Stormwater Management Report User Guidance

(This guidance is for user’s reference and not to be included in report.)

When a MassDOT project falls under jurisdiction of the Wetlands Protection Act or Water Quality Certification regulations, designers must document how the Project complies with each of the MassDEP Stormwater Management Standards in a Stormwater Management Report. The designer should use this template as a guide to create a project-specific Stormwater Management Report; however, the designer should use their judgement to determine which sections, tables, appendices, and figures in this template are applicable. Instructions or guidance are shown in blue italics. Suggested content is shown in black text, but this text should be edited/modified/expanded upon by the designer, as necessary. Multiple reports may be necessary if a project crosses town boundaries or sections in this report may be divided into subsections by town to facilitate review by local conservation commissions.

The designer is responsible for ensuring that all the necessary information is included in the report. The designer should consult with MassDOT’s Environmental Services Section if additional guidance is needed for the designer to complete their Stormwater Management Report.

The designer should refer to the MassDOT Stormwater Design Guide (the SDG)[[1]](#footnote-2) for guidance on stormwater design and regulatory requirements. The SDG should be used in conjunction with, and as a supplement to, EPA and MassDEP regulations.

MassDEP is currently revising the 2008 Massachusetts Stormwater Handbook and the Stormwater Standards. This template will be revised when MassDEP’s revisions are released.

Documentation Checklist

(This checklist is for user’s reference and not to be included in report.)

|  |  |
| --- | --- |
| Project Summary | |
|  | Project Description |
|  | Existing Conditions |
|  | * Description of existing drainage |
|  | * List of drainage area delineations and design points |
|  | * Description of existing Stormwater Control Measures (SCMs), if applicable |
|  | * List of receiving waters and wetland resource areas |
|  | * Description of key features or sensitive resources |
|  | * Explanation if the project area is within a floodplain |
|  | * Description of soils within the project area |
|  | Proposed Conditions |
|  | * Description of the Project and changes within the project limits |
|  | * Description of proposed drainage |
|  | * List of drainage area delineations and design points |
|  | * Description of non-structural SCMs and Low Impact Development (LID) features |
|  | * Description of proposed SCMs |
|  | * Any impacts to key features or sensitive resources |
| Impaired Waters and TMDLs | |
|  | Details on the impaired waters and waters with Total Maximum Daily Loads (TMDLs) affected by the Project |
|  | Explanation on how the proposed stormwater system treats the pollutant of concern and/or makes progress towards meeting the TMDL requirements |
|  | Description of non-structural measures implemented to meet the TMDL requirements |
| Stormwater Management Standards | |
|  | 1. No New Untreated Discharges |
|  | * Outlet design calculations for erosion control |
|  | 2. Peak Rate Attenuation |
|  | * Peak rates to each design point (existing and proposed conditions) |
|  | * Hydraulic and hydrologic modeling assumptions, node diagrams, and model reports |
|  | * Hydraulic capacity calculations for conduits, linear practices, basins, and other structural components |
|  | 3. Recharge |
|  | * Table of existing and proposed impervious areas within each hydrologic soil group (HSG) |
|  | * Recharge volume required |
|  | * Recharge volume provided |
|  | * Capture area adjustment calculation (if necessary) |
|  | * Geotechnical report with soil evaluation (i.e., Seasonal High Water Table (SHWT), soil textural analysis, and/or in-situ infiltration rate test) for each SCM |
|  | * Drawdown calculations |
|  | 4. Water Quality Treatment |
|  | * Table of the required Water Quality Volume (WQV) and the WQV that should be attained to the maximum extent practicable (MEP) at each design point * Table of the WQV provided by the SCMs at each design point |
|  | * MassDEP TSS Removal Calculation Worksheet for each SCM treatment train[[2]](#footnote-3) |
|  | * Reference Long-Term Pollution Prevention Plan (LTPPP) |
|  | 5. Land Uses with Higher Potential Pollutant Loads (LUHPPLs) |
|  | * Narrative description of how this standard is addressed |
|  | * Consistency with Standard 3 and Standard 4 |
|  | 6. Critical Areas |
|  | * Narrative description of how this standard is addressed |
|  | * Consistency with Standard 3 and Standard 4 |
|  | 7. Redevelopment |
|  | * Narrative description of redevelopment areas and how they are treated in the Project |
|  | * Consistency with Standards 1 through 6 |
|  | * Evaluation of possible stormwater management measures, specifically LID (e.g., pavement disconnection), in accordance with the SDG |
|  | * Demonstrate an improvement over existing conditions if some standards are met to the maximum extent practicable |
|  | 8. Erosion and Sediment Control |
|  | * For all projects, show erosion and sediment controls on the plans and provide a description |
|  | * For projects with disturbance of one or more acres of land, confirm that coverage under the NPDES CGP will be requested and a SWPPP will be prepared by the contractor as a separate line item |
|  | 9. Operation and Maintenance (O&M) Plan |
|  | * Reference O&M Plan |
|  | 10. Prohibition of Illicit Discharges |
|  | * Reference LTPPP |
| Appendices | |
|  | A. MassDEP Checklist for Stormwater Report |
|  | * Signed and stamped by a Massachusetts Registered Professional Engineer |
|  | B. Soils and FEMA Information |
|  | * Natural Resources Conservation Service (NRCS) Soil Survey |
|  | * On-site subsurface investigation report |
|  | * FEMA Flood Insurance Rate Map (FIRM) |
|  | * FEMA Flood Insurance Study (FIS), if necessary |
|  | C. Supporting Calculations |
|  | * Riprap outlet protection sizing calculations |
|  | * Groundwater recharge calculations |
|  | * Water quality calculations |
|  | * MassDEP TSS Removal Calculation Worksheets for SCM treatment trains |
|  | * Compensatory flood storage calculations, if necessary |
|  | D. Hydraulic and Hydrologic Information |
|  | * Modeling reports for existing and proposed conditions |
|  | Inputs |
|  | *Precipitation data for design storm events (depth, duration, distribution)* |
|  | 2-year, 24-hour |
|  | 10-year, 24-hour |
|  | 100-year, 24-hour |
|  | Other design storm events, as needed |
|  | *Runoff Curve Number (RCN) assumptions by land cover and soil type* |
|  | Outputs |
|  | *Peak flow rates, runoff volumes, and water surface elevation results* |
|  | E. O&M Plan and LTPPP |
|  | * Stormwater Management System Operation and Maintenance (O&M) Plan and Long-Term Pollution Prevention Plan (LTPPP) |
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|  | 3. Existing Key Features and Wetland Resource Areas |
|  | 4. NRCS Soils Information |
|  | 5. Proposed Drainage Patterns |
|  | 6. Other applicable figures as appropriate |

|  |
| --- |
| Stormwater Management Report |

*Project Name*

*City or Town*

|  |
| --- |
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| PREPARED BY  [Logo]  Name  Address  Town, State, Zip  MONTH/DATE/YEAR |

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# Introduction

This Stormwater Management Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards (the Standards) in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00) and Water Quality Certification Regulations (314 CMR 9.00). Appendix A includes a completed Massachusetts Department of Environmental Protection (MassDEP) Checklist for Stormwater Report, stamped by a Massachusetts registered professional engineer.

The Project follows the guidance presented in the MassDOT Stormwater Design Guide (SDG), and stormwater management systems are designed in accordance with the Standards.

The following MassDOT standard methodologies are being employed in this project:

Include any that apply:

* Use of Macro Approach for Standards #, #, # to meet requirements on a project-wide scale[[3]](#footnote-4)
* Use of MassDOT SCM Water Quality curves to meet impaired waters and TMDL requirements[[4]](#footnote-5)

# Project Summary

The Applicant, MassDOT, is proposing Project [MassDOT Project Number] to construct a/an [list type of project (e.g., resurfacing of highway, stormwater retrofits, bikeway/bike path, highway reconstruction or widening, bridge, tunnel, utilities, streetscape improvements, etc.)] (the Project) located in [City/Town(s), MA]. As proposed, the Project consists of [Describe:

• General description of the proposed activities for the Project

• Purpose of the Project

• Street or description of section of road(s)

• Limits of project / roads the Project covers

• Mile markers

• Length of the Project

• # acres of area disturbed by the Project]

If the Project crosses town boundaries, describe the scope of work within each town.

Additionally, list any areas related to or affected by the Project:

• Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

• Critical Areas and/or sensitive resources (as defined in Standard 6)

• Any other important jurisdictional areas

• Wetland resource areas

• Wildlife habitat

• Stream crossings

• Flood zones

• Cultural resources

• Riverfront area

• Bordering land subject to flooding

See Figure 1 for the Project Locus Map.

Figure 1 Locus Figure

Include in Figure 1:

• USGS topographic background

• Town, city, or state boundaries

• Property line boundaries

• Overlay districts or other local zoning, as applicable

• Project limit of work

• Water bodies and wetlands

• Other key features

# Existing Conditions

The project is currently [Describe the existing conditions of the Project in detail, including:

• Impervious areas

• Grassed or pervious areas

• Key features

• Topography

• The major watershed(s) the Project is located within

• Receiving waterbodies and wetlands

• Drainage patterns

• Existing drainage infrastructure

• Existing Stormwater Control Measures (SCMs)

• Discharge points from existing drainage patterns

• Existing Design Points (DPs)]

Break this section into sub-sections by town if project crosses over town boundaries.

**Note:** Design point is chosen by the designer and is at a location of interest such as an outfall, receiving water body, wetland, culvert, etc.

Table 1 presents the existing drainage areas and their characteristics. See Figure 2 for existing drainage areas and existing SCMs by design point.

Table 1 Existing Drainage Areas

|  |  |  |  |
| --- | --- | --- | --- |
| Drainage Area | Design Point | Area (acres) | Curve Number |
| *Ex-#* | *DP-#* | *#* | *#* |
| *Ex-#* | *DP-#* | *#* | *#* |
|  |  |  |  |

Table 2 lists the existing SCMs and provides a description of each.

Provide information on the existing SCMs in a table, such as provided below, or in paragraph format.

Table 2 Existing SCMs

|  |  |
| --- | --- |
| SCM | Description |
| *Infiltration Linear Practice #* | *X* |
| *Infiltration Basin #* | *X* |
|  |  |

Key features in and around the project area include [identify wetland resource areas/ water features, Critical Areas, sensitive resource areas, buffer zones, LUHPPLs, etc.] and are shown on Figure 3.

The Project [is/isn’t] located within the 100-year floodplain as shown on the [include title of FEMA Flood Map, Panel number and date] included in Appendix B [or shown on Figure #]. For Appendix B, show the Project in relation to the floodplain boundary. Designers may use a copy of FEMA Flood Map(s) or create a new figure. If the Project is in a floodplain or special flood hazard area, describe implications to the Project.

Review of the NRCS Soil Survey map of the project area identified [provide soils names and HSG types] and are shown on Figure 4. On-site subsurface investigations performed at the project area included [discuss boring/test pit information and infiltration rates (if available)]. Review of the soil information indicates [provide summary of soil conditions, SHWT, and infiltration potential]. Appendix B provides detailed soils information, including the NRCS soil survey data for the project area and results of on-site subsurface investigations.

Figure 2 Existing Drainage Patterns

Include in Figure 2:

• Existing conditions or drainage information as the basemap, if available

• Existing drainage area delineations

• Existing SCMs

• Time of concentration (Tc) flowpaths

• Design points

• Project limit of work

• Topography

• Receiving water bodies and wetlands and their buffer zones

Figure 3 Existing Key Features and Wetland Resource Areas

Include in Figure 3:

• Key features or sensitive resources

• Receiving water bodies and wetlands and their buffer zones

• Project limit of work

• Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

• Critical Areas and/or sensitive resources (as defined in Standard 6)

Figure 4 NRCS Soils Information

Include in Figure 4:

• Soils with Hydrologic Soil Group (HSG) labeled

• Existing drainage area delineations

• Project limit of work

# Proposed Conditions

The Project will include construction of [describe the proposed conditions of the Project], including:

* *Proposed impervious areas*
* *Proposed pervious areas*
* *Change in impervious area compared to existing impervious area (+ or -)*
* *Proposed grading*
* *Other key features*

Table 3 provides a breakdown of the impervious area for the Project.

Table 3 Impervious Area

| Condition | Impervious Area (sq. ft) |
| --- | --- |
| Existing | *X* |
| Proposed | *X* |
| **Net** | *+ or - X* |

Break this section into sub-sections by town if project crosses over town boundaries.

Discuss how the proposed design maintains existing drainage and grading patterns to the maximum extent possible.

Discuss proposed drainage patterns, conveyance systems, and the stormwater management systems, including how integrated site design and Low Impact Development (LID) techniques were considered and how these practices were implemented to the maximum extent practicable (see Chapter 3 of the SDG for guidance). Discuss:

* *Non-structural SCMs and LID techniques implemented, including areas of pavement disconnection*
* *Identify key project layout elements and limit-of-work restrictions designed to protect natural resources such as preserving trees, placement of the limit-of-work, etc.*
* *Proposed SCMs and water quality/quantity attenuation measures*
* *Proposed drainage patterns, drainage areas, and receiving water bodies and wetlands*
* *The design storm for which the closed-drainage system is designed (e.g., minimum 10-year 24-hour storm)*
* *Proposed design points*
* *Any* impacts to key features or natural resources (e.g., wetland resource areas/ water features, Critical Areas, sensitive resource areas, buffer zones, LUHPPLs)

Table 4 presents the proposed drainage areas and their characteristics under proposed conditions. Figure 5 shows proposed drainage patterns and drainage area delineations by design point.

Table 4 Proposed Drainage Areas

| Drainage Area | Design Point | Area (acres) | Curve Numbers |
| --- | --- | --- | --- |
| *Pr-#* | *DP-#* | *#* | *#* |
| *Pr-#* | *DP-#* | *#* | *#* |
|  |  |  |  |

See Figure 5 for proposed drainage areas and proposed SCMs by design point.

Table 5 lists the proposed SCMs and provides a description of each.

Provide information on the proposed SCMs in a table, such as provided below, or in paragraph format.

Table 5 Proposed SCMs

|  |  |
| --- | --- |
| SCM | Description |
| *Infiltration Linear Practice #* | *X* |
| *Infiltration Basin #* | *X* |
|  |  |

Figure 5 Proposed Drainage Patterns

Include in Figure 5:

• Proposed drainage area delineations

• Tc flowpaths

• Proposed work

• Proposed grading

• Proposed SCMs

• Design points

• Project limit of work

• Receiving water bodies and wetlands and their buffer zones

# Impaired Waters and TMDLs

As described under the Proposed Conditions section, the Project will discharge to [list the water bodies]. Of these water bodies, [name of water bodies] are impaired based on the MassDEP Year [20## - use the most recent final list from MassDEP] Integrated List of Waters, also known as the 303(d) list. [**Note**: A MassDOT Water Quality Data Form (WQDF) needs to be completed and submitted to MassDOT for the Project by the time of the 25% design submission. A WQDF still needs to be completed at the 25% design submission even if the Project does not discharge to an impaired water body. For projects with stormwater designs, additional WQDFs are submitted at the final design stages (e.g., 75% to PS&E) to provide updated stormwater design information. The WQDF assists in the identification of impaired waters and TMDL requirements and collects pollutant reduction data provided by the Project’s SCMs.]

Table 6 lists the receiving water bodies that are impaired and if the water body has a TMDL. [If the impaired waterbody has no TMDL, state this but describe any listed impairments. If any of the impaired waterbodies this project will discharge to have a TMDL, include the TMDL in Table 6 and include the following text:]. MassDOT is expecting to receive a Transportation Separate Storm Sewer System (TS4) Permit from EPA, which will require that pollutant reductions presented in the TMDL be met on the watershed scale. As a result, the TMDL reductions do not need to be met by MassDOT on a project-by-project basis, but rather, MassDOT strives to make incremental progress towards achieving the required TMDL pollutant reductions with each project. Incremental progress is achieved through the implementation of SCMs designed to treat for the specific pollutants of concern for waterbodies within the watershed.

Table 6 Impaired Waters and TMDL Information

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Water Body | 303(d) Category | 303(d) Impairments | TMDL | TMDL Pollutant | TMDL Report Name |
| *X* | *#* | *[pollutant(s)]* | *[Yes]* | *X* | *X* |
| *X* | *#* | *[pollutant(s)]* | *[No]* | *N/A* | *N/A* |
|  |  |  |  |  |  |

SCMs were selected and designed to specifically treat for [TMDL pollutant and/or other pollutants of concern. Describe why these specific SCMs were chosen and how they qualitatively address the TMDL pollutant and/or other pollutants of concern. See Chapter 4 of the SDG for SCM guidance and the WQDF for impaired waters requirements. Describe the implementation recommendations for MassDOT and/or stormwater discharges in the TMDL].

[When a waterbody is impaired for nutrient-related impairments, the designer should include Table 7. Nutrient-related impairments include the following:

* Total Phosphorus (TP)
* Total Nitrogen (TN)
* Nutrient/Eutrophication Biological Indicators

Designer should create a separate column for each nutrient the water body is impaired for (i.e., TP and/or TN). Provide both TP and TN columns if impaired for Nutrient/Eutrophication Biological Indicators. The estimated nutrient removal can be calculated using the WQDF.[[5]](#footnote-6)]

Table 7 lists each water body, the proposed SCMs that drain to it, and each SCM’s estimated [pollutant(s)] removal per year.

Table 7 Nutrient Removal for Project

|  |  |  |
| --- | --- | --- |
| Water Body | SCM | *Nutrient*  Removal (lbs/yr) |
| *Water Body Name* | | |
|  | *Infiltration Linear Practice #* | *#* |
|  | *Infiltration Basin #* | *#* |
|  | Total Provided by SCMs | *#* |
|  |  |  |
| *Water Body Name* | | |
|  | *Infiltration Linear Practice #* | *#* |
|  | *Infiltration Basin #* | *#* |
|  | Total Provided by SCMs | *#* |
|  |  |  |

Describe any additional non-structural measures beyond structural SCMs (e.g., source control, street sweeping, illicit discharge elimination, etc.) that are proposed by the Project that support compliance with the TMDL.

See Standard 4 in Section 6 below for more water quality calculations and discussion.

# Stormwater Management Standards

As demonstrated below, the proposed Project complies with the MassDEP Stormwater Management Standards (the Standards). The Project is a [identify MassDEP development category (new development, redevelopment, or mix of both). If the Project is a redevelopment and only meets certain standards to the maximum extent practicable (MEP), state this here. **Note**: if the project is considered maintenance and improvement of existing roadways, then the Project needs to meet the Standards to the MEP. See page 2-30 of the SDG for the definition of projects that are considered maintenance and improvements of existing roadways.]

If using the Macro Approach, include the following paragraphs (see Section 2.3.4 of the SDG for guidance).

The Project utilized the MassDOT Macro Approach[[6]](#footnote-7) (a methodology that allows the design to provide peak rate control, recharge, and/or water quality treatment holistically on a project-wide scale to overcome site constraints) for [description of the area of the Project being used by the approach]. The Macro Approach was employed due to [must provide additional detailed information under the given Standard that used the Macro Approach but provide a general reasoning of why the Project used the Macro Approach here. Explain all integrated site design practices, LID techniques, and potential structural SCMs considered. Provide detailed description of the constraints encountered (e.g., proximity of wetlands, steep slopes, presence of bedrock, high groundwater, soils with poor infiltration capacity, limited right-of-way, or existing development). Explain why the design could not achieve full compliance at all design points.].

By implementing the Macro Approach, the Project achieves compliance with the given Standard on a project-wide scale. The approach was utilized for Standards #, #, #, and #. [**Note**: the Macro approach can only be applied to Standards 2, 3, 4, and 7]. Implementation of the Macro Approach for these Standards is described in the following sections.

**Note:** MassDOT has created an example using the Macro Approach to meet Standard 4. This example*[[7]](#footnote-8)* is meant to provide the designer a general understanding of the Macro Approach and how it could be employed to meet MassDEP Standard 4 using a conceptual project. While this example presents the application of the Macro Approach to Standard 4, the overall concept of the Macro Approach can also be applied to Standards 2 and 3.

Standard 1: No New Untreated Discharges

*No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *State if this standard is met.*
* *State if the Project is considered redevelopment.* 
  + *If only meeting the standard to the maximum extent practicable for existing discharges, discuss constraints and how existing conditions are improved in relation to the requirements of this standard.*
* *If there are new outfalls (see SDG for guidance on definition of existing outfalls), discuss outlet protection and treatment provided.*
* *Include supporting calculations for outlet protection in Appendix C.*

**Standard text for use:**

The Project has been designed to comply with Standard 1.

If new outfalls:

All new outfalls are designed with [describe type of outlet protection (e.g., flared end sections and rip rap protection or other measures] to prevent erosion to [name of receiving water bodies or wetlands]. Appendix C provides supporting calculations for the outlet protection design.

Stormwater runoff will be treated by [list proposed SCMs] before discharging off-site. See Standard 4 for the water quality treatment provided by the Project.

If NO new outfalls:

No new stormwater outfalls are proposed for the Project. Existing outfalls were [describe if existing outfalls were retrofitted with improved scour protection].

Standard 2: Peak Rate Attenuation

*Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard. See Chapter 3 of the SDG for integrated site design and LID practices.*
* *State if this standard is met.*
* *State if the Project is considered redevelopment.* 
  + *If only meeting the standard to the maximum extent practicable, discuss constraints and how existing conditions are improved in relation to the requirements of this standard.*
* *Include summary of existing and proposed peak rates in tables.*
* *Include supporting peak rate modeling for both existing and proposed conditions in Appendix D. The appendix should include:* 
  + *Node diagrams*
  + *Modeling inputs (precipitation, curve numbers, etc.)*
  + *Modeling results (hydraulic capacity calculations for conduits, linear practices, basins, and other structural components, etc.)*
* *If using Macro Approach, include discussion of how n there will be no disproportionate adverse impacts to receiving waters and/or downstream conveyances (e.g., culverts).*

**Standard text for use:**

The Project has been designed to comply with Standard 2. This project reduces post-development peak runoff rates to below pre-development peak runoff rates for the 2-year, 10-year, and 100-year 24-hour design storm events based on NOAA Atlas 14 precipitation data as shown in Table 8. [If TP-40 or another precipitation data source as directed by the Town is used for the analysis, state this here].

Table 8 Rainfall Depths (in)

|  |  |
| --- | --- |
| Design Storm Event | Rainfall Depth (in) |
| 2-year | *#* |
| 10-year | *#* |
| 100-year | *#* |

Table 9 provides a summary of peak rates for each design point under existing and proposed conditions. Appendix D provides computations and supporting information regarding the hydraulic and hydrologic modeling.

Table 9 Peak Discharge Rates (cfs)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Design Point | Existing | | | Proposed | | |
| 2-year | 10-year | 100-year | 2-year | 10-year | 100-year |
| *DP-#* | *#* | *#* | *#* | *#* | *#* | *#* |
| *DP-#* | *#* | *#* | *#* | *#* | *#* | *#* |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**If using the Macro Approach:**

The Macro Approach is being used for compliance with this standard due to constraints at the project site. [In Table 9, show that proposed peak rates could not meet existing peak rates at the design points(s) and explain why the design could not achieve full compliance. Provide documentation that shows all reasonable efforts to meet peak rate control at each design point were made.]

To employ the Macro Approach, the designer needs to identify “ultimate” design points for the Project. These “ultimate” design points should be located downstream of the design points that the designer tried to meet peak rates for and should represent a downstream location of interest such as a receiving waterbody, wetland, culvert, dam, etc. Run the model and present the peak flow rates at the “ultimate” design points.

Revise Table 9 to show the peak rates to the ultimate design points and that flows are controlled on a project-wide scale. Include explanation on how the design improves existing conditions and implements the highest practicable level of stormwater management. Demonstrate that there are no disproportionate effects with using the Macro Approach (i.e., no increased flooding will occur at downstream resource areas based on the 100-year 24-hour storm and that disproportionate impacts to any one wetland resource area are avoided).

Standard 3: Recharge

*Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures, including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard. See Chapter 3 of the SDG for integrated site design LID measures.*
* *State if this standard is met.*
* *State if the Project is considered redevelopment.* 
  + *If only meeting the standard to the maximum extent practicable, discuss constraints and how existing conditions are improved in relation to the requirements of this standard.*
* *If pavement disconnection to a qualifying pervious area is used as an SCM in the Project, designers can remove the amount of impervious area from the calculation.*
* *Summarize required and provided recharge volumes in table*
  + *Include values for each drainage area to each design point*
  + *Show the amount of impervious area removed from the calculation if one of the SCMs is a qualifying pervious area*
* *Describe analysis method used (static, simple dynamic, or dynamic) and supporting modeling/calculations*
* *Summarize and reference soil information or geotechnical report describing infiltration capabilities of soils at proposed infiltration SCMs, such as:* 
  + *Soil testing or geotechnical analysis results (Appendix B)*
  + *Supporting computations, drawdown calculations, and information regarding recharge (Appendix C)*

**Standard text for use:**

The Project has been designed to comply with Standard 3. The stormwater management design recharges the required recharge volume to groundwater.

Table 10 provides the required recharge volume for the Project, and Table 11 provides the recharge volumes proposed for each design point.

Table 10 Required Recharge Volume for Project

|  | HSG A | HSG B | HSG C | HSG D | Total |
| --- | --- | --- | --- | --- | --- |
| Existing Impervious (sq. ft.) | *#* |  | *#* |  | *#* |
| Proposed Impervious (sq. ft.) | *#* |  | *#* |  | *#* |
| Net Impervious Area (sq. ft.) | *#* |  | *#* |  | *#* |
| Target depth, F (in) | 0.60 | 0.35 | 0.25 | 0.10 | - |
| Required Recharge Volume, ReV (cf) | *#* |  | *#* |  | *#* |

[Drainage areas should be delineated to design points. Design point is defined as a location of interest such as an outfall, receiving water body, wetland, culvert, etc. Provided Recharge Volume in the table may want to be further broken down by SCM.]

Table 11 Provided Recharge Volumes at Each Design Point

|  | HSG A | HSG B | HSG C | HSG D | Total |
| --- | --- | --- | --- | --- | --- |
| DP-1 | | | | | |
| Net Impervious Area (sf) | *#* | *#* | *#* | *#* | *#* |
| Required Recharge Volume, ReV (cf) | *#* | *#* | *#* | *#* | *#* |
| Provided Recharge Volume (cf) | *#* | *#* | *#* | *#* | *#* |
| DP-2 | | | | | |
| Net Impervious Area (sf) | *#* | *#* | *#* | *#* | *#* |
| Required Recharge Volume, ReV (cf) | *#* | *#* | *#* | *#* | *#* |
| Provided Recharge Volume (cf) | *#* | *#* | *#* | *#* | *#* |

The infiltration SCMs are designed to drain completely within 72 hours.

Appendix B provides soil evaluation information (including the geotechnical report if applicable), and Appendix C provides computations, drawdown calculations, and supporting information regarding recharge.

**If using the Macro Approach:**

The Macro Approach is being used for compliance with this standard due to constraints at the project site. [In Table 11, show that the recharge volume could not be met at each design point and explain why the design could not achieve full compliance. Provide documentation that shows all reasonable efforts to meet each Standard were made.]

The Project’s design provides more than the required recharge volume on a project-wide scale. [Add a row at the bottom of Table 11 for “Project Area” and sum all the recharge volumes for all design points. Every effort should be made to meet the required recharge volume within each design point. However, if this is infeasible, the design should show that the provided recharge volume is greater than the required recharge volume on a project-wide scale. Include explanation on how the design improves existing conditions and implements the highest practicable level of stormwater management. Demonstrate that there are no disproportionate effects with using the Macro Approach (i.e., sensitive resources such as vernal pools will maintain the same hydrologic regime (using Thornthwaite method or equivalent) and that disproportionate impacts to any one wetland resource area are avoided.)]

Standard 4: Water Quality Treatment

*Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:*

* *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.*
* *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook.*
* *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard. See Chapter 3 of the SDG for integrated site design and LID measures.*
* *State if this standard is met.*
* *State if the Project is considered redevelopment.* 
  + *If only meeting the standard to the maximum extent practicable, discuss constraints and how existing conditions are improved in relation to the requirements of this standard.*
* *If pavement disconnection to a qualifying pervious area is used as an SCM in the Project, designers can remove the amount of impervious area from the calculation.*
* *Populate Tables 12 and 13 with required and provided water quality volumes by design point.*
* *Include any additional pretreatment requirements due to Standard 5 or 6.*
* *Develop a project-specific LTPPP (using MassDOT’s template) and include in Appendix E.*

**Standard text for use:**

The Project has been designed to comply with Standard 4. Stormwater control measures have been sized to treat the required water quality volume (WQV) and provide the required pollutant load removal. The Project:

* Achieves 80% TSS reduction through treatment of the WQV equal to 0.5 or 1.0 inch times the new impervious area within the project limits, based on MassDEP TSS removal rates as defined in the Massachusetts Stormwater Handbook.
* Treats existing impervious area to the MEP by [describe all the stormwater improvements added to the project including deep sump catch basins, SCMs proposed within the corridor where possible, amount of additional WQV treated].
* Improves existing conditions through [describe measures proposed to improve existing conditions].

Table 12 shows the WQV to be treated for both new and existing impervious area within each drainage area, organized by design point. If the Project discharges to a waterbody with a TMDL, refer to Section 5 on Impaired Waters and TMDLs and refer to Tables 6 and 7 as necessary.

Table 12 WQV at Each Design Point

| Design Point | WQV for  New IA (cf) | WQV for  Existing IA (cf) | Total WQV (cf) |
| --- | --- | --- | --- |
| DP-1 |  |  |  |
| *DA-1* | *#* | *#* | *#* |
| *DA-2* | *#* | *#* | *#* |
| Total | # | # | # |
| DP-2 |  |  |  |
| *DA-3* | *#* | *#* | *#* |
| *DA-4* | *#* | *#* | *#* |
| Total | # | # | # |
| Project Total | # | # | # |

Table 13 shows the WQV provided by the SCMs at each design point. [Note: if the Project discharges to a Critical Area or LUHPPL, the runoff treatment depth should be a minimum of 1.0 inches.]

Table 13 WQV Provided by the SCMs at Each Design Point

| Design Point | Pretreatment (y/n) | WQV Provided (cf) | Meets Total WQV | Meets Required WQV for New IA |
| --- | --- | --- | --- | --- |
| DP-1 |  |  | *no/yes* | *no/yes* |
| *Infiltration Linear Practice #* |  | *#* |
| Total |  | # |
| DP-2 |  |  | *no/yes* | *no/yes* |
| *Infiltration Basin #* |  | *#* |
| Total |  | # |
| Project Total | | **#** | ***no/yes*** | ***no/yes*** |

In DP-1, the project provides [identify amount of treatment provided and describe constraints if the total WQV could not be met and this is a redevelopment project. Repeat this approach in DP-2, etc.].

If SCMs are in series and part of a treatment train, show the total treatment provided by the treatment train in the table and reference the appendix with the MassDEP TSS Removal Calculation Worksheet. Appendix C provides the MassDEP TSS Removal Calculation Worksheets.

For SCMs #, #, #, pretreatment is provided through [describe pretreatment measures].

**If proposing infiltration near a Critical Area or LUHPPL:**

[If the design contains infiltration SCMs that discharge to or near a Critical Area and/or treat runoff from a LUHPPL, describe this here and say:] SCMs #, #, # discharge to a Critical Area and/or treat runoff from a LUHPPL. These SCMs have describe the pretreatment measures to meet the required 44% TSS reduction before infiltration.

For MassDOT facilities, Long-Term Pollution Prevention Plans (LTPPPs) are implemented at a programmatic level through MassDOT’s highway operation and maintenance program by district. Appendix E includes the LTPPP for this project.

**If using the Macro Approach:**

The Macro Approach is being used for compliance with this standard due to constraints at the project site. The Project’s design provides the required WQV on a project-wide scale. [In Table 13, show that the required water quality volume could not be achieved at all design point(s) and explain why.

Provide documentation that shows all reasonable efforts to meet this standard at all design points were made. Every effort should be made to meet the required water quality volume within each drainage area and for each design point. However, if this is infeasible, the design should show that the total provided WQV is equal to or greater than the required WQV on a project-wide scale. Include explanation on how the design improves existing conditions and implements the highest practicable level of stormwater management. Demonstrate that there are no disproportionate effects with using the Macro Approach and that disproportionate impacts to any one wetland resource area are avoided.]

Standard 5: Land Uses with Higher Potential Pollutant Loads

*For Land Uses with Higher Potential Pollutant Loads (LUHPPLs), source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all LHPPLs cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from LUHPPLs shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *State if this standard applies to all or portion of the project site and is met.*
* *For LUHPPLs:*
  + *Describe source control and pollution prevention measures to address project and site-specific activities and pollutants*
  + *Summarize and refer to Standard 4 as necessary where additional treatment requirements are addressed.*
* *Discuss off-site contributions and/or tie-ins as necessary.*

**Standard text for use:**

If LUHPPLs are present:

The Project has been designed to comply with Standard 5. Figure 3 shows LUHPPLs in the vicinity of the project site [and describe how stormwater discharges from LUHPPLs are treated and/or refer to earlier sections where it has already been described.]

If LUHPPLs are NOT present:

Standard 5 does not apply to the Project. There are no Land Uses with Higher Potential Pollutant Loads within the project area.

Standard 6: Critical Areas

*Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A “stormwater discharge” as defined in 314 CMR 3.04(2)(a)1 or (b), to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard. See Chapter 3 of the SDG for integrated site design and LID measures.*
* *State if this standard applies and is met.*
* *For discharges to Critical Areas:*
  + *Describe Critical Area and special water quality concerns*
  + *Develop a figure showing Critical Areas in relation to the proposed drainage system and discharges*
  + *Summarize and refer to Standard 4 as necessary where additional treatment requirements are addressed.*
  + *Describe supportive measures to help provide a buffer between discharges and the Critical Area*
* *For discharges to a Zone A or Zone I:*
  + *Describe coordination with public water supply owner and local first responders*
  + *Describe any provisions included in the Project to address spill containment (e.g., providing training and materials to local first responders)*

**Standard text for use:**

If Critical Areas are present:

The Project has been designed to comply with Standard 6. Figure 3 shows the Critical Areas in the vicinity of the project site [and describe how stormwater discharges to these resource areas are treated and/or refer to earlier sections where it has already been described.]

If Critical Areas are NOT present:

Standard 6 does not apply to the Project. There are no Critical Areas near the project area.

Standard 7: Redevelopment

*A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *Designers should use the Checklist for Redevelopment Projects in the Massachusetts Stormwater Handbook (Volume 2, Chapter 3) to evaluate redevelopment projects for compliance with Standard 7.*
* *Describe which portions of the Project meet MassDEP’s definition of new and redevelopment.*
* *Describe how the Project complies with applicable standards to “maximum extent practicable” supported by the site context review and SCM screening and selection analyses.*
* *Demonstrate an improvement over existing conditions. See Chapter 3 of the SDG for integrated site design and LID measures for guidance.*

**Standard text for use:**

The Project is a redevelopment project. Provide a description of any redevelopment areas (e.g., widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, repaving projects).List any standards that the Project meets to the maximum extent practicable. Refer directly to each standard for applicable computations and supporting information demonstrating compliance with each standard.

If the Macro Approach was used to meet Standards 2, 3, and/or 4: The Macro Approach was used to meet Standard [2, 3, and/or 4] and is described in more detail under Standard [2, 3, and/or 4].

Standard 8: Erosion and Sediment Control

*A plan to control construction related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *Include a summary of proposed erosion and sediment control measures depicted on the plans.*
* *Indicate whether the Project requires filing for NPDES Construction General Permit coverage, and/or discharges to an Outstanding Resource Water and requires filing of Form BRP WM: 15 with MassDEP.*

**Standard text for use:**

The implementation of erosion and sediment (E&S) controls during construction is considered a standard practice for all MassDOT projects. E&S controls will be installed before any land disturbance begins for the Project and will remain in place for the duration of the Project. The E&S controls for the Project are shown on the project plans and include [Provide description of the controls, including straw wattle, silt fence, filters at drain inlets, sedimentation basins, temporary earth berms, temporary ditches and check dams, energy dissipaters, etc. Describe any specific resources they will protect and describe if buffer between the controls and the resource area is part of the E&S control design. If the Project lasts more than one season, describe how many replacements of the E&S control will occur during the Project.]

See the following resources for more guidance on E&S control design:

* *The MassDOT Erosion and Sediment Control Field Guide includes detailed descriptions, photographs, and illustrations of E&S controls that the designer may incorporate into the plans.*
* *Chapter 8 of the MassDOT Project Development & Design Guide,[[8]](#footnote-9) Section 8.5 - Erosion During Construction, includes a description of common construction period E&S control practices.*
* *The Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas[[9]](#footnote-10) is an authoritative reference on erosion prevention measures.*
* *The Massachusetts Nonpoint Source Pollution Management Manual[[10]](#footnote-11) provides an innovative user interface to present comprehensive detailed guidance on E&S controls for construction projects.*

If the proposed disturbance is one or more acres of land:

The Project disturbs one or more acres of land; therefore, the project contractor will request coverage under the NPDES Construction General Permit (CGP) and develop a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP follows the requirements of this standard and complies with the NPDES CGP.

Standard 9: Operation and Maintenance Plan

*A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *If the Project is owned by MassDOT:*
  + *Develop an O&M Plan (using MassDOT’s template) and include in Appendix E.*
* *If the Project involves a roadway or bridge that is not owned by MassDOT:*
  + *Work with the municipality’s Department of Public Works to develop an O&M Plan in accordance with their practices.*

**Standard text for use for MassDOT owned projects:**

MassDOT O&M plans are implemented on a programmatic level by each MassDOT district. Each MassDOT district office is responsible for providing operation and maintenance for the MassDOT stormwater management systems within their respective jurisdictions. Appendix E includes the O&M Plan for this project.

**Standard text for use for non-MassDOT owned projects:**

If the project is owned by a municipality and funded and/or constructed by MassDOT, then confirm the municipal DPW’s commitment to operate and maintain the Project’s SCMs. The O&M plan must be reviewed and approved by the municipal DPW.

The [roadway or bridge] included in this project is not owned by MassDOT. The activities included in the O&M Plan will be implemented by the municipality. Appendix E includes the O&M Plan for this project.

Standard 10: Prohibition of Illicit Discharges

*All illicit discharges to the stormwater management system are prohibited.*

User guidance:

* *See MassDOT SDG Section 2.2.1 for guidance on how to comply with this standard.*
* *State compliance with this standard.*
* *Describe presence of sewer or other infrastructure that may contribute to a potential illicit connection and its relation to the drainage system.*
* *Further describe any connections or tie-ins identified through the survey and site investigation process and describe any actions taken to address those connections.*

**Standard text for use:**

Illicit Discharge Statement

The project’s stormwater management system, as shown on the plans submitted with this report, have been designed in full compliance with Standard 10. The project area does not have any known illicit connections. Any illicit connections to the stormwater management system found in the project limit of work during construction will be removed and/or resolved through MassDOT’s Illicit Discharge Detention and Elimination (IDDE) Program. The Long-Term Pollution Prevention Plan, provided in Appendix E, includes measures to prevent illicit discharges.

Appendix A: MassDEP Checklist for Stormwater Report

Insert a completed checklist, stamped by a registered professional engineer.

Appendix B: Soils and FEMA Information

* NRCS Soil Survey Information
* On-Site Subsurface Investigations
* FEMA Flood Insurance Rate Map (FIRM)
* Flood Insurance Study (FIS), if necessary

Appendix C: Supporting Calculations

* Riprap outlet protection sizing calculations
* Groundwater recharge calculations
* Water quality calculations
* MassDEP TSS Removal Calculation Worksheets for SCM treatment trains
* Compensatory flood storage calculations, if necessary

Appendix D: Hydraulic and Hydrologic Data

* Node diagrams
* Modeling inputs (precipitation, curve numbers, etc.)
* Modeling results (hydraulic capacity calculations for conduits, linear practices, basins, other structural components, etc.)

Appendix E: O&M Plan and LTPPP

* Stormwater Management System Operation and Maintenance (O&M) Plan
* Long-Term Pollution Prevention Plan (LTPPP)

1. The MassDOT SDG can be requested from the MassDOT Environmental Services Section and/or found online on the MassDOT Stormwater Management website: <https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services> [↑](#footnote-ref-2)
2. A treatment train is a collection of SCMs in series designed to provide water quality treatment. [↑](#footnote-ref-3)
3. See more information on the Macro Approach in Section 2.3.4 of the MassDOT SDG which can be requested from the MassDOT Environmental Services Section and/or found online on the MassDOT Stormwater Management website: <https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services> [↑](#footnote-ref-4)
4. The MassDOT SCM Water Quality Curves can be requested from the MassDOT Environmental Services Section and/or found online in the WQDF at: <https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services>. [↑](#footnote-ref-5)
5. See links to the WQDF at: <https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services>. [↑](#footnote-ref-6)
6. Authorized by MassDEP per the Massachusetts Stormwater Handbook, Vol. 1 Ch. 1. [↑](#footnote-ref-7)
7. See Example of Macro Approach for Standard 4 at: <https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services>. [↑](#footnote-ref-8)
8. See MassDOT PDDG at: <https://www.mass.gov/lists/design-guides-and-manuals> [↑](#footnote-ref-9)
9. See Complete Erosion and Sedimentation Control Guidelines: A Guide for Planners, Designers, and Municipal Officials (May 2003) at: <https://www.mass.gov/service-details/stormwater>. [↑](#footnote-ref-10)
10. See Massachusetts Nonpoint Source Pollution Management Manual at: <https://megamanual.geosyntec.com/npsmanual/default.aspx>. [↑](#footnote-ref-11)