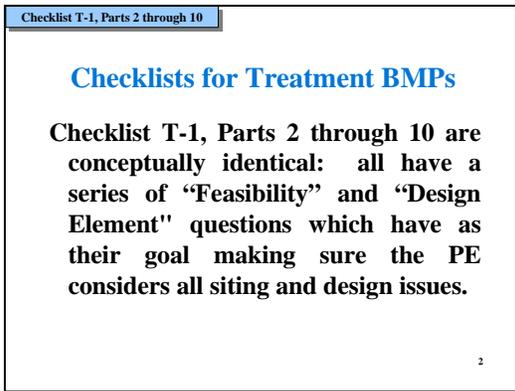


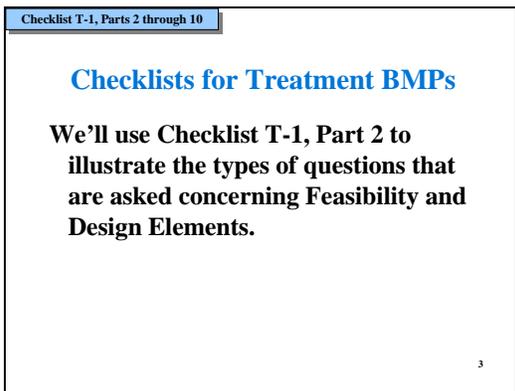
Treatment BMP Training – Text to the “Checklists T-1, Parts 2 through 10” PowerPoint Presentation  
 Caltrans Headquarters Office of Storm Water Management



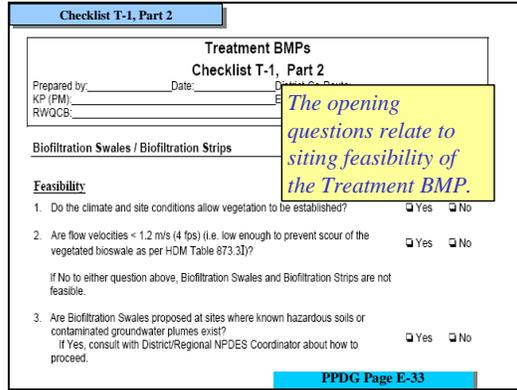
**Slide 1:** We will go over Checklist T-1, Parts 2 through 10, which are for the project-specific siting of a Treatment BMP.



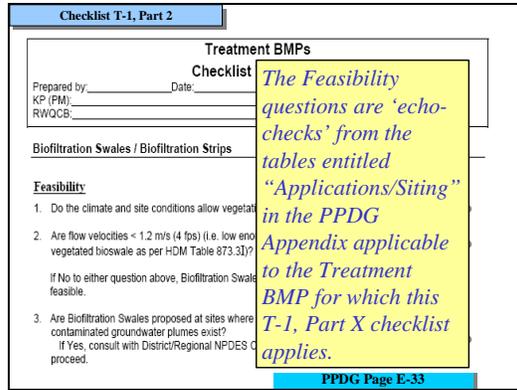
**Slide 2:** Checklist T-1, Parts 2 through 10 are conceptually identical: all have a series of “Feasibility” and “Design Element” questions which have as their goal making sure the PE considers all siting and design issues.



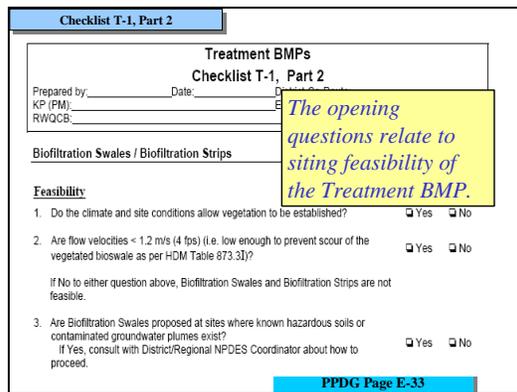
**Slide 3:** We will use Checklist T-1, Part 2, Biofiltration Strips and Swales, as the generic example for the next series of slide.



**Slide 4:** The opening questions relate to siting feasibility of the Treatment BMP.



**Slide 5:** The Feasibility questions are ‘echo-checks’ from the tables entitled “Applications/Siting” in the PPDG Appendix applicable to the Treatment BMP for which this T-1, Part X checklist applies.



**Slide 6:** Checklist T-1, Parts 2 through 10 have two general categories: Feasibility and Design Requirements.

Let’s go over the questions on this Checklist questions to ensure that you understand them, and know where to get the answers. While

Treatment BMP Training – Text to the “Checklists T-1, Parts 2 through 10” PowerPoint Presentation  
 Caltrans Headquarters Office of Storm Water Management

completing this checklist the PE should have handy Table B-1, Summary of Biofiltration Strips and Swales Siting and Design Criteria, on PPDG page B-5 – please keep that page handy for the next few minutes.

“Question 1: Do the climate and site conditions allow vegetation to be established?  Yes  No”  
 In most climates of California vegetation naturally grows, so in general the response to this question is Yes.

“Question 2: Are flow velocities < [less than] 1.2 m/s (4 fps) [i.e. low enough to prevent scour of the vegetated Bioswale as per HDM Table 873.3I]?  Yes  No”  
 When a Bioswale is under consideration there are HDM criteria that must be considered.

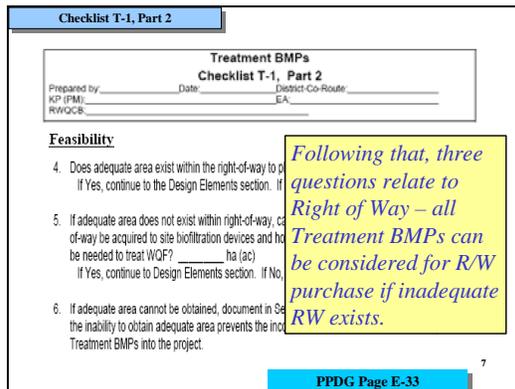
“Question 3: Are Biofiltration Swales proposed at sites where known hazardous soils or contaminated groundwater plumes exist? If Yes, consult with District/Regional NPDES Coordinator about how to proceed.  Yes  No”  
 We saw this situation as a potential disqualifier in the previous set of slides. However, the District NPDES could consult with the RWQCB and in some situations this may not be a disqualifier.

and how much right-of way would be needed to treat WQF? \_\_\_\_\_ hectares (acres) If Yes, continue to Design Elements section. If No, continue to Question 6.  Yes  No”

These are general questions asked on all the Feasibility Checklists – if enough right of way does not exist the Project Engineer must consider the purchase of additional right of way, as we will see on the following question shown on the next slide. From PPDG page 2-15, Section 2.4.2.1: “If a BMP is too large to fit at a site, several options should be considered: (1) cooperation with another jurisdiction contributing drainage to obtain sufficient additional space; (2) purchase of additional land; and (3) installing a BMP that is smaller than what normal sizing procedures would dictate, if agreeable to the RWQCB. Again, these are issues to be brought to the attention of the District/Regional NPDES Storm Water Coordinator so that decisions can be made on a project-by-project basis.” Also, on PPDG page 2-15, Section 2.4.2.2: “The designer must determine if sufficient right-of-way is available for the desired BMP, or if the benefits associated with a potential BMP justify the consideration of acquiring additional right-of-way.”

The last question under Feasibility directs that documentation regarding right of way issues be included in the Storm Water Data Report (SWDR).

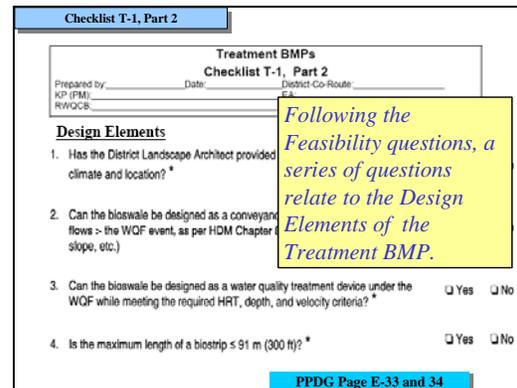
“Question 6. If adequate area cannot be obtained, document in Section 5 of the SWDR that the inability to obtain adequate area prevents the incorporation of these Treatment BMPs into the project.  Complete”



**Slide 7:** Continuing on this Checklist T-1, Part 2, still on the Feasibility questions.

Questions 4 and 5 elate to right of way:  
 “Question 4. Does adequate area exist within the right-of-way to place biofiltration device(s)? If Yes, continue to the Design Elements section. If No, continue to Question 5.  Yes  No”

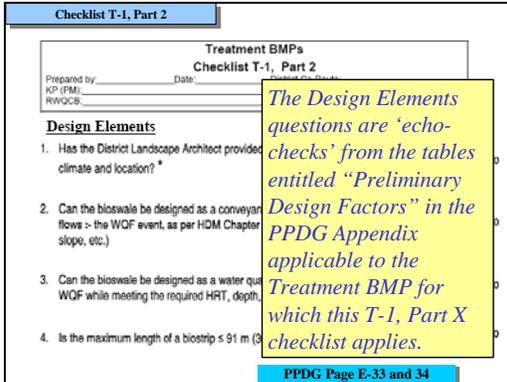
“Question 5. If adequate area does not exist within right-of-way, can suitable, additional right of- way be acquired to site biofiltration devices



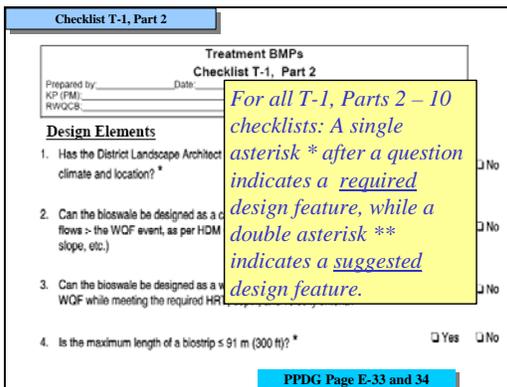
**Slide 8:** The 2nd part of Checklist T-1, Parts 2

Treatment BMP Training – Text to the “Checklists T-1, Parts 2 through 10” PowerPoint Presentation  
 Caltrans Headquarters Office of Storm Water Management

through 10, involves questions about the “Design Elements” of the Treatment BMP, and we again will use Checklist T-1, Part 2 for the Biofiltration Strips and Swales as our example.



**Slide 9:** The Design Elements questions are ‘echo-checks’ from the tables entitled “Preliminary Design Factors” in the PPDG Appendix B applicable to the Treatment BMP for which this T-1, Part [2 through 10, as applicable] checklist applies.



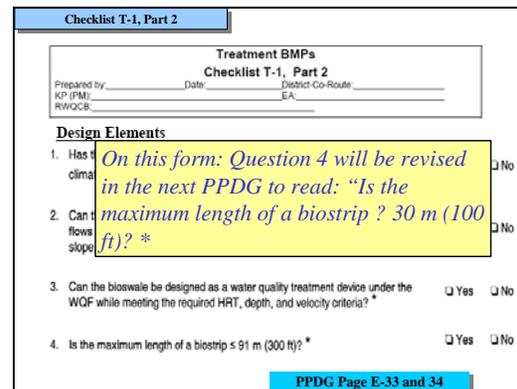
**Slide 10:** First note that after each of the Design Elements Questions there is either one or two asterisks; a single asterisk (“\*”) indicates a required feature for design of the Media Filter, and a double asterisk (“\*\*”) indicates a recommended feature. The Project Engineer must ensure that required features can be incorporated or that the site meets that condition, or else the site would be disqualified; recommended features only indicate that the Project Engineer should attempt to comply, but if he were unable to incorporate that feature, the site would not be disqualified.

Each of these questions can be related to an Applications/Siting or Preliminary Design Factor shown on Table B-1.

“Question 1. Has the District Landscape Architect provided vegetation mixes appropriate for climate and location? \*  Yes  No”  
 For almost all project the Project Engineer will rely on the District Landscape Architects to provide a mix design – recall that to function properly the vegetation both acts to protect the native ground and provides or aids treatment by increasing the frictional resistance to flow of the runoff.

“Question 2. Can the Bioswale 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

In the event that no upstream diversion occurs to bypass events of greater intensity than the Water Quality Flow (WQF) regime, then design standards applicable for the HDM events also apply.



**Slide 11:** “Question 3: Can the Bioswale be designed as a water quality treatment device under the WQF while meeting the required HRT, depth, and velocity criteria? \*  Yes  No”

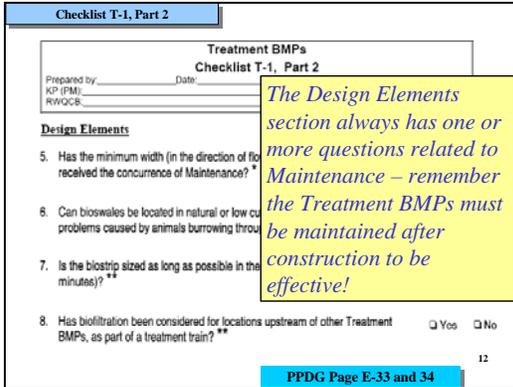
For water quality treatment to occur, one of the main relationships is the travel time in the Bioswale to the depth and velocity of the WQF being carried in the swale. These all relate to the length and slope of the Bioswale, and to the Manning’s n value, when using the Manning’s Equation. [A separate training module will illustrate the use of the Manning’s Equation.]

“Question 4: Is the maximum length of a Biostrip ≤ 91 m (300 ft)? \*  Yes  No”

There is a maximum length of the Biostrip, set at 300 ft – this is really placed to indicate that often rilling will begin after sheet flow of this length,

Treatment BMP Training – Text to the “Checklists T-1, Parts 2 through 10” PowerPoint Presentation  
 Caltrans Headquarters Office of Storm Water Management

so consider placing the Bioswale at a closer distance to the edge of the roadway. NOTE: this has changed to 30 m (100 ft) in the HDM June 26, 2006.

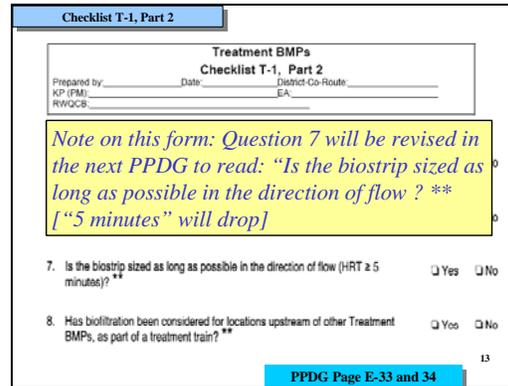


**Slide 12:** The Design Elements section always has one or more questions related to Maintenance – remember the Treatment BMPs must be maintained after construction to be effective! Related to that is the next question: “Question 5. Has the minimum width (in the direction of flow) of the invert of the Bioswale received the concurrence of Maintenance? \*  Yes  No” District Maintenance must periodically mow the Bioswale, and there may be equipment issues that would suggest one invert width be preferable over another.

Question 6: and 7 relate to other Design elements specific to Bioswales.

Question 8 indicates that for almost all project only Biofiltration Treatment BMPs can be placed upstream of other approved Treatment BMPs (in series) to provide increase treatment while meeting MEP (maximum extent practicable) requirements.

“Question 8. Has biofiltration been considered for locations upstream of other Treatment BMPs, as part of a treatment train? \*\*  Yes  No”



**Slide 13:** Note on this checklist (July 2005 version): Question 7 will be revised in the next PPDG to read: “Is the Biostrip sized as long as possible in the direction of flow? \*\* That is, the “5 minutes” will be deleted.



**Slide 14:** End of the presentation.