



GOVE ENVIRONMENTAL SERVICES, INC.

**2021 ANNUAL WETLAND
MONITORING REPORT
(REPORT 2)**

for

**TUSCAN VILLAGE
POLICY BROOK FLOODPLAIN
IMPROVEMENT PROJECT**

Salem, New Hampshire

September 15, 2021

GES Project # 2016157A
NHDES File # 2016-03374

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1.0 Introduction

The Policy Brook floodplain improvement project is associated with Tuscan Village redevelopment project, located at the former Rockingham Park racetrack site in Salem, NH. The project was intended to serve as compensatory mitigation for wetland impacts and remedy flooding problems at the site and in nearby areas. The project involved the daylighting and floodplain restoration of 3,200 linear feet of Policy Brook which had previously flowed a series of constricted pipes and ditches through the site.

This report details the condition and success of the vegetated wetland component of the constructed floodplain and is the second of five (5) reports required by the NH Department of Environmental Services (NHDES) under Permit No. 2016-03374 (the Wetland Permit). The post construction monitoring report for the main pond in the center of the development (Tuscan Pond) is proceeding under a different schedule and is therefore being provided under separate cover. The related monitoring report required by the approved Stream Monitoring Protocol, which addresses the integrity of the floodplain and elements of stream channel morphology, is being submitted separately by Tighe&Bond.

The following sections provide an overview of the success standards, a narrative describing the monitoring process, current condition of the wetlands, and recommendations for corrective action. A sketch plan is included at the end of the text to provide the location of items discussed in the narrative. Photographs, monitoring data forms, an as-built plan, and a copy of the permit can be found in Appendices A through D.

2.0 Monitoring Requirements and Success Standards

Monitoring of the floodplain wetland will consist of a spring visit to assess early season, conditions followed by a comprehensive monitoring at the end of the growing season, including collection of data at established data plots. The standards by which the success of the wetland portion of the floodplain project will be judged are specified in the Wetlands Permit and the approved Wetland Monitoring Protocol. They are:

- a. The site has clear evidence of hydrology capable of supporting the designated wetland type.
- b. Wetland areas have at least 75% cover by noninvasive hydrophytes excluding planned open water or aquatic bed areas.
- c. Invasive species [Common reed (*Phragmites australis*), Purple Loosestrife (*Lythrum salicaria*), Russian and autumn olive (*Elaeagnus spp.*), buckthorn (*Rhamnus spp.*), Japanese knotweed (*Polygonum cuspidatum*), and/or multiflora rose (*Rosa multiflora*)] are being controlled at the site. For this standard, small patches must be

eliminated during the entire monitoring period. Large patches must be aggressively treated, and the treatment documented.

- d. All slopes, soils, substrates, and constructed features within and adjacent to the created wetland areas stabilized?

3.0 Monitoring Summary

Monitoring was conducted on 9/13/21 and 9/14/21. The nine (9) data plots established in 2020 were revisited to collect data on vegetation and record observations of hydrology and soil conditions. Eight of the plots are located along Transacts 6, 7, 8, and 11 as identified in the monitoring protocol. At each transect the first Plot was established in the broader wetland portion of the stream meander while the second was established close the bank. An additional 9th plot (8-3) is located in the narrow channel area near the crossing. The location of these data plots and other items discussed in this report are depicted on the monitoring plan, included before the appendices. Photographs were taken along each transect and of each data plot. General observations and documentation of invasive species were also made site wide. Photographs are included in Appendix A. The monitoring plot data forms are included in Appendix B. The results of the monitoring and discussions of the success standards are provided in the following sections.

3.1 Hydrology

No formal data are being collected on the hydrology within the created wetland areas as part of the post construction monitoring. Monitoring of hydrology is limited to observations of inundation, saturation, and other indications that wetland hydrology is supported. These indicators are also used for wetland delineation and therefore provide a useful indicator of whether or not this wetland criteria is being met. They are also useful in determining whether or not the flood storage and attenuation function is being supported as intended by the design.

The design goal was for the wetland areas within the floodplain to be permanently saturated and seasonally flooded. Observations made over the course of construction and during the initial monitoring, however, point to a more variable and quickly changing hydrology that is strongly influenced by precipitation events. The 2021 season was marked with frequent and sometimes extreme precipitation events beginning in July. Therefore, it was not surprising this year to observe water extending well beyond the channel itself and covering much of the floodplain to a depth of 2 to 6-inches. On the design plans this corresponds approximately to an elevation at or just below elevation 121 where elevation 122 represents the toe of the side slope. There were also signs of even higher water levels and higher flows in the form of bent over vegetation, sediment deposits, and water marks. At this water level the lower reaches of the floodplain are inundated by a foot or more of water.

Colonization of inundated areas outside the channel by aquatic plant species also suggests that these conditions were persistent during the 2021 growing season. These water levels are nearly ideal for the development a scrub shrub and emergent wetland type in the upper and middle areas of the floodplain and notable changes in vegetation were observed in these areas as discussed in the next section. Increased depth and frequency of inundation in the lower floodplain will, however, inhibit the development of a scrub shrub wetland in this area as intended.

3.2 Vegetation

To document the development of vegetation at each data plot the percent areal coverage of all species was estimated within a 15-foot radius for shrubs and within a 5-foot radius for herbaceous species. The data recorded at these plots can be found in Appendix B. Tables 1 and 2 summarize the data in terms of the success standards and provide a list of species observed throughout the floodplain. For reference the approved revised planting list is provided in Table 3.

Cover and Composition

The status of the vegetation within the floodplain wetland areas can be generally characterized as already meeting or nearly meeting the 75% coverage standard. There have, however, been some changes in species composition and overall coverage this year. Average cover declined slightly from of 79% to 61% (excluding invasive species) but this decline occurred only in the middle and lower sections of the floodplain. This can likely be attributed to a combination of the construction timeline and more persistent inundation of the floodplain this season.

As noted in the 2020 monitoring report, roughly the first 900 feet of the channel was completed early during the project and has had several more years to develop. The better developed and more resilient wetland plant community in this area (data plots on transects 6 and 7) was able to increase its overall cover and expand further from the channel out onto the floodplain, even under higher and more persistent water levels. This area remains the most densely vegetated and diverse section of the monitoring area.

In the middle and lower floodplain, (Plots 8-1, 8-2, 8-3, & 11-1) the wetter hydrology has pushed out upland leaning and early opportunistic species such as Pennsylvania Smartweed, groundsel, clover, vetch, birds foot trefoil, and crabgrass. Since these sections of the floodplain were completed more recently and had also experienced a relatively dry season last year, this type of growth accounted for a larger percentage of the overall cover. Overall cover therefore declined in these areas but was accompanied by a promising shift toward more desirable wetland species.

A somewhat different scenario exists on the interior of the lower floodplain (plot 11-2) which appears to have been persistently inundated to a depth that has prevented most

vegetation from growing. This area is dominated by Northern Water Plantain and Water Primrose with a scattering of cattail and Soft rush. Under these conditions, the lower floodplain will likely develop as emergent wetland along its edges with something closer to aquatic bed wetland in the deeper area immediately along the channel.

Woody Vegetation

Woody plantings were deliberately minimal in the revised planting list for fear or widespread mortality due to unpredictable hydrology. This appears to have been a good choice given what was observed this year. Coverage by woody species was up slightly overall, primarily due to Speckled Alder and the dormant willow and dogwood cuttings installed along the channel. These three species are flourishing and are known for rapid growth in wet conditions so shrub cover can be expected to expand in the coming years. The deepest portion of the lower floodplain may be the exception, even the willow cutting do not appear to have done well here.

The success of the container grown winterberry and northern arrow-wood will depend on the cycle of flooding in the next few years. Some of these plantings already appear stressed by flooding which has completely overtopped these small shrubs during peak flow events.

Table 1—Summary Vegetation Coverage Data 2020-2021

Plot #*	Areal Coverage of Shrub Layer (%)		Areal Coverage of Herbaceous Layer (%)		Total Areal Coverage (%)		Areal Coverage of Invasive Species (%)	
	2020	2021	2020	2021	2020	2021	2020	2021
6-1	7	14	64	60	71	74	0	10
6-2	20	20	62	80	82	100	15	15
7-1	4	6	55	57	59	63	2	4
7-2	30	35	67	64	97	99	5	5
8-1	0	5	95	30	95	35	0	15
8-2	25	35	62	42	87	77	0	0
8-3	2	7	62	42	64	49	0	0
11-1	7	7	55	47	62	54	0	0
11-2	5	0	92	5	97	5	2	0
AVERAGE	11.1	14.3	68.2	47.4	79.3	61.7	2.7	5.4

Table 2—List of Species Observed in Wetland Areas Site-Wide

Herbs	
Common Name	Scientific Name
Small White Aster*	<i>Symphyotrichum racemosum</i>
Beggars Tick	<i>Bidens sp.</i>
Birdsfoot Trefoil	<i>Lotus corniculatus</i>
Boneset	<i>Eupatorium perfoliatum</i>
Barnyard Grass	<i>Echinochloa crusgalli</i>
Canada Rush	<i>Juncus canadensis</i>
Cattail	<i>Typha latifolia</i>
Crabgrass	<i>Digitaria sanguinalis</i>
Common Groundsel	<i>Senecio vulgaris</i>
Evening Primrose*	<i>Oenothera biennis</i>
Goldenrods	<i>Solidago sp.</i>
Joe-Pye-Weed*	<i>Eutrochium maculatum</i>
Purple Loosestrife	<i>Lythrum salicaria</i>
Rabbits foot clover	<i>Trifolium arvense</i>
Rice Cutgrass	<i>Leersia oryzoides</i>
Red Clover	<i>Trifolium repens</i>
Red Root Flat Sedge	<i>Cyperus erythrorhizos</i>
Slender False Foxglove	<i>Agalinis tenuifolia</i>
Shallow Sedge	<i>Carex lurida</i>
Soft Rush	<i>Juncus effusus</i>
Soft Stemmed Bulrush	<i>Scirpus validus</i>
Switchgrass	<i>Panicum vigatum</i>
Mugwort	<i>Artemisia vulgaris</i>
Northern Water Plantain	<i>Alisma</i>
Nut Sedge	<i>Cyperus esculentus</i>
Nodding Beggarticks	<i>Bidens cernua</i>
Yellow Sedge	<i>Carex flava</i>
Woolgrass	<i>Scirpus cyperinus</i>
Willow Herb*	<i>Epilobium leptophyllum</i>
Water Primrose*	<i>Ludwigia palustris</i>
Unidentified Grass	Unknown
Phragmites	<i>Phragmites australis</i>
Pennsylvania Smartweed	<i>Persicaria pensylvanica</i>
Shrubs	
Common Name	Scientific Name
Arrowwood	<i>Viburnum dentatum</i>
Black Elderberry*	<i>Sambucus canadensis</i>
Silky Dogwood	<i>Cornus amomum</i>
Speckled Alder	<i>Alnus rugosa</i>
Winterberry	<i>Illex verticillata</i>
Willow	<i>Salix sp.</i>

*first observed 2021

Table 3—Approved Revised Planting List

AREA A: STREAMBANK MARGIN (6,700 LF)			
Layer	Species	Type/Size	Number
Shrub	Willow (<i>Salix sp.</i>)	Dormant cuttings	25,000
Shrub	Silky dogwood (<i>Cornus amomum</i>)	Dormant cuttings	15,000
AREA B: NARROW CHANNEL AREA (65,400 SF)			
Shrub	Winterberry (<i>Ilex verticillata</i>)	1gal. pots	60
Shrub	Northern Arrowwood (<i>Viburnum dentatum</i>)	1gal. pots	60
Seed	New England Roadside Matrix Wet Meadow Seed Mix	17lbs/ac	26 lbs
Seed	New England Erosion Control/Restoration Mix for Detention Basins and Moist Sites	17lbs/ac	26 lbs
AREA C: PIT & MOUND SCRUB SHRUB AREA (87,100 SF)			
Shrub	Winterberry (<i>Ilex verticillata</i>)	1gal. pots	150
Shrub	Speckled Alder (<i>Alnus incana</i>)	1gal. pots	150
Seed	New England Roadside Matrix Wet Meadow Seed Mix	17lbs/ac	34 lbs
Seed Mix	New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites	17lbs/ac	34 lbs
AREA D: EMBANKMENTS (152,500 SF)			
Shrub	Mapleleaf viburnum (<i>Viburnum acerifolium</i>)	1gal. pots	550
Shrub	Huckleberry (<i>Gaylussacia baccata</i>)	1gal. pots	550
Shrub	Black Chokecherry (<i>Aronia melanocarpa</i>)	1gal. pots	500
Shrub	Shadbush (<i>Amelanchier Canadensis</i>)	1gal. pots	300
Shrub	Sweetfern (<i>Comptonia peregrine</i>)	1gal. pots	500
Shrub	Sweet Pepperbush (<i>Clethra alnifolia</i>)	1gal. pots	500
Seed	New England Erosion Control/Restoration Mix For Detention Basins and Moist Sites	25 lbs/ac	88 lbs

3.3 Invasive Species

There are three invasive species of concern on the site, one more than was observed in 2020. These are Purple Loosestrife, Phragmites, and Japanese Knotweed. Cover of all invasive species across all plots rose from under 3% to over 5% but distribution is not even. Japanese Knotweed was observed in 3 discrete patches high on the embankment adjacent to the Ford Dealership. Phragmites cover is denser and it has spread downstream from where it was initially observed in 2020. The approximate location of Knotweed and Phragmites is depicted on the monitoring plan.

Purple Loosestrife is widely distributed along the floodplain in nearly all shallowly inundated and saturated areas. Galerucella beetle remains active at the site. Although the less feeding damage was observed this year on Purple Loosestrife, the beetle does appear to be exerting some control over the population of this invasive plant. Though widely distributed, much of the Purple Loosestrife is short and with relatively fewer plants flowering than would be expected within a vigorous population. This may also be due in part to high water levels and the availability of food (Purple Loosestrife) both of which effect the reproductive cycle of the beetle. The relative success of Purple Loosestrife can be expected to vary from year to year depending on these factors.

Eradication of Phragmites from the floodplain and Japanese Knotweed from the embankment is of paramount importance. Either of these species has the potential to have very negative effects on the floodplain, not only from a biological perspective but also an aesthetic perspective, which is an important consideration for the Tuscan Village development.

3.4 Soils and Stability

Several small erosion issues have been noted in the monthly post construction monitoring being completed by Tighe & Bond. These are largely related to runoff originating outside the floodplain and have (or will be) addressed through the stream monitoring process. The technical aspects of the stream and floodplain integrity will also addressed by this process but in general, the stream channel and adjacent floodplain wetlands have proved stable during a variety of water levels and flows. No obvious issues were observed with the channel or adjacent floodplain areas during this monitoring.

Soils in planned wetland areas continue to exhibit indications of hydric soil development. Growth of vegetation, transport from upstream areas, and, more frequent flooding have contributed to the accumulation of organic matter on the floodplain. In areas where the water level had recently receded, a thin layer of muck was observed on the soil surface. Slightly lower chroma colors (indicative of reduced oxygen in the soil due to water) were observed at several of the transects. The development of these low chroma colors would not be expected to happen so rapidly so this could also be the result of the mineral soils being moister at the time of observation than they were last year or differences in the

materials used to establish the subgrade. Redox features however, which are indicative of a fluctuating water in the soil, do develop quickly and these were clearly more numerous and distinct. Soil descriptions from within planned wetland areas at each transect are provided in Table 4.

Table 4—Soil Descriptions

Soil observation at Transect 6:	
Depth	Horizon/Description
0" – 4"	A 2.5 Y 3/1 Oxidized rhizospheres Mucky coarse sand (moist) Wetland soil placed during construction
4" – 16"	B 2.5Y 5/3—10YR 4/4 2% Redox, faint Loamy sand, evidence of organic matter transport and accumulation
16" +	C 10YR 4/6 coarse sand construction subgrade
Soil observation at Transect 7:	
Depth	Horizon/Description
0" – 12"	A 2.5 Y 3/1—10YR 3/3 2% Redox faint Mucky coarse sand (moist) Wetland soil placed during construction
12" – 18" +	C 2.5Y 6/3—7.5 YR 4/6 redox 5% Loamy sand construction subgrade
Soil observation at Transect 8:	
Depth	Horizon/Description
0" – 12"	A 2.5 Y 3/2—2.5Y 4/4 5% redox Mucky coarse sand (moist) Wetland soil placed during construction

12"—16" +	C 2.5Y 5/1—2.5Y 5/4 5% redox Dense sand and gravel, construction subgrade
Soil observation at Transect 11:	
Depth	Horizon/Description
0" – 6"	A 2.5 Y 4/2 Mucky coarse sand (moist) Wetland soil placed during construction
6"+	unable to observe to inundation

4.0 Wildlife

The creation of wildlife habitat was not a primary goal of the flood plain improvement project but several observations made this year are noteworthy. Small fish (species unknown) were observed within the channel and even in areas of shallow inundation flooded area all the way up to the pool-riffle feature exiting the pond at the beginning of the floodplain. Other wildlife observed directly utilizing the floodplain habitat includes Great White Egret, Double Crested Cormorant, and Spotted Sandpiper. An abundance of pollinators also utilize the floodplain, particularly where wildflower species are more mature.

5.0 Conclusions and Recommendations

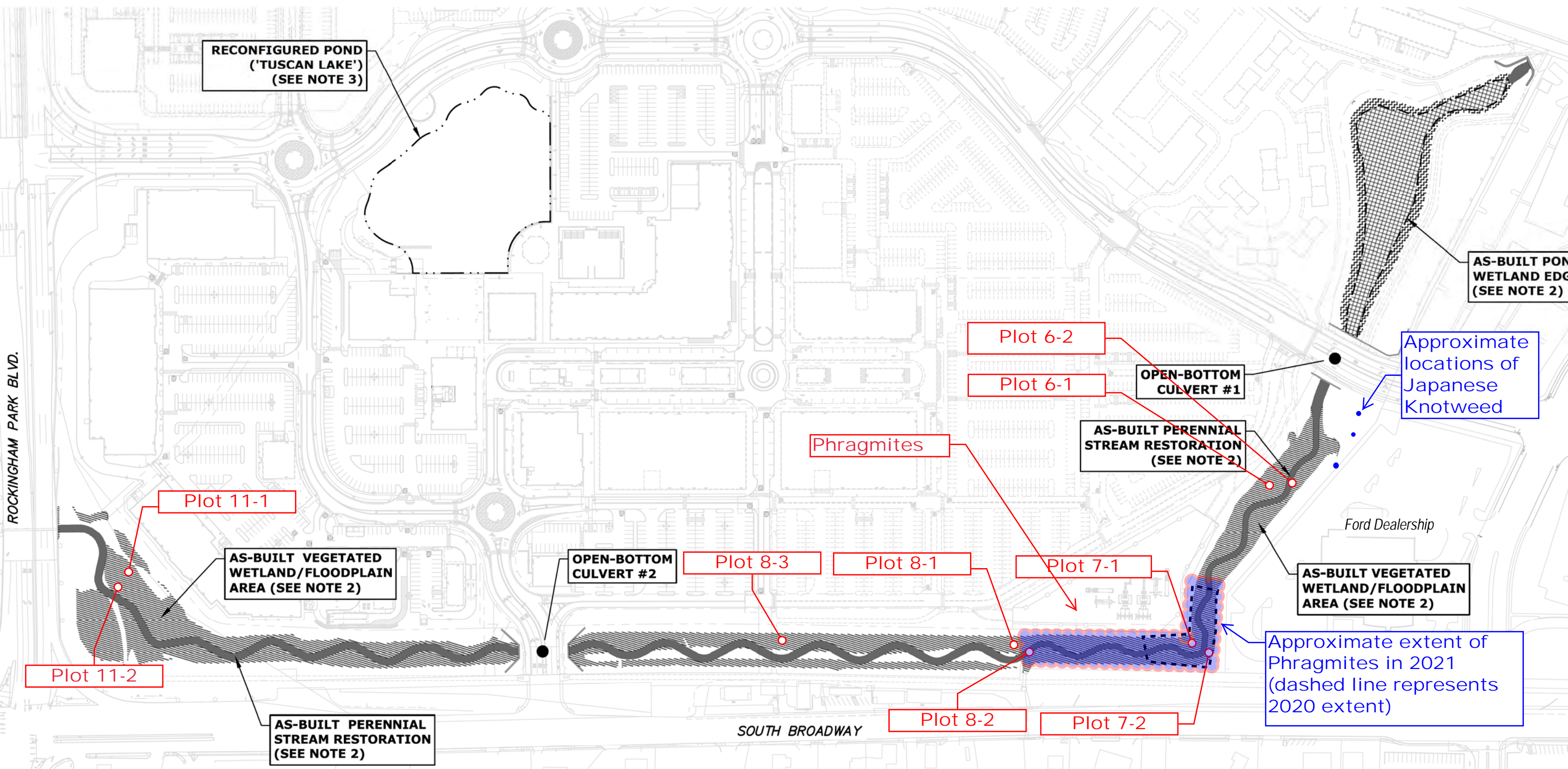
The development of desirable wetland vegetation in the floodplain wetlands is good, already meeting or very nearly meeting overall coverage requirements. A slight decline in average cover due to a decline in less desirable pioneer species has been accompanied by an expansion of more desirable wetland species, especially in the middle floodplain area. This appears to be the result of more frequent inundation on these areas. Woody species have also continued to develop in most areas of the floodplain. Speckled Alder, Willow, and Silky Dogwood are the best represented and the most likely to flourish under the cycle of inundation that appears to be typical for the floodplain. The exception may be the lowermost floodplain which seems likely to develop as primarily emergent wetland.

Purple Loosestrife is widespread in the floodplain but the most practical and effective long term control is already in place in the form of biological control by Galerucella beetle. There is evidence that the beetle is currently exerting pressure on the Purple Loosestrife population.

Aggressive corrective action to address the two invasive species Phragmites and Japanese Knotweed has been recommended and discussed with Tuscan Village personnel. The recommended method for treating the small patches of Japanese Knotweed on the embankment is a foliar treatment of Glyphosate based herbicide and follow up treatment of regrowth in early summer of 2022. Alternative methods may involve careful removal of the above ground portions of the plant smothering with black plastic and mulch, or a combination of smothering and herbicide. The recommended method for treatment of the Phragmites is targeted application of Glyphosate based herbicide using a hand wiping technique to avoid collateral damage to desirable vegetation.

This concludes the 2021 (2nd year) monitoring report.

Figures



Tuscan Village Floodplain Improvement Project--2021 Wetland Monitoring Plan
Reference Plan: Wetland Creation Record Drawing, Tighe&Bond, 9/16/20 (as-built plan)

Appendix A

Photographs

PHOTOGRAPHS
2021 Annual Wetland Monitoring Report (Report #2)
Tuscan Village
Floodplain Improvement Project
September 15, 2021



Photo 1: Transect 6



Photo 2: Data Plot 6-1



Photo 3: Data Plot 6-2



Photo 4: Transect 7



Photo 5: Plot 7-1



Photo 6: Plot 7-2

PHOTOGRAPHS
2021 Annual Wetland Monitoring Report (Report #2)
Tuscan Village
Floodplain Improvement Project
September 15, 2021



Photo 7: Transect 8



Photo 8: Data Plot 8-1



Photo 9: Data plot 8-2



Photo 10: Data Plot 8-3



Photo 11: Data Plot 11-1



Photo 11: Data Plot 11-2



Photo 13: Galerucella beetle is still active on the site but less plant damage is visible in 2021



Photo 14: Japanese Knotweed on the embankment adjacent to Ford Dealership

PHOTOGRAPHS
2021 Annual Wetland Monitoring Report (Report #2)
Tuscan Village
Floodplain Improvement Project
September 15, 2021



Photo 15&16: Same section of floodplain (taken from opposite directions) June 2020 (above) and September 2021 (below)





Photo 17 & 18: The stretch of channel adjacent to the Ford dealership (taken from opposite directions) Sept 2020 (above) and September 2021 (below)



Appendix B

Monitoring Plot Data Forms

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
6-1	SHRUBS				
	Speckled Alder	<i>Alnus rugosa</i>	FACW	10	
	Willow	Salix sp.	FACW	2	
	Winterberry	<i>Illex verticillata</i>	FACW	2	apparent expansion of dormant cutting installation
	HERBS				
	Soft Rush	<i>Juncus effusus</i>	FACW	25	
	Slender False Foxglove	<i>Agalinis tenuifolia</i>	FACW	15	
	Canada Rush	<i>Juncus canadensis</i>	OBL	5	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	5	
	Path Rush	<i>Juncus tenuis</i>	FAC	10	
	Red Clover	<i>Trifolium repens</i>	FACU		
	Purple loosestrife	<i>Lyuthrum salicaria</i>	OBL	(10)	
	TOTAL % COVER (excluding invasive sp).....				74 % up 2% from 2020

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
6-2	SHRUBS				
	Willow	Salix sp.	FACW	20	Dormant cutting installation
	HERBS				
	Woolgrass	Scirpus cyperinus	FACW	30	
	Cattail	Typha latifolia	OBL	30	
	Soft Rush	Juncus effusus	FACW	10	
	Rice Cutgrass	Leersia oryzoides	OBL	2	
	Yellow Sedge	Carex flava	OBL	2	
	Northern Water Plantain	Alisma plantago-aquatica	OBL	2	growth of these aquatic species indicates more prolonged inundation
	Water Primrose	Ludwigia palustirs	OBL	5	
	Nodding Beggarticks	Bidens cernua	OBL		
	Phragmites	Phragmites australis	FACW	(5)	
	Purple loosestrife	Lyuthrum salicaria	OBL	(10)	
	TOTAL % COVER (excluding invasive sp).....				100 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
7-1	SHRUBS				
	Willow	Salix sp.	FACW	2	Dormant cutting installation
	Winterberry	Illex verticillata	FACW	2	2 planted individuals
	Speckled Alder	Alnus rugosa	FACW	2	apparent expansion of planted material
	HERBS				
	Path Rush	Juncus tenuis	FAC	10	
	Nut Sedge	Cyperus esculentus	FACW	10	
	Cattail	Typha latifolia	OBL	10	
	Purple Stem Beggars Tick	Bidens connata	OBL	2	
	Soft Rush	Juncus effusus	FACW	20	
	Willow Herb	Epilobium leptophyllum	OBL	5	
	Slender False Foxglove	Agalinis tenuifolia	FACW		
	Purple loosestrife	Lyuthrum salicaria	OBL	(2)	
	Phragmites	Phragmites australis	FACW	(2)	NEW, has expanded into this area
	TOTAL % COVER (excluding invasive sp).....				63 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
7-2	SHRUBS				
	Willow	Salix sp.	FACW	35	Dormant cutting installation
	HERBS				
	Cattail	<i>Typha latifolia</i>	OBL	30	
	Woolgrass	<i>Scirpus cyperinus</i>	FACW	20	
	Soft Rush	<i>Juncus effusus</i>	FACW	10	
	Water Primrose	<i>Ludwigia palustirs</i>	OBL	2	
	Marsh Bedstraw	<i>Galium palustre</i>	OBL	2	
	Common Groundsel	<i>Senecio vulgaris</i>	FACU		these species appear to have been forced out by wetter conditions
	Nut Sedge	<i>Cyperus esculentus</i>	FACW		
	Purple loosestrife	<i>Lyuthrum salicaria</i>	OBL	(5)	
	TOTAL % COVER (excluding invasive sp).....				99 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS	
	COMMON NAME	SCIENTIFIC NAME		COVER		
8-1	SHRUBS					
	Willow	Salix sp.	FACW	5	apparent expansion of dormant cutting instalation	
	HERBS					
	Barnyard Grass	Echinochloa crusgalli	FACU	15		
	Nut Sedge	Cyperus esculentus	FACW	5		
	Soft Rush	Juncus effusus	FACW	10		
	Purple loosestrife	Lyuthrum salicaria	OBL	(15)		
	Red Clover	Trifolium repens	FACU	25	These UPL leaning species have been pushed out of the area by persist inundation	
	Birdsfoot Trefoil	Lotus corniculatus	FACU	20		
	Slender False Foxglove	Agalinis tenuifolia	FACW	15		
	Common Groundsel	Senecio vulgaris	FAVU	10		
	Crabgrass	Digitaria sanguinalis	FACU	10		
	Common Vetch	Vicia sativa	FACU	5		
	TOTAL % COVER (excluding invasive sp).....				35 %	down 60% at the time of monitoring due to high water

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
8-2	SHRUBS				
	Willow	Salix sp.	FACW	20	Dormant cutting installation
	Silky dogwood	Cornus amomum	FACW	15	Dormant cutting installation
	HERBS				
	Barnyard Grass	Echinochloa crusgalli	FACU	20	
	Nut Sedge	Cyperus esculentus	FACW	2	
	Cattail	Typha latifolia	OBL	5	
	Northern Water Plantain	Alisma plantago-aquatica	OBL	5	
	Pennsylvania Smartweed	Persicaria pensylvanica	FACW	5	
	Water Primrose	Ludwigia palustirs	OBL	5	
	Common Groundsel	Senecio vulgaris	FAVU		
	Purple Stem Beggars Tick	Bidens connata	OBL		
	TOTAL % COVER (excluding invasive sp).....				77% down 10% from 2020

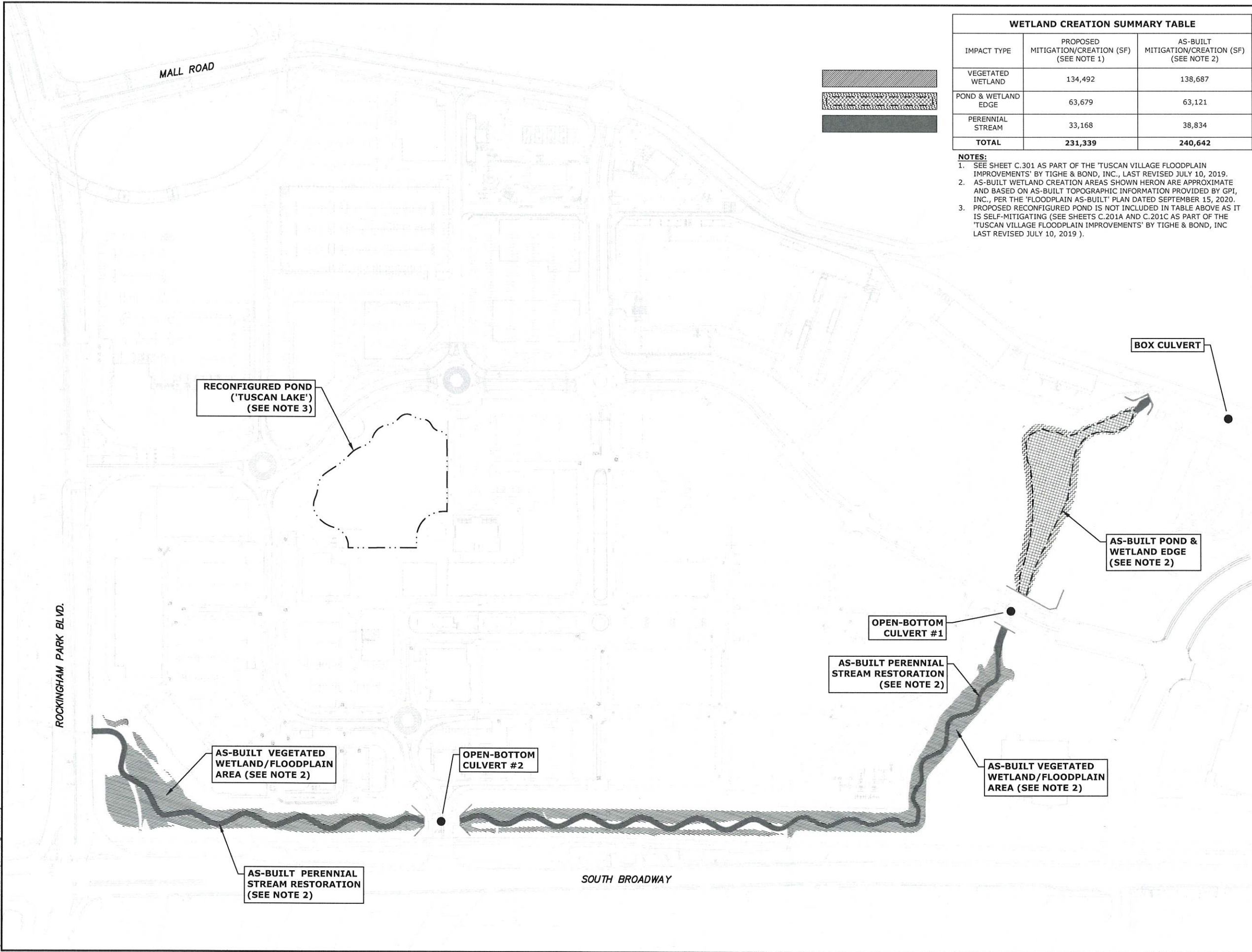
PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
8-3	SHRUBS				
	Willow	Salix sp.	FACW	5	Dormant cutting installation
	Winterberry	Illex verticillata	FACW	2	
	HERBS				
	Barnyard Grass	Echinochloa crusgalli	FACU	20	
	Pennsylvania Smartweed	Persicaria pensylvanica	FACW	10	
	Nut Sedge	Cyperus esculentus	FACW	2	
	Northern Water Plantain	Alisma plantago-aquatica	OBL	5	
	Yellow Sedge	Carex flava	OBL	5	
	Crabgrass	Digitaria sanguinalis	FACU		
	Common Groundsel	Senecio vulgaris	FACU		
	Slender False Foxglove	Agalinis tenuifolia	FACW		
	TOTAL % COVER (excluding invasive sp).....				49 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
11-1	SHRUBS				
	Speckled Alder	<i>Alnus rugosa</i>	FACW	5	2 planted individuals
	Winterberry	<i>Illex verticillata</i>	FACW	2	2 planted individuals
	HERBS				
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	5	
	Soft Rush	<i>Juncus effusus</i>	FACW	30	
	Northern Water Plantain	<i>Alisma plantago-aquatica</i>	OBL	10	
	Pennsylvania Smartweed	<i>Persicaria pensylvanica</i>	FACW	2	
	Rabbits Foot Clover	<i>Trifolium arvense</i>	NI		
	Birdsfoot Trefoil	<i>Lotus corniculatus</i>	FACU		
	TOTAL % COVER (excluding invasive sp).....				54 % down 8% from 2020

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL	COMMENTS
	COMMON NAME	SCIENTIFIC NAME		COVER	
11-2	SHRUBS				
	Willow	Salix sp.	FACW		Dormant cutting installation, installed ~ 30 feet from bank due to extent of flooding at time of installation
	HERBS				
	Northern Water Plantain	Alisma plantago-aquatica	OBL	5	Plot was flooded by more than 12” which appears to be a persistent A. plantago was the only recognizable species but its not clear if others, particularly willow are still viable
	Red Root Flat Sedge	Cyperus erythrorhizos	OBL		
	Barnyard Grass	Echinochloa crusgalli	FACU		
	Common Groundsel	Senecio vulgaris	FACU		
	Pennsylvania Smartweed	Persicaria pensylvanica	FACW		
	Purple loosestrife	Lythrum salicaria	OBL		
	TOTAL % COVER (excluding invasive sp).....				5 %

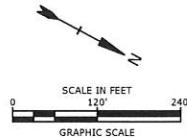
Appendix C
As-Built Plan

Last Saved: 9/16/2020
 User: JMB
 Project: TV Fldm Wetland.dwg
 Title: Tighe & Bond, C:\Users\JMB\Desktop\TV Fldm Wetland.dwg



WETLAND CREATION SUMMARY TABLE		
IMPACT TYPE	PROPOSED MITIGATION/CREATION (SF) (SEE NOTE 1)	AS-BUILT MITIGATION/CREATION (SF) (SEE NOTE 2)
VEGETATED WETLAND	134,492	138,687
POND & WETLAND EDGE	63,679	63,121
PERENNIAL STREAM	33,168	38,834
TOTAL	231,339	240,642

- NOTES:**
- SEE SHEET C.301 AS PART OF THE 'TUSCAN VILLAGE FLOODPLAIN IMPROVEMENTS' BY TIGHE & BOND, INC., LAST REVISED JULY 10, 2019.
 - AS-BUILT WETLAND CREATION AREAS SHOWN HEREON ARE APPROXIMATE AND BASED ON AS-BUILT TOPOGRAPHIC INFORMATION PROVIDED BY GPI, INC., PER THE 'FLOODPLAIN AS-BUILT' PLAN DATED SEPTEMBER 15, 2020.
 - PROPOSED RECONFIGURED POND IS NOT INCLUDED IN TABLE ABOVE AS IT IS SELF-MITIGATING (SEE SHEETS C.201A AND C.201C AS PART OF THE 'TUSCAN VILLAGE FLOODPLAIN IMPROVEMENTS' BY TIGHE & BOND, INC. LAST REVISED JULY 10, 2019).



RECORD DRAWING

**TUSCAN VILLAGE
 FLOODPLAIN
 IMPROVEMENTS**



OMJ REALTY, LLC
 Salem, New Hampshire

VERIFY SCALE
 BAR IS 1 INCH ON
 ORIGINAL DRAWING
 IF NOT ONE INCH ON
 THIS SHEET, ADJUST
 SCALES ACCORDINGLY

1	9/16/2020	WETLAND RECORD DWG
MARK	DATE	DESCRIPTION
PROJECT NO:	M-1775-1	
DATE:	11/28/2016	
FILE:	TV Fldm Wetland.dwg	
DRAWN BY:	JMB	
CHECKED:	JMB	
APPROVED:	BLM	

WETLAND CREATION PLAN:
 RECORD DRAWING

SCALE: AS SHOWN

Appendix D

Permits



The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner



WETLANDS AND NON-SITE SPECIFIC PERMIT 2016-03374 PAGE 1 OF 5

PERMITTEE: OMJ REALTY LLC
63 MAIN STREET
SALEM NH 03079

NOTE CONDITIONS

PROJECT LOCATION: 79 ROCKINGHAM PARK BOULEVARD, SALEM
TAX MAP 98 LOTS 7887 & 12502 ETA
WATERBODY: POLICY BROOK

APPROVAL DATE: AUGUST 16, 2019

EXPIRATION DATE: AUGUST 28, 2022

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued by the New Hampshire Department of Environmental Services (NHDES). This permit shall not be considered valid unless signed as specified below.

*****AMENDMENT*****

PERMIT DESCRIPTION: Impact a total of 74,108 square feet (SF) palustrine wetlands to include 62,273 SF of permanent impact and 11,835 SF of temporary impact along 1,908 linear feet (LF) of Policy Brook, a Tier 3 stream, for the mixed-use redevelopment of the Rockingham Park Racetrack. Work includes the day-lighting of 15,153 LF of Policy Brook as habitat improvement including the construction of 134,912 SF of palustrine emergent and scrub-shrub wetlands adjacent to the Brook.

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by Tighe & Bond dated November 28, 2016 and revised through 7/10/2019 as received by the NH Department of Environmental Services Land Resources Management Program (NHDES) on July 10, 2019. Any changes shall be submitted to NHDES in writing and approved by NHDES prior to implementation.
2. This permit is not valid until it has been recorded with the Rockingham County Registry of Deeds by the applicant. Prior to starting work under this permit, the permittee shall submit a copy of the recorded permit to NHDES by certified mail, return receipt requested.
3. The permittee shall schedule a pre-construction meeting with NHDES staff to occur at least 48 hours prior to the start of any work authorized by this permit to review the conditions of this wetlands permit and the Alteration of Terrain permit. The meeting will be held at the NHDES offices in Concord and shall be attended by the permittee, his/her professional engineer(s), wetlands scientist(s), and the contractor(s) responsible for performing the work.
4. This permit is contingent on receiving written authorization from the NH Department of Transportation for the impacts on Salem Tax Map 151 Lot 12213 and Salem Tax Map 117 Lot 7885.
5. This approval for in-stream work is not valid unless the US Department of Homeland Security's Federal Emergency Management Agency (FEMA) issues a conditional revision to the Flood Insurance Rate Map (FIRM) for Rockingham County, New Hampshire, All Jurisdictions.
6. This permit is not valid unless an Alteration of Terrain permit is issued in accordance with RSA 485-A:17 and Env-Wq 1500.
7. This permit is contingent on review and approval, by the NHDES, of final stream and pond diversion/erosion control plans. Those plans shall detail the timing and method of stream flow and pond diversion during construction, and show temporary siltation/erosion/turbidity control and other stabilization measures and water quality controls to be implemented.

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095

NHDES Main Line: (603) 271-3503 • Subsurface Fax: (603) 271-6683 • Wetlands Fax: (603) 271-6588

TDD Access: Relay NH 1 (800) 735-2964

8. The permittee shall submit an existing conditions report and monitoring reports for the Rockingham Boulevard culvert for signs of erosion of the embankments adjacent to the culvert. These reports shall be included in the post construction monitoring report of the stream system for each year the post-construction monitoring reports are submitted.
9. No person undertaking any activity shall cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards in RSA 485-A and Env-Wq 1700.
10. Any further alteration of areas on this property that are subject to RSA 482-A jurisdiction will require further permitting.
11. Construction equipment shall be inspected daily for leaking fuel, oil, and hydraulic fluid prior to entering surface waters or wetlands or operating in an area where such fluids could reach groundwater, surface waters, or wetlands.
12. The permittee's contractor shall maintain appropriate oil/diesel fuel spill kits on site that are readily accessible at all times during construction, and shall train each operator in the use of the kits.
13. All refueling of equipment shall occur outside of surface waters or wetlands during construction. Machinery shall be staged and refueled in upland areas only.
14. Faulty equipment shall be repaired immediately prior to entering areas that are subject to RSA 482-A jurisdiction.
15. The contractor responsible for completion of the work shall use techniques described in the New Hampshire Stormwater Manual, Volume 3, Erosion and Sediment Controls During Construction (December 2008).
16. The project engineer shall oversee installation of erosion controls and periodically verify that the controls are properly maintained during construction.
17. Appropriate siltation and erosion controls shall be in place prior to construction, shall be maintained during construction, and shall remain until the area is stabilized. Temporary controls shall be removed once the area has been stabilized.
18. Appropriate turbidity controls shall be installed prior to construction, shall be maintained during construction such that no turbidity escapes the immediate work site and shall remain until suspended particles have settled and water at the work site has returned to normal clarity.
19. Work shall be conducted in a manner so as to minimize turbidity and sedimentation to surface waters and wetlands.
20. No work shall occur adjacent to the Osprey nest until after the Osprey have migrated south for the winter. The Osprey nest relocation shall be supervised by a certified wildlife biologist (CWB) and the permittee shall provide the name and contact information for the CWB to NHDES prior to nest relocation.
21. Written confirmation and photographs of the nest relocation shall be submitted to NHDES and the US Army Corps of Engineers (ACOE) within 30 days of completion of the relocation work.
22. All dredged and excavated material and construction-related debris shall be placed outside of areas subject to RSA 482-A.
23. No excavation shall be done in flowing water and no construction equipment shall be operated in flowing water.
24. Prior to commencing work located within Policy Brook the permittee or permittee's contractors shall construct a cofferdam to isolate the work area from Policy Brook.
25. Cofferdams shall not be installed during periods of high flow, whether due to seasonal runoff or precipitation. Once the cofferdam is fully effective, confined work can proceed without restriction.
26. Work within Policy Brook, inclusive of work associated with installation of a cofferdam, shall be done during periods of low flow only. The permittee shall monitor local weather forecasts to avoid working during events until low flow conditions have returned.
27. Discharge from dewatering of work areas shall be to sediment basins that are: a) located in uplands; b) lined with hay bales or other acceptable sediment trapping liners; c) set back as far as possible from wetlands and surface waters, with a preferred undisturbed vegetated buffer of at least 50 feet and a minimum undisturbed vegetative buffer of 20 feet.
28. Any work performed to 'Tuscan Pond' shall be done only under drawn down conditions. Any fish and/or amphibian species relocated from the pond shall be documented, including but not limited to, species and size. NHDES shall be provided the list of relocated species within 7-days following the completion of draw down. The relocation shall be supervised by a CWB.
29. Dredged materials, whether to be stockpiled or disposed of, shall be dewatered in sedimentation basins lined with siltation and erosion controls, and located outside of areas subject to RSA 482-A jurisdiction.
30. The temporary cofferdam shall be entirely removed within 2 days after work within the cofferdam is completed and water has returned to normal clarity.
31. Proper headwalls shall be constructed over the ends of the upgraded culverts within seven days of culvert installation.
32. Any fill used shall be clean sand, gravel, rock, or other suitable material.
33. Precautions shall be taken to prevent the import or transport of soil or seed stock containing nuisance, invasive plant species such as Purple Loosestrife (*Lythrum salicaria*), Knotweed (*Fallopia japonica*), or common reed (*Phragmites*

australis). The contractor responsible for work shall appropriately address invasive species in accordance with the NHDOT Best Management Practices for Roadside Invasive Plants (2008).

34. At least 133,993 square feet of palustrine emergent and scrub shrub wetlands along 15,153 linear feet of Policy Brook shall be constructed, monitored and managed in accordance with the plans and details as approved by NHDES in accordance with condition 1 above.

35. The permit is contingent on the permittee providing start dates for NHDES to review and approve the stream and wetland construction project to commence, dates for completion of plantings and dates for the site to be finalized.

36. The permit is contingent on the permittee providing dates for NHDES to review and approve for submittal of post construction monitoring report.

37. The permit is contingent on NHDES and ACOE approval of a permittee developed monitoring plan that establishes performance standards for the stream and wetland construction project.

38. All construction activities, including the stream construction, shall be carried out and supervised by qualified professionals. More specifically, the stream construction activities shall be performed by an individual(s) with a combination of education and experience, such as a fluvial geomorphologist or hydrologist, who has knowledge sufficient to enable the individual to evaluate stream systems. The permittee shall notify NHDES of the name and contact information of the qualified professional(s) and shall re-notify NHDES of any changes of qualified professional(s).

39. A qualified professional(s) shall supervise the construction activities to ensure that the work is accomplished pursuant to this approval.

40. Siltation, erosion, and turbidity control management measures, practices and devices shall be in place prior to construction, shall be maintained during construction so as to reduce erosion and retain sediment on-site during and after construction and ensure continued effectiveness and remain in place until all disturbed surfaces are stabilized

41. All steps shall be taken during the stream and wetland habitat improvement work that are necessary to ensure that no water quality violations occur.

42. Within three days following the last activity in the stream and wetland area or where activities are suspended for more than three days, all soils exposed by construction activities shall be stabilized by seeding and mulching, or through erosion control blankets as necessary, with review and approval by NHDES.

43. Wetland soils from areas vegetated with the invasive plant species identified in Condition 34 shall not be used in the wetland construction site.

44. The invasive plant species shall be controlled by measures approved by NHDES if the species is found in the construction areas during construction and during the early stages of vegetative establishment.

45. The habitat improvement shall not be considered successful if sites are newly invaded by invasive plant species during the first full growing season following the completion of construction. The applicant shall work with NHDES to attempt to eradicate nuisance species found in the restoration area during this same period.

46. Materials used to emulate a natural channel bottom must be consistent with the streambed materials identified in the reference reach, and shall not include angular riprap or gravel unless specifically identified on the approved plans.

47. There shall be no substitutions made for the plant species specified on the approved plans for replanting purposes without prior written approval from NHDES. Woody material may be incorporated into the stream system as recommended by the qualified professional to improve habitat conditions of the stream.

48. The qualified professional(s) shall inspect the construction areas and submit a monitoring report to NHDES after a rain event of 1/2 inch or greater within a 24 hour period during restoration activities. The monitoring reports shall include, but not be limited to, documentation of erosion control deployment, construction sequencing, construction activities and status of construction at time of initial monitoring report. Photographs should depict all stages of construction sequencing.

49. Stream banks and wetland areas shall have at least 75% successful establishment of hydrophytic vegetation after two (2) growing seasons, or shall be replanted and re-established until a functional wetland is established to the satisfaction of NHDES and ACOE.

50. For construction and monitoring purposes of the stream and wetland construction areas, a minimum of ten cross section station locations shall be identified on the plans for review and approval by NHDES and the ACOE.

51. Separate post-construction reports for the stream/wetland and pond construction, prepared by a Certified Wetland Scientist and the qualified stream professional, as applicable, documenting status of the stream/wetland and pond construction areas, including photographs of all stages of construction from designated photo stations and an as-built plan, a longitudinal profile with water depth within the creation areas, shall be submitted to the NHDES within 60 days of the completion of stream/wetland construction and within 60 days of the completion of the pond construction. The post construction reports shall note the area of the stream/wetland and pond construction areas.

52. Subsequent monitoring reports of the stream and wetland construction, prepared by a qualified professional, shall be submitted to NHDES by September 15, 2020, September 15, 2021, September 15, 2022, September 15, 2023, and September 15, 2024 to document the success of the construction and outline a schedule for remedial actions if necessary. Such reports shall be submitted to NHDES, the ACOE, and Salem Conservation Commission with narrative description, photographs, from predetermined photo stations and the cross-sections, demonstrating the conditions on the site, a summary on vegetative success, any necessary remedial actions to improve plant establishment, flood storage capacity, and a schedule for completing the remedial actions and conducting follow up inspections.

53. Subsequent monitoring reports of the pond construction, prepared by a qualified professional, shall be submitted to NHDES by September 15, 2021, September 15, 2022, September 15, 2023, September 15, 2024, and September 15, 2025 to document the success of the construction and outline a schedule for remedial actions if necessary. Such reports shall be submitted to NHDES, the ACOE, and Salem Conservation Commission with narrative description, photographs, from predetermined photo stations and the cross-sections, demonstrating the conditions on the site, a summary on vegetative success, any necessary remedial actions to improve plant establishment, flood storage capacity, and a schedule for completing the remedial actions and conducting follow up inspections.

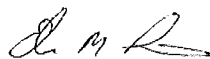
54. Remedial actions may include, but are not limited to replanting, relocation of plantings, removal of invasive species, altering the soil composition or depths, deconsolidation of soils due to compaction, altering the elevation of the wetland surface, changing the stream geometric contours, or hydraulic regime.

55. Upon being notified by the qualified professional who is monitoring the project that the stream or wetland area have not met the performance standards after the second growing season, the permittee shall submit to NHDES an in lieu mitigation payment to compensate for the portions of the project that failed to meet the performance standards. The payment shall be determined by NHDES, ACOE and the US Environmental Protection Agency.

GENERAL CONDITIONS THAT APPLY TO ALL NHDES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The NHDES Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US EPA, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources (NH Department of Cultural Resources), NHDES Alteration of Terrain, etc.);
5. Transfer of this permit to a new owner shall require notification to and approval by NHDES;
6. This project has been screened for potential impacts to **known** occurrences of protected species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have only received cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species;
7. Review enclosed sheet for status of the US Army Corps of Engineers' federal wetlands permit.

APPROVED:



Eben Lewis
Wetlands Bureau
Land Resources Management

BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)