



GOVE ENVIRONMENTAL SERVICES, INC.

**2020 ANNUAL WETLAND  
MONITORING REPORT  
(REPORT 1)**

**for**

**TUSCAN VILLAGE  
POLICY BROOK FLOODPLAIN  
IMPROVEMENT PROJECT**

Salem, New Hampshire

September 15, 2020

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 first of five (5) reports required by the NH Department of Environmental Services (NHDES) under Permit No. 2016-03374 (the Wetland Permit). The annual post construction monitoring of wetlands associated with the main pond in the center of the development (Tuscan Pond) is not included in this report since this element of the project is not yet complete. It is anticipated that post construction monitoring of the pond will commence in the fall of 2021 and be included in the next monitoring report. Also, the integrity of the floodplain and elements of stream channel morphology are being monitored and reported on separately by Tighe&Bond under a different schedule in accordance with the approved Stream Monitoring Protocol.

The following sections provide an overview of construction period, an overview of the success standards, and 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 Construction

Construction for the floodplain improvements began in the summer of 2017 with the installation of the long section of box culvert that would carry the stream from Pleasant Street to the proposed pond and beginning of the new stream alignment. Various portions of the floodplain were constructed over the next two years with delays being incurred by high water levels, a major contractor change, unanticipated need for blasting, and the need to obtain additional authorizations for offsite work to alleviate high water conditions. These are detailed in the Construction Update submitted to the NH Department of Environmental Services (NHDES) on 4/15/19. Substantial work was completed over the constriction season following that update report. All major grading was completed, live flow was initiated in the channel, and embankment areas were planted by the end of 2019.

The remainder of plantings in wetland areas were delayed over concerns that high water levels, particularly in the lower portions of the floodplain, would result in the immediate mortality of potted plant material. A change in the planting schedule was requested and approved in October 2019. The revised planting schedule greatly reduced the number of containerized and bare root plantings and substituted additional seed mixes for diversity, including with shrub seed. The revised list is presented below. These plantings along with the dormant willow and dogwood cuttings were installed in the spring of 2020.

By late summer 2020 the floodplain was considered complete following the planting and completion of outstanding items identified during construction monitoring. Notable among these was the reconstruction of the pool-riffle feature at the pond outlet and the channel rock veins in the lower sections of floodplain. An extensive photo documentation of the construction can be found in the final report completed by Tighe & Bond which includes the compiled weekly monitoring reports completed between August 2017 and September 2020.

**Table 1—Approved Revised Planting List**

<b>AREA A: STREAMBANK MARGIN (6,700 LF)</b>			
<b>Layer</b>	<b>Species</b>	<b>Type/Size</b>	<b>Number</b>
Shrub	Willow ( <i>Salix</i> sp.)	Dormant cuttings	25,000
Shrub	Silky dogwood ( <i>Cornus amomum</i> )	Dormant cuttings	15,000
<b>AREA B: NARROW CHANNEL AREA (65,400 SF)</b>			
Shrub	Winterberry ( <i>Ilex verticillata</i> )	1gal. pots	60
Shrub	Northern Arrowood ( <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
<b>AREA C: PIT &amp; MOUND SCRUB SHRUB AREA (87,100 SF)</b>			
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
<b>AREA D: EMBANKMENTS (152,500 SF)</b>			

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	Shadblush ( <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

## 3.0 Monitoring Requirements and Success Standards

Monitoring of the floodplain wetland will consist of a spring visit to assess early season, presumably during high water, followed by a comprehensive monitoring at the end of the growing season. The end of growing season will include 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?

## 4.0 Monitoring Summary

This year was the first post construction monitoring of this site. Monitoring was conducted on 9/10/20 and 9/14/20 during which data plots were established at nine (9) locations. Eight of these plots were established along Transacts 6, 7, 8, and 11 as identified in the monitoring protocol. At each transect the first Plot (#-1) was established in the broader wetland portion of the stream meander while the second (#-2) was established close the bank to capture the differences between these two zones which were already quite evident. An additional 9<sup>th</sup> plot (8-3) was established in the narrow channel

area near the crossing. The location of these data plots and other relevant items are depicted on the monitoring plan, included before the appendices.

Monitoring of the data plots included collection of vegetation data and hydrology observations. Soils were also described along each transect with an emphasis on documenting the development of hydric soil indicators. Photographs were taken along each transect and of each data plot. General observations were also made site wide along with the documentation of invasive species. 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.

## 4.1 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, therefore, limited to observations of inundation, saturation, and other indicators of the presence and duration of wetland hydrology. Generally, these are the same indicators that are used for wetland delineation and therefore provide a useful indicator of the areas success at meeting this wetland criteria. In the case of the wetlands at this site, which were constructed with flood storage in mind, attention was paid to indicators that these functions being supported by the hydrology achieved in the created wetland areas.

The design goal was for the wetland areas within the floodplain to be permanently saturated and seasonally flooded. Water levels were generally much higher than this during the construction period though, particularly in the lower floodplain. After live flow had been established through the stream channel it seemed clear that the hydrology would be much less stable than anticipated. Wetlands in the created floodplain will likely be flooded, at least shallowly, on a regular basis, and possibly much drier than anticipated between rain events.

Southern New Hampshire experienced drought conditions for much of the growing season in 2020 so particularly dry conditions were observed during the 2020 monitoring. Soils remained slightly saturated further from the bank of the stream and fully saturated near the stream, which maintained a subtle flow barely covering the rock veins in most cases. There is ample evidence that the adjacent wetland areas will continue to be inundated during rain events in more typical years. Hydrology does, therefore, seem to be suitable to support hydrophytic vegetation.

## 4.2 Vegetation

To document the development of vegetation at the site and address the success standards, data was collected at the nine (9) vegetation monitoring plots established within the floodplain (see Monitoring Plan). 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 at each plot. The data recorded at these plots can be found in Appendix B. Table 2 provides a list of species observed in the data plots and elsewhere in the floodplain. Table 3 summarizes the data in terms of the success standards.

Future monitoring reports will include a detailed discussion of each plot, notable changes, and the relevant success standards. At this early stage, the status of vegetation within the floodplain wetland areas can be generally described as meeting or very nearly meeting coverage requirements with an average cover of just over 79% excluding invasive species. Diversity of vegetation in the monitoring area varies along a gradient from upstream to downstream. Upstream areas, which were completed earlier during the construction period, particularly the first section of stream channel below the pond, are much better developed. This is also likely compounded by more frequent and longer inundation experienced in the lower floodplain. Vegetation should become more consistent over the monitoring period as more recently constructed areas mature and species occupy niche areas with the most suitable hydrology.

The less well developed areas are occupied by pioneer species such as Pennsylvania Smartweed, groundsel, and clovers. This is quite common in newly constructed wetland areas as many seed species are slow to germinate. Woody plantings in these broader areas were deliberately minimal but are showing signs of growth. In future monitoring years, particular attention will be paid to documenting the expansion of cover by shrub species, whether from seed, volunteer species, or the proliferation of planted container stock.

Importantly, the banks of stream channel are consistently well vegetated throughout the floodplain. Species from the seed mixes as well as common volunteer species are well represented, particularly in the areas seeded more than a year ago. Unsurprisingly, Cattail is present along the stream edge in most areas. The dormant willow and dogwood cutting installed this spring have sprouted nicely and can be expected to flourish. The primary intent of the dormant woody cuttings was to anchor coir log/soil interface and secure the bank of the stream. Over the rather long duration of construction, however, the coir lot installation has proved quite stable and the bank was well vegetated in many areas when the dormant cuttings were finally installed. Some of the dormant cuttings were therefore also installed beyond the bank up to several feet away to supplement the adjacent wetland areas. A healthy corridor of shrub vegetation is anticipated along the stream by the end of next season

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

Herbs	
Common Name	Scientific Name
Beggars Tick	<i>Bidens</i> sp.
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>
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>
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>
Unidentified Grass	<i>Unknown</i>
Phragmites	<i>Phragmites australis</i>
Pennsylvania Smartweed	<i>Persicaria pensylvanica</i>
Shrubs	
Common Name	Scientific Name
Arrowwood	<i>Viburnum dentatum</i>
Silky Dogwood	<i>Cornus amomum</i>
Speckled Alder	<i>Alnus rugosa</i>
Winterberry	<i>Ilex verticillata</i>
Willow	<i>Salix</i> sp.

**Table 3—Summary Vegetation Coverage Data**

Plot #*	Areal Coverage of Shrub Layer (%)	Areal Coverage of Herbaceous Layer (%)	Total Areal Coverage (%)	Areal Coverage of Invasive Species (%)
<b>6-1</b>	7	64	71	0
<b>6-2</b>	20	62	82	15
<b>7-1</b>	4	55	59	2
<b>7-2</b>	30	67	97	5
<b>8-1</b>	0	95	95	0
<b>8-2</b>	25	62	87	0
<b>8-3</b>	2	62	64	0
<b>11-1</b>	7	55	62	0
<b>11-2</b>	5	92	97	2
<b>AVERAGE</b>	<b>11.1</b>	<b>68.2</b>	<b>79.3</b>	<b>2.7</b>

### 4.3 Invasive Species

Two invasive species were observed in the floodplain, Purple Loosestrife and Phragmites. Together less than 3% cover was recorded in all the data plots with Purple Loosestrife being more widely distributed, mostly along the bank of the stream. Fortunately, Galerucella beetle, which has been widely introduced in the region for biological control of Purple Loosestrife was also confirmed to be active on the site. This should help keep this species under. The presence and relative activity of Galerucella beetle activity will be noted in future reports. More concerning is the emergence of Phragmites which is limited to the area immediately upstream and downstream of Transect 6 where the stream turns south (see monitoring plan). Eradication of Phragmites from the site is possible at this early stage, but it is very important that it be addressed now before the species proliferates into a much more difficult problem.

### 4.4 Soils and Stability

Although there have been a number of small erosion and slope stability issues over the course of construction these have been largely related to runoff from the larger construction site outside the floodplain. The stream channel and adjacent floodplain wetlands have proved very stable under a variety of water levels. As stated in the introduction, the integrity of the stream and floodplain from a stream morphology and engineering standpoint will be monitored separately by the engineer. The wetland monitoring will focus on the development of hydric soil indicators suggesting long term wetland hydrology has been achieved. Soil descriptions from each transect are provided in Table 4.

**Table 4—Soil Descriptions**

<b>Soil observation at Transect 6:</b>	
<b>Depth</b>	<b>Horizon/Description</b>
0" – 4"	<b>A</b> 2.5 Y 3/1— Oxidized rhizospheres Mucky coarse sand (moist) Wetland soil placed during construction
4" – 8"	<b>Bh</b> 10YR 3/4—7.5YR3/2 Loamy sand, evidence of organic matter transport and accumulation
8" – 16" +	<b>C</b> 2.5Y 6/3 Loamy sand construction subgrade
<b>Soil observation at Transect 7:</b>	
<b>Depth</b>	<b>Horizon/Description</b>
0" – 12"	<b>A</b> 2.5 Y 3/1—10YR 3/3 2% Redox faint Mucky coarse sand (moist) Wetland soil placed during construction
12" – 18" +	<b>C</b> 2.5Y 6/4—7.5 YR 4/6 redox 5% Loamy sand construction subgrade
<b>Soil observation at Transect 8:</b>	
<b>Depth</b>	<b>Horizon/Description</b>
0" – 12"	<b>A</b> 2.5 Y 3/2—2.5Y 4/4 2% redox faint Mucky coarse sand (moist) Wetland soil placed during construction
12" – 16" +	<b>C</b> 5Y 4/2 Dense sand and gravel construction subgrade
<b>Soil observation at Transect 11:</b>	
<b>Depth</b>	<b>Horizon/Description</b>
0" – 6"	<b>A</b> 2.5 Y 4/2

	Mucky coarse sand (moist) Wetland soil placed during construction
6"–18" +	<b>C</b> 5Y 5/2—5Y 5/6 10% redox Dense sand and gravel construction subgrade

## 5.0 Conclusions and Recommendations

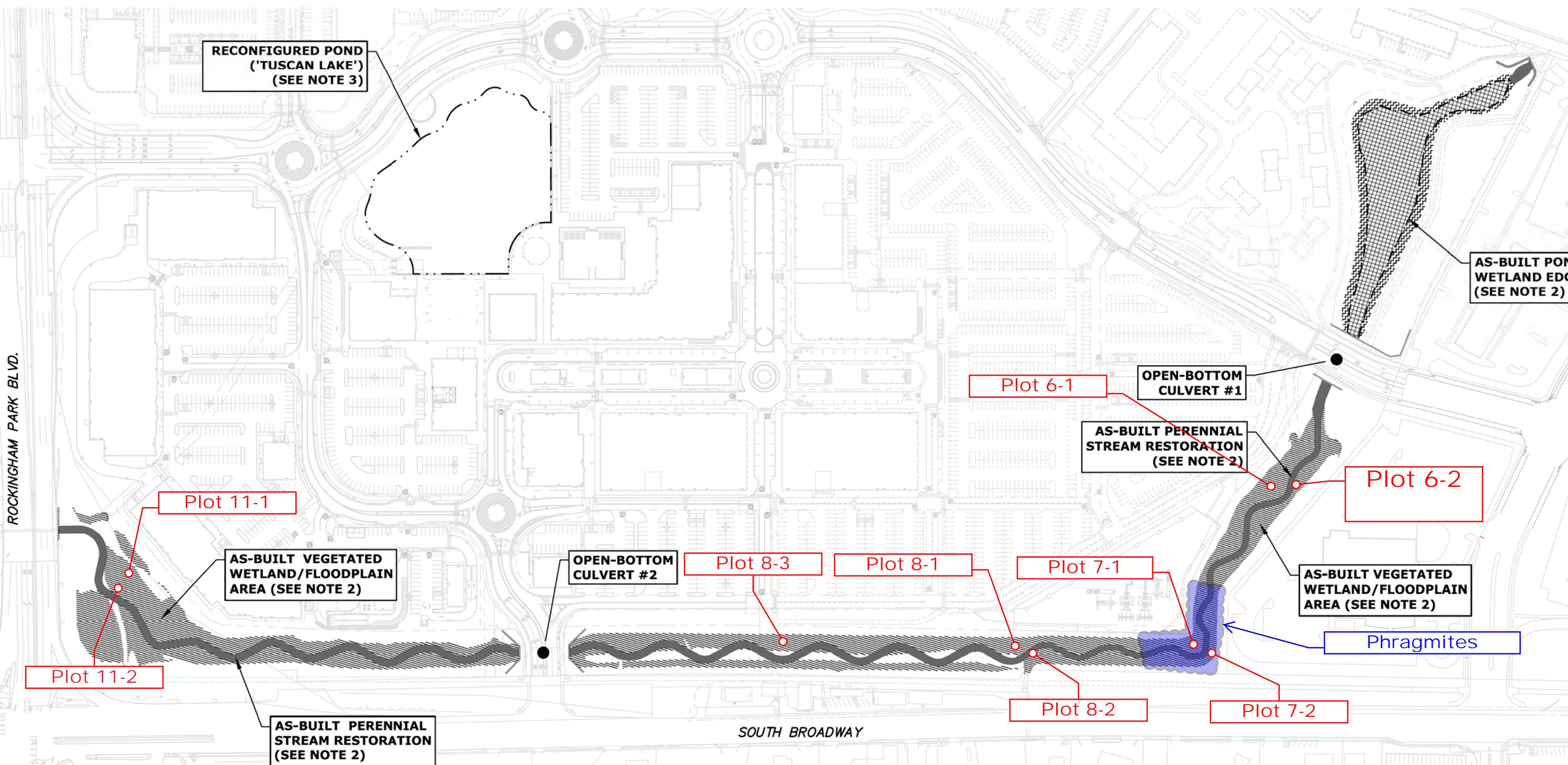
The development of planted woody species and seed mix is good and, in general, the floodplain meets or exceeds overall coverage requirements. Coverage by common pioneer species should decline as more desirable and diverse plant community develops including shrub species. These will be key focus points in the coming monitoring efforts. Invasive species are currently limited and the presence of Galerucella beetle is promising as it should help control Purple Loosestrife in the floodplain.

One important corrective action is recommended. A concerted effort needs to be made to eradicate this invasive species before it becomes entrenched. The recommended method is targeted application of Glyphosate based herbicide with a hand wiping technique to avoid collateral damage to desirable vegetation.

This concludes the 2020 (1<sup>st</sup> year) monitoring report.

## Figures

ROCKINGHAM PARK BLVD.



Tuscan Village Floodplain Improvement Project--2020 Wetland Monitoring Plan

Reference Plan: Wetland Creation Record Drawing, Tighe&Bond, 9/16/20 (as-built plan)

## **Appendix A**

### **Photographs**

**PHOTOGRAPHS**  
**2020 Annual Wetland Monitoring Report (Report #1)**  
**Tuscan Village**  
**Floodplain Improvement Project**  
**September 15, 2020**

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**Photo 1: Transect 6**



**Photo 2: Data Plot 6-1**

**PHOTOGRAPHS**  
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**Photo 3: Data Plot 6-2**



**Photo 4: Transect 7**

**PHOTOGRAPHS**  
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**Photo 5: Plot 7-1**



**Photo 6: Plot 7-2**

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**Photo 7: Transect 8**



**Photo 8: Data Plot 8-1**

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**Photo 9: Data plot 8-2**



**Photo 10: Data Plot 8-3**

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**Photo 11: Data Plot 11-1**



**Photo 11: Data Plot 11**

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**Photo 13: Galerucella beetle acting on Purple Loosestrife, June 2020**



**Photo 14: Purple Loosestrife damage September 2020**

**PHOTOGRAPHS**  
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**Photo 15&16: June 2020, dormant cuttings installed in May are sprouting**



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**Photo 17: The stretch of channel adjacent to the Ford dealership is very well vegetated**



**Photo 18: Phragmites near Ford dealership needs to be addressed (see monitoring plan for location)**

**Appendix B**  
**Monitoring Plot Data Forms**

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
6-1	<b>SHRUBS</b>				
	Speckled Alder	<i>Alnus rugosa</i>	FACW	5	
	Winterberry	<i>Ilex verticillata</i>	FACW	2	
	<b>HERBS</b>				
	Soft Rush	<i>Juncus effusus</i>	FACW	20	
	Slender False Foxglove	<i>Agalinis tenuifolia</i>	FACW	25	
	Canada Rush	<i>Juncus canadensis</i>	OBL	2	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	2	
	Red Clover	<i>Trifolium repens</i>	FACU	5	
	Path Rush	<i>Juncus tenuis</i>	FAC	10	
	TOTAL % COVER (excluding invasive sp).....			71 %	

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
6-2	<b>SHRUBS</b>				
	Willow	Salix sp.	FACW	20	Dormant cutting installation
	<b>HERBS</b>				
	Woolgrass	<i>Scirpus cyperinus</i>	FACW	20	
	Cattail	<i>Typha latifolia</i>	OBL	25	
	Soft Rush	<i>Juncus effusus</i>	FACW	10	
	Rice Cutgrass	<i>Leersia oryzoides</i>	OBL	5	
	Yellow Sedge	<i>Carex flava</i>	OBL	2	
	Nodding Beggarticks	<i>Bidens cernua</i>	OBL	5	
	Phragmites	<i>Phragmites australis</i>	FACW	(5)	
	Purple loosestrife	<i>Lythrum salicaria</i>	OBL	(10)	
TOTAL % COVER (excluding invasive sp).....				82 %	

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
7-1	<b>SHRUBS</b>				
7-1	Willow	Salix sp.	FACW	2	Dormant cutting installation
	Winterberry	<i>Ilex verticillata</i>	FACW	2	2 planted individuals
	<b>HERBS</b>				
	Path Rush	<i>Juncus tenuis</i>	FAC	20	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	20	
	Cattail	<i>Typha latifolia</i>	OBL	5	
	Purple Stem Beggars Tick	<i>Bidens connata</i>	OBL	5	
	Slender False Foxglove	<i>Agalinis tenuifolia</i>	FACW	5	
	Purple loosestrife	<i>Lythrum salicaria</i>	OBL	(2)	
TOTAL % COVER (excluding invasive sp).....				59 %	

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
7-2	<b>SHRUBS</b>				
	Willow	Salix sp.	FACW	30	Dormant cutting installation
	<b>HERBS</b>				
	Cattail	<i>Typha latifolia</i>	OBL	30	
	Woolgrass	<i>Scirpus cyperinus</i>	FACW	20	
	Soft Rush	<i>Juncus effusus</i>	FACW	10	
	Common Groundsel	<i>Senecio vulgaris</i>	FAVU	5	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	2	
	Purple loosestrife	<i>Lythrum salicaria</i>	OBL	(5)	
	TOTAL % COVER (excluding invasive sp).....			97 %	

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
8-1	<b>SHRUBS</b>				
	No shrubs				
	<b>HERBS</b>				
	Red Clover	<i>Trifolium repens</i>	FACU	25	
	Birdsfoot Trefoil	<i>Lotus corniculatus</i>	FACU	20	
	Slender False Foxglove	<i>Agalinis tenuifolia</i>	FACW	15	
	Common Groundsel	<i>Senecio vulgaris</i>	FAVU	10	
	Barnyard Grass	<i>Echinochloa crusgalli</i>	FACU	10	
	Crabgrass	<i>Digitaria sanguinalis</i>	FACU	10	
	Common Vetch	<i>Vicia sativa</i>	FACU	5	
	TOTAL % COVER (excluding invasive sp).....				95 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
8-2	<b>SHRUBS</b>				
8-2	Willow	Salix sp.	FACW	10	Dormant cutting installation
	Silky dogwood	<i>Cornus amomum</i>	FACW	15	Dormant cutting installation
	<b>HERBS</b>				
	Barnyard Grass	<i>Echinochloa crusgalli</i>	FACU	30	
	Common Groundsel	<i>Senecio vulgaris</i>	FAVU	15	
	Purple Stem Beggars Tick	<i>Bidens connata</i>	OBL	10	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	5	
	Northern Water Plantain	<i>Alisma plantago-aquatica</i>	OBL	2	
TOTAL % COVER (excluding invasive sp).....				87 %	

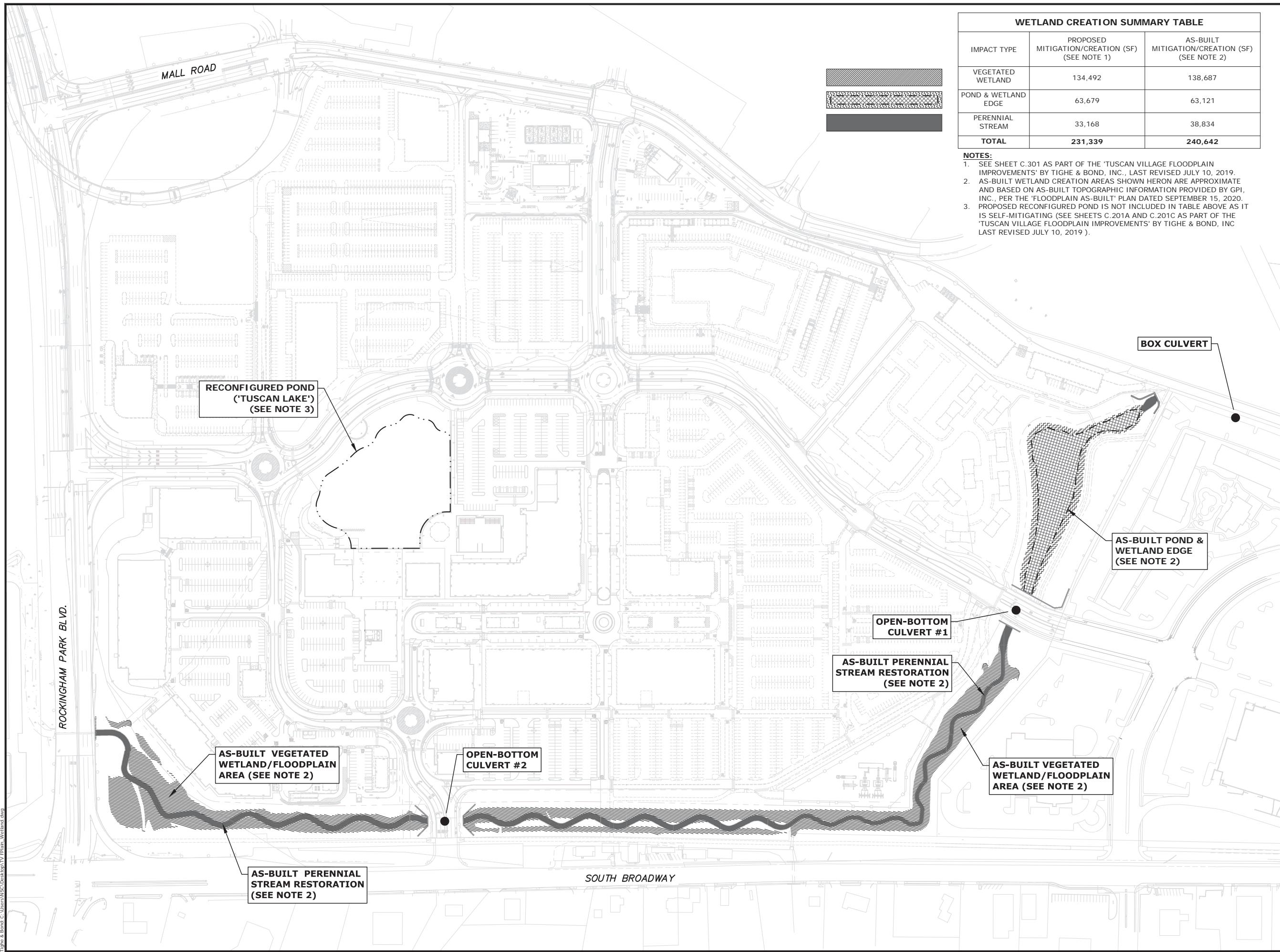
PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
8-3	<b>SHRUBS</b>				
	Willow	Salix sp.	FACW	2	Dormant cutting installation
	<b>HERBS</b>				
	Barnyard Grass	<i>Echinochloa crusgalli</i>	FACU	30	
	Crabgrass	<i>Digitaria sanguinalis</i>	FACU	15	
	Common Groundsel	<i>Senecio vulgaris</i>	FACU	5	
	Slender False Foxglove	<i>Agalinis tenuifolia</i>	FACW	5	
	Pennsylvania Smartweed	<i>Persicaria pensylvanica</i>	FACW	5	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	2	
	TOTAL % COVER (excluding invasive sp).....			64 %	

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
11-1	<b>SHRUBS</b>				
11-1	Speckled Alder	<i>Alnus rugosa</i>	FACW	5	2 planted individuals
	Winterberry	<i>Ilex verticillata</i>	FACW	2	2 planted individuals
	<b>HERBS</b>				
	Birdsfoot Trefoil	<i>Lotus corniculatus</i>	FACU	35	
	Nut Sedge	<i>Cyperus esculentus</i>	FACW	10	
	Soft Rush	<i>Juncus effusus</i>	FACW	5	
	Rabbits Foot Clover	<i>Trifolium arvense</i>	NI	5	
	TOTAL % COVER (excluding invasive sp).....				62 %

PLOT ID	COMPOSITION OF PLANTS		INDICATOR STATUS	% AREAL COVER	COMMENTS
	COMMON NAME	SCIENTIFIC NAME			
11-2	<b>SHRUBS</b>				
	Willow	Salix sp.	FACW	5	Dormant cutting installation, installed ~30 feet from bank due to extent of flooding at time of installation
<b>HERBS</b>					
	Red Root Flat Sedge	<i>Cyperus erythrorhizos</i>	OBL	80	Thought to be native volunteer
	Barnyard Grass	<i>Echinochloa crusgalli</i>	FACU	5	
	Common Groundsel	<i>Senecio vulgaris</i>	FACU	2	
	Pennsylvania Smartweed	<i>Persicaria pensylvanica</i>	FACW	5	
	Purple loosestrife	<i>Lythrum salicaria</i>	OBL	(2)	
	TOTAL % COVER (excluding invasive sp).....				97 %

## **Appendix C**

### **As-Built Plan**

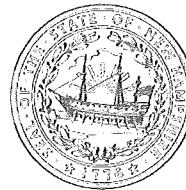


## **Appendix D**

### **Permits**



The State of New Hampshire  
**Department of Environmental Services**



**Robert R. Scott, Commissioner**

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

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**PERMITTEE:** **OMJ REALTY LLC** **NOTE CONDITIONS**  
**63 MAIN STREET**  
**SALEM NH 03079**

**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**

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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.

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.

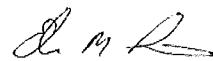
54. Remedial actions may include, but are not limited to replanting, relocation of plantings, removal of invasive species, altering the soil composition or depths, deconsolidation of soils due to compaction, altering the elevation of the wetland surface, changing the stream geometric contours, or hydraulic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

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

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OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)