Lavenger Creek Conservation Plan

Prepared by the New Castle Conservation Commission, Oak Hill Environmental Services and in collaboration with the Rockingham County Conservation District

Introduction

The intent of the Lavenger Creek Conservation Plan is to outline the significance of this wetland area, provide the reasons why it is critical to establish measures to protect the functions and values of this ecosystem, and create specific long and short term measures, guidelines and practices to ensure this wetland's survival.

The Town of New Castle designated the Lavenger Creek area as Class A Wetland Buffer under article 9.2 Wetlands Conservation District (2012) within the New Castle Zoning Ordinance in recognition that this unique and sensitive estuarine wetland ecosystem warrants greater protection. In addition to the greater protections provided a Class A wetland, the Conservation Commission deemed additional protections necessary and worked to develop this conservation plan.

The Lavenger Creek Conservation Plan provides specific measures and best management practices adopted to preserve the integrity of this incredible resource. It includes specific steps to be pursued in collaboration with residents, the Town, NHDES and abutters to protect the Lavenger Creek area and its buffer zone. These steps not only promote best management practices, they establish stringent safeguards including limiting structures and landscaping practices.

Overview

Lavenger Creek is classified as a Estuarine Wetland System.

An Estuarine wetland system consists of deep water tidal habitats and adjacent tidal wetlands that are semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean such that its ocean water is at least occasionally diluted by freshwater runoff from land. Two factors that influence the growth and distribution of plants in an estuary are the percent of salinity and the degree of oxygenation of the water. Since different species demonstrate different tolerances to the degree of salinity, fresh water intermixing with ocean water leads to stratification and diversity of plant material. In addition, the frequency and amount of flooding affects oxygenation because the longer and deeper an area is flooded with water the less oxygen is available to plants in the soil. Since certain species of plants are adaptive to oxygen shortage, the duration of these events dictates where and which individual plant species reside within this system.

Estuaries are critical habitat for certain species of animals at various stages of their lives. A few animal species have adapted to the characteristically changeable conditions of salinity, temperature, and water level in the estuary and reside there for the duration of their lives. Many migratory species of birds and fish as well as predatory animals utilize these areas and are dependent on the food chain that it presents. The mudflats that are periodically exposed support a variety of invertebrates including mussels, clams, snails and amphipods. These small shelled creatures filter the water and consume the detritus organic materials, and each other in order to survive. Estuaries provide an environment characterized by rapid and frequent change, which leads to biological diversity and complex dynamics.

In New Hampshire it has been estimated that only 6,200 acres of estuarine wetlands are present, and they are considered extremely rare compared to fresh water wetland systems.

Lavenger Creek Wetland Evaluation

A wetland evaluation is the process of determining the values of a wetland based on the functions that it performs. Identifying the principle functions and values present within the total wetland system provides information to support local planning and decision-making.

Two methods for evaluating functions and values were employed in the analysis of the Lavenger Creek wetland: The Highway Methodology and the Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire, 2011. Thirteen functions and values were reviewed for their applicability to Lavenger Creek, and the level at which the creek retains those values and performs those functions. The list of identified functional values of wetlands under the Highway Method include:

- Groundwater Recharge/Discharge;
- Recreation;
- Educational Scientific Value;
- Visual Quality/Aesthetics;
- Sediment/Toxicant Retention;
- Nutrient Removal;
- Production Export;
- Sediment/Shoreline Stabilization;
- Wildlife Habitat;
- Fish and Shellfish Habitat;
- Flood Flow Alteration;
- Uniqueness/Heritage;
- Endangered Species Habitat

The evaluation results for principle functions and values provided by the Lavenger Creek wetland are:

- Fish and Shellfish Habitat,
- Wildlife Habitat,
- Nutrient Removal/ Retention /Transformation,
- Sediment Trapping,
- Uniqueness/ Noteworthiness and Visual Quality/Aesthetics
- Ecological Integrity for the wetland area is high (Appendix 3&4).
- Recreation;
- Educational Scientific Value;
- Wildlife Habitat;
- Uniqueness/Heritage

Lavenger Creek is classified both as Estuarine, Intertidal, Unconsolidated Shore, Mud, Regularly Flooded (E2US3N), and as Estuarine, Intertidal, Emergent, Persistent, (E2EM1) that supports saltwater plants at its center and fresh water plants on the edge. Lavenger Creek supports a wide variety of plant species: **Cordgrass** (*Spartina alterniflora)* being the most dominate, Fowl Meadow grass (*Poa palustris*) and Black grass (*Juncus geradii*). Other species include Seaside arrow grass (*Triglochin maritime*), sea lavender (*Limonium carolinianum*) and traces of silverweed (*Argentina egedii*). Chairmaker's rush (*Scirpus americanus*) is seen along the edges. Scattered throughout the marsh representing large tracks of area is marsh elder (*Iva frutescens*) shrubs. The NH Division of Resources and Economic Development, Natural Heritage Bureau has listed Marsh Elder as threatened in NH (S1). Marsh Elder has an extensive presence along the banks and within the marsh itself. Shrubs at the edge of the wetland include winterberry holly (*Ilex verticillata*), swamp rose (*Rosa palustris*) and arrowwood. Poison ivy is also common along the edge. The adjacent tree canopy is white pine, red oak, red maple and Pitch pine (*Prunus rigida*).

Existing and Potential Threats to Lavenger Creek

The primary threat to the Lavenger Creek wetland system is a loss or degradation of its natural wetland and upland buffers. The natural buffers need to be sufficient in width for wetland systems to perform the specific functions and values that they provide. Vegetative upland buffers to wetlands have been researched and documented over the last few decades to determine minimum needs and requirements of wetlands. The consensus of environmental professionals involved in the research and the conclusions of the many extensive assessments and evaluations regarding what constitutes an adequate vegetative upland buffer width is agreed to be a 100 foot minimum. An unaltered 100 foot vegetative buffer will safeguard the wetland systems' ability to continue to perform certain functions and retain its inherent values. Impacts within the 100 foot vegetative upland buffer zone will create stress on the Lavenger Creek wetland

system and lessen its ability to perform and maintain the recognized functions and values.

In addition the following are concerns when considering the protection of this ecosystem:

- Development Impacts: Review of aerial photos between 1974 and 2010 (Attached as appendix A,B,C) indicates a significant change to the buffer of Lavenger Creek with the overall loss of trees and an increase in impermeable surfaces resulting from the building of homes, roads, and driveways. From 1974 to 2010 an overall loss of vegetation in the 100 foot buffer area is documented as significant. There has been an overall loss of vegetation in the buffer as evidenced by increased fresh water infiltration, changes in vegetation within the marsh and general silting in of the marsh. If vegetation loss continues in the buffer it will significantly impact the buffer's ability to protect the integrity and functionality of the Lavenger Creek wetland resources.
- Point Source and Non -Point Source Pollution: Increased nitrogen levels in the water have been recorded throughout Great Bay, the Piscataqua River and areas in Little Harbor and the Back Channel of Goat Island which flood Lavenger Creek. Nitrogen levels directly affect algea blooms and reduce oxygen levels in the water. Decreased oxygen levels affect the Creek's ability to support life and biodiversity. Reducing nitrogen flow into the watershed by eliminating fertilizer runoff, proper maintenance of septic systems, and improved stormwater management practices is crucial to maintaining Lavenger Creek's functions and values.
- Fresh Water and Salinity Levels: Fresh water inundation is a significant threat to the system.
- Hazardous Waste and Potential Contamination Sources
- Cumulative Impacts

Regulatory Oversight

State:
Wetlands by law fall under the jurisdiction of the US Army Corps of Engineers and the NH Department of Environmental Services Wetlands Bureau. The Lavenger Creek buffer is regulated by the state under the defined Tidal Buffer Zone, being an Estuarine Wetland, and the Shoreland Protection Act. The Wetlands Bureau does recognize and approve additional protective measures authorized by a town for highly sensitive areas when evaluating actions that require permits.

NH State Law, Planning and Zoning-RSA 674.39 addresses vested rights or pre-existing conditions that carries with a property. If a resource has been determined to protect public health and water quality then all properties that abut the resource have no exception to current ordinances for pre-existing rights held.

Town:
The Town of New Castle Zoning Ordinance (May, 2012) has Lavenger Creek listed under Section 9.2.3 2: Definitions of Wetland Buffers: a) Class A Wetland Buffer

A Class A Wetland Buffer is an established 100 foot buffer from the edge of the named wetland and evaluated to have the highest functional values and requiring a higher degree of protection. Town guidelines may be developed to protect the functions and values of these Class A Wetland Buffers.

Guidelines for Landscaping and Permitted Actions

Lavenger Creek presents a unique, diversified, sensitive and threatened ecosystem. Through the proper use of stormwater management tools, design techniques (including low impact development design approaches), and utilizing best management practices, adverse hydrologic and water quality impacts can be minimized. In the short and long term, these efforts will protect and enhance the functions and values of this rare wetland resource.

Non-Structural Site Design Techniques to be used in Lavenger Creek area

1.) Minimize Disturbed Land Areas – the most effective way to minimize the amount of disturbed area and to reduce stormwater impacts of land use or projects is to use hydrology-based site design for any projects or land use proposals that impact the Lavenger Creek buffer. This process requires an understanding of existing land features (depth to ledge, steep slopes, soil conditions, proximity to wetlands, etc.) on the site. This information and how the use or project will comply with best management practices should be requested as part of any site plan review process.

2.) Maintain Natural Buffers - The natural buffers around Lavenger Creek intercept runoff from pervious and impervious areas and treat it through natural filtration, infiltration, and vegetative uptake. Stormwater runoff generally enters the natural buffer as a sheet flow. The sheet flow should be slowed and retained in the natural buffer area; this requires that a variety of native species be maintained and planted in the buffer surrounding Lavenger Creek. Required planting of native species will enhance the functions of the buffer (list attached for native species). Planting of native grasses for landscaped green spaces around structures that require less water and fertilizer are critical to reducing erosion and runoff contamination (list attached).

Cutting of live or dead trees within the 100 foot buffer area shall be limited to those that create a potential safety risk to home owner's property, and shall be based upon an arborists' written opinion presented to the New Castle Conservation Commission. Shrubs, grasses and herbs shall be left undisturbed.

3.) Minimize Impervious Cover - Land use and Projects in the buffer area should consider alternative roadway layouts, use narrow driveway widths, use shared driveways, incorporate porous or permeable pavement, and utilize porous pavers on driveways and walkways. Additionally, rooftop runoff should be disconnected and directed to areas of infiltration or allowed to sheet flow over a pervious lawn area.

4.) Disconnect Impervious Cover - Impervious cover cannot be eliminated completely; it can be minimized by utilizing the existing soils and landscape to re-direct runoff flow into infiltration basins or designated buffer areas. New Castle has used rain gardens, cisterns, and other stormwater management techniques in buffer areas with great success. Any project or use should look to be stormwater neutral or look to reduce stormwater runoff.

5.) Minimize Soil Compaction - Avoid unnecessary development disturbances and limit mechanical machinery traffic to the smallest practicable construction envelope and the farthest distance possible from the resource. Proposed disturbed/temporary construction areas should be clearly marked on any development/site plans. All plans should include specific mitigation practices that will be installed prior to construction starting and will remain throughout the project. Final site conditions should be specified on site plans prior to approval.

Structural Site Design Techniques to be used in Lavenger Creek area

The area below the highest observable tide line will not be impacted. No permanent or temporary structures, including docking structures, rafts or boats are allowed below the highest observable tide line.

Access stairs in the buffer area for resident abutters shall conform to specific guidelines to minimize adverse impacts to Lavenger Creek and its buffers. NH DES may have other requirements specific to what is permitted within the Tidal Buffer Zone and based upon individual site conditions. Consistency at the town level to provide specifications for design standards include:

- Width- Maximum of 3 feet.
- Height above ground- Minimum 18 inches
- Platform (NH DES Approved dimensions). Generally, NH DES has approved platforms (size and dimension) in the Laveneger Creek area; however, it is based upon individual site conditions.
- Non-intrusive techniques for anchoring structure, such as pinning to ledge and reduced number of footings which may cause erosion.
- Minimize cutting of woody material for access stair placement to pruning and limbing of branches only.
- No freshwater garden hoses for cleaning canoes or kayaks permitted.

No permanent structure shall be constructed or placed in the buffer.

No temporary or auxiliary structures beside access stairs shall be built or placed in buffer.

No cars or storage of hazardous materials shall be allowed within the buffer zone.

Best Management Practices for Stormwater runoff in the Lavenger Creek area

Design and development plans coming before the town for subdivisions or individual lots, may require these practices where necessary to protect the health of the natural resources. Any project or use being contemplated in the buffer should review the following for applicability and incorporate best management practices in its plans.

Pre-treatment Practices - use sediment forebays to temporarily impound runoff waters, dissipate the energy of incoming runoff, and allow for an initial settling of coarse sediments. These forebays can be constructed as separate structures or integrated into larger storm-water management structures.

Vegetated Filter Strips - are left in place or designed to slow storm-water velocity, filter out sediment and associated pollutants, and provide minimal infiltration of runoff. They can also provide wildlife habitat and travel corridors. These practices must be maintained over time, and can be required during development planning.

Pre-treatment Swales - are shallow, linear, vegetated, earthen channels designed, into the landscape, to convey flows with the expressed purpose of attempting to capture larger sediment particles. A level spreader incorporated at the end of the swale may be necessary to convert the runoff to a sheet flow.

Drip Edge Trenches - can be incorporated along the center of a vegetated swale to increase infiltration capabilities. It is a stone-filled excavation used to temporarily store runoff and allow for more infiltration time. It is particularly good for intercepting roof runoff.

Dry Wells & Leaching Basins - consists of a small dug pit that is filled with stone and surrounded with stone to capture and allow runoff to infiltrate and percolate into the soil. It is a good tool for treatment in tight spots where the contributing area of runoff is small. For example placement of a dry well or leaching basin might be required ……

Bioretention System - is a type of filtration BMP (sometimes referred to as a 'rain garden') designed to collect and filter moderate amounts of impervious storm-water runoff. It incorporates the use of vegetation (perennial grasses & shrubs) that are planted in the shallow depressions to assist in the root uptake of pollutants. It can

easily be aesthetically incorporated into most landscapes. These practices must be sited correctly, cannot account for all season treatment, and will also need maintenance.

Sediment Control Practices – Use of barriers should be considered to deter the erosion of soil particles and to check their migration into sensitive wetland areas from construction sites. Selection of these sediment barriers should be dependent on specific site conditions. For instance, silt fence barriers require a disturbance of soil to anchor them; a much better BMP would be the use of silt soxx or wattles placed on top of the soil surface and securely staked on the down slope side. Other BMPs to consider during development proposals include: hay bales, erosion control mix berms, temporary check dams, sediment traps and engineered sediment basins to impound water for significant time periods.

Understanding storm-water management requirements and planning for the implementation of measures to protect the environment from adverse impacts due to new development and redevelopment is the responsibility of local governments, developers, and private citizens. These and other innovative BMPs should be incorporated during the design phases for all new proposals within the Lavenger Creek buffer area.

Invasive Species Control

Common Reed (*Phragmites*) has taken a foothold in the Lavenger Creek area currently at two locations. Other prohibited invasive species known to occur in proximity to Lavenger Creek or have the potential to appear are the following plants: Oriental bittersweet, honeysuckle, glossy buckthorn, Japanese and European barberry, autumn olive, and multiflora rose, Japanese knotweed, and purple loosestrife.

To prevent the spread of these plants both within and outside the Lavenger Creek area, appropriate containment measures and disposal methods must be in place. The invasive species should be inventoried and located on a map. A comprehensive monitoring plan should be put in place that establishes a baseline of information describing the current condition of invasive species present and that is used to determine what measures are best to control the spread of these plants. In a cooperative effort with abutting landowners it is recommended that permission be gained to survey their properties for the presence of invasive species. This conservation plan will not detail appropriate management techniques for the invasive species listed, but will refer to the *New Castle High Value Resources Report* (RCCD, 2013). This recent plan outlines additional information for several important natural areas on the island and presents integrated pest management techniques for the top twelve invasive plant species found here.

Type I: invasive species may be removed by cutting, digging, burning, or pulling from the ground. Removal by cutting should take place prior to the plants going to seed. For Type I these removal operations are usually conducted between the dates of February 1st to July 1st. Type II invasive species have the ability to sprout and reproduce from stems, root fragments, and even small cut pieces of the plant material. It is important to note that mowing of plant species is not an option as it tends to spread vegetative material.

Monitoring Programs

A comprehensive monitoring plan for both invasive plants and exemplary plant communities would provide important information to the Conservation Commission to determine impacts, whether positive or negative, on specific plant species and the effects of development. All past efforts and data collection that has been conducted will be utilized to help establish a baseline against which to measure progression or changes in species composition and gauge health in future years. Plot samples, GPS locations, measurements of target species, water quality, and upland buffer changes should be incorporated into the monitoring plan.

Funding

Money should be allocated from annual Conservation Commission budget to a dedicated resource fund for the Lavenger Creek Monitoring Plan and needed updates to the Conservation Plan. Additional funding sources for a variety of conservation projects related to the Lavenger Creek marsh can be found in the *New Castle High Value Resources Report* (RCCD, 2013). Available funding sources should be pursued immediately to determine possible feasibility, monitoring, and conservation projects worthy of pursuit.