WETLAND RESTORATION USING THE LINER TECHNIQUE

SCOPE OUT YOUR SITE

Look for signs of existing seasonally dry wetlands on the site: there is no point in replacing natural wetlands. To identify a vernal pool during its dry phase, look for shells of aquatic insects, snails, or fingernail clams, buttressed tree trunks, dark stained leaves, or mosses or sedges growing in a dry, shallow depression (Biebighauser, 2007).

Once you've identified an appropriate site to construct a vernal pool, you must obtain necessary permits and approvals. A permit from the Department of Environmental Protection is required to fill or excavate any wetland, regardless of size. Additional approvals may be required depending on the presence of federal and state protected species and archeological resources. Be sure to 'call before you dig' to avoid damaging buried utility lines.

1

G. GRESS/ TNC

Vernal Pool 1 prior to installing two synthetic liners. A 15 x 66 foot synthetic liner was divided in half to create two 15 x 33 foot pools.

2

B. LEPPO/ PNHP

The size of the liner and maximum depth of each pool was determined by measuring the basin dimensions using a construction level and survey rod.

3

T. COLEMAN/ TNC

Leaves were raked from the basin prior to construction and reserved.

4

K. KING AND M. BERTRAM/ TNC

Mosses and other plants were also removed prior to construction and reserved.

5

B. LEPPO/ PNHP

Predetermined access routes and careful navigation through the woodland minimizes disturbance to the construction site.

6

T. BIEBIGHAUSER/ CWSR

The basin dimensions were marked and topsoil was removed using the excavator.

7

B. LEPPO/ PNHP

Topsoil was set aside for replacement after construction.

8

K. KING AND M. BERTRAM/ TNC

A test hole was dug by the excavator, and the target maximum depth measured with the construction level.

Literature Cited:

Biebighauser, T. R. 2008. Build Your Own Wetland. Kentucky Woodlands Magazine. 3(2):12-15.

Biebighauser, T. R. 2007. Wetland Drainage, Restoration, and Repair. The University Press of Kentucky, Lexington.

WETLAND CONSTRUCTION STRATEGIES KEY

Adapted from Biebighauser (2008)

Determine how your wetland will fill with water. A surface water wetland holds rainfall like a cereal bowl, with packed clayey soils in the basin and a dam preventing water from flowing downhill. A ground water wetland contains water like a large hand-dug well, exposing a high water table near the surface.

The following key identifies the best strategy for building or restoring a vernal pool and requires testing the soil at the construction site. Start at the beginning to see which one applies to your site.

(1) Water seeps into the test hole from the bottom and sides and rises near the surface: Use the Ground Water Strategy (see Kiosk 3).

(2) Soils high in clay (you can make a ribbon 2 inches or longer): Use the Surface Water Strategy (see Kiosk 4).

(3) Soils not high in clay and ground water absent: Use the Synthetic Liner Strategy (this Kiosk).

9

K. KING AND M. BERTRAM/ TNC

About 8 to 12 inches of mineral soil and rock were removed and set aside. A gradually sloped depression was shaped and compacted by the excavator.

10

K. KING AND M. BERTRAM/ TNC

Target basin dimensions were marked and checked using the construction level and flagging.

11

K. KING AND M. BERTRAM/ TNC

The rough excavated depression was smoothed by raking sideways and uphill. It was important to remove any sharp rocks or sticks from the depression to prevent puncturing of the liner.

12

T. COLEMAN/ TNC

The three liner layers were placed in the depression one at a time. The 30 mil aquatic-safe liner was protected on both sides by 16-ounce geo-textile pads.

13

K. KING AND M. BERTRAM/ TNC

The orange flagging marked the high water-mark of the pool and indicated placement of the liner and pads.

14

K. KING AND M. BERTRAM/ TNC

The three liner layers were held in place by 12-inch galvanized steel spikes and washers. These were placed along the upper edge of the liner at the high water-mark indicated with spray paint.

15

K. KING AND M. BERTRAM/ TNC

Once the liner was secured, excess material was trimmed from above the spikes.

16

K. KING AND M. BERTRAM/ TNC

One half of the liner was secured, the other half rolled back.

SET RESTORATION GOALS

Restoration efforts can recreate vernal pools in areas where they have been lost. Improving the adjacent uplands is important as well to sustain healthy vernal pools. Minimize disturbances within 100 feet of the vernal pool edge. Encourage native plants in this area and remove invasive ones. Connect multiple pools with forest patches. Look for ditches and pipes that change how water flows to and from a pool. Remove garbage and protect pools from road and lawn chemicals. See Kiosk 3 for information on vernal pool protection zones and Kiosk 4 for additional best management practices.

HOW TO BUILD A LINER WETLAND

Pools 1 and 4 sit above the water table and rely on snowmelt and precipitation for water input. However, these basins do not hold water long enough for successful amphibian breeding because their sandy-silt-loam soils allow water to seep into the ground quickly. Adding a liner to these very shallow pools will increase water retention so that the pools dry down in mid-summer rather than late spring in a year with typical rainfall.

17

T. COLEMAN/ TNC

Rolling the liner allowed the excavator to drive closer to the secured half to replace soil.

18

K. KING AND M. BERTRAM/ TNC

The second half of the liner was unrolled, secured, and covered with soil. Never allow machinery to touch or drive on the liner.

19

K. KING AND M. BERTRAM/ TNC

The mineral soil (photo 9) was replaced and topped with 1 inch of topsoil (photo 7). Hand tools were used to smooth the upper edges of the basin.

20

K. KING AND M. BERTRAM/ TNC

Woody debris placed within the basin provides shelter for animals during the pool's wet and dry phases. It also provides a place for salamanders to attach egg masses.

21

K. KING AND M. BERTRAM/ TNC

Wheat or oat seed covered with weed free straw was spread throughout the restoration site. This prevents soil erosion and invasion by non-native plants that thrive on disturbed soils.

22

K. KING AND M. BERTRAM/ TNC

Leaves raked from the basin (photo 3) were spread across the bottom of the depression. Mosses and other plants previously removed (photo 4) were placed along the upper edges of the basin.

23

B. LEPPO/ PNHP

This pool was designed to hold no more than 12 inches of water. A few days after construction a steady rainfall showed that the wheat and straw controlled erosion and the liners were holding water.

24

T. COLEMAN/ TNC

Three months after construction, this restored pool looks untouched as leaf litter covers the forest floor and the basin fills with water.

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