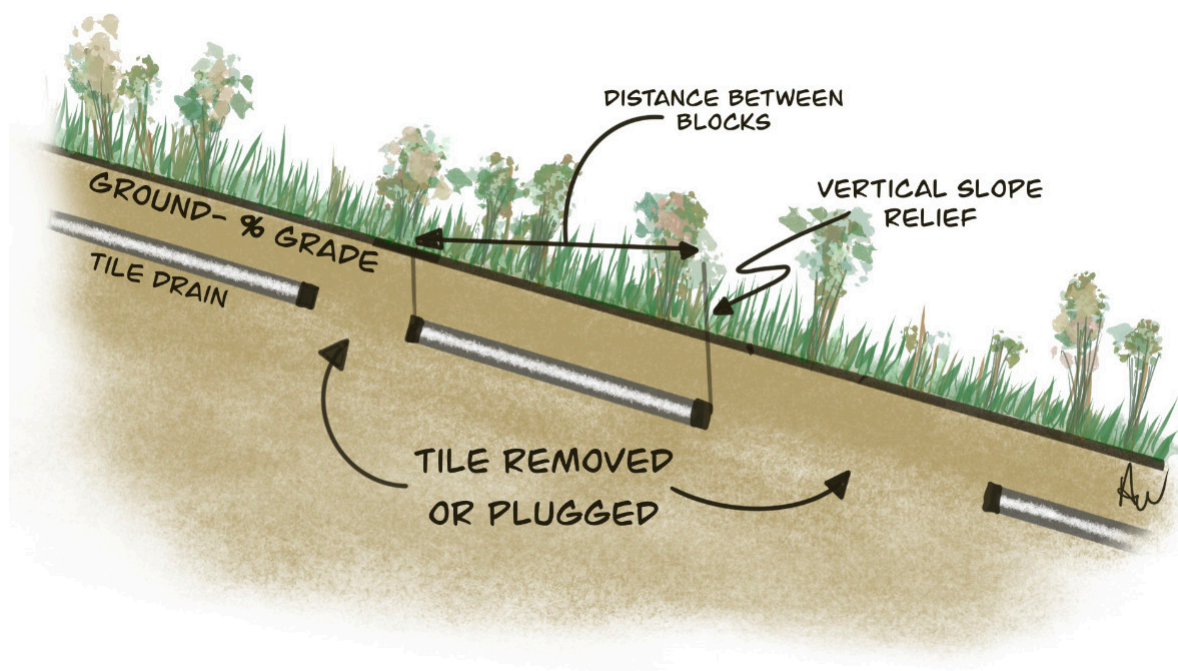
Tile drain installation

Joshua Faulkner



Tile Block Specification

Plug Material	Concrete grout or clay.
Property Line Setback	Offset impacts 25' or more from project or property boundaries.
Level/Flat (<4%) Wetlands	<p><i>(Subsurface drainage is typically provided by just a single tile line or tile main. There may be one or more branches of the tile system that tie into the main tile line.)</i></p> <p>Blocking one section on the main tile line will likely be sufficient to restore hydrology.</p> <p>Block spacing: 1-2' vertical slope relief.</p> <p>Begin the tile block at the anticipated restored wetland's edge and extend downslope.</p> <p>Minimum length of block: 50' in heavy clay soils to 150' in sandy or organic soils.</p>
Sloped (>4%) Wetlands	<p><i>(Restoration of hydrology in sloped wetlands is challenging and may require more advanced design help.)</i></p> <p>More than one block may be needed depending on the size of the restoration area and extent of the existing tile. The design will include tile blocks on each tile line running upslope through the wetland.</p> <p>Block spacing: Every 2-4' of vertical slope relief.</p> <p>Primary Block: Begin the lowest tile block at the anticipated restored wetland's edge and extend downslope 100'.</p> <p>Supplemental Blocks: Block 30' to 50' of tile upslope of anticipated wetland edge, spaced every 2-4' of vertical elevation change.</p> <p>Close spacing of the blocks in a stepped fashion will produce the best results for reestablishing hydrology. Longer lengths can be used in areas with more organic or sandy soils.</p>



Pre-Construction Planning

Map Tile Drain Network

Determine type (clay, concrete, or plastic), sizes (diameter), locations, flow directions and outlets of existing drainage tile within and adjacent to the restoration area. Potential sources of this information include landowners, the Natural Resource Conservation Service (NRCS), and aerial photos.

Plan Block Locations

Identify the location and sizing of blocks per specifications for either sloped or level sites. Decide whether removal or plugging is most appropriate.

Acquire Block Materials

Caps are needed for both tile removal and plugging. These can often be found at a local hardware store. Plug material can include redmix concrete, clean clay fill and expandable foam.

Identify Trench Fill Material

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

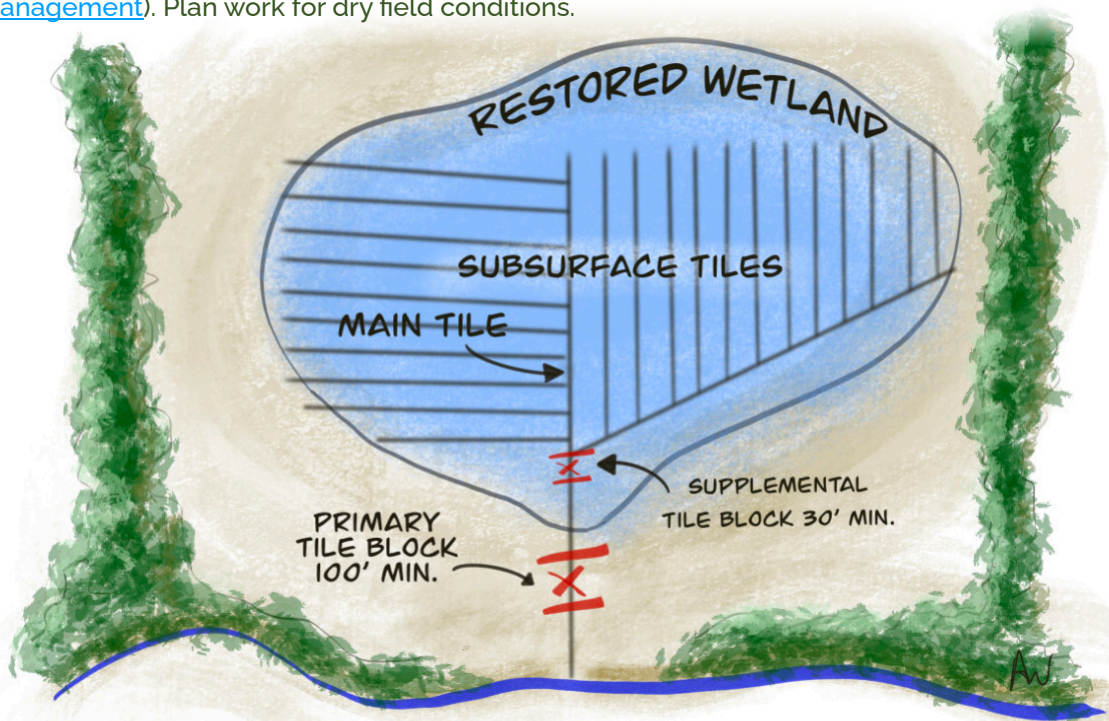
Find an upland staging location for temporary storage of imported soils (as needed), removed tile drains, and parking of equipment.

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 who has previous experience working in wetlands and use 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, specifications for tile blocking construction, and NNIS control/management procedures ([see Invasive Species Control and Management](#)). Plan work for dry field conditions.



Construction Sequencing

1. Stockpile imported soils in staging area. Use erosion control measures if storing for more than a week or if heavy rain is predicted.
2. Stake out block and plug locations. Stakes at both ends of the block will guide the contractor.
3. Excavate trench and block tiles.
4. Seal or cap two exposed ends of tile system with manufactured cap. To ensure the tile is sealed from future flow, install a cement plug in the end of the tile break first. Pour enough concrete or grout to fill a couple of feet of line.
5. Refill trench.
6. Compact spoils in the ditch (generally in lifts of 4-6"). Build spoils up 10%-20% over the level of the ground to allow for settling.
7. Securely stabilize the site through appropriate erosion control measures. Seed and mulch all disturbed soils ([see Erosion Control](#)).
8. Proceed with restoration practices in the area of the abandoned tile drainage.



Tile drain removal for wetland restoration, Ducks Unlimited



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

Challenges and Solutions

- Sizes, grades and locations of existing tile lines may be unclear: Ask the landowner, look at air photos for linear patterns that are unnatural, look for surface intakes, look for outlets, look for tile blowouts, look for changes in vegetation, and explore with a tile probe.
- Leaky blocks: Incorrect sealing of blocks can result in leaking and erosion.
- Settling of fill material: Overfilling the ditch seeks to offset settling, but addition of fill may be necessary.
- Controlling adverse impacts to upslope and downslope property owners: If the subject drainage network is not confined to the project property, leave a 25' section of the existing system intact before the property line. This will buffer unanticipated impacts from the tile blocking.

Complementary Practices:

- 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.

