

1.0 INTRODUCTION

1.1 Project Description and Background

The proposed project is an Effective Impervious Cover (EIC) reduction project funded by the Massachusetts Department of Transportation (MassDOT) through the Impaired Waters Program. Through this project, MassDOT will implement an extended detention basin BMP to temporarily store and treat stormwater runoff just north of the Route 20 Bridge over the Westfield River in the City of Westfield, Massachusetts, as shown in **Figure 1**. Currently, the 4.02- acre watershed area located along a section of Route 20 and owned by MassDOT contains approximately 3.95 acres of impervious cover. This roadway property contribution assessment was done by the Highway Division as a part of MassDOT's Impaired Waters Retrofit Initiative. The assessment report identifies a target reduction of 1.6 acres of EIC for MassDOT direct discharges in the Westfield River watershed.

With the addition of the proposed extended detention basin BMP located within the footprint of the existing drainage swale and an adjacent area to the north, stormwater runoff will be temporarily contained, allowing pollutants to settle to the bottom of the detention basin. The detention basin will be capable of treating a water quality volume equal to that required to achieve an EIC reduction equivalent to the contributing impervious area within the subwatershed.

1.2 Project Goal

The goal for this project is to provide an extended stormwater detention basin BMP with a sediment forebay that will be capable of treating a water quality volume to achieve an EIC reduction equivalent to the contributing impervious area within the subwatershed. The proposed detention basin BMP will effectively disconnect 2.96 acres of directly connected impervious area in order to meet and potentially exceed the EIC reduction equivalent of 1.6 acres. Disconnection of impervious area will help reduce pollutant loading to the Westfield River and improve water quality.

2.0 EXISTING SITE CONDITIONS

2.1 Existing Conditions

Existing stormwater drainage is collected in catch basins located along a portion of Route 20 for approximately 1,850 feet between the Route 20 Bridge and a point to the west near the intersection of Ascutney Street and Route 20. The stretch of road has relatively gentle slopes that drain from the bridge to the west reaching a low point approximately 300 feet to the east of the Ascutney Street intersection. A very small portion of the subwatershed flows east towards this low point from a high point located approximately 150 feet east of Ascutney Street. CEI confirmed through field investigations and plan review that this high point is the delineation break for the subwatershed. The remainder of this section of Route 20 is served by a drainage system located 50 feet to the east of Ascutney Street that discharges to the Westfield River near the intersection with Maine Line Drive.

Two separate trunk lines located on either side of Route 20 collect and convey runoff to a junction structure from which one drainage line located on the westbound side of Route 20

conveys the combined flow for approximately 480 feet to a 36" outfall near the bridge. Drainage from a 285 foot long portion of the Route 20 Bridge is collected at the west end of the bridge, conveyed to the junction structure within the trunk line and discharged through the same 36" diameter outfall. Using MassGIS, MassDOT plans and field investigations, CEI estimates that approximately 3.95 acres of directly contributing impervious area drains to the Westfield River from MassDOT road areas in this 4.02 acre sub-watershed.

The 36" outfall discharges directly to a drainage swale on the northern side of the Route 20 Bridge approach. The swale runs for approximately 200 feet to discharge into the Westfield River to the east. The swale location is bordered to the south by steep grading, sloping downward from Route 20 to the floor of the swale. Areas to the north are moderately sloped and consist largely of wooded areas, while the western edge of the swale is bordered by an access road leading to the Home Depot. The base of the swale is sparsely vegetated with assorted grasses and sporadic woody plant material. Photos documenting existing conditions are provided in **Appendix A**.

Based on the topographical survey completed in November, Right of Way, utility locations and topography confirm that there is adequate available land for expanding and retrofitting the existing swale.

According to the Natural Heritage & Endangered Species Program and the Division of Fisheries & Wildlife, the project site is located within Priority and Estimated Habitats. See Section 5.3 for more information.

2.2 Site Soils

The soil type along the section of Route 20 comprises Hadley very fine sandy loam, Winooski silt loam and an Urban Land complex, 0 to 3 percent slopes, as identified by the Soil Survey of central Hampden County, Massachusetts covering Westfield (MA607). Both Hadley and Winooski soils are classified as HSG-B. However the survey does not assign a specific hydrologic survey group to the urban land complex. The soil survey states that "capacity of the most limiting layer to transmit water" is moderately high to high (0.6 to 2.00 in/hr) for Hadley 0-3 percent slopes and is moderately high to high (0.6 to 6.00 in/hr) for Winooski 0-3 percent slopes. The survey states that for the urban lands, "an on-site investigation is needed to determine suitability or limitation for intended uses."

As recommended by the soil survey, onsite investigations consisting of field observations and a test pit were performed on November 2, 2012 by Comprehensive Environmental, Inc. Based on the November 2nd test pit data and analysis, the HSG-B soil classification is accurate, however the soils exploration revealed the presence of high groundwater mottling between 6 and 18 inches below the ground surface. Additionally, standing water was witnessed between 30 and 32 inches below existing ground surface. Test pit logs are provided in **Appendix B**. Based on the shallow groundwater found onsite, a large scale infiltration basin was no longer feasible. Instead, future alternatives focused on an extended detention basin or a smaller infiltration swale.

2.3 Wetlands

The bulk of construction work will take place in a FEMA Zone A21 flood boundary or areas of 100-year flood as shown on Flood Insurance Rate Map (FIRM) panel number 250153 0020 B, dated May 1, 1978 provided as **Figure 2**. This boundary has a base flood elevation of approximately 131.5 feet in the vicinity of the proposed project. Some additional work is located in a Zone B area, however this will largely consist of temporary material storage and staging areas.

3.0 ALTERNATIVES ANALYSIS

Three BMP alternatives were taken into consideration to meet the targeted EIC reduction standards and were analyzed as part of this project to assess the most practical and efficient solution to the problem.

3.1 Alternative 1 – Extended Detention BMP – Proposed Alternative

The first alternative was to construct an extended detention BMP, sediment forebay, and outlet structure capable of holding and treating the required volume of stormwater runoff. This basin will be capable of collecting and safely discharging stormwater runoff from at least the 2-inch storm.

Excavations of 3-4 feet would be required within most of the existing swale footprint and a 3-foot high berm would be added to the end of the existing drainage swale. Stormwater would be discharged to the Westfield River via an overflow structure during most storms, and via an emergency overflow spillway during large storms if necessary. This alternative will provide adequate pollutant removal; however, it will impact the largest amount of sensitive environmental resource area. This alternative will also provide the most environmental benefit by treating larger storm volumes than other alternatives.

3.2 Alternative 2 – Smaller Extended Detention Basin

The second alternative was to construct a slightly smaller extended detention BMP which would have been capable of effectively reducing EIC to a lesser degree than Alternative 1, but still exceed the targeted volume. The footprint of this BMP includes a sediment forebay, detention area, and outlet features, much like the proposed BMP.

Excavations of 2-3 feet would be required within most of the existing swale footprint and a 2-foot high berm would be added at the end of the existing drainage swale. Additionally, the basin footprint could be slightly reduced and balanced with a 3-4 foot deep excavation and a 2-3 foot high berm to meet the same impervious area depth target volume. This alternative has the potential to minimize resource area impacts and lower construction costs. However, the potential water quality treatment volume is roughly 70% of that offered by the proposed alternative with similar resource area impacts and permitting requirements to the proposed alternative.

3.3 Alternative 3 – Infiltration Swale

The third alternative included the construction of an infiltration swale within the existing swale footprint. However, based on the presence of seasonal high groundwater in the area, proper

infiltration would not be achieved and the swale would not meet the required clearance to groundwater standards. The swale also would not provide the required infiltration/storage volumes, and balancing would require cuts and fills during construction in order to not cause an increase in Base Flood Elevation (BFE) or create the need for Compensatory Flood Storage (CFS).

Installing fill to provide the required groundwater clearance for infiltration would require major changes to the existing outlet piping and invert elevations, which would impact the roadway side slopes and adjacent drainage structures. Additionally, the construction of the infiltration swale within Land Subject to Flooding would require no net fill or loss of flood storage in the area without providing additional compensatory flood storage elsewhere. A net fill would have to be created in order to achieve the required groundwater clearance for proper infiltration, thus eliminating this alternative as a viable option.

4.0 DESCRIPTION OF PROPOSED WORK

The project will require the addition of an extended detention BMP and a pre-treatment forebay within the Riverfront area to the north of the Route 20 Bridge. This proposed detention BMP, capable of holding and treating 31,000 cubic feet of stormwater runoff, will be constructed partially within the existing drainage swale footprint and an adjacent area to the north.

Approximately 3-4 feet of excavation is required over most of the existing basin footprint to achieve necessary depths ranging from 5-6 feet in order to effectively collect and slowly discharge the stormwater runoff generated from at least the 2-inch storm from the contributing watershed area. The construction of a 3-foot high berm at the end of the existing drainage swale will be necessary to temporarily contain the incoming stormwater runoff.

The proposed sediment forebay will be constructed in front of the detention basin to pre-treat the incoming stormwater before it proceeds to flow into the adjacent detention basin. An additional 1,500 cubic feet of untreated stormwater runoff will be stored and pre-treated in the forebay. All side slopes will be 2H:1V and covered with geotextile fabric for slope stabilization.

An armored overflow berm located at elevation 110.0' will separate the sediment forebay from the adjacent extended detention pond. Stormwater will pond in the forebay during small storms and at the beginning of larger ones, allowing suspended sediment to settle out, easing maintenance requirements. Stormwater will then flow over a rock-armored spillway into the detention basin.

The treated stormwater will exit the detention basin via an outlet control structure with low flow orifice located on the east side of the detention basin. The outlet control structure and low flow orifice will allow stormwater runoff to slowly release over an 86-hour period. This is intended to limit the rate of the stormwater leaving the basin to provide stormwater treatment and to control downstream flows to protect bank stabilization. The treated runoff will flow through a 110-foot long 24" RCP where it will discharge into the Westfield River. An armored emergency spillway located at an elevation of 112.0' will allow stormwater to bypass the treatment system if the basin reaches capacity during a large storm event. The 100-year flood event is estimated at elevation 131.5', or roughly 19.5' above the elevation of the emergency spillway. CEI has

revised the grading of this project to provide compensatory flood storage to offset the impacts of fill within the Bordering Land Subject to Flooding.

An access path will be created north of the detention BMP to provide for both construction access and for future maintenance. Due to the short, steep slopes required near the northern edge of the access road, modified rock fill will be placed to limit erosion potential.

Project plans are provided in **Appendix C**.

4.1 Protective Measures

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 socks, or approved equivalent, will be placed as shown on the drawings to protect wetland resource areas.
- Compost filter socks, 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 socks 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 one of the above erosion control methods.

An operation and maintenance plan has been included in **Appendix D**.

5.0 ACTIVITIES SUBJECT TO REGULATIONS

5.1 Resource Area Impacts

Although this project is intended to improve water quality, it is necessary to disturb resource areas to do so. The following resource areas will undergo temporary and/or permanent impacts due to the installation the water quality BMP:

1. Bordering Land Subject to Flooding
2. Inland Riverfront Area

Wetlands are not present along much of the northwest side of the Route 20 Bridge or along the banks of the adjacent reach of the Westfield River except for a small area approximately 175 feet northeast of the project area. The adjacent reach of the river has steep banks and based on the National Wetlands Inventory (NWI) delineation, no Bordering Vegetated Wetlands are present adjacent to the banks. However, the project is located within Bordering Land Subject to Flooding and Riverfront Area. All construction will occur within Bordering Land Subject to Flooding, and approximately half within Riverfront Area. Although work will occur within these resource areas, the majority of the project will take place at least 100 feet from the river,

including construction of the riprap spillway and emergency overflow. The only construction proposed within 100 feet of the river is the installation of the stormwater outfall, riprap pad, and associated grading. Proposed conditions will be similar to existing areas. Resource area impacts are shown on **Figure 3** and in **Table 1**.

Table 1 – Resource Area Impacts

Resource Area	Regulation Section Number	Estimated Disturbance
Bordering Land Subject to Flooding	310 CMR 10.57	19,866 SF
Inland Riverfront Area	310 CMR 10.58	10,205 SF* (0 SF)

*Disturbance is shown for informational purposes only. Actual disturbance is zero square feet, as disturbance area calculations may exclude areas used for structural stormwater management measures provided a wildlife corridor is maintained. See Section 5.3 for further details.

This project has been designed such that it will comply with resource area performance standards. The intent of this project is to improve water quality and to protect the interests identified in M.G.L.c.131§40.

5.2 Bordering Land Subject to Flooding – 310 CMR 10.57

Significance

Bordering Land Subject to Flooding is likely to be significant to flood control and storm damage prevention. These areas frequently provide temporary storage for flood waters that have overtopped the bank of the main channel. During periods of peak runoff, flood waters are both retained and detained. Certain portions are also likely to be significant to the protection of wildlife habitat and include areas within the 100-year floodplain.

Performance Standards

1. *The project will provide compensatory storage for all flood storage volume lost.*
Construction of this project will result in a net cut of 1,029 cy (27,783 cf), with a total cut of 1,135 cy (30,645 cf) and total fill of 103 cy (2,781 cf). Of these cuts and fills, compensatory storage of 276 cy (7,452 cf) was provided to balance the fill quantities of 103 cy (2,781cf) a each impacted elevation in order to meet the performance standards for BLSF impacts. These fill vales and compensatory storage cut volumes are shown on Form WPA-3. The remaining cut of 859 cy (23,193 cf) for the project will be required to construct the basin below existing grades. Based on the compensatory cut volumes, flood storage will actually increase, thereby slightly lowering the flood elevation and reducing the risk of property damage. As a whole, compensatory flood storage will be increased. See the attached tables for a detailed breakdown of cut and fill quantities used to calculate compensatory storage.
2. *The project shall not restrict flows so as to cause an increase in flood stage or velocity.*
The project will provide an improvement over existing conditions, as water will be released from the detention basin slowly to mimic natural conditions as opposed to in an uncontrolled manner with the existing stormwater swale. In the event of a large storm, stormwater will bypass the BMP via the emergency spillway. During a 100-year flood

event with peak elevation nearly 20 feet above the basin, the river will flow into the BMP via the emergency spillway. Thus, the BMP will continue to provide flood storage.

3. *The project shall not adversely impact wildlife habitat and function.*

The proposed project will not impair wildlife habitat. Much of the existing site is an existing stormwater swale, thus providing limited habitat. The proposed BMP will largely mirror existing conditions. Existing vegetation will be maintained when possible, and the BMP will not be fenced so as to allow wildlife passage.

4. *The project will have no adverse effect on specified habitat sites of rare vertebrate or invertebrate species.*

The project will be similar in nature to existing conditions, and will not substantially alter habitat area. Water quality will be improved, thus helping to improve wildlife habitat.

5.3 Inland Riverfront Area – 310 CMR 10.58

Significance

Riverfront Area is likely to be significant to protect the private or public water supply; to protect groundwater; to provide flood control; to prevent storm damage; to prevent pollution; to protect land containing shellfish; to protect wildlife habitat; and to protect the fisheries. Land adjacent to rivers and streams can protect the natural integrity of these water bodies. The presence of natural vegetation within riverfront areas is critical to sustaining rivers as ecosystems and providing these public values. Sediments are trapped by vegetation before reaching the river. Nutrients and toxic substances may be detained in plant root systems or broken down by soil bacteria.

Performance Standards

1. *The project will meet the performance standards for all other resource areas within the riverfront area.*

The project will meet the performance standards for other resources areas as outlined previously.

2. *The project will have no adverse effect on specified habitat sites of rare vertebrate or invertebrate species.*

The proposed project is located within a Priority Habitat of Rare Species (#1337, **Figure 4**) and within Estimated Habitats of Rare Wildlife (#76, **Figure 5**) according to the MA Natural Heritage Atlas. The goal of the proposed project is to ultimately improve water quality as well as prevent future degradation. No adverse effects are anticipated to any rare species within the area. Wildlife access will be maintained, and existing natural habitat preserved as much as feasible.

3. *The project must have no practicable and substantially equivalent economic alternative with less adverse effects.*

There are no practicable and substantially equivalent economic alternatives to the proposed project with less adverse effects. This alternative is the most practicable and economic alternative.

4. *The work must have no significant adverse impact on the riverfront area.*

The project has no significant adverse impact on resource areas and has been designed to minimize resource area disturbance.

Exception to Riverfront Area Impacts

Note that the riverfront area impacts noted on WPA Form 3 are for informational purposes only.

As per 310 CMR 10.58(4)(d)1d,

...The calculation also shall exclude areas used for structural stormwater management measures, provided there is no practicable alternative to siting these structures within the riverfront area and provided a wildlife corridor is maintained (e.g. detention basins shall not be fenced).

As outlined in sections above, this is a stormwater retrofit project at an existing outfall.

Therefore, there is no practicable alternative to siting the BMP. Additionally, wildlife passage will be maintained, as a fence will not encircle the site. A fence is proposed to be installed along a portion of the project, particularly along the existing roadways and sidewalks to limit potential pedestrian access to the area. The fence will also encourage wildlife to cross under the bridge along the riverbank rather than over Route 20.

5.4 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 resource area performance standards as a resource area improvement project, as outlined previously. The above 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.

6.0 DEP STORMWATER STANDARDS AND REPORT

The following is an overview of project compliance with the ten stormwater standards. The installation of the above discussed detention BMP will not create additional impervious area. There will be no new discharges associated with this EIC reduction improvement project. The completed stormwater checklist is included as **Appendix E**.

Standard 1. No New Untreated Discharges

N/A – This is an EIC reduction improvement project involving no new stormwater discharges. The existing discharges will be treated with the

construction of the proposed detention BMP.

Standard 2. Peak Rate Attenuation

N/A – No new impervious area is proposed. The detention basin BMP was designed to treat stormwater runoff generated from impervious surfaces and will help attenuate peak runoff.

Standard 3. Recharge

N/A – This project will not result in a loss of annual recharge to groundwater. The project purpose is to treat stormwater runoff and discharge it into the adjacent Westfield River. No new impervious area is proposed as part of this project, therefore groundwater recharge will remain the same or be slightly increased due to exfiltration during detention.

Standard 4. Water Quality

The project purpose is to improve stormwater runoff quality by temporarily containing it in the detention basin BMP. Pollutants in the stormwater runoff will settle to the bottom of the BMP before it is discharged into the Westfield River.

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 by way of stormwater structural improvements.

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

Project includes <1 acre of disturbance therefore 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 EIC reduction improvements for the Route 20 Bridge site in Westfield, MA, 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 known illicit discharges to the existing drainage system.