**THIS REPORT IS PROVIDED AS AN EXAMPLE ONLY. ALL PROJECT INFORMATION, NAMES, AND DATES ARE FICTITIOUS. THIS IS NOT INTENDED TO BE A FINAL REPRESENTATION OF THE WORK DONE OR RECOMMENDATIONS MADE BY CALTRANS FOR AN ACTUAL PROJECT.**

# *Long Form - Storm Water Data Report*

Dist-County-Route: 03-ED-50

Post Mile Limits: 0.0/2.9

Project Type: Lane Addition (HOV)

Project ID (or EA): 03-xxxxxx

Program Identification: HB4

Phase: ☒ PID ☐ PA/ED ☐ PS&E

Regional Water Quality Control Board(s): Region 5, Central Valley Region

Is the Project required to consider Treatment BMPs? Yes ☒ No ☐

If yes, can Treatment BMPs be incorporated into the project? Yes ☒ No ☐

If No, a Technical Data Report must be submitted to the RWQCB at least 30 days prior to the projects RTL date. List RTL Date: _____

Total Disturbed Soil Area: 18.35 acres Risk Level: 2

Estimated: Construction Start Date: December 2011 Construction Completion Date: June 2013

Notification of Construction (NOC) Date to be submitted: November 2011

| | | | |
|---|---|---|---|
| Erosivity Waiver | Yes ☐ | Date: _____ | No ☒ |
| Notification of ADL reuse (if Yes, provide date) | Yes ☒ | Date: TBD in PS&E | No ☐ |
| Separate Dewatering Permit (if yes, permit number) | Yes ☐ | Permit # _____ | No ☒ |

***This Report has been prepared under the direction of the following Licensed Person. The Licensed Person attests to the technical information contained herein and the date upon which recommendations, conclusions, and decisions are based. Professional Engineer or Landscape Architect stamp required at PS&E.***

Betsy Ross — 08/26/10

Betsy Ross, Registered Project Engineer/Landscape Architect — Date

***I have reviewed the stormwater quality design issues and find this report to be complete, current and accurate:***

George Washington — 08/26/10

*George Washington, Project Manager* — *Date*

Paul Revere — 08/26/10

*Paul Revere, Designated Maintenance Representative* — *Date*

Horatio Gates — 08/26/10

*Horatio Gates, Designated Landscape Architect Representative* — *Date*

Friedrich Wilhelm von Steuben — 08/26/10

*[Stamp Required for PS&E only]*

*Friedrich Wilhelm von Steuben, District/Regional Design SW Coordinator or Designee* — *Date*

# STORM WATER DATA INFORMATION

## 1. Project Description

El Dorado County (County) and Caltrans propose to construct High Occupancy Vehicle (HOV) lanes along US Route 50 within El Dorado County (ED-50) from the County Line (PM 0.0) to west of Bass Lake Road (PM 2.9). This project is partially funded by the State of California's Corridor Mobility Improvement Account (CMIA), with the remaining funds provided by the County. The project will consist of constructing an additional lane in the median in each direction and widening median shoulders to meet current standards. Two alternatives are under consideration, a No-Build and a Build Alternative, as described below.

No-Build Alternative
The No-Build Alternative provides a basis of comparison with the Build Alternative in the future analysis year of 2030. This No-Build Alternative would include all currently planned and programmed projects in the ED-50 corridor through the year 2030 with the exception of the ED-50 HOV Lane project.

Build Alternative
The ED-50 HOV Lane project would construct the following improvements within the project limits:

- Replacement of the existing Latrobe Road undercrossing (UC) (Bridge No. 25-0071L/R)
- Median widening of the Clarksville UC (Bridge No. 25-0072L/R)
- Placement of a concrete median barrier from the County Line (PM 0.0) to just east of the Clarksville UC (PM 1.8)

The total disturbed soil area (DSA) for the project is 18.35 acres. The DSA was calculated based on the project side slopes to be disturbed, construction staging work and areas that are anticipated to be used by the contractor for equipment. Furthermore, the existing side slopes would be disturbed by the inclusion of new pavement areas, new cut/fill slopes, construction access, ditch excavation, installation of signs, etc. The existing impervious area is 40.18 acres. The proposed added impervious area is 13.09 acres. The total impervious area after construction is 53.27 acres.

The project is located within an unincorporated portion of El Dorado County and within the El Dorado Hills, El Dorado County Municipal Separate Storm Sewer System (MS4) area. Directly north of ED-50 is the community of El Dorado Hills; however, there are no major incorporated cities or towns within the area.

## 2. Site Data and Storm Water Quality Design Issues (refer to Checklists SW-1, SW-2, and SW-3)

The project is located within the Region 5, Central Valley Regional Water Quality Control Board (RWQCB) jurisdiction.

### Hydrologic Unit

The project is within the Middle Sierra Hydrologic Unit, Cosumnes Hydrologic Area, and Upper Deer Creek Hydrologic Sub-Area (HSA) 532.22. This was determined using the California State University, Sacramento Office of Water Programs *Water Quality Planning Tool*.

### Receiving Water Bodies

Carson Creek is the only major water body that crosses ED-50 within the project limits, and it is a direct receiving water body for the project (see attached Vicinity Map). Carson Creek merges with Deer Creek approximately 10 miles downstream of the project. Deer Creek is tributary to Cosumnes River, which is tributary to Mokelumne River, which joins the San Joaquin River.

### 2006 CWA Section 303(d) List

Carson Creek is listed on the 2006 Clean Water Act 303(d) List of Water Quality Limited Segments downstream of the project site. The 303(d) list identifies Carson Creek as being impaired for aluminum and manganese from the Waste Water Treatment Plant (WWTP) at Carson Creek to the creek's confluence with Deer Creek. The WWTP is located on Latrobe Road approximately 1.2 miles south of the Latrobe Road UC and 1.3 miles southwest of the ED-50 crossing of Carson Creek. There are no total maximum daily load (TMDL) requirements within the project limits.

### Special Construction Considerations

The Federal Highway Administration has designated an area along ED-50 as an "Area of Potential Effects." Railroad Cemetery is located on the eastbound side of ED-50 where Carson Creek crosses ED-50. This area is identified as a historical resource where no work will be permitted.

According to the Preliminary Environmental Assessment Report (PEAR), other areas within the project limits are designated as Environmentally Sensitive Areas (ESA) due to the presence of an existing waterway and/or the need to preserve vegetation within the area. All areas determined as an ESA will be detailed in the PS&E phase and will be properly fenced off and protected through the use of best management practices (BMPs), and work will be prohibited in these areas.

## Climate

The average temperatures in the western end of the county range from 100ºF (high temperature) in July to 44ºF (low temperature) in January. Winter storms, which can extend from November through May, generally come from the southwest and travel in a northeasterly direction. The average rainfall for the western portion of the County is 30 inches per year (Federal Emergency Management Agency [FEMA], 1995).

## Topography

El Dorado County is mountainous, and its terrain consists of steep slopes. There is relatively little level land. Elevations vary from approximately 200 ft at the Sacramento County boundary to 10,881 ft at the top of Freel Peak along the eastern border of the county in the Lake Tahoe Basin. The 1,000 ft elevation lines run diagonally across the county from northwest to southwest (FEMA, 1995).

The United States Geological Survey (USGS) topography map of the area shows the elevation of the project area ranging from 600 ft to 1,300 ft.

## Soil Characteristics

The soil data for this project is obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey. The general soil type was identified as HSG D (very dense soils and rocky silt loam). HSG D is defined as soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. More geotechnical information will be available in the next project phase.

## Groundwater Information

According to the NRCS Web Soil Survey, the groundwater is about 7 feet below ground. The Log of Test Borings will be performed in later phases of the project.

## Hazardous Waste

Based on historic and current projects within this corridor of ED-50, soils containing aerially deposited lead (ADL) are anticipated to be present within the project. Further testing for ADL will occur during later phases of the project.

## Erosion Potential

The NRCS provides soil erodibility information in its soil surveys by providing a set of numerical indices for each soil type (K). The K within the project area is primarily 0.32; there is a small pocket of soils near the Latrobe Road interchange with a k value of 0.20, but the weighted average K value is still 0.32.

### Risk Assessment

The R factor was determined from the EPA's "Rainfall Erosivity Factor Calculator" to be 67.44; the K factor is 0.32 and LS factor was determined from a GIS map prepared by Caltrans to be 5.82. More detailed calculations to determine the project specific LS will be completed once cross sections of the existing grade become available.

The product of these values is 126 tons/acre; because this value is greater than 75 tons/acre, the project is classified as having a high sediment risk. See the Supplemental Attachments for the sediment risk factor input values.

The receiving water risk is classified as low because Carson Creek is not on the 303(d) List for sediment, and the creek does not have the beneficial uses of SPWN, COLD and MIGR.

The combined high sediment risk and low receiving water risk result in the project being classified as Risk Level 2. The requirements for Risk Level 2 projects are summarized in Section 6 of this report.

### Measures for Avoiding or Reducing Potential Storm Water Impacts

The project team will coordinate with Caltrans Maintenance to determine if there are any historical slope failures within the project corridor and determine the necessary mitigation measures to be proposed during the design phase.

The project will propose to grade slopes to be 2:1 (H:V) or flatter, and the slopes will be stabilized by using permanent erosion control measures. There is currently a retaining wall that will be proposed at the Latrobe Road UC to reduce DSA and stabilize slopes.

The project design allows for ease of maintaining all BMPs, and the project can be scheduled or phased to minimize soil-disturbing work during the project construction period.

### Land Use

Currently, the land use is primarily residential and light commercial.

### Right-of-Way Requirements

The project is primarily within Caltrans' right-of-way (R/W); no R/W acquisitions or variances are expected. It is anticipated that there is adequate room within the R/W for treatment BMPs.

## 3. Regional Water Quality Control Board Agreements

An initial project meeting with Elysia Perry from the RWQCB was held on August 23, 2010 to discuss the project. Ms Perry stated that at this phase of the project, there are no negotiated understandings or agreements with the Central Valley RWQCB pertaining to this project.

## 4. Proposed Design Pollution Prevention BMPs to be used on the Project.

Downstream Effects Related to Potentially Increased Flow, Checklist DPP-1, Parts 1 and 2

The proposed improvements will increase the impervious area, which will increase velocity and volume of flow within the project limits. This increase has will be accounted for in the project design and mitigated through the use of BMPs. Based on preliminary flows and conceptual design information, increased flows within the project limits should have a negligible impact on downstream flow. Efforts to mitigate the increases in velocity and volume will include the use of treatment devices that will increase the surface roughness and promote infiltration. The intent of these mitigation measures is for post-construction flows to equal pre-construction flows. The design and calculations related to these measures will be completed during the design phase of the project.

The addition of the HOV lane along ED-50 and the resulting work at the UCs could potentially result in an increase in sediment load of the downstream flow. These increases will be mitigated through the use of treatment BMPs, discussed in Section 5 of this report.

This project will incorporate low impact development (LID) efforts to maintain or restore pre-project hydrology, as well as provide overall water quality improvement of discharges. These LID efforts will be incorporated in the development and placement of permanent BMPs during the design phase to the maximum extent practicable. Potential LID measures that will be considered for this project to improve water quality include:

- Minimizing impervious surface area and using pervious material for hardened surfaces outside of the roadway prism,
- Grading slopes to blend with the natural terrain and decrease the need for dikes, promoting sheet flow to vegetated areas that can provide water quality benefits and promote infiltration;
- Designing permanent drainage facilities that mimic the existing drainage pattern of the area through the use of permanent check dams for attenuation of flow and disconnected drainage facilities;
- Constructing permanent vegetated drainage ditches to decrease the velocity of discharge, plus decreasing the volume of discharge by promoting infiltration and allowing for pollutant removal; and
- Maintaining existing vegetated areas.

The project does not propose to encroach, cross, realign or cause other hydraulic changes to Carson Creek or any other streams or water bodies that will affect downstream channel stability.

Slope/Surface Protection Systems, Checklist DPP-1, Parts 1 and 3

The work along ED-50 and the UCs will result in the creation of new slopes and/or the modification of existing slopes. When possible, slopes within the project will be proposed to be 4:1 (H:V) or flatter, with maximum 2:1 (H:V) slopes in areas where R/W or existing slopes do not allow for flatter slopes. The project, when possible, will attempt to maintain or match existing slopes to reduce any slope stabilization and erosion concerns. Measures to prevent slope stabilization concerns during construction are discussed in Section 6.

At this phase of the project, a general lump sum for design pollution prevention measures is calculated from the total construction cost. Individual design pollution prevention measures, including slope stabilization measures, will be identified during the design phase. The minimum anticipated erosion control measures for this project include:

- Move-in/Move-out (Erosion Control)
- Fiber Rolls
- Erosion Control (Hydroseed)
- Rolled Erosion Control Product (Netting)

The effectiveness of the proposed erosion control materials will be verified during the design phase by using the Revised Universal Soil Loss Equation 2 (RUSLE2).

Concentrated Flow Conveyance Systems, Checklist DPP-1, Parts 1 and 4

The project proposes to create and modify existing ditches, dikes, and berms.

Currently, there are existing unlined channels within the project R/W that receive both on-site and off-site runoff. . These channels act as conveyance systems between the on-site systems' outfalls and cross culverts.

Existing slopes will be created and modified to satisfy roadway widening drainage and erosion control needs. The existing roadway drainage systems will be either modified to fit with new drainage items or be abandoned and replaced by new systems. The change in drainage will result in changes in the interception of surface runoff. To ensure that the proposed drainage systems do not result in downstream erosion or scour, the project will consider energy dissipation devices at the end of culvert systems and appropriate lining material within proposed ditches.

The proposed drainage and related calculations for this project will be completed during the design phase. The design of the proposed systems and system components will be done to meet recommendations and requirements that minimize impacts due to scour and erosion, as presented in the Caltrans *Highway Design Manual*, resulting in insignificant effects to downstream water.

Preservation of Existing Vegetation, Checklist DPP-1, Parts 1 and 5

Clearing and grubbing is anticipated to be limited to two areas: (1) within the existing median area of ED-50 where the widening will occur, and (2) within the immediate vicinity of the Latrobe Road UC as part of replacing the existing structure.

The Railroad Cemetery is as an ESA. According to the PEAR, other areas throughout the project are ESAs, where construction activities should be prohibited. These areas were determined to need protection either due to the presence of an existing waterway or the need to preserve existing vegetation. All areas determined to be an ESA will be enclosed by a Temporary Fence (Type ESA).

## 5. Proposed Permanent Treatment BMPs to be used on the Project

Treatment BMP Strategy, Checklist T-1

This project is required to consider treatment BMPs in accordance with the July 2010 Project Planning and Design Guide (PPDG).

As previously stated in Section 2 of this report, the soils are mainly classified as HSG D. Based on this information, at this phase of the project, to be conservative, it is assumed that the estimated infiltration ranking will be less than 90% for biofiltration and infiltration devices. Detailed studies to determine the infiltration capacity, soil amendments to increase infiltration capacity and to calculate the actual infiltration ranking will be investigated during the design phase.

It is the goal of the project team to treat all the added impervious area created by the project, which is 13.09 acres. The preferred treatment method for this project is biofiltration because these devices were determined to be the most feasible for the project area. The treatment feasibility assessment for project is discussed further in this section.

Biofiltration Swales/Strips, Checklist T-1, Parts 1 and 2

Preliminary investigation into the climate and site conditions of the project area demonstrates favorable conditions for the establishment of vegetation necessary for the use of biofiltration devices. A single Checklist T-1, Part 1 is completed for sub-watersheds because the consideration for BMPs is similar at all locations within the project. A single Checklist T-1, Part 2 is completed for all biofiltration devices because the feasibility and design elements for all biofiltration devices are similar. Further geotechnical and design investigation into these sites will be completed during the design phase.

Infiltration Devices, Checklist T-1, Parts 1 and 4

Infiltration devices are not feasible for this project because the soils within the project are mainly classified as HSG D.

### Detention Devices, Checklist T-1, Parts 1 and 5

Detention devices were not proposed for this project because there was not adequate R/W within the project limits to meet the design criteria for a detention device or construct maintenance access to the devices, and no additional R/W can be acquired to meet these criteria.

### Media Filters, Checklist T-1, Parts 1 and 8

Austin Vault Sand Filters are not feasible because the minimum hydraulic head cannot be obtained. There was a meeting on August 3, 2010, with Thomas Florence of the El Dorado County's Department of Public Health. In this meeting, the Mr. Florence indicated that Delaware Sand Filters are not allowed for this project because the permanent standing water has the potential for vector concerns.

### Multi-Chambered Treatment Trains (MCTTs), Checklist T-1, Parts 1 and 9

MCTTs were not proposed for the project because there are no critical source areas within the project limits.

## 6. Proposed Temporary Construction Site BMPs to be used on Project

As previously mentioned in Section 2 of this report, this is a Risk Level 2 project. This section presents the temporary construction site BMP strategy to be implemented for this project. Project specific BMP measures will be specified and quantified during the design phase. The cost estimate for construction site BMPs was calculated using the Percent of Total project Cost (Option 1) of the PPDG's Appendix F.

### Storm Water Pollution Prevention Plan

This project will disturb more than one acre of soil, so a Storm Water Pollution Prevention Plan (SWPPP) must be submitted by the Contractor prior to the start of construction. The SWPPP shall include a Construction Site Monitoring Program (CSMP) that presents procedures and methods related to the visual monitoring and sampling and analysis plans for non-visible pollutants, sediment and turbidity, and pH.

### Rain Event Action Plan

Risk Level 2 projects are required to prepare a Rain Event Action Plan (REAP). The quantities and costs for REAP will be determined during the design phase.

### Construction Site BMP Strategy

Construction of this project is scheduled over one and a half years. Whenever possible, the scheduling of earth-disturbing construction activities should not be made during anticipated rain events. To mitigate any potential runoff or run-on within the project area, construction

site BMPs should be installed prior to the start of construction or as early as feasibly possible during construction.

DSAs will be protected in accordance with the project's pollution control measures. Measures that are to be considered for this project are listed below and will be detailed during the design phase. The construction site BMP strategy for this project shall consist of the following:

- Soil Stabilization Measures
- Sediment Control Measures
- Tracking Control
- Non-storm Water Management Measures
- General Construction Site Management
- Stormwater Sampling and Analysis

This project awaits early coordination with the Julian Franklin, the Construction Storm Water Coordinator (CSWC). An upcoming meeting is scheduled during the PA/ED between the project team and the CSWC.

Storm Water Sampling and Analysis

The project is required to perform stormwater sampling at all discharge locations, as it is a Risk Level 2 project. During the PS&E phase, sampling locations will be identified.

### 7. Maintenance BMPs (Drain Inlet Stenciling)

The project will require drain inlet stenciling in areas where there is pedestrian access, primarily at the undercrossings. Stenciling will not be required along ED-50 as there will be no pedestrian access. The stenciling detail in the Caltrans Standard Plans will be used for drain inlet stenciling.

Other types of maintenance BMPs will be considered during the design phase and coordinated with the Caltrans Maintenance Area Manager.

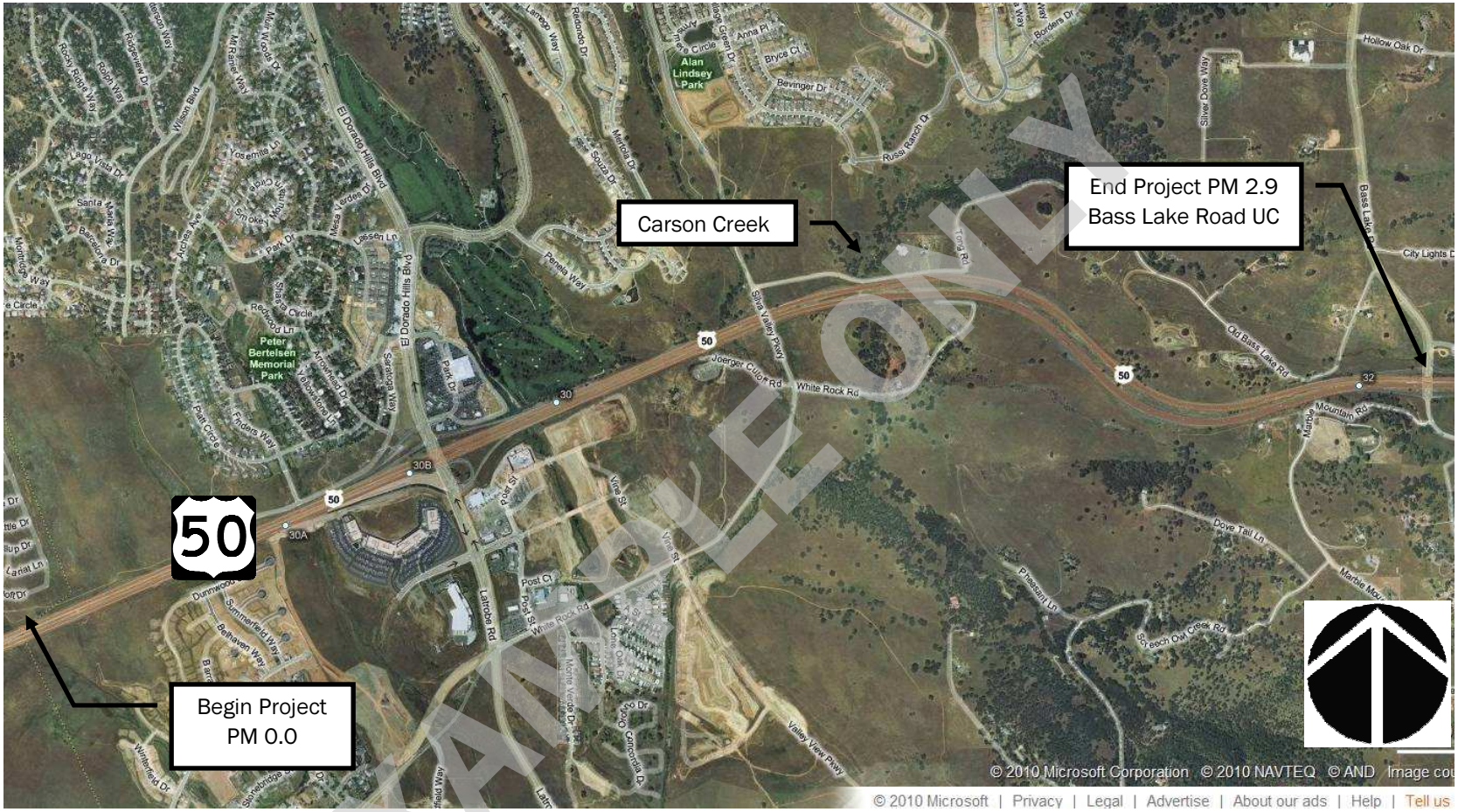
Required Attachments

- Vicinity Map
- Evaluation Documentation Form (EDF)
- Risk Level Determination Documentation
- SWDR Tracking Form

## Supplemental Attachments

***Note: Supplemental Attachments are to be supplied during the SWDR approval process; where noted, some of these items may only be required on a project-specific basis.***

- Storm Water BMP Cost Summary
- BMP cost information from: Project Planning Cost Estimate (PPCE)
- Checklist SW-1, Site Data Sources
- Checklist SW-2, Storm Water Quality Issues Summary
- Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water BMPs
- Checklists DPP-1, Parts 1–5 (Design Pollution Prevention BMPs)
- Checklists T-1, Parts 1 and 2 (Treatment BMPs)




Source: Microsoft Bing Maps

DATE: 8/26/10

Project ID ( or EA): 03-xxxxxx

| NO. | CRITERIA | YES ✓ | NO ✓ | SUPPLEMENTAL INFORMATION FOR EVALUATION |
|---|---|---|---|---|
| 1. | Begin Project Evaluation regarding requirement for consideration of Treatment BMPs | ✓ | | See Figure 4-1, Project Evaluation Process for Consideration of Permanent Treatment BMPs. Go to 2 |
| 2. | Is this an emergency project? | | ✓ | If **Yes**, go to 10.<br>If **No**, continue to 3. |
| 3. | Have TMDLs or other Pollution Control Requirements been established for surface waters within the project limits? Information provided in the water quality assessment or equivalent document. | | ✓ | If **Yes**, contact the District/Regional NPDES Coordinator to discuss the Department's obligations under the TMDL (if Applicable) or Pollution Control Requirements, go to 9 or 4.<br>_____ *(Dist./Reg. SW Coordinator initials)*<br>If **No**, continue to 4. |
| 4. | Is the project located within an area of a local MS4 Permittee? | ✓ | | If **Yes**. *(El Dorado County)*, go to 5.<br>If **No**, document in SWDR go to 5. |
| 5. | Is the project directly or indirectly discharging to surface waters? | ✓ | | If **Yes**, continue to 6.<br>If **No**, go to 10. |
| 6. | Is it a new facility or major reconstruction? | ✓ | | If **Yes**, continue to 8.<br>If **No**, go to 7. |
| 7. | Will there be a change in line/grade or hydraulic capacity? | | | If **Yes**, continue to 8.<br>If **No**, go to 10. |
| 8. | Does the project result in a net increase of one acre or more of new impervious surface? | ✓ | | If **Yes**, continue to 9.<br>If **No**, go to 10.<br>*13.09 acres (Net Increase New Impervious Surface)* |
| 9. | Project is required to consider approved Treatment BMPs. | ✓ | | See Sections 2.4 and either Section 5.5or 6.5 for BMP Evaluation and Selection Process. Complete Checklist T-1 in this Appendix E. |
| 10. | Project is not required to consider Treatment BMPs.<br>_____ *(Dist./Reg. Design SW Coord. Initials)*<br>_____ *(Project Engineer Initials)*<br>_____ *(Date)* | | | Document for Project Files by completing this form, and attaching it to the SWDR. |



*See Figure 4-1, Project Evaluation Process for Consideration of Permanent Treatment BMPs*

## Risk Level Determination Documentation

*Figure 1 . R Factor (Value=67.44)*

**Rainfall Erosivity Factor Calculator for Small Construction Sites**

**Facility Information**

Facility Name: ED-50 HOV (PM 0.0/2.9)
Start Date: 12/01/2011
End Date: 06/30/2013
Latitude: 38.6567
Longitutde: -121.0573

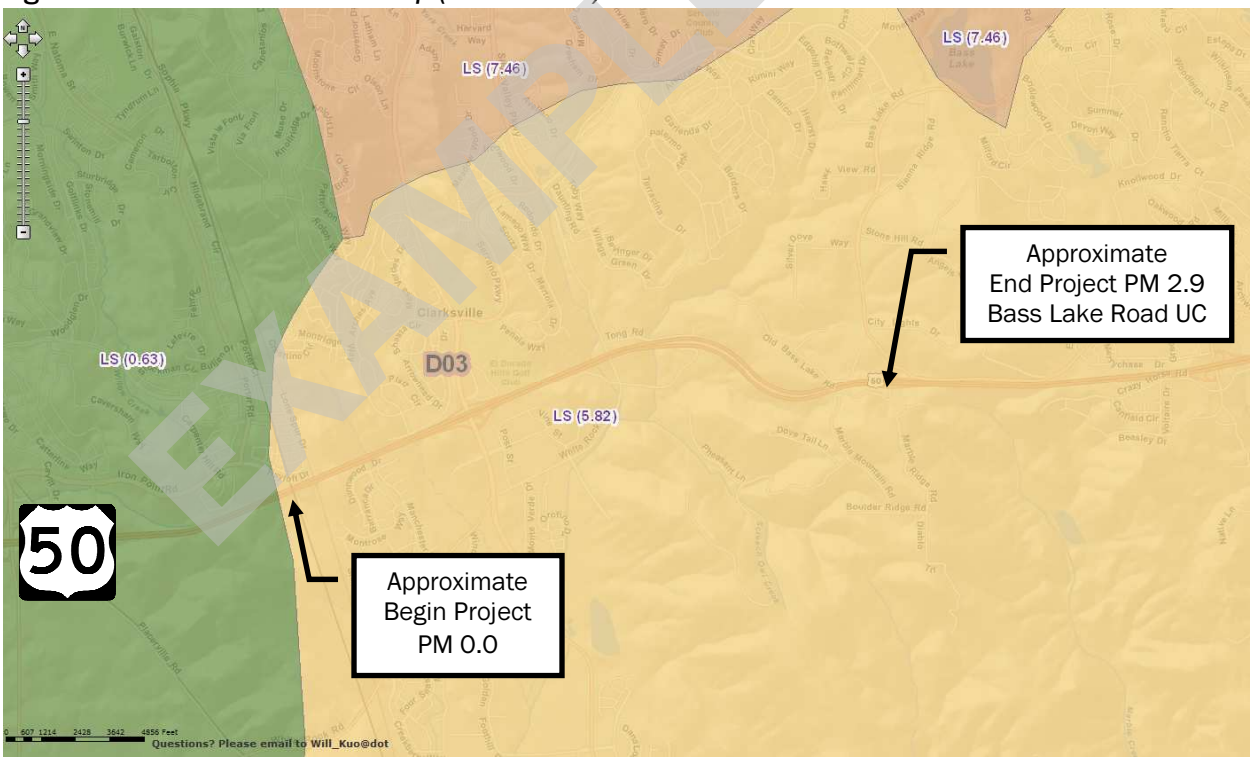
**Erosivity Index Calculator Results**

AN EROSIVITY INDEX VALUE OF **67.44** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF **12/01/2011 - 06/30/2013**.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. **You do not qualify for a waiver from NPDES permitting requirements.**

Source: EPA < http://cfpub.epa.gov/npdes/stormwater/lew/lewcalculator.cfm>

*Figure 2 . LS Factor from GIS Map (Value=5.82)*




Source: Caltrans

| | A | B | C |
|---|---|---|---|
| 1 | **Sediment Risk Factor Worksheet** | | **Entry** |
| 2 | **A) R Factor** | | |
| 3 | Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site. | | |
| 4 | http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm | | |
| 5 | **R Factor Value** | | 67.44 |
| 6 | **B) K Factor (weighted average, by area, for all site soils)** | | |
| 7 | The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. | | |
| 8 | Site-specific K factor guidance | | |
| 9 | **K Factor Value** | | 0.32 |
| 10 | **C) LS Factor (weighted average, by area, for all slopes)** | | |
| 11 | The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction. | | |
| 12 | LS Table | | |
| 13 | **LS Factor Value** | | 5.82 |
| 14 | | | |
| 15 | **Watershed Erosion Estimate (=RxKxLS) in tons/acre** | | 126 |
| 16 | **Site Sediment Risk Factor** | | **High** |
| 17 | Low Sediment Risk: < 15 tons/acre | | |
| 18 | Medium Sediment Risk: >=15 and <75 tons/acre | | |
| 19 | High Sediment Risk: >= 75 tons/acre | | |
| 20 | | | |



Source: State Water Resources Control Board

| Receiving Water (RW) Risk Factor Worksheet | Entry | Score |
|---|---|---|
| **A. Watershed Characteristics** | yes/no | |
| A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please check the attached worksheet or visit the link below: | **No** | **Low** |
| 2006 Approved Sediment-impared WBs Worksheet | | |
| http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml | | |
| **OR** | | |
| A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? | | |
| http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp | | |

Source: State Water Resources Control Board

## Combined Risk Level Matrix

| Receiving Water Risk | Sediment Risk: Low | Sediment Risk: Medium | Sediment Risk: High |
|---|---|---|---|
| Low | Level 1 | Level 2 | |
| High | Level 2 | | Level 3 |

**Project Sediment Risk:** High

**Project RW Risk:** Low

**Project Combined Risk:** Level 2

Source: State Water Resources Control Board

| Report_Date | Dist_EA | District | EA | County | Route | Beg_PM | End_PM | Descrip | Phase | LongSWDR | PhaseRptDate | Exempt | TBMP | Pollution_Program | Land Disturbance Acreage | AddImpArea | PercentTreated | MS4Area | MS4CiCo | Water Bodies Affected | Criteria | BioStrip | BioSwale | Detention | Infiltration | InfilTrench | GSRD | TST | DryWeath | MedFilter | MCTT | WetBasin | Const_Start | Const_Comp | SWComment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8/26/2010 | 03-XXXX | 3 | XXXXXX | ED | 50 | 0 | 2.9 | Lane Ad | PID | TRUE | 8/26/2010 | FALSE | TRUE | SWPPP | 18.35 | 13.09 | 100 | TRUE | El Dorado | Carson Creek | N/A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12/1/2011 | 6/30/2013 | |

Storm Water BMP Cost Summary - PID Phase Only

THIS INFORMATION IS FOR CALTRANS INTERNAL USE ONLY

| | |
|---|---|
| **Project Name:** | **El Dorado 50 High Occupancy Vehicle Lanes Project** |
| **District:** | **03** |
| **County:** | **El Dorado** |
| **Route:** | **50** |
| **Postmile Limits:** | **0.0/2.9** |
| **Project ID (or EA):** | **03-XXXXXX** |

**1.0 Design Pollution Prevention BMPs**

| BMP Quantity | Unit Cost | | | |
|---|---|---|---|---|
| **1** | **$300,000.00** | **SUBTOTAL** | $ | 300,000 |

**2.0 Treatment BMPs**

| Miles of Pavement | $100,000 per Mile | | | |
|---|---|---|---|---|
| **2.9** | **$290,000** | **SUBTOTAL** | $ | 841,000 |

**3.0 Prepare SWPPP**

| Total Construction Cost | Cost per Table F-6 | | | |
|---|---|---|---|---|
| **$30,000,000** | **$27,700** | **SUBTOTAL** | $ | 27,700 |

**RQM Value (if SWPPP is required):** **$21,700**

**4.0 Construction Site BMPs**

| Total Construction Cost | x.x% per Table F-3 | | | |
|---|---|---|---|---|
| **$30,000,000** | **1.25%** | **SUBTOTAL** | $ | 375,000 |

**4.0 Stormwater Monitoring**

| Project Risk Level | SWM Cost-PPDG Apndx F* | | | |
|---|---|---|---|---|
| **2** | **$86,600** | **SUBTOTAL** | $ | 86,600 |

| **TOTAL COST FOR STORM WATER BMPs** | $ 1,630,300 |
|---|---|

*SWM Cost = M x {[$Days_{0.5"}$ x $1000] + $2000 (1 + 0.1 (Months/12))}

where M=2; $Days_{0.5"}$ = 41; and Months = 18

# Checklist SW-1, Site Data Sources

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

Information for the following data categories should be obtained, reviewed and referenced as necessary throughout the project planning phase. Collect any available documents pertaining to the category and list them and reference your data source. For specific examples of documents within these categories, refer to Section 5.5 of this document. Example categories have been listed below; add additional categories, as needed. Summarize pertinent information in Section 2 of the SWDR.

| DATA CATEGORY/SOURCES | Date |
|---|---|
| Topographic | |
| • USGS Quadrangle Topography Map | Map Version 1979 |
| • Google Earth | Accessed: August 2010 |
| • Microsoft Bing Maps | Accessed: August 2010 |
| • Project Strip Maps | June 2010 |
| Hydraulic | |
| • California State University, Sacramento. *Water Quality Planning Tool.* <http://stormwater.water-programs.com/> | Accessed August 2010 |
| Soils | |
| • Natural Resource Conservation Service. *Natural Resource Conservation Web Soil Survey*. <http://websoilsurvey.nrcs.usda.gov/app/> | Accessed August 2010 |
| Climatic | |
| • California Department of Transportation. *Statewide Storm Water Management Plan.* CTSW-RT-02-008 | May 2003 |
| • FEMA, *Flood Insurance Study, El Dorado County, California Unincorporated Areas* Community No. 060040 | October 18, 1995 |
| Water Quality | |
| • State Water Resources Control Board. *2006 State Water Resources Control Board 303(d) List for Water Quality Limited Segments.* | USEPA Approval Date June 28, 2007 |
| • California Department of Transportation. *Storm Water Management Program District 3 Work Plan, Fiscal Year 2010-2011.* CTSW-RT-10-182-42.1 | April 1, 2010 |
| • California State Water Resources Control Board (SWRCB). *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.* NPDES Number CAS000002. | September 2, 2009 |

| Other Data Categories | |
|---|---|
| • California Department of Transportation. *Storm Water Quality Handbooks–Construction Site Best Management Practices (BMPs) Manual.* | March 2003 |
| • Project Planning Design Guide, Storm Water Quality Handbooks. Caltrans State of California, Department of Transportation. | July 2010 |
| • California Department of Transportation. *Preliminary Environmental Assessment Report, US 50 Phase 1 HOV Lane CMIA Project, PM 0.0 To PM 2.9 (EA 3A711) El Dorado County, California*. | January 2010 |
| • California Department of Transportation. *Project Risk Level Determination Guidance* | July 2010 |
| • California Department of Transportation. *Estimating Guidance for CGP.* | September 2010 |

## Checklist SW-2, Storm Water Quality Issues Summary

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

The following questions provide a guide to collecting critical information relevant to project stormwater quality issues. Complete responses to applicable questions, consulting other Caltrans functional units (Environmental, Landscape Architecture, Maintenance, etc.) and the District/Regional Storm Water Coordinator as necessary. Summarize pertinent responses in Section 2 of the SWDR.

| | | | |
|---|---|---|---|
| 1. | Determine the receiving waters that may be affected by the project throughout the project life cycle (i.e., construction, maintenance and operation). | ☒ Complete | ☐ NA |
| 2. | For the project limits, list the 303(d) impaired receiving water bodies and their constituents of concern. | ☒ Complete | ☐ NA |
| 3. | Determine if there are any municipal or domestic water supply reservoirs or groundwater percolation facilities within the project limits. Consider appropriate spill contamination and spill prevention control measures for these new areas. | ☐ Complete | ☒ NA |
| 4. | Determine the RWQCB special requirements, including TMDLs, effluent limits, etc. | ☐ Complete | ☒ NA |
| 5. | Determine regulatory agencies seasonal construction and construction exclusion dates or restrictions required by federal, state, or local agencies. | ☒ Complete | ☐ NA |
| 6. | Determine if a 401 certification will be required. | ☐ Complete | ☒ NA |
| 7. | List rainy season dates. | ☒ Complete | ☐ NA |
| 8. | Determine the general climate of the project area. Identify annual rainfall and rainfall intensity curves. | ☒ Complete | ☐ NA |
| 9. | If considering Treatment BMPs, determine the soil classification, permeability, erodibility, and depth to groundwater. | ☒ Complete | ☐ NA |
| 10. | Determine contaminated soils within the project area. | ☒ Complete | ☐ NA |
| 11. | Determine the total disturbed soil area of the project. | ☒ Complete | ☐ NA |
| 12. | Describe the topography of the project site. | ☒ Complete | ☐ NA |
| 13. | List any areas outside of the Caltrans right-of-way that will be included in the project (e.g. contractor's staging yard, work from barges, easements for staging, etc.). | ☐ Complete | ☒ NA |
| 14. | Determine if additional right-of-way acquisition or easements and right-of-entry will be required for design, construction and maintenance of BMPs. If so, how much? | ☐ Complete | ☒ NA |
| 15. | Determine if a right-of-way certification is required. | ☐ Complete | ☒ NA |
| 16. | Determine the estimated unit costs for right-of-way should it be needed for Treatment BMPs, stabilized conveyance systems, lay-back slopes, or interception ditches. | ☐ Complete | ☒ NA |
| 17. | Determine if project area has any slope stabilization concerns. | ☒ Complete | ☐ NA |
| 18. | Describe the local land use within the project area and adjacent areas. | ☒ Complete | ☐ NA |
| 19. | Evaluate the presence of dry weather flow. | ☒ Complete | ☐ NA |

# Checklist SW-3, Measures for Avoiding or Reducing Potential Storm Water Impacts

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

The PE must confer with other functional units, such as Landscape Architecture, Hydraulics, Environmental, Materials, Construction and Maintenance, as needed to assess these issues. Summarize pertinent responses in Section 2 of the SWDR.

Options for avoiding or reducing potential impacts during project planning include the following:

| | | | | |
|---|---|---|---|---|
| 1. | Can the project be relocated or realigned to avoid/reduce impacts to receiving waters or to increase the preservation of critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions? | ☐ Yes | ☒ No | ☐ NA |
| 2. | Can structures and bridges be designed or located to reduce work in live streams and minimize construction impacts? | ☒ Yes | ☐ No | ☐ NA |
| 3. | Can any of the following methods be utilized to minimize erosion from slopes: | | | |
| | a. Disturbing existing slopes only when necessary? | ☒ Yes | ☐ No | ☐ NA |
| | b. Minimizing cut and fill areas to reduce slope lengths? | ☒ Yes | ☐ No | ☐ NA |
| | c. Incorporating retaining walls to reduce steepness of slopes or to shorten slopes? | ☒ Yes | ☐ No | ☐ NA |
| | d. Acquiring right-of-way easements (such as grading easements) to reduce steepness of slopes? | ☐ Yes | ☐ No | ☒ NA |
| | e. Avoiding soils or formations that will be particularly difficult to re-stabilize? | ☐ Yes | ☐ No | ☒ NA |
| | f. Providing cut and fill slopes flat enough to allow re-vegetation and limit erosion to pre-construction rates? | ☒ Yes | ☐ No | ☐ NA |
| | g. Providing benches or terraces on high cut and fill slopes to reduce concentration of flows? | ☐ Yes | ☐ No | ☒ NA |
| | h. Rounding and shaping slopes to reduce concentrated flow? | ☐ Yes | ☐ No | ☒ NA |
| | i. Collecting concentrated flows in stabilized drains and channels? | ☒ Yes | ☐ No | ☐ NA |
| 4. | Does the project design allow for the ease of maintaining all BMPs? | ☒ Yes | ☐ No | |
| 5. | Can the project be scheduled or phased to minimize soil-disturbing work during the rainy season? | ☒ Yes | ☐ No | |
| 6. | Can permanent storm water pollution controls such as paved slopes, vegetated slopes, basins, and conveyance systems be installed early in the construction process to provide additional protection and to possibly utilize them in addressing construction storm water impacts? | ☒ Yes | ☐ No | ☐ NA |

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 1

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## Consideration of Design Pollution Prevention BMPs

### Consideration of Downstream Effects Related to Potentially Increased Flow [to streams or channels]

| | | | |
|---|---|---|---|
| Will project increase velocity or volume of downstream flow? | ☒ Yes | ☐ No | ☐ NA |
| Will the project discharge to unlined channels? | ☒ Yes | ☐ No | ☐ NA |
| Will project increase potential sediment load of downstream flow? | ☒ Yes | ☐ No | ☐ NA |
| Will project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability? | ☐ Yes | ☒ No | ☐ NA |

If Yes was answered to any of the above questions, consider ***Downstream Effects Related to Potentially Increased Flow***, complete the DPP-1, Part 2 checklist.

### Slope/Surface Protection Systems

| | | | |
|---|---|---|---|
| Will project create new slopes or modify existing slopes? | ☒ Yes | ☐ No | ☐ NA |

If Yes was answered to the above question, consider ***Slope/Surface Protection Systems***, complete the DPP-1, Part 3 checklist.

### Concentrated Flow Conveyance Systems

| | | | |
|---|---|---|---|
| Will the project create or modify ditches, dikes, berms, or swales? | ☒ Yes | ☐ No | ☐ NA |
| Will project create new slopes or modify existing slopes? | ☒ Yes | ☐ No | ☐ NA |
| Will it be necessary to direct or intercept surface runoff? | ☒ Yes | ☐ No | ☐ NA |
| Will cross drains be modified? | ☒ Yes | ☐ No | ☐ NA |

If Yes was answered to any of the above questions, consider ***Concentrated Flow Conveyance Systems***; complete the DPP-1, Part 4 checklist.

### Preservation of Existing Vegetation

It is the goal of the Storm Water Program to maximize the protection of desirable existing vegetation to provide erosion and sediment control benefits on all projects. ☒ Complete

Consider ***Preservation of Existing Vegetation***, complete the DPP-1, Part 5 checklist.

## Design Pollution Prevention BMPs

## Checklist DPP-1, Part 2

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Downstream Effects Related to Potentially Increased Flow

| | | |
|---|---|---|
| 1. | Review total paved area and reduce to the maximum extent practicable. | ☐ Complete |
| 2. | Review channel lining materials and design for stream bank erosion control. | ☐ Complete |
| | (a) See Chapters 860 and 870 of the HDM. | ☐ Complete |
| | (b) Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity. | ☐ Complete |
| 3. | Include, where appropriate, energy dissipation devices at culvert outlets. | ☐ Complete |
| 4. | Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour. | ☐ Complete |
| 5. | Include, if appropriate, peak flow attenuation basins or devices to reduce peak discharges. | ☐ Complete |

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 3

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Slope / Surface Protection Systems

1. What are the proposed areas of cut and fill? (attach plan or map) ☒Complete
2. Were benches or terraces provided on high cut and fill slopes to reduce concentration of flows? ☐Yes ☒No
3. Were slopes rounded and/or shaped to reduce concentrated flow? ☐Yes ☒No
4. Were concentrated flows collected in stabilized drains or channels? ☒Yes ☐No
5. Are new or disturbed slopes > 4:1 horizontal:vertical (h:v)? ☒Yes ☐No

   If Yes, District Landscape Architect must prepare or approve an erosion control plan, at the District's discretion.
6. Are new or disturbed slopes > 2:1 (h:v)? ☐Yes ☒No

   If Yes, Geotechnical Services must prepare a Geotechnical Design Report, and the District Landscape Architect should prepare or approve an erosion control plan. Concurrence must be obtained from the District Maintenance Storm Water Coordinator for slopes steeper than 2:1 (h:v).
7. Estimate the net new impervious area that will result from this project. 13.09 acres ☒Complete

**VEGETATED SURFACES**

1. Identify existing vegetation. ☒Complete
2. Evaluate site to determine soil types, appropriate vegetation and planting strategies. ☒Complete
3. How long will it take for permanent vegetation to establish? ☒Complete
4. Minimize overland and concentrated flow depths and velocities. ☒Complete

**HARD SURFACES**

1. Are hard surfaces required? ☐Yes ☒No

   If Yes, document purpose (safety, maintenance, soil stabilization, etc.), types, and general locations of the installations. ☐Complete

Review appropriate SSPs for Vegetated Surface and Hard Surface Protection Systems. ☒Complete

# Design Pollution Prevention BMPs

## Checklist DPP-1, Part 4

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Concentrated Flow Conveyance Systems

**Ditches, Berms, Dikes and Swales**

1. Consider Ditches, Berms, Dikes, and Swales as per Topics 813, 834.3, and 835, and Chapter 860 of the HDM. ☒Complete
2. Evaluate risks due to erosion, overtopping, flow backups or washout. ☒Complete
3. Consider outlet protection where localized scour is anticipated. ☒Complete
4. Examine the site for run-on from off-site sources. ☒Complete
5. Consider channel lining when velocities exceed scour velocity for soil. ☒Complete

**Overside Drains**

1. Consider downdrains, as per Index 834.4 of the HDM. ☒Complete
2. Consider paved spillways for side slopes flatter than 4:1 h:v. ☒Complete

**Flared Culvert End Sections**

1. Consider flared end sections on culvert inlets and outlets as per Chapter 827 of the HDM. ☒Complete

**Outlet Protection/Velocity Dissipation Devices**

1. Consider outlet protection/velocity dissipation devices at outlets, including cross drains, as per Chapters 827 and 870 of the HDM. ☒Complete

Review appropriate SSPs for Concentrated Flow Conveyance Systems. ☒Complete

## Design Pollution Prevention BMPs

## Checklist DPP-1, Part 5

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Preservation of Existing Vegetation

1. Review Preservation of Property, Standard Specifications 16.1.01 and 16-1.02 (Clearing and Grubbing) to reduce clearing and grubbing and maximize preservation of existing vegetation. ☒Complete
2. Has all vegetation to be retained been coordinated with Environmental, and identified and defined in the contract plans? ☒Yes ☐No
3. Have steps been taken to minimize disturbed areas, such as locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling? ☒Complete
4. Have impacts to preserved vegetation been considered while work is occurring in disturbed areas? ☒Yes ☐No
5. Are all areas to be preserved delineated on the plans? ☒Yes ☐No

# Treatment BMPs

## Checklist T-1, Part 1

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

### Consideration of Treatment BMPs

**Note: A single Checklist T-1, Part 1 is completed for subwatersheds because the consideration for BMPs is similar at all locations within the Project.**

This checklist is used for projects that require the consideration of Approved Treatment BMPs, as determined from the process described in Section 4 (Project Treatment Consideration) and the Evaluation Documentation Form (EDF). This checklist will be used to determine which Treatment BMPs should be considered for each watershed and sub-watershed within the project. Supplemental data will be needed to verify siting and design applicability for final incorporation into a project.

**Complete this checklist for each phase of the project, when considering Treatment BMPs. Use the responses to the questions as the basis when developing the narrative in Section 5 of the Storm Water Data Report to document that Treatment BMPs have been appropriately considered.**

**Answer all questions, unless otherwise directed. Questions 14 through 16 should be answered after all subwatershed (drainages) are considered using this checklist.**

1. Is the project in a watershed with prescriptive TMDL treatment BMP requirements in an adopted TMDL implementation plan? ☐Yes ☒No

   If Yes, consult the District/Regional Storm Water Coordinator to determine whether the T-1 checklist should be used to propose alternative BMPs because the prescribed BMPs may not be feasible or other BMPs may be more cost-effective. Special documentation and regulatory response may be necessary.

2. Dry Weather Flow Diversion

   (a) Are dry weather flows generated by Caltrans anticipated to be persistent? ☐Yes ☒No

   (b) Is a sanitary sewer located on or near the site? ☒Yes ☐No

   If Yes to both 2 (a) and (b), continue to (c). If No to either, skip to question 3.

   (c) Is connection to the sanitary sewer possible without extraordinary plumbing, features or construction practices? ☐Yes ☐No

   (d) Is the domestic wastewater treatment authority willing to accept flow? ☐Yes ☐No

If Yes was answered to all of these questions consider ***Dry Weather Flow Diversion***, complete and attach **Part 3** of this checklist

3. Is the receiving water on the 303(d) list for litter/trash or has a TMDL been issued for litter/trash? ☐Yes ☒No

   If Yes, consider ***Gross Solids Removal Devices (GSRDs)***, complete and attach **Part 6** of this checklist. Note: Infiltration Devices, Detention Devices, Media Filters, MCTTs, and Wet Basins also can capture litter. Before considering GSRDs for stand-alone installation or in sequence with other BMPs, consult with District/Regional NPDES Storm Water Coordinator to determine whether Infiltration Devices, Detention Devices, Media Filters, MCTTs, and Wet Basins should be considered instead of GSRDs to meet litter/trash TMDL.

4. Is project located in an area (e.g., mountain regions) where traction sand is applied more than twice a year? ☐Yes ☒No

   If Yes, consider ***Traction Sand Traps***, complete and attach **Part 7** of this checklist.

5. Maximizing Biofiltration Strips and Swales ☒Yes ☐No

   Objectives:

   1) Quantify infiltration from biofiltration alone
   2) Identify highly infiltrating biofiltration (i.e. > 90%) and skip further BMP consideration.
   3) Identify whether amendments can substantially improve infiltration.

   (a) Have biofiltration strips and swales been designed for runoff from all project areas, including sheet flow and concentrated flow conveyance? If no, document justification in Section 5 of the SWDR. ☐Yes ☒No

   (b) Based on site conditions, estimate what percentage of the WQV can be infiltrated. Use the 12-hour WQV for Type A and B soils, the 24-hour WQV for Type C soils, and the 48-hour WQV for Type D soil.

   _x_ < 20%
   ___ 20 % - 50%
   ___ 50% - 90%
   ___ > 90%

   ☒Complete

   (c) Is infiltration greater than 90 percent? If Yes, skip to question 13. ☐Yes ☒No

(d) Can the infiltration ranking in question 5(b) above be increased by using soil amendments? Use the 'drain time' associated with the amended soil (the 12-hour WQV for Type A and B soils, the 24-hour WQV for Type C soils[1]). ☒Yes ☐No

If Yes, consider including soil amendments; increasing the infiltration ranking allows more flexibility in the selection of BMPs (strips and swales will show performance comparable to other BMPs). Record the new infiltration estimate below:

_x_ < 20% (skip to 6)
___ 20 % - 50% (skip to 6)
___ 50% - 90% (skip to 6)
___ >90%

☒Complete

(e) Is infiltration greater than 90 percent? If Yes, skip to question 13. ☐Yes ☒No

6. Biofiltration in Rural Areas

Is the project in a rural area (outside of urban areas that is covered under an NDPES Municipal Stormwater Permit[2]). If Yes proceed to question 13. ☐Yes ☒No

7. Estimating Infiltration for BMP Combinations

Objectives:

1) Identify high-infiltration biofiltration or biofiltration and infiltration BMP combinations and skip further BMP consideration.

2) If high infiltration is infeasible, then identify the infiltration level of all feasible BMP combinations for use in the subsequent BMP selection matrices

(a) Has concentrated infiltration (i.e., via earthen basins or earthen filters) been prohibited? Consult your District/Regional Storm Water Coordinator and/or environmental documents. ☐Yes ☒No



[1] Type D soils are not expected where amendments are incorporated

[2] See pages 39 and 40 of the Fact Sheets for the CGP.
http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_factsheet.pdf

If No proceed to 7 (b); if Yes skip to 7 (e) and do not consider earthen basin-type BMPs

(b) Assess infiltration of an infiltration BMP that is used in conjunction with biofiltration. Include infiltration losses from biofiltration, if biofiltration is feasible. ☒Complete

(use 24 hr WQV)

_x_ < 20% (do not consider this BMP combination)

___ 20% - 50%

___ 50% - 90%

___ >90%

Is at least 90 percent infiltration estimated? If Yes proceed to 13. If No proceed to 7(c). ☐Yes ☒No

(c) Assess infiltration of biofiltration with combinations with remaining approved earthen BMPs using water quality volumes based on the drain time of those BMPs. This assessment will be used in subsequent BMP selection matrices.

| Earthen Detention Basin (use 48 hr WQV) | Earthen Austin SF (use 48 hr WQV) |
|---|---|
| _x_ < 20% | _x_ < 20% |
| ___ 20% - 50% | ___ 20% - 50% |
| ___ > 50% | ___ > 50% |

☒Complete

Continue to Question 8

8. Identifying BMPs based on the Target Design Constituents

(a) Does the project discharge to a water body that has been placed on the 303-d list or has had a TMDL adopted? If "No," use Matrix A to select BMPs, consider designing to treat 100% of the WQV, then skip to question 12. ☐Yes ☒No

If Yes, is the identified pollutant(s) considered a Targeted Design Constituent (TDC) (check all that apply below)?

☐ sediments
☐ phosphorus
☐ nitrogen
☐ copper (dissolved or total)
☐ lead (dissolved or total)
☐ zinc (dissolved or total)
☐ general metals (dissolved or total)[3]

(b) Treating Sediment. Is sediment the only TDC? If Yes, use Matrix A to select BMPs, then skip to question 12. Otherwise, proceed to question 9. ☐Yes ☐No

[3] General metals include cadmium, nickel, chromium, and other trace metals. Note that selenium and arsenic are not metals. Mercury is a metal, but is considered later during BMP selection, under Question 12 below.

| BMP Selection Matrix A: General Purpose Pollutant Removal | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Strip: HRT > 5<br>Austin filter (concrete)<br>Austin filter (earthen)<br>Delaware filter<br>MCTT<br>Wet basin | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Strip: HRT < 5<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Swale<br>MCTT<br>Wet basin | Austin filter (concrete)<br>Delaware filter<br>MCTT<br>Wet basin |
| HRT = hydraulic residence time (min)<br><br>*Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |



9. Treating both Metals and Nutrients.

   Is copper, lead, zinc, or general metals *AND* nitrogen or phosphorous a TDC? If Yes use Matrix D to select BMPs, then skip to question 12. Otherwise, proceed to question 10. ☐Yes ☒N/A

10. Treating Only Metals.

    Are copper, lead, zinc, or general metals listed TDCs? If Yes use Matrix B below to select BMPs, and skip to question 12. Otherwise, proceed to question 11. ☐Yes ☒N/A

| BMP Selection Matrix B: Any metal is the TDC, but not nitrogen or phosphorous | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | MCTT<br>Wet basin<br>Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>MCTT<br>Wet basin | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>MCTT<br>Biofiltration Strip<br>Biofiltration Swale<br>Wet basin |
| Tier 2 | Strip: HRT > 5<br>Strip: HRT < 5<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale | Austin filter (concrete)<br>Delaware filter |
| HRT = hydraulic residence time (min)<br>*Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |



11. Treating Only Nutrients.
    Are nitrogen and/or phosphorus listed TDCs? If "Yes," use Matrix C to select BMPs. If "No", please check your answer to 8(a). At this point one of the matrices should have been used for BMP selection for the TDC in question, unless no BMPs are feasible. ☐Yes ☒N/A

| BMP Selection Matrix C: Phosphorous and / or nitrogen is the TDC, but no metals are the TDC | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter** | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches* | Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins*<br>Infiltration trenches*<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Wet basin<br>Biofiltration Strip<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale<br>Wet basin | Austin filter (concrete)<br>Delaware filter<br>Wet basin |
| * Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |
| ** Delaware filters would be ranked in Tier 2 if the TDC is nitrogen only, as opposed to phosphorous only or both nitrogen and phosphorous. | | | |

| BMP Selection Matrix D: Any metal, plus phosphorous and / or nitrogen are the TDCs | | | |
|---|---|---|---|
| Consider approaches to treat 100% of the WQV with combinations of the BMPs in this table. The highest preference is for Tier 1, followed by Tier 2. Within each Tier, BMP selection will be determined by the site-specific determination of feasibility (Section 2.4.2.1). BMPs that infiltrate should be highlighted in the infiltration category summarized in question 7 (f) and listings of BMPs that infiltrate in other categories should be ignored. | | | |
| | BMP ranking for infiltration category: | | |
| | Infiltration < 20% | Infiltration 20% - 50% | Infiltration > 50% |
| Tier 1 | Wet basin*<br>Austin filter (earthen)<br>Austin filter (concrete)<br>Delaware filter** | Wet basin*<br>Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins***<br>Infiltration trenches*** | Wet basin*<br>Austin filter (earthen)<br>Detention (unlined)<br>Infiltration basins***<br>Infiltration trenches***<br>Biofiltration Strip<br>Biofiltration Swale |
| Tier 2 | Biofiltration Strip<br>Biofiltration Swale<br>Detention (unlined) | Austin filter (concrete)<br>Delaware filter<br>Biofiltration Strip<br>Biofiltration Swale | Austin filter (concrete)<br>Delaware filter |
| * The wet basin should only be considered for phosphorus | | | |
| ** In cases where earthen BMPs can infiltrate, Delaware filters are ranked in Tier 2 if the TDC is nitrogen only, but they are Tier 1 for phosphorous only or both nitrogen and phosphorous. | | | |
| *** Infiltration BMPs that infiltrate the water quality volume were considered previously, so only undersized infiltration BMPs or hybrid designs are considered where infiltration is less than 90% of the water quality volume. | | | |

12. Does the project discharge to a waterbody that has been placed on the 303-d list or has had a TMDL adopted for mercury or low dissolved oxygen? ☐Yes ☒No

    If Yes contact the District/Regional NPDES Storm Water Coordinator to determine if standing water in a Delaware filter, wet basin, or MCTT would be a risk to downstream water quality.

13. After completing the above, identify and attach the checklists shown below for every Treatment BMP under consideration. (use one checklist every time the BMP is considered for a different drainage within the project) ☒Complete

    _x__ Biofiltration Strips and Biofiltration Swales: Checklist T-1, Part 2
    _____ Dry Weather Diversion: Checklist T-1, Part 3
    _____ Infiltration Devices: Checklist T-1, Part 4
    _____ Detention Devices: Checklist T-1, Part 5
    _____ GSRDs: Checklist T-1, Part 6
    _____ Traction Sand Traps: Checklist T-1, Part 7
    _____ Media Filter [Austin Sand Filter and Delaware Filter]: Checklist T-1, Part 8
    _____ Multi-Chambered Treatment Train: Checklist T-1, Part 9
    _____ Wet Basins: Checklist T-1, Part 10

14. Estimate what percentage of WQV (or WQF, depending upon the Treatment BMP selected) will be treated by the preferred Treatment BMP(s): _____% ☐Complete

    (a) Have Treatment BMPs been considered for use in parallel or series to increase this percentage? ☒Yes ☐No

15. Estimate what percentage of the net WQV (for all new impervious surfaces within the project) that will be treated by the preferred treatment BMP(s): _____% ☐Complete

16. Prepare cost estimate, including right-of-way, and site specific determination of feasibility (Section 2.4.2.1) for selected Treatment BMPs and include as supplemental information for SWDR approval. ☒Complete

# Treatment BMPs

# Checklist T-1, Part 2

Prepared by: B. Ross Date: 8/26/10 District-Co-Route: 03-ED-50

PM : 0.0/2.9 Project ID (or EA): 03-xxxxxx RWQCB: Central Valley (Region 5)

## Biofiltration Swales / Biofiltration Strips

**Note: A single Checklist T-1, Part 2 is completed for all biofiltration devices because the feasibility and design elements for all biofiltration devices are similar.**

### *Feasibility*

| | | | |
|---|---|---|---|
| 1. | Do the climate and site conditions allow vegetation to be established? | ☒ Yes | ☐ No |
| 2. | Are flow velocities from a peak drainage facility design event < 4 fps (i.e. low enough to prevent scour of the vegetated biofiltration swale as per HDM Table 873.3E)? | ☒ Yes | ☐ No |
| | If "No" to either question above, Biofiltration Swales and Biofiltration Strips are not feasible. | | |
| 3. | Are Biofiltration Swales proposed at sites where known contaminated soils or groundwater plumes exist? If "Yes", consult with District/Regional NPDES Coordinator about how to proceed. | ☐ Yes | ☒ No |
| 4. | Does adequate area exist within the right-of-way to place Biofiltration device(s)? If "Yes", continue to Design Elements section. If "No", continue to Question 5. | ☒ Yes | ☐ No |
| 5. | If adequate area does not exist within right-of-way, can suitable, additional right-of-way be acquired to site Biofiltration devices and how much right-of-way would be needed to treat WQF? _____ acres If "Yes", continue to Design Elements section. If "No", continue to Question 6. | ☐ Yes | ☐ No |
| 6. | If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of these Treatment BMPs into the project. | ☐ Complete | |

### *Design Elements*

* **Required** Design Element – A "Yes" response to these questions is required to further the consideration of this BMP into the project design. Document a "No" response in Section 5 of the SWDR to describe why this Treatment BMP cannot be included into the project design.

** **Recommended** Design Element – A "Yes" response is preferred for these questions, but not required for incorporation into a project design.

| | | | |
|---|---|---|---|
| 1. | Has the District Landscape Architect provided vegetation mixes appropriate for climate and location? * | ☐ Yes | ☐ No |
| 2. | Can the biofiltration swale be designed as a conveyance system under any expected flows > the WQF event, as per HDM Chapter 800? * (e.g. freeboard, minimum slope, etc.) | ☒ Yes | ☐ No |
| 3. | Can the biofiltration swale be designed as a water quality treatment device under the WQF while meeting the required HRT, depth, and velocity criteria? (Reference Appendix B, Section B.2.3.1)* | ☒ Yes | ☐ No |
| 4. | Is the maximum length of a biofiltration strip ≤ 300 ft? * | ☐ Yes | ☐ No |
| 5. | Has the minimum width (in the direction of flow) of the invert of the biofiltration swale received the concurrence of Maintenance? * | ☒ Yes | ☐ No |
| 6. | Can biofiltration swales be located in natural or low cut sections to reduce maintenance problems caused by animals burrowing through the berm of the swale? ** | ☒ Yes | ☐ No |
| 7. | Is the biofiltration strip sized as long as possible in the direction of flow? ** | ☒ Yes | ☐ No |
| 8. | Have Biofiltration Systems been considered for locations upstream of other Treatment BMPs, as part of a treatment train? ** | ☐ Yes | ☐ No |