Bioengineering Projects in VT

That NorthWoods Helped With

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NORTHWOODS
STEWARDSHIP CENTER

Bioengineering

Application of engineering principles of design and analysis to biological systems

Observation: hardscaped shorelines tend to be undermined by wave action, constitute a barrier to wildlife, and contribute to a redistribution of lakeshore issues such as flooding and erosion.

Observation: unbuffered shorelines tend to be more susceptible to wave and ice pressure and contribute large amounts of sediment into aquatic systems, causing water quality issues

Observation: steep slopes tend to settle into shallower angles, where they become more stable

Riparian Bioengineering

Goals:

1. Stable shorelines
2. Diverse habitat & accessibility to wildlife
3. Positive water quality impact
4. Low maintenance over practice lifetime
5. Updated aesthetic

Riparian Bioengineering

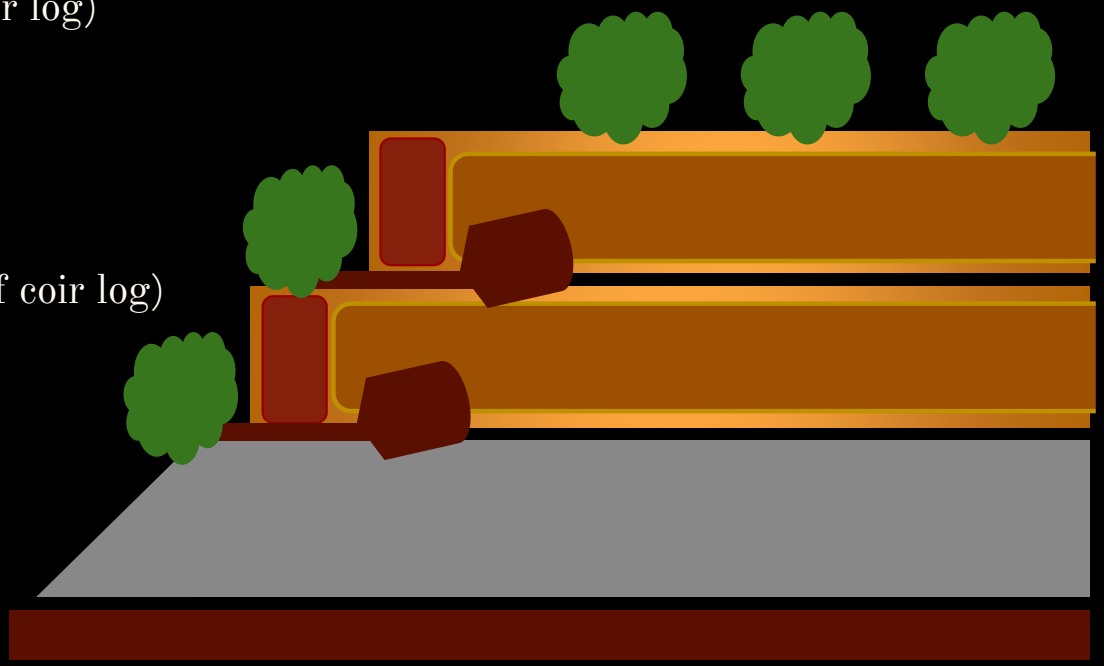
Techniques

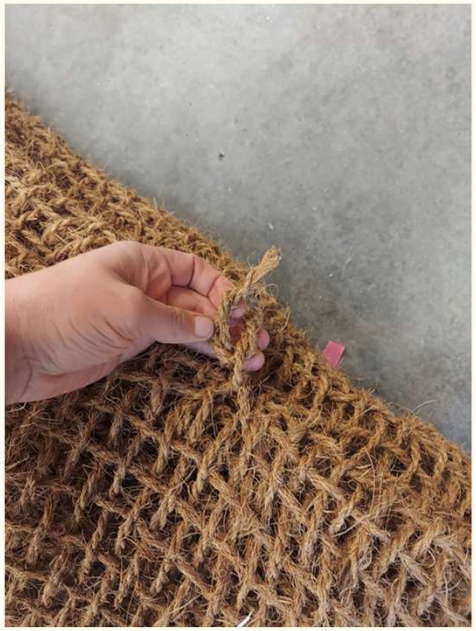
- Vegetated buffer
- Slope regrading
- Fiber coir roll
- Live staking
- Encapsulated soil lift
- Vegetated geogrid
- Live crib wall
- Stone toe

Encapsulated Soil Lifts

Layers:

1. Coir fabric blanket (attached to top of coir log)
2. Straw erosion control blanket
3. Seed
4. Top Soil
5. Straw erosion control blanket
6. Coir fabric blanket (attached to bottom of coir log)
7. Plant root ball
8. Geotextile (filter fabric upper half)
9. Stone Toe
10. Geotextile (filter fabric lower half)
11. Ground





Black Pond Encapsulated Soil Lifts

DEC Lakes & Ponds/Town of Hubbardton

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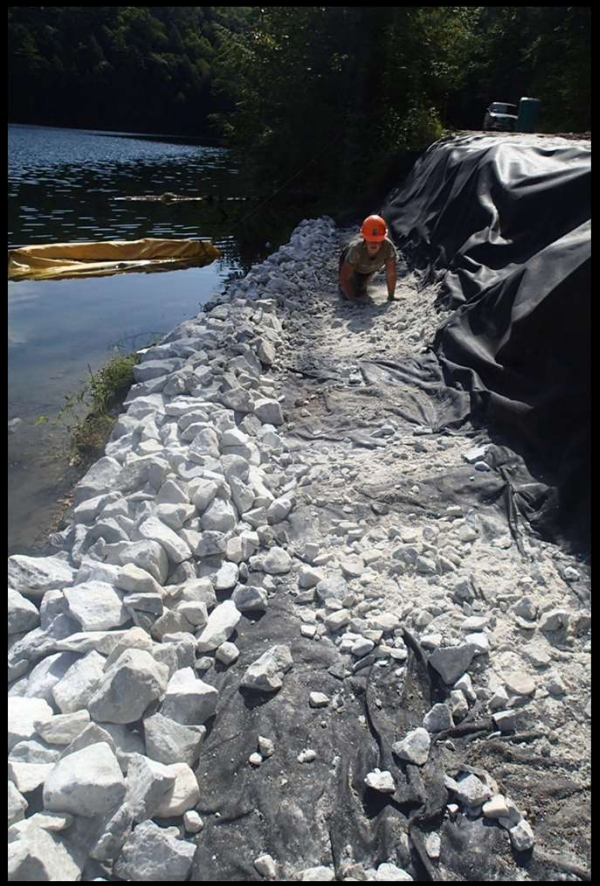

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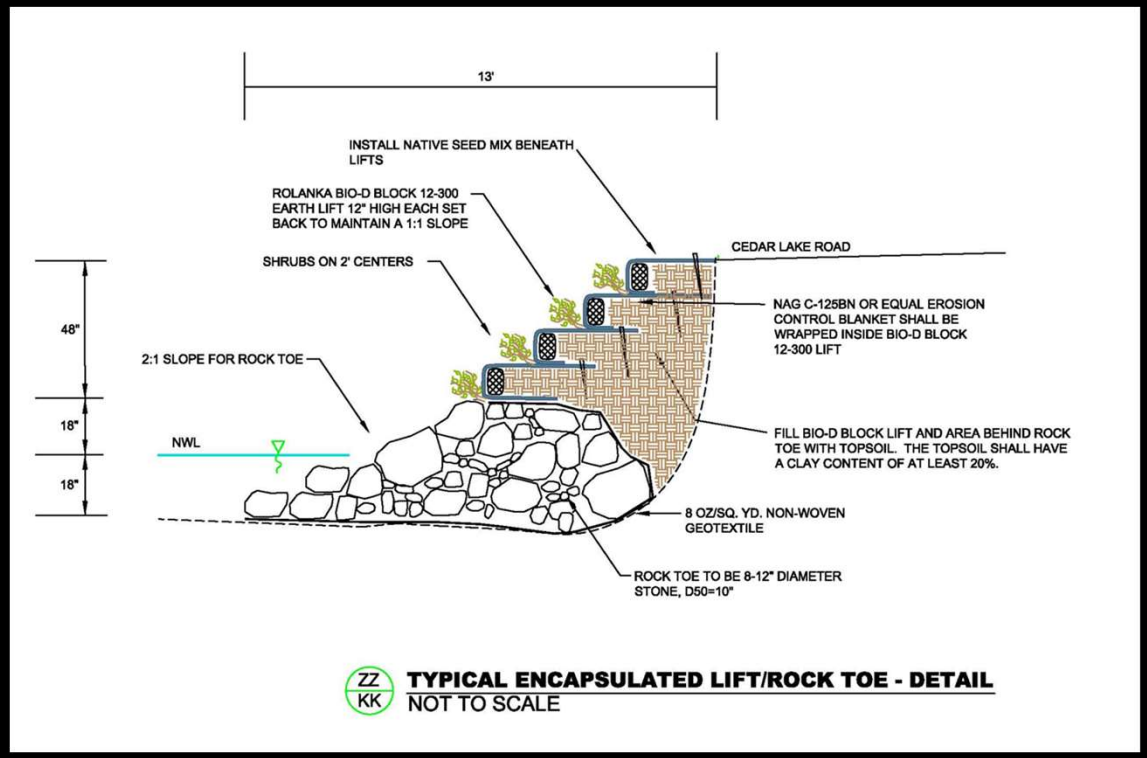
Lake Bomoseen Encapsulated Soil Lifts

DEC Lakes & Ponds/Town of Castleton



Lake Bomoseen Encapsulated Soil Lifts

DEC Lakes & Ponds/Town of Castleton

Lake Bomoseen Encapsulated Soil Lifts

DEC Lakes & Ponds, Town of Castleton

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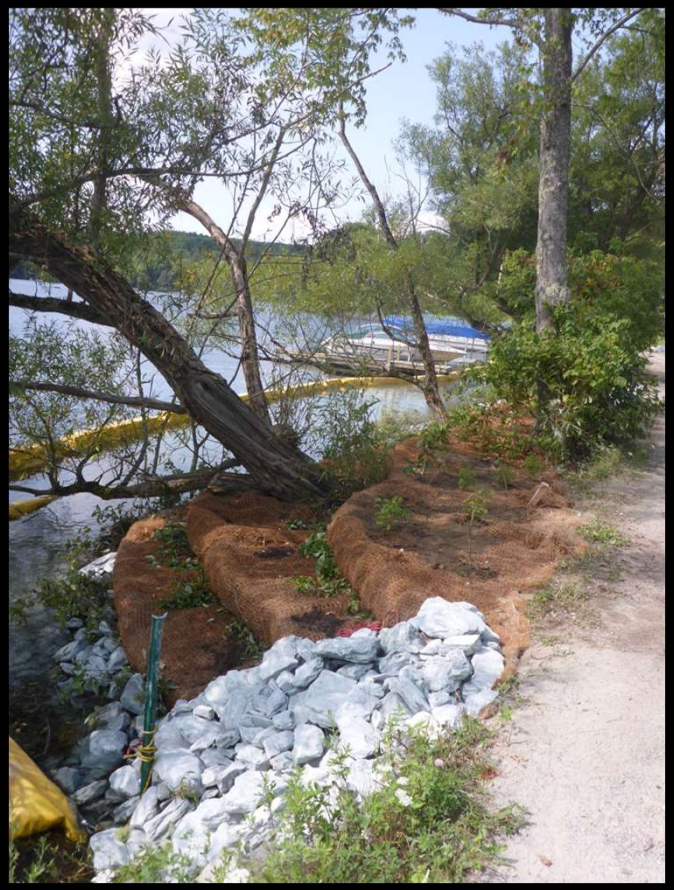
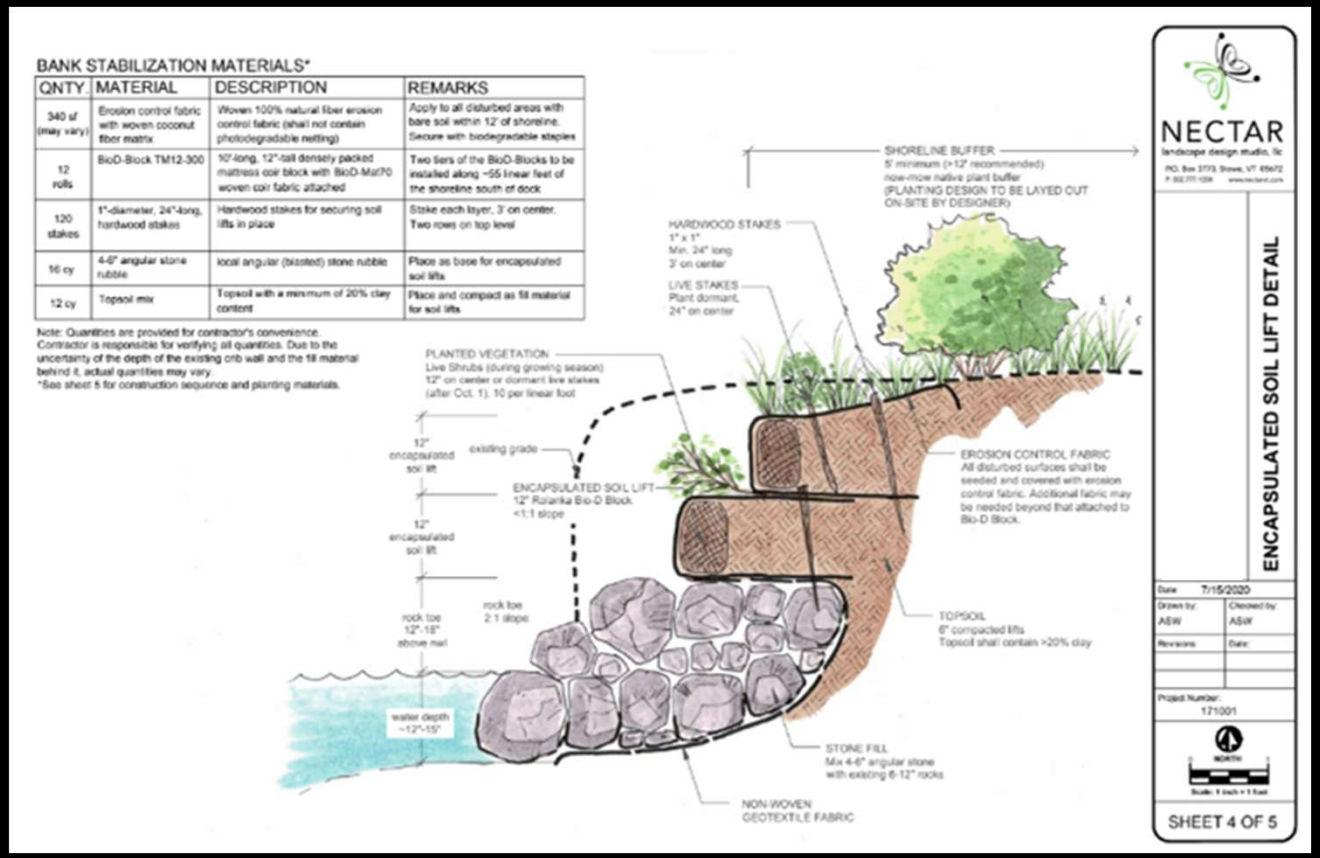


Maidstone Lake Encapsulated Soil Lifts

Essex County Natural Resources Conservation District, DEC Lakes & Ponds, Nectar



BANK STABILIZATION MATERIALS*

QNTY.	MATERIAL	DESCRIPTION	REMARKS
340 sf (may vary)	Erosion control fabric with woven coconut fiber matrix	Woven 100% natural fiber erosion control fabric (shall not contain photodegradable netting)	Apply to all disturbed areas with bare soil within 12' of shoreline. Secure with biodegradable staples
12 rolls	BioD-Block TM12-300	10'-long, 12"-tall densely packed mattress coir block with BioD-Mat70 woven coir fabric attached	Two tiers of the BioD-Blocks to be installed along ~55 linear feet of the shoreline south of dock
120 stakes	1"-diameter, 24"-long, hardwood stakes	Hardwood stakes for securing soil lifts in place	Stake each layer, 3' on center. Two rows on top level
16 cy	4-6" angular stone rubble	local angular (blasted) stone rubble	Place as base for encapsulated soil lifts
12 cy	Topsoil mix	Topsoil with a minimum of 20% clay content	Place and compact as fill material for soil lifts

Note: Quantities are provided for contractor's convenience. Contractor is responsible for verifying all quantities. Due to the uncertainty of the depth of the existing crib wall and the fill material behind it, actual quantities may vary.
*See sheet 5 for construction sequence and planting materials.

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Essex County Natural Resources Conservation District, DEC Lakes & Ponds, Nectar

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Caspian Lake Encapsulated Soil Lifts

Orleans County Natural Resources Conservation District, WindenWater LLC

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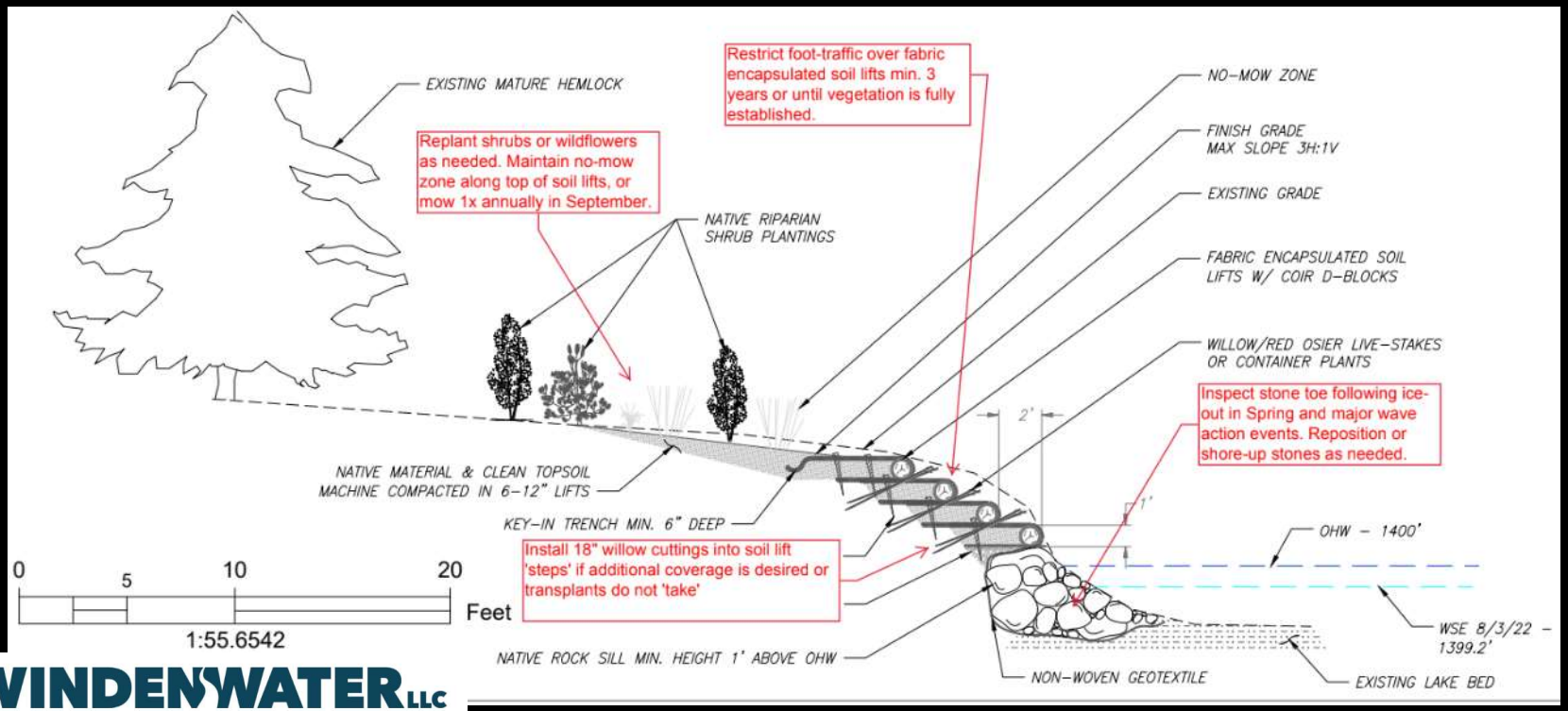
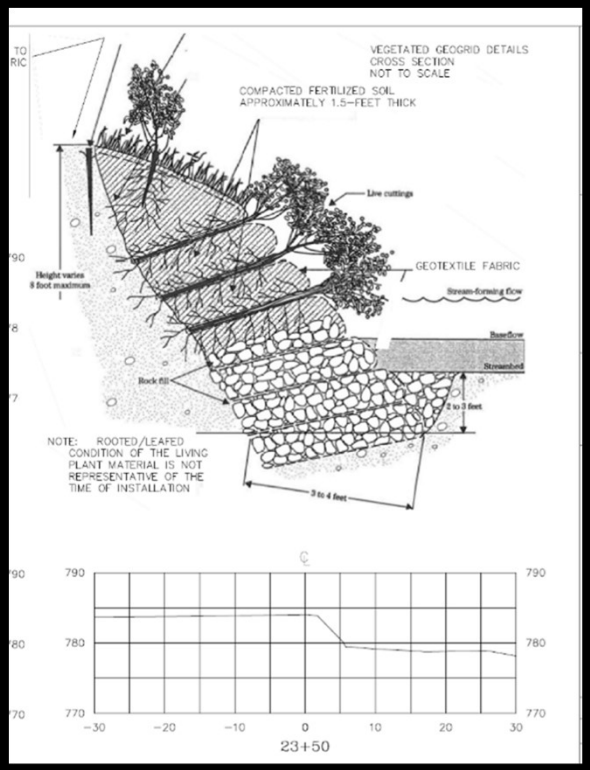
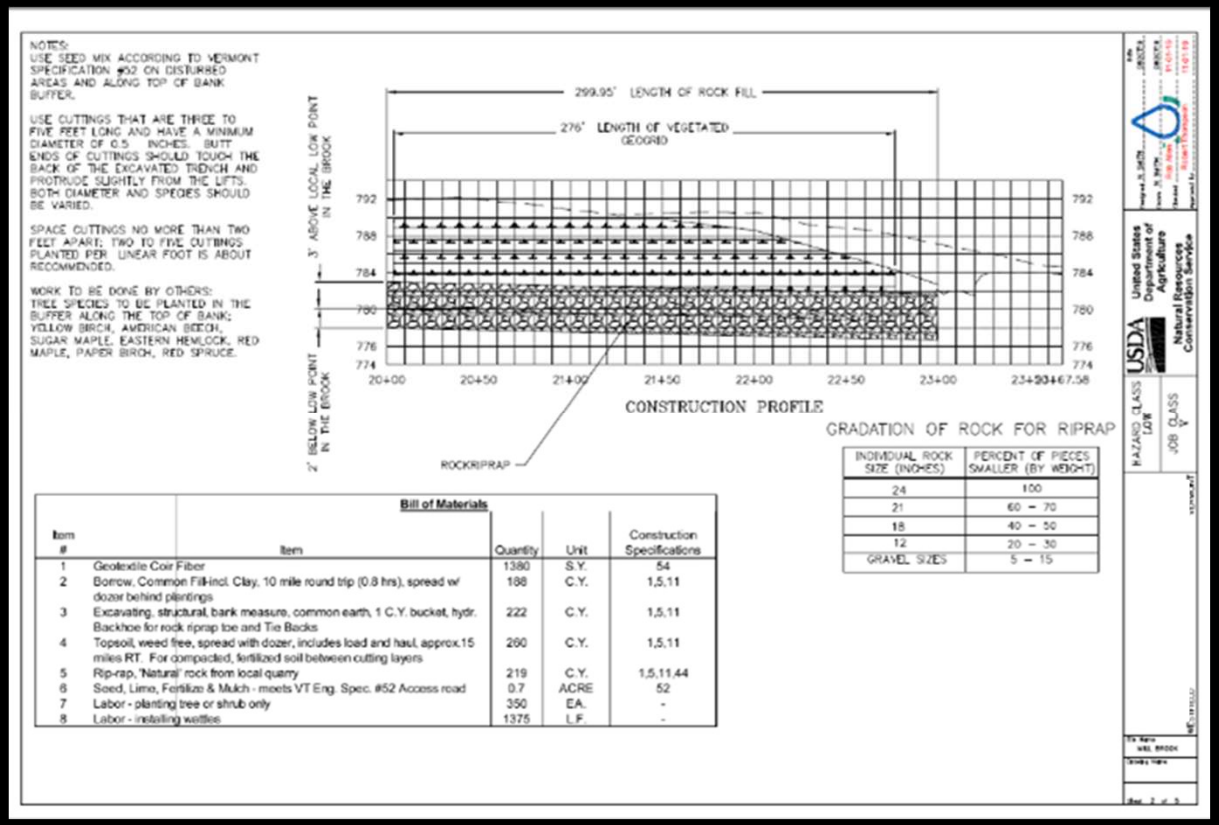


WINDENWATER LLC

Mill Brook Vegetated Geogrid

Upper Missisquoi and Trout Rivers (UMATR) Wild & Scenic Committee





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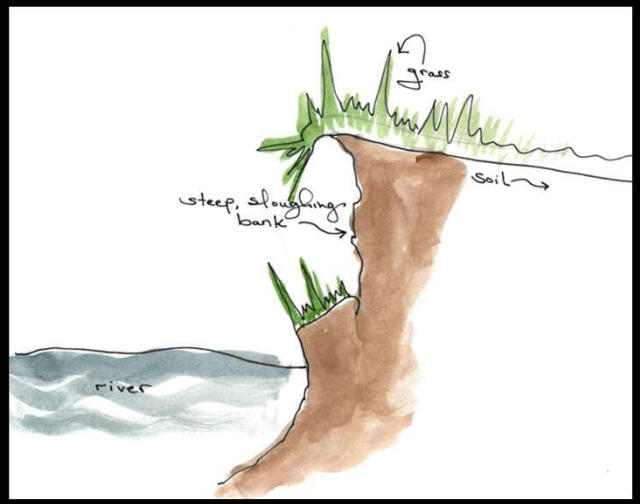
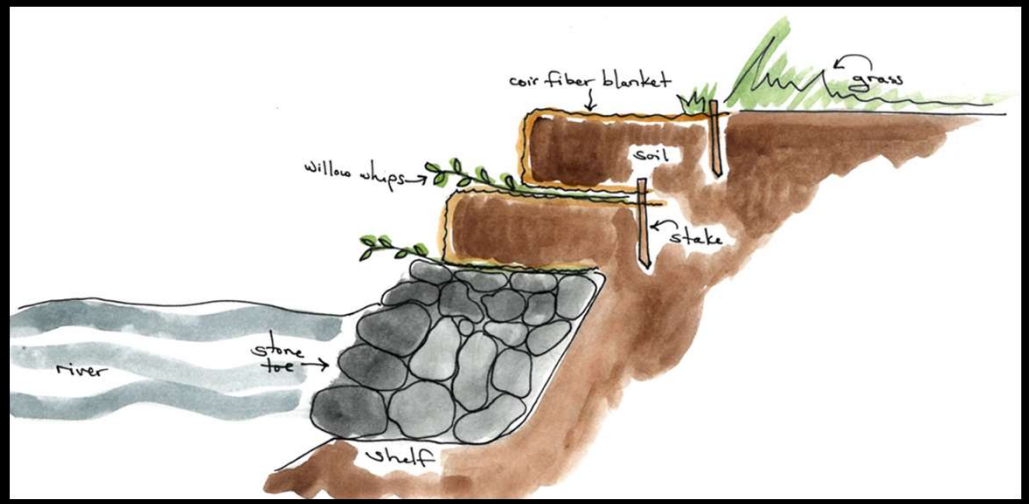
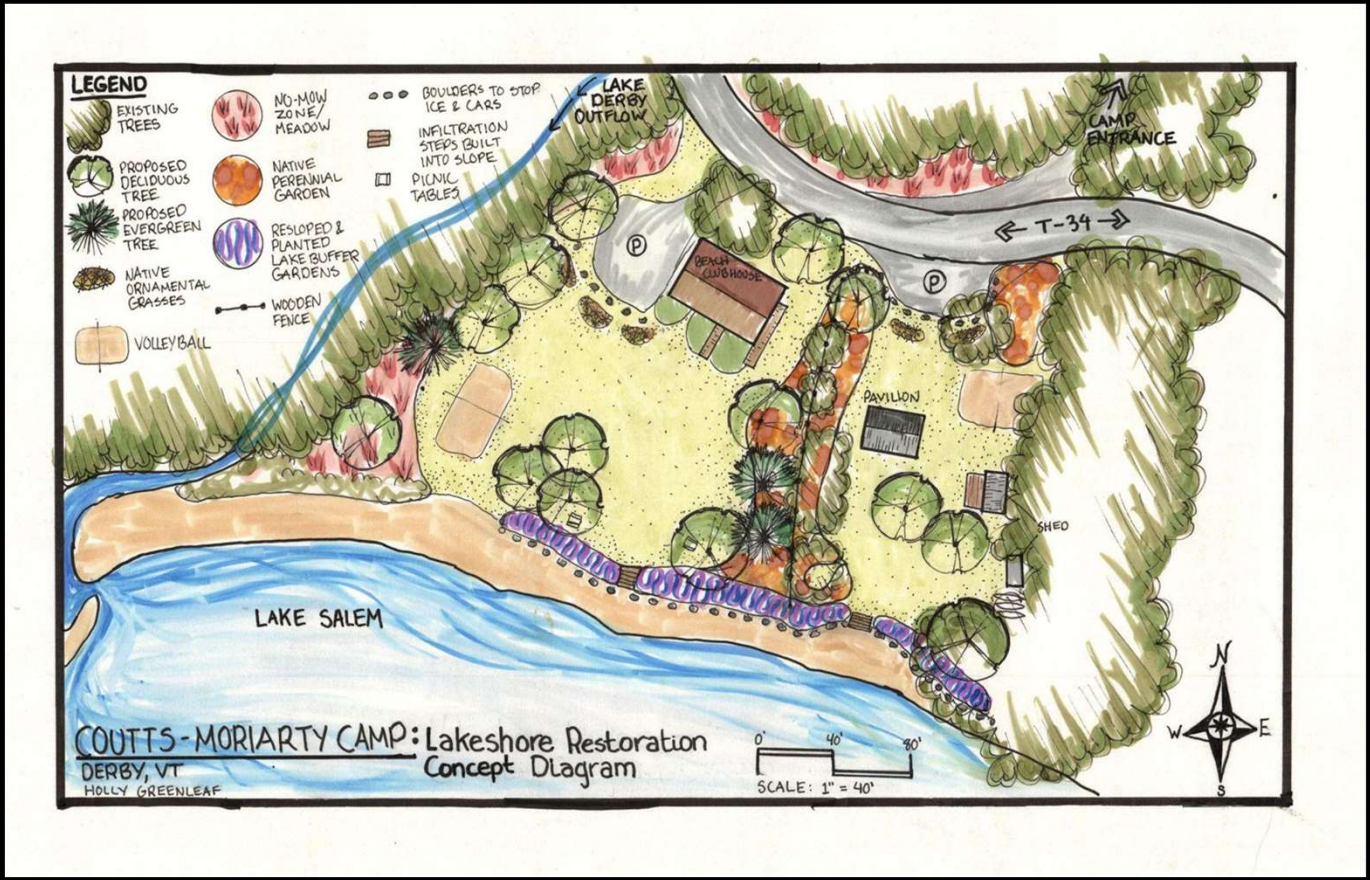




Lake Salem & Coutts Camp Coir Log

Coutts-Moriarty Camp, Town of Derby, Salem Lakes Association, DEC Lakes & Ponds



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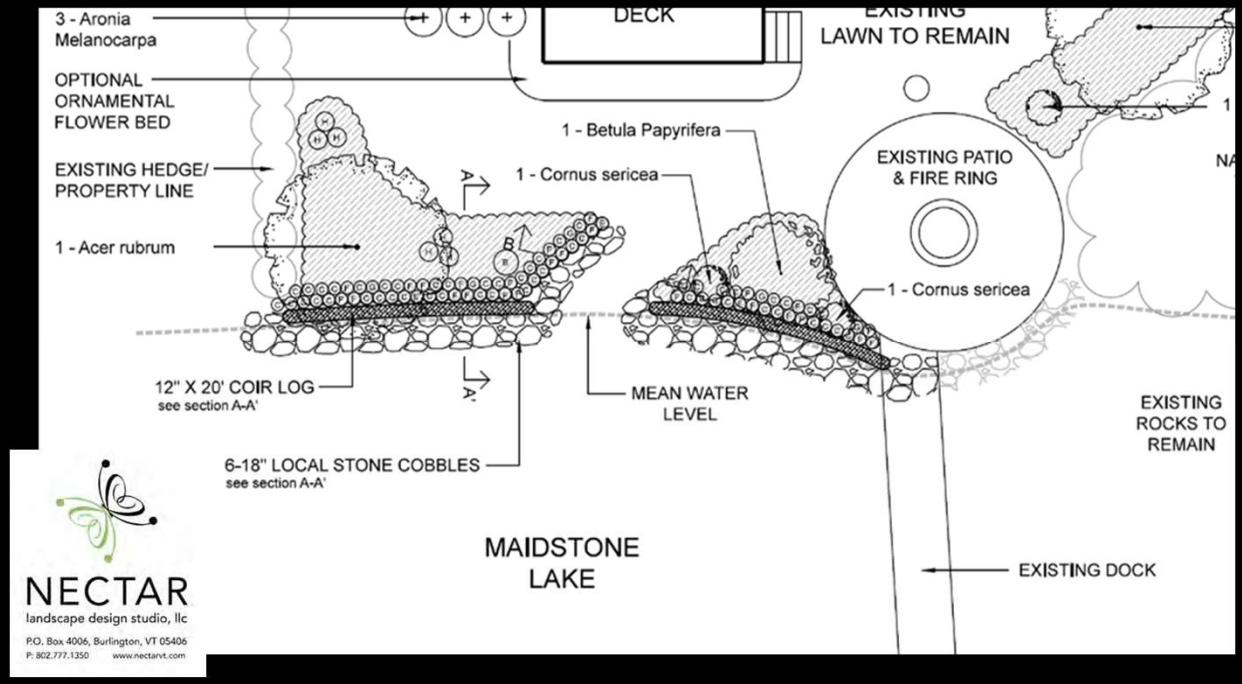
Maidstone Lake Coir Log

Essex County Natural Resources Conservation District/DEC Lakes & Ponds/Nectar



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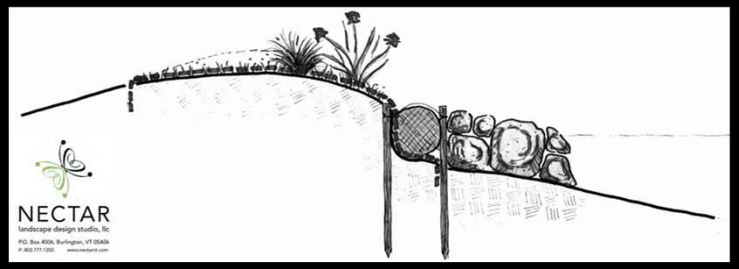

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Essex County Natural Resources Conservation District, DEC Lakes & Ponds, Nectar

Bioengineering Projects - Lessons Learned

1. Post-installation watering and care are very important
2. Invasives species treatment should occur to prevent opportunistic takeover
3. Plan on follow up visits and maintenance annually until the practice is well-established - includes replacement planting and re-setting ice damaged project parts
4. Excavation services are incredibly important
5. Favor wildflower seed over conservation mix seed - more expensive but overall serves broader ecological function and enhances project beauty
6. Install temporary or permanent fencing around the practice to prevent trampling or compacting
7. Install informational/educational signage on projects that are on public land or are in the public eye
8. Use clean topsoil/sand/nursery stock
9. Clean turbidity curtain between each use

Thanks!

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