

1.0 Introduction

The intent of this project is to implement water quality improvements under the MassDOT Impaired Water Stormwater Compliance Program. Stormwater Best Management Practices (BMPs) will be installed within the Greenwood Pond watershed as part of MassDOT's Impaired Waters Retrofit Initiative to improve the water quality of Greenwood Pond. No roadway expansion or new impervious area is proposed. The project is solely to treat stormwater runoff prior to reaching Greenwood Pond. **Figure 1** provides a project locus map.

1.1 Project Description

The proposed project is a total phosphorus load reduction project for stormwater runoff draining to Greenwood Pond. The Massachusetts Department of Transportation (MassDOT) proposes to construct an infiltration swale along the south side of the eastbound on-ramp of Route 2 from Route 2A, just west of Greenwood Pond in the Town of Templeton, Massachusetts. The final *Massachusetts Year 2010 Integrated List of Waters* lists the impairment for Greenwood Pond as "aquatic plants". A Total Maximum Daily Load (TMDL) for phosphorus in Greenwood Pond was developed to manage the aquatic plants impairment. Phosphorus is a limiting nutrient in freshwater aquatic systems, and elevated amounts of phosphorus can result in excessive growth of nuisance aquatic plants. MassDOT has assessed the contribution of phosphorus from MassDOT urban area properties directly draining to this water body. By capturing the phosphorus through the implementation of stormwater BMPs before it can access Greenwood Pond, the project aims to mitigate the aquatic plant impairment. No MassDOT BMPs are currently in place in the Greenwood Pond watershed, thus there is no total phosphorus reduction currently being provided.

The installation of an infiltration swale is proposed to effectively capture and infiltrate phosphorus-containing stormwater, reducing the load to Greenwood Pond. Drainage infrastructure will be installed to reroute stormwater runoff to the proposed infiltration swale. Several check dams will be placed within the swale to improve storage, infiltration, and treatment of stormwater runoff.

1.2 Project Goal

The goal of this project is to install the proposed infiltration swale with check dams to provide treatment of stormwater and reduce the total phosphorus load, resulting in an improvement to water quality entering Greenwood Pond. Through the installation of the proposed infiltration swale, including check dams, and by routing existing and proposed stormwater infrastructure to the proposed infiltration swale, the total phosphorus loads to Greenwood Pond will be reduced. The infiltration swale will provide treatment for runoff from the surrounding subcatchment area from a 1-inch storm event.

1.3 Project Background & Existing Conditions

Currently, stormwater runoff from the Greenwood Pond watershed drains to Greenwood Pond through a series of small, piped stormwater collection systems that discharge to various outfalls along either side of Route 2. Runoff collected in catch basins from the east side of Greenwood Pond discharges upstream of the pond, approximately 500 feet away via two trunk lines. Stormwater runoff also enters Greenwood Pond by way of small curb cuts to paved channels at the discharge culvert along a segment of Route 2A. Water exits Greenwood Pond through a 60-inch RCP culvert, where it flows through a large wetland system prior to discharging to the Otter River.

The existing stormwater runoff infrastructure does not currently have any BMPs in place to reduce the total phosphorus load to Greenwood Pond. Untreated runoff from around the watershed is collected and discharged into Greenwood Pond and has resulted in impairment of the waterbody. Photos documenting existing conditions are provided in **Appendix A**.

1.4 Site Soils

Soil types throughout the Route 2 corridor are mostly Hydrologic Soils Group (HSG) C or D, with poor infiltration rates. Existing soils mapping shows a pocket of B-soils along the shoulder of Route 2.

Westbound shoulder of Route 2 - CEI completed two test pits within this area on October 17, 2012. Test pits were completed within the open grassed area of the westbound shoulder of Route 2 to approximate depths of 4.5 feet and 6.0 feet. The exploration revealed the presence of very tight silty sand and fill material both indicative of HSG C or D soils that would limit infiltration capabilities in this area. Additionally, the soils exploration revealed the presence of seasonally high groundwater mottling between 24 and 44 inches below the ground surface which would limit infiltration swale grading opportunities while maintaining adequate clearance to groundwater. No standing water was witnessed in TP-1 while groundwater was encountered at 68 inches below ground surface in TP-2. Test pit logs are provided in **Appendix B**. This area became unfeasible for infiltration of stormwater upon identification of the existing soils and groundwater table. In late September 2012, CEI identified resource areas located adjacent to the Route 2 westbound shoulder as Bordering Vegetated Wetlands (BVW) to Greenwood Pond. These wetlands were identified and flagged along the existing westbound right of way line within the easternmost section of this proposed project area.

Eastbound on-ramp of Route 2 - CEI completed a single test pit, TP-3, within this portion of Route 2 on October 17, 2012. The test pit was completed at the end of an existing paved drainage swale located along the southern shoulder of Route 2 eastbound on-ramp. The test pit was dug to an approximate depth of 5.5 feet. This test pit data and analysis revealed that the underlying soils consist of silty loam, indicative of HSG C soils, and an infiltration rate of approximately 0.27 inches/hour. Additionally, the soils exploration revealed the presence of seasonal high groundwater mottling at approximately 68 inches below the ground surface. No standing water was witnessed within this test pit. Based on the projected soil infiltration rate and groundwater

depths, this location provides a feasible location to install infiltration BMPs. Logs for this test pit and the approximate test pit locations are provided in **Appendix B**. In November 2012, CEI identified resource areas located adjacent to the Route 2 westbound shoulder as BVW to Greenwood Pond. These wetlands were identified and flagged along the existing east bound right of way near the discharge of the on-ramp drainage swale to the east of the proposed work area.

2.0 Description of Proposed Work

The project proposes the construction of an infiltration swale along the south side of the eastbound on-ramp of Route 2 from Route 2A, in Templeton, MA, just west of Greenwood Pond. A series of three check dams will be installed within the swale to help store, infiltrate, and treat stormwater runoff before entering the pond. The proposed infiltration swale BMP will be constructed within the existing drainage path. The BMP will be capable of storing and treating approximately 1,500 cubic feet of stormwater runoff, which is equivalent to the 1-inch storm event for the subcatchment area. Currently, the existing paved swale discharges stormwater into the area with no treatment or protection from erosion.

Earthwork and grading are required to create the grassed infiltration swale and grassed check dams, designed to be easily mowed and maintained. Areas in which earthwork is required will grade new side slopes to a moderate 3:1 horizontal to vertical ratio. Drainage infrastructure will be installed along the eastbound on-ramp to route stormwater runoff to the swale to ensure that the runoff will be treated and total phosphorus loads decreased. Construction of two new drainage catch basins and the redirection of one existing catch basin will direct stormwater runoff into the swale. Proposed new piping and flared end sections will accompany the catch basins to provide stabilization to the outlets. Riprap scour pads will also be placed at all drainage inlets to minimize erosive discharge velocities. Project plans are provided in **Appendix C**.

2.1 Erosion Control

Measures will be taken to minimize sedimentation/siltation into the resource areas, corresponding buffer zones, and the surrounding community during construction activities. Implementation of accepted and usual methods of sedimentation erosion control will be used at the site during all phases of construction. Erosion control during construction will include:

- Compost filter tubes, or approved equivalent, will be placed as shown on the drawings to protect wetland resource areas.
- Compost filter tubes, or approved equivalent, will be staked in place with the grain of the material perpendicular to the ground. This will allow the erosion controls to conform to the landscape making it more effective.
- Erosion control devices will be inspected weekly and after each significant rainfall event. Any entrapped silt or other materials will be removed. Compost filter tubes and other devices will be replaced as necessary.
- Erosion control devices will remain in place locally until disturbed surfaces have been stabilized with the final vegetative cover in the area of disruption.

- Any necessary temporary soil storage will be placed in a specified staging area and be surrounded by compost filter socks, or an approved erosion control method.

A detailed plan of the erosion controls and the Erosion Control Plan are illustrated on Sheets 3 and 7, respectively. An operation and maintenance plan has been included in **Appendix D**.

3.0 Activities Subject to Regulations

Impacts to regulated areas for the proposed project are limited to the buffer zone to BVW. No work will occur within the BVW. Currently a paved swale directs flow into the area with no protection against erosion or from sediment reaching the adjacent wetlands. The construction proposed within the buffer zone would consist of two check dams, a drainage outfall and riprap pad, and associated grading. The disturbance area is estimated to be approximately 5,607 square feet of BVW buffer zone. Resource area impacts are shown on **Figure 2**.

3.1 Description of Resource Area Impacts

The project is partially located within the 100-foot buffer zone to BVW where stormwater will infiltrate into the underlying soil from the infiltration swale. The project will result in an overall benefit to the resource area.

The proposed project is not located within a Priority Habitat of Rare Species or within an Estimated Habitat of Rare Wildlife as shown on the map provided by the MassGIS Online Data Viewer in **Appendix E**. The project is also not located within an Area of Critical Environmental Concern and there are no vernal pools in the project's vicinity.

The proposed project is not located within a FEMA Zone flood boundary or within areas of the 100-year flood plain as shown on Flood Insurance Rate Map (FIRM) map in **Appendix F**.

3.2 Limited Project Status

Several sections of 310 CMR 10.00 provide for limited project status for improving inadequate drainage systems and improving the natural capacity of a resource area to protect the interests identified in the Wetlands Protection Act. The following limited project standards apply:

10.53(3)f ...maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems.

10.53(4) ...projects which will improve the natural capacity of a resource area(s) to protect the interests identified ...

This project has been designed such that it will comply with all pertinent performance standards as a resource area improvement project, as outlined above. The cited limited project provisions

have been noted and, although this project would be eligible under 310 CMR 10.53(3)f and 10.53(4), no limited project status is requested.

3.3 Project Alternatives

Several phosphorus removal alternatives were analyzed as part of this project to assess the most efficient and cost effective solution to the impairment. These alternatives were evaluated using the addition of a stormwater BMP in different locations within the project area.

Alternative 1: The first alternative was to install an infiltration swale within the footprint of an existing drainage ditch along the westbound side of Route 2, just west of Greenwood Pond. The area did allow for existing drainage infrastructure to be routed to the proposed infiltration swale, providing for treatment adequate to reach the target TP reduction. The area is currently grassed and regularly mowed, which would minimize site preparation and clearing requirements for BMP construction. However this option proved to be less efficient than the proposed option because the underlying soils are not highly conducive to infiltration. Therefore, a greater storage area would have been required to capture sufficient runoff to meet the target total phosphorus reduction. Proposed piping and portions of the infiltration swale would be located within the 100-foot buffer zone of the BVW. This alternative was not selected due to soils and groundwater depths which limit recharge capabilities.

Alternative 2: Another alternative was to install an infiltration trench along Route 2A. Several site constraints along Route 2A would make the construction of a stormwater BMP difficult. The shoulders along the roadway are quite narrow and the side slopes are moderately steep leading down to Greenwood Pond. There is also no formalized existing drainage infrastructure present in this area which would make it difficult to capture runoff. It may be possible to install a new closed drainage system in the roadway and pipe the runoff to an area with sufficient space and suitable grades for constructing a BMP. This would likely require MassDOT to acquire land outside of the roadway right-of-way in order for a stormwater BMP to be installed; therefore this alternative was not selected.

Alternative 3 (Proposed Alternative): The selected alternative is an infiltration swale along the south side of the eastbound on-ramp of Route 2 from Route 2A, just west of Greenwood Pond. A series of three check dams will be installed within the swale to help store, infiltrate, and treat stormwater runoff before entering the pond. The proposed infiltration swale BMP will be constructed within the existing drainage path. The BMP will be capable of storing and treating approximately 1,500 cubic feet of stormwater runoff, which is equivalent to the 1-inch storm event for the subcatchment area. This alternative was selected because suitable underlying soils maximize the infiltration capacity within the catchment area while eliminating major right-of-way hindrances. The proposed BMP will incorporate stormwater treatment upgrades around an existing drainage path footprint outside of the resource area.

4.0 DEP Stormwater Standards & Report

The following is an overview of project compliance with the ten stormwater standards. The installation of the proposed infiltration swale will not create additional impervious area or stormwater volume. There will be no new discharges associated with this drainage system improvement project. The completed stormwater checklist is included in **Appendix G**. Supporting calculations to accompany the checklist are provided in **Appendix H**.

Standard 1. No New Untreated Discharges

This is a stormwater treatment project that will provide treatment to existing untreated stormwater runoff. No new untreated discharges are proposed.

Standard 2. Peak Rate Attenuation

No new impervious area is proposed. The infiltration swale installation will reduce peak rates as well as total runoff volume by providing infiltration and recharge to groundwater.

Standard 3. Recharge

No new impervious area is proposed. The project will provide infiltration and an increase in recharge to groundwater.

Standard 4. Water Quality

The proposed infiltration swale will result in improvements to stormwater management, water quality, and increased groundwater infiltration. The infiltration swale will provide treatment for runoff from the surrounding subcatchment area for a 1-inch storm event. Upstream deep sump structures will be constructed to help capture any sediment prior to discharge.

Standard 5. Land Uses With Higher Potential Pollutant Loads

N/A – The project is not in an area with higher potential pollutant loads.

Standard 6. Critical Areas

N/A – The project is not located within any critical areas.

Standard 7. Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

This is a redevelopment project as it is designed to provide stormwater treatment improvements.

Standard 8. Construction Period Pollution Prevention and Erosion and Sedimentation Control

Project includes less than 1 acre of disturbance and therefore is not covered under the Construction General Permit. Erosion and sedimentation measures are discussed in Section 2.2 and identified on the project plans.

Standard 9. Operations & Maintenance Plan

An Operations and Maintenance (O&M) Plan for the drainage system improvements and the infiltration swale has been completed and is included at the end of this report. See **Appendix D** for the full O&M Plan.

Standard 10. Prohibition of Illicit Discharges

There are no illicit discharges to this drainage system.

5.0 Summary

Installation of an infiltration swale along the south side of the eastbound on-ramp of Route 2 will provide a significant improvement to the water quality entering Greenwood Pond. The project will treat stormwater and reduce the phosphorus load to the pond, minimizing the aquatic plant impairment. The project will only affect 5,607 square feet of BVW buffer zone, with no direct impacts to resource areas. This project represents an effective way to improve existing drainage and catchment conditions for the purpose of enhancing stormwater treatments within the MassDOT Impaired Waters Retrofit Program

MassDOT respectfully requests that the Templeton Conservation Commission find these measures adequately protective of the interests identified in the WPA and issue an Order of Conditions approving the work described in this NOI and shown on the accompanying plans.