

Cowen EcoDesign, LLC

Ecological Design, Wetland, Biological and Soil Sciences

August 17, 2022

Mr. Skip Adams
42 New Shore Road
Waterford, CT 06385

**RE: 48 Great Neck Road
Waterford, Connecticut**

Dear Mr. Adams;

At your request I have conducted field observations of 4 test pits in the locations of proposed stormwater basins and field review of the proposed wetland crossing Alternative A and have worked with Joe Wren to incorporate my recommendations.

In all 4 test pits there was no indication of seasonal high groundwater well below the bottom of the proposed basins. The underlying soil was medium loamy sand. No restrictive layer or water table was observed. This is consistent with the mapped soil units (Canton & Charlton) Both soil units have a depth to a root restrictive layer greater than 60 inches and the natural drainage class is well drained.

The soils excavated to create the basins are suitable to use in the biofiltration soil mix.

Wetland Crossing Alternative A

This is the preferred alternative as shown on the plans with a single span. I concur with Joe Wren's analysis. In addition, the existing wetland functions and values will be protected: the watercourse function and the upstream seasonal pool. There are 2 large boulders one on each side of the streambank at the southern edge of the proposed box culvert. These boulders stabilize and define the stream channel banks. Leave them in place or reposition them if needed so that they continue to function.

Additional Recommendations:

1. The two boulders that stabilize and define the stream channel banks at the south side of the box culvert shall be left in place or repositioned if needed so that they continue to function.
2. Mow Japanese Stiltgrass in the vicinity of the farm crossing as soon as possible before it sets seed
3. Since most of the on-site invasive plants are on the west side of the wetland, any excavated or graded soil on that side should be used on that side to avoid spreading invasives onto the east side.

4. Construct the road crossing during the dry season to the extent feasible.
5. Existing farm road may be used for construction access with the use of matting.
6. Remove invasive non-native plants from the work area
7. Do not disturb the ponded area
8. Stabilize disturbed soils with biodegradable erosion control mats and seed with New England Wetmix
9. Salvage mountain Laurel stumps and black huckleberry mats to the extent feasible and replant along the limit of disturbance. This will provide quick stabilization and revegetation of the edge.
10. Install native plants along the disturbed edge.
11. Use on site soils to the extent feasible to create the biofiltration soil mix.
12. Install a wood chip berm at the toe of slope within the basins to keep sediment out of the basin bottoms.

Respectfully submitted,

A handwritten signature in cursive script that reads "James R. Cowen". The signature is written in dark ink and is positioned below the "Respectfully submitted," text.

James R. Cowen
Registered Soil Scientist
Certified Professional Wetland Scientist

Test Hole 1			
Horizon	Depth	Color	texture
Organic (leaf litter)	0-2"		fibric
A	2-4"	10YR2/2	fine sandy loam
B	4-30"	10YR6/6	fine sandy loam
C	30'+	10YR3/2	loamy sand
No water or redoximorphic features			
Test Hole 2			
Horizon	Depth	Color	texture
Organic (leaf litter)	0-4"		fibric
A	4-8"	10YR2/2	fine sandy loam
B	8-20"	10YR6/6	fine sandy loam
C	20-75"	10YR3/2	loamy sand
No water or redoximorphic features			
Test Hole 3			
Horizon	Depth	Color	texture
Organic (leaf litter)	0-3"		fibric
A	3-8"	10YR2/2	fine sandy loam
B	8-31"	10YR6/6	fine sandy loam
C	31-51"+	10YR3/2	loamy sand
No water or redoximorphic features			
Test Hole 4			
Horizon	Depth	Color	texture
Organic (leaf litter)			fibric
A	0-1	10YR2/2	fine sandy loam
B	26-Jan	10YR6/6	fine sandy loam
C	26-47"	10YR5//3	loamy sand
No water or redoximorphic features			

Wetland Mitigation & Stormwater Basin Plant List							
48 Great Neck Road							
Waterford, CT							
	Scientific Name	Common Name	Quan.			Size	Root
Trees			Basin	Wetland	URA		
ARA	Acer rubrum	Red Maple			6	6-8' HT	Cont
CF	Cornus florida	Flowering Dogwood			4	6-8' HT	Cont
LT	Liriodendron tulipifera	Tulip Tree			3	6'	Cont
NS	Nyssa sylvatica	Black Gum			6	6'	Cont
PT	Populus tremuloides	Quacking Aspen			3	6-8' HT	Cont
PV	Prunus virginiana	Chokecherry			6	4-6'	Cont
QB	Quercus bicolor	Swamp White Oak			6	6'	Cont
SA	Sorbus americana	Mountain Ash			3	6'	Cont
Shrubs							
Ac	Amelanchier canadensis	Shadblow	6		6	3-4'	Cont

Am	Aronia/Photinia melanocarpa	Black Chokeberry	9			3-4'	Cont
CEA	Ceanothus americana	New Jersey Tea	12			18-24"	Cont
CO	Cephalanthus occidentalis	Buttonbush	12			3-4'	Cont
CA	Cornus amomum	Silky Dogwood	9			3-4'	Cont
CR	Cornus racemosa	Gray Dogwood	6			3-4'	Cont
COR	Corylus americana	American Hazelnut			12	2-3'	Cont
DL	Diervilla lonicera	Northern Bush Honeysuckle	6			18-24"	Cont
HV	Hamamelis virginiana	Witchhazel			12	3-4'	Cont
IV	Ilex verticillata (female)	Winterberry	5		5	3-4'	Cont
IVM	Ilex verticillata (male)	Winterberry	1		1	3-4'	Cont
Mp	Morella pensylvanica	Northern Bayberry	12		6	18-24"	Cont
RT	Rhus typhina	Staghorn Sumac			6	3-4'	Cont
SC	Sambucus canadensis	Common Elderberry	6			3-4'	Cont
SD	Salix discolor	Pussy Willow	6			3-4'	Cont
SL	Spiraea latifolia	Meadowsweet	12			3-4'	Cont
ST	Spiraea tomentosa	Steeplebush	12			3-4'	Cont
Vc	Vaccinium corymbosum	Highbush Blueberry	6		6	3-4'	Cont
VA	Viburnum acerifolium	Maple-leaved Viburnum			18	3-4'	Cont
VD	Viburnum dentatum	Arrowwood	6			3-4'	Cont
VL	Viburnum lentago	Nannyberry	6			3-4'	Cont
Vines							
	Parthenocissus quinquefolia	Virginia Creeper			6	1 Gal.	
CV	Clematis virginiana	Virgins Bower			6		
LS	Lonicera sempervirens	Trumpet Honeysuckle			6		
Herbs						2" plugs	
	Achillea millefolium	Common Yarrow			50		
	Aquilegia canadensis	Wild Columbine			50		

	Asclepias incarnata	Swamp Milkweed	50				
	Asclepias syriaca	Common Milkweed			50		
	Asclepias tuberosa	Butterfly Weed	50		50		
	Aster cordifolius	Blue Wood Aster			50		
	Aster laevis	Smooth Aster	50				
	Aster novae-angliae	New England Aster	50				
	Aster puniceus	Swamp Aster	50				
	Caltha palustris	Marsh Marigold		50			
	Carex vulpinoidea	Fox Sedge	50				
	Cinna arundinacea	Stout Wood-Reedgrass	50		50		
	Chelone glabra	Turtleheads		50			
	Eupatorium maculatum	Spotted Joe-pye Weed	50				
	Eupatorium perfoliatum	Boneset	50				
	Eurybia divaricata	White Wood Aster			50		
	Juncus effusus	Soft Rush	100				
	Iris versicolor	Blue Flag	50				
	Lobelia cardinalis	Cardinal Flower	50				
	Lupinus perennis	Lupine	50				
	Monarda fistulosa	Wild Bergamot	50				
	Rudbeckia laciniata	Cut-leaf Coneflower	50				
	Packera aurea	Golden Ragwort	50		50		
	Penstemon digitalis	Foxglove Beardtonge	50				
	Rudbeckia hirta	Black-eyed Susan			50		
	Solidago speciosa	Showy Goldenrod			50		
	Vernonia noveboracensis	New York Ironweed	50				
	Zizia aurea	Golden Alexanders	50		50		
Seed Mixes							
	New England Roadside Matrix Upland Mix						
		Application Rate: 1 LB/1250 sq. ft.					
	New England Erosion Control/Restoration Mix for Moist Sites						
		Application Rate: 1 LB/1250 sq. ft.					
	New England Semi-Shade Grass and Forbs Mix						
		Application Rate: 1 LB/1450 sq. ft.					
	Seed mixes are available from New England Wetland Plants, Inc (newp.com)						

	"No Mow" Lawn Mix (areas to be mowed)						
	6 Festuca spp.	fine fescues					
		Application Rate: 5 LB./100sq.ft.					
	available from PrairieNursery.com						
Wetland Crossing							
	Scientific Name	Common Name	Quan.	Size	Root		
Shrubs							
Ac	Amelanchier canadensis	Shadblow	6	3-4'	Cont		
Am	Aronia/Photinia melanocarpa	Black Chokeberry	6	3-4'	Cont		
IV	Ilex verticillata (female)	Winterberry	5	3-4'	Cont		
IVM	Ilex verticillata (male)	Winterberry	1	3-4'	Cont		
SC	Sambucus canadensis	Common Elderberry	6	3-4'	Cont		
SD	Salix discolor	Pussy Willow	3	3-4'	Cont		
Vc	Vaccinium corymbosum	Highbush Blueberry	6	3-4'	Cont		
VD	Viburnum dentatum	Arrowwood	6	3-4'	Cont		
Herbs				2" plugs			
	Asclepias incarnata	Swamp Milkweed	50				
	Caltha palustris	Marsh Marigold	50				
	Carex vulpinoidea	Fox Sedge	50				
	Chelone glabra	Turtleheads	50				
	Juncus effusus	Soft Rush	50				
	Iris versicolor	Blue Flag	50				
	Lobelia cardinalis	Cardinal Flower	50				
	Zizia aurea	Golden Alexanders	50				