

## **The Range at Weathervane Golf Academy Wetland Replication Plan – Revised August 2020**

This Wetland Replication Plan (“WRP”) has been developed to compensate for alteration of isolated vegetated wetland (“IVW”) required to construct the new parking area associated with the proposed Project. The proposed construction will result in the alteration of approximately 4,987 square feet of IVW. The majority of the wetland impacted during construction consists of a palustrine forested system. The WRP shall serve to create an area of IVW approximately 17,400 square feet in area (3.4:1 ratio of alteration to replication) with a combination of palustrine scrub-shrub and open water in an attempt to provide potential vernal pool habitat. The WRP will also restore the functions and values of the wetland that will be affected by construction of the Project. The site plans submitted within the Notice of Intent application package depict the location and design of the wetland replication area.

Wildlife species currently using the site are adaptable species such as white-tailed deer, raccoon, wild turkey and Eastern coyote. The site may also be used by breeding and migratory songbirds such as warblers. Due to the previous disturbance within the site, it does not provide unique or sensitive habitats for resident or migratory wildlife. The U. S. Fish and Wildlife Service and Massachusetts Natural Heritage and Endangered Species program have no documented records of any federal or state-listed rare species within the project area.

The replication area will be graded down to or slightly below the grade of the adjacent wetland area, requiring a roughly 2-6 foot excavation on average. Some micro-topography will be left within the wetland to support some of the trees to be planted and to re-establish a more natural ground contour. The side slopes of the replication area will grade up at a 5:1 maximum to 20:1 minimum slope. The saturated soils and areas of standing water within the adjacent wetlands indicate that the hydrology for the wetland replication area will be from groundwater. A planting plan has been developed to establish a variety of native tree and shrub species in both the restored wetland area as well as the adjacent side slopes, with several fern species proposed as ground cover along with a wetland seed mix.

**Wetland Function Compensation:** Due to the replication of impacted wetlands, the proponent does not anticipate any significant loss of function or value of the impacted wetlands. The hydrological functions of the systems will be maintained post-construction. The main impact of the work on wetland function will be associated with habitat modification due to the change in upland forest to scrub-shrub and open water wetland. Habitat significance will be compensated by the replication of the impacted wetlands with plant species that provide basic habitat requirements such as food and cover. The replication of wetlands within the site will result in an improvement of the area to provide flood storage capacity, provide for groundwater recharge and nutrient removal / retention and protect water quality.

**Design Constraints:** Bedrock is present in the area where the replication will be completed and has constituted a significant design constraint which necessitated modification of the originally approved wetland replication design. The revised design accounts for the bedrock and has included a new area to the south of the existing cart path where bedrock is not expected to be present. Steep slopes will be graded and stabilized using water bars, vegetation and jute matting (or equivalent).

**Construction Oversight:** A wetland scientist or other qualified professional shall monitor construction of the wetland replication area to ensure compliance with the replication plan and to make adjustments when appropriate to meet replication goals.

**Construction Timing:** Compensatory replication shall be initiated prior to the commencement of construction activities within areas subject to jurisdiction of the Conservation Commission and

completed prior to the end of the 2020 growing season unless the Commission-approved replication plan specifically states otherwise or there is a significant delay in the construction schedule.

## 1. Hydrology

The wetland replication area has been investigated by a wetland scientist to inventory the soil and hydrologic conditions for the design of the restored wetland. The proposed excavation for the wetland replication area is expected to intercept the seasonal high groundwater table to a depth sufficient to produce anaerobic conditions to foster development of hydric soil.

In addition, groundwater seepage, or interflow, from the adjacent IVW will assist the development of proper hydrology within the replication area. This interflow is expected to continue to seep out along the edge of the undisturbed IVWs and spread laterally through the root zone as it disperses toward the interior of the replication area. The seasonal variation of the water table in this landscape position will not alter the conclusion that sufficient hydration of the soils will occur in the root zone of the wetland. The typical fluctuation of the water table in this type of setting is in the range of 2-3 feet. The period of time that the water table will drop below the root zone will be restricted to later portions of the growing season and will not adversely affect the growth of hydrophytic plants.

## 2. Grading

The wetland replication area will be established by lowering the existing grade to the point where it intercepts the groundwater table. This will reduce the grade of the wetland replication area to approximately the same or slightly below the elevation of the adjacent portion of the adjacent IVWs.

### 2.1. Topsoil

The wetland replication area will be constructed by first removing the existing A and B horizons from the replication site; these soils will be stockpiled separately within an upland area. Existing topsoil will be re-used to the extent possible.

Should testing of this soil indicate that additional organic matter is needed to provide for a suitable growing substrate, additional organic matter such as peat or well-decomposed clean leaf compost or other soil amendments (if more readily available than clean leaf compost) will be used to increase the percent organic carbon content.

When topsoil must be stockpiled on the site, the following guidelines will be followed to maintain moisture in the soil.

- Avoid stockpiling compost organics in piles over 4 feet in height;
- Protect stockpiles from surface water flow and contain them with erosion controls;
- Cover stockpiles with a material that prevents erosion (tarps, erosion control mat, straw and temporary seed, depending on size and duration of storage).
- Inspect and repair protection measures listed above regularly (weekly), as well as prior to (to the extent possible) and after storm events.
- Maintain moisture in the soils during droughty periods.

### 3. Planting Plan

A variety of plantings and herbaceous species are proposed to stabilize the exposed soil in a timely fashion and to direct and ensure the establishment a diverse wetland plant community. It is the goal of this wetland replication effort to achieve at least 75 percent coverage of the surface of the disturbed area not containing persistent standing water within two growing seasons. If at the time of final grading soil temperature and site conditions are not appropriate for transplantation and seed germination, the replication area will be stabilized with 2 to 4 inches of straw mulch and subsequently planted at an appropriate time.

Plantings will be accomplished through the use of plant stocks chosen for their compatibility with the local environment as well as the various hydrologic regimes within the replication area. Commercially available plants and seeds will be utilized to accomplish this goal. The planting plan has been designed to provide a variety of wetland plant species to promote species richness, enhance wildlife edge habitat, and improve the aesthetics of the on-site wetland system.

The table at the end of this section provides the composition of the proposed wetland seed mix that is to be applied within the proposed replication areas. Only plant materials native and indigenous to the region will be used. Species not specified in the replication plan will not be used without written approval from the Conservation Commission. No cultivars of native species such as *Acer rubrum* shall be used. The following notes further clarify the proposed planting program:

1. A wetland seed mix will be hand broadcast, mechanically broadcast or hydro-seeded at appropriate rates throughout appropriate areas of the wetland replication area to create an herbaceous groundcover layer. A New England Erosion Control / Restoration for Dry Sites seed mix will be distributed along the upland peripheries of the replication area, where the slopes grade into the natural surroundings. Acceptable wetland seed mixes include New England Wet Mix (New England Wetland Plants, Amherst, MA), whose components are listed in the attached table. Comparable alternative sources may be approved by the wetland scientist.
2. In addition to herbaceous plantings referenced above, woody plantings are proposed around the wetland replication area and throughout the upland buffer zone bordering the replication area. Mulch will be used around woody plantings in an 18" diameter circle approximately 2" deep. These plantings are shown on the attached table. Final placement of the plantings will be determined in the field by the wetland scientist.
3. The contractor will be required to maintain adequate moisture in the wetland replication area for the first two growing seasons following planting to support the plantings (or until >75% survival is achieved).

To ensure the success of the proposed replication plan, a wetland scientist or other qualified professional will make certain that the necessary hydrologic regimes are achieved, and that the benefits of the proposed plan are maximized. During planting, a qualified professional may relocate the plantings if as-built conditions would pose an unreasonable threat to the survival of plantings installed according to the replication plan. The plantings will be relocated to locations with suitable hydrology and soils and where appropriate structural context with other planting cells can be maintained.

**COMMON PLANT SPECIES IN PROPOSED WETLAND SEED MIX**

Seed Mix	Common Name	Scientific name
New England Wet Mix from New England Wetland Plants, Inc.	Fox Sedge	<i>Carex vulpinoidea</i>
	Hop Sedge	<i>Carex lupulina</i>
	Water Plantain	<i>Alisma plantagoaquatica</i>
	Nodding Bur-marigold	<i>Bidens cerua</i>
	Lurid Sedge	<i>Carex lurida</i>
	Soft Rush	<i>Juncus effusus</i>
	Grass-leaved Goldenrod	<i>Solidago graminifolia</i>
	Beared Sedge	<i>Carex comosa</i>
	Fringed Sedge	<i>Carex crinita</i>
	Boneset	<i>Eupatorium perfoliatum</i>
	Flat-top Aster	<i>Aster umbellatus</i>
	Hardstem Bulrush	<i>Scirpus acutus</i>
	Green Bulrush	<i>Scirpus atrovirens</i>
	Woolgrass	<i>Scirpus cyperinus</i>
	Spotted Joe-pye Weed	<i>Eupatorium maculatum</i>
	Blue Vervain	<i>Verbana hastata</i>
Ditch Stonecrop	<i>Penthorum sedoides</i>	

**WETLAND REPLICATION PLANT SPECIES LIST**

SPECIES	SIZE	CONDITION	NOTES	QUANT.
<b>Herbaceous Species</b>				
BLUE FLAG ( <i>IRIS VERSICOLOR</i> )	2" PLUG	POT/ROOT	HERB	40
HARD-STEM BULRUSH ( <i>SCHOENOPLECTUS ACUTUS</i> )	2" PLUG	POT/ROOT	HERB	100
<b>Subtotal</b>				<b>140</b>
<b>Shrub Species</b>				
SPECKLED ALDER ( <i>ALNUS INCANA</i> )	2 GAL.	CONTAINER	SHRUB	30
HIGHBUSH BLUEBERRY ( <i>VACCINIUM CORYMBOSUM</i> )	2' - 3' HT.	CONTAINER	SHRUB	15
SWEET PEPPERBUSH ( <i>CLETHRA ALNIFOLIA</i> )	2' - 3' HT.	CONTAINER	SHRUB	20
BUTTONBUSH ( <i>CEPHALANTHUS OCCIDENTALIS</i> )	2' - 3' HT.	CONTAINER	SHRUB	30
SAND BAR WILLOW ( <i>SALIX EXIGUA</i> )	TUBELING	TUBELING	SHRUB	50
<b>Subtotal</b>				<b>145</b>
<b>Tree Species</b>				
RED MAPLE ( <i>ACER RUBRUM</i> )	4' - 5' HT.	5 GALLON CONTAINER	TREE	10
GRAY BIRCH ( <i>BETULA POPULIFOLIA</i> )	4' - 5' HT.	5 GALLON CONTAINER	TREE	10
<b>Subtotal</b>				<b>20</b>
<b>TOTAL</b>				<b>305</b>

### 3.1. Coarse Woody Debris and Other Features

A supply of dead and dying woody debris shall cover at least 4% of the ground throughout the perimeter of the replication site after completion of construction of the replication site. These materials shall not include any invasive species. This material will be used within the replication area. In addition, a few various sized rocks / boulders from the site shall be scattered throughout the replication area to increase structure and habitat in the site. The on-site wetland scientist will direct the contractor to distribute appropriate parts of this woody material (e.g., tree tops and selected tree boles) and rocks throughout the perimeter of the replication area.

### 4. Erosion Controls

Implementation of erosion control measures will be initiated in compliance with the construction replication measures. During the creation process the erosion control barriers will be maintained on a regular basis and remain in place until the disturbed area is stabilized. Erosion control barriers will also be installed along the “new” wetland boundary when the grading and plantings within the creation area are complete. Extra erosion control materials will be kept on-site to be used for any maintenance of the installed erosion control barriers. These devices will be disassembled and properly disposed of upon receipt of a Certificate of Compliance or other written approval by the Conservation Commission. Sediment collected by these devices will be removed and placed within an upland area in a manner that prevents its erosion and transport to a waterway or wetland.

### 5. Monitoring Plan

Within 60 Days of completion of the replication work, the proponent will submit a signed letter to the Conservation Commission specifying the date of completion of the replication work. The proponent will monitor the replication area for a period of at least two growing seasons or until the replication area achieves >75% coverage with native hydrophytic species in non-inundated areas. Observations will occur at least two times during the growing season – in late spring/early summer and again in late summer/early fall. Each annual monitoring report shall be submitted to the Conservation Commission no later than December 15 of the year being monitored.

The following Items shall be addressed in the monitoring report:

- Highlighted summary of problems which need immediate attention (e.g., problem with hydrology, serious erosion, major losses from herbivory, etc.). This should be at the beginning of the report.
- Dates work on each replication site began and ended.
- Describe the monitoring inspections that occurred since the last report.
- Soils data, commensurate with the requirements of the soils portion of the 1987 Corps Delineation Manual (Technical Report Y-87-1) New England District data form, should be collected after construction and every alternate year throughout the monitoring period.
- Concisely describe remedial actions done during the monitoring year to meet the success standards – actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), re-grading the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.

- Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?
- Give visual estimates of (1) percent vegetative cover for each replication site and (2) percent cover of the invasive species listed under Success Standard No. 2, above, in each replication site.
- By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.

#### 6. Contingency

As noted previously, a wetland scientist or other qualified individual will be on-site during the construction of the replication area to ensure compliance with the plan and to make appropriate adjustments to meet replication goals. The wetland scientist will also be charged with supervising the conditions encountered during the construction and dealing with unforeseen conditions. Such conditions might include: encountering bedrock within the excavation zone; different groundwater conditions than anticipated based upon testing; unexpected subgrade textures that would affect the design and function of the replication area, etc. Under such circumstances, the wetland scientist will suspend the work and consult with the project engineer and construction manager about the implications of the findings for carrying out the intended plan. Alternatives to addressing the issue will be developed, if necessary. Any substantial change in the design of the replication area will require the submission of revised plans to the Conservation Commission for review and approval prior to implementation.