UC Berkeley

Storm Water Management Checklist

Applicability: All construction projects that create and/or alter more than 2,500 square feet of impervious surface area must submit this checklist with accompanying documentation to ehs-ep@berkeley.edu

Instructions:

1) Fill out all fields in the Project Overview page.

2) Answer all 13 questions, as applicable to your project.

3) Arrows (→) indicate actions that are required.

Contents:

Project Overview

Project Name:				
Street Address:		Cross Streets:		
Description of Project:				
Project Type: (Check one or more boxes)	☐	New Development	☐	Utility
	☐	Re-Development	☐	Road
	☐	Retrofit	☐	Landscaping
	☐	Other (brief title):		

Is the site located within City of Berkeley property or require a City utility connection?	☐	Yes	☐	No
Has the Project footprint been cross-referenced with the Storm Water Facilities campus map (available from ehs-ep@berkeley.edu) to determine that there are no conflicts in land use regarding previously installed storm water treatment facilities?	☐	Yes	☐	No

UC Berkeley Project Manager:	
Architect/Engineer in charge of storm water design:	

Name of person filling out this form:		Date:	

Section A: Surface Areas

1) What is the pre-project impervious surface area, in square feet?	
2) What is the post-project impervious surface area, in square feet?	

→Attach 2 maps with the following information:

Map 1 – Project boundary outline* and pre-project impervious surface area with accompanying square footage noted.

Map 2 – Project boundary outline* and post-project impervious surface area with accompanying square footage noted.

* The project boundary outline only includes altered areas that are part of the project. Temporary staging does not count unless there are permanent alterations after staging is complete.

→ **IMPORTANT**: If the total Project site area (including temporary staging) is greater than one acre, registration within SMARTS is required with the State Water Quality Control Board (in addition to this Storm Water Management checklist).

3) Have sites above 1 acre completed an application in SMARTS and gained a WDID?	
☐	Not applicable. This project area is below 1 acre.
☐	Yes. → **Fill out WDID # here:**
☐	No. → **Explain here:**

Section B: Storm Water Runoff Calculations

→ Input the answers from #1 and #2 into the State Water Board's Post-Construction Water Balance Calculator (or its equivalent) to quantify storm water runoff. Enter the values here.

4) What is the pre-project runoff, in cubic feet?	
5) What is the post-project runoff, in cubic feet?	

6) If you are <u>not</u> using the Water Balance Calculator to quantify runoff, name the equivalent methodology that you are using. State why you are not using the Water Balance Calculator.

Section C: Site Design Measures

→If you are not using Site Design Measures to treat your storm water runoff, skip this section and go to Section D.

→ Using the Water Balance Calculator (or its equivalent) as your guide, select one or more of the following Site Design Measures that will be used to treat your storm water. If applicable, answer the embedded question for each Site Design Measure.

☐	**C.3 Criteria** Site intends to meet MRP C.3 storm water criteria. Contact ehs-ep@berkeley.edu to see if your site qualifies for C3 before continuing.	
☐	**Stream Setbacks and Buffers** A vegetated area including trees, shrubs, and herbaceous vegetation that exists or is established to protect a stream system, lake reservoir, or coastal estuarine area.	
☐	**Soil Quality Improvement and Maintenance** Improvements and maintenance through soil amendments and creation of microbial community.	
☐	**Tree Planting and Preservation** Planting and preservation of healthy established trees that include both evergreens and deciduous, as applicable.	
☐	**Rooftop and Impervious Area Disconnection** Rerouting of rooftop drainage pipes to drain rainwater to rain barrels, cisterns, or permeable areas instead of to the storm water system.	
☐	**Porous Pavement** Pavement that allows runoff to pass through it, thereby reducing the runoff from a site and surrounding areas and filtering pollutants.	
	Q: What is the gravel subbase thickness under the porous pavement and/or permeable pavers, in inches?	
☐	**Green Roofs** A vegetative layer grown on a roof (rooftop garden).	
☐	**Vegetated Swales** A vegetated, open-channel management practice designed specifically to treat and attenuate storm water runoff.	
	Q: What is the tributary area draining to the vegetated swale, in square feet?	
	Q: What is the area of the vegetated swale, in square feet?	
	Q: What is the potential treatment volume of the vegetated swale, in cubic feet?	
☐	**Rain Barrels and Cisterns** System that collects and stores storm water runoff from a roof or other impervious surface.	
	Q: What is the tributary area draining to the rainwater tanks/cisterns, in square feet?	
	Q: What is the total storage capacity of the rainwater tanks/cisterns, in gallons?	

→ **Attach all documents relevant to your chosen Site Design Measures implemented, including:**

- Site maps that delineate square footage of relevant Site Design Measures
- Construction details of Site Design Measures
- Operations and Maintenance manuals (may be submitted at the time of Final Inspections, see Attachment A)

7) According to the Water Balance Calculator (or its equivalent), has all storm water been treated using these Site Design Measures?	
☐	**Yes.** → **Attach the completed Water Balance Calculator (or its equivalent) and go to Section E.**
☐	**No.** → **Attach the completed Water Balance Calculator (or its equivalent) and fill out Section D.**

Section D: Bioretention and Hydromodification

This section is only required if you are not using Site Design Measures or if the Site Design Measures listed in **Section C** do not adequately treat the storm water required, as calculated by the Water Balance Calculator.

- If your project has more than one discharge point then you will need to divide your project into individual drainage management areas (DMA's). Treatment BMPs must be designed for each DMA.

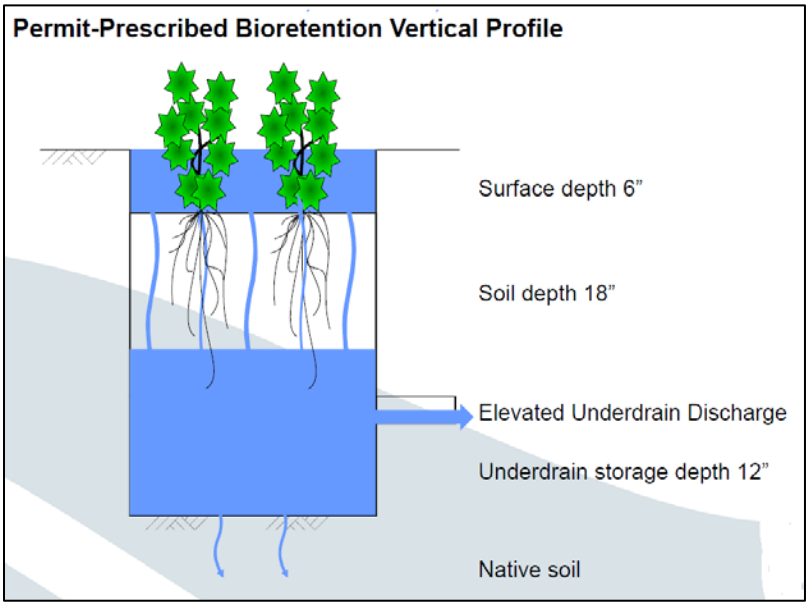
- Bioretention facilities (Option 1) are preferred for treatment but alternative treatment Best Management Practice (BMPs) can be used.

- If Alternative BMPs are selected (Option 2) then all sizing and calculations should be prepared by a Registered Civil Engineer and attached to this document.

8) Which Option are you choosing?	
☐	Option 1 –Bioretention facilities are vegetated areas that can be designed as swales, basins, or flow-through planters. → **Fill out the information for Option 1.**
☐	Option 2 – Alternative treatment BMPs are a range of treatment options designed by a Registered Civil Engineer. → **Fill out the information for Option 2**.

Option 1: Bioretention Facilities or Flow-Through Planters (Suggested by MS4 Permit)

Bioretention facilities can be sized based on 4% of the total impervious tributary area to the bioretention facility (see section F.5.g.2.c. of permit) and in accordance with the typical section below:



Additional Bioretention Design Requirements:

- Bioretention facilities located in areas with highly infiltrative soils or high groundwater tables may omit the underdrain.
- The 18" Soil layer (Planting layer) shall be comprised of a mixture of sand (60-70%) and compost (30-40%) and shall meet ASTM C33 Standards.
- The 12" Storage layer shall be comprised of gravel and underdrain shall be placed near the top of this layer.
- No liners or other barriers shall be used unless there is a structure or other geotechnical hazard located within 10 feet of facility.
- The appropriate plant palette should be selected based on the soil type, maximum available water use during wet periods, and drought tolerance during dry season.

9) What is the total impervious surface area draining to the bioretention facility, in square feet?	
10) What is the total Bioretention Area required, in square feet? (based on 4% of impervious area draining to bioretention facility)	
11) What is the total Bioretention Area provided, in square feet?	

12) If the Total Bioretention Area is less than the area required, explain why in the space below:

→ Attach all documents showing how the Bioretention facilities meet the design requirements. Include:

- Site maps that delineate the square footage noted in Questions 9 and 11
- Construction details that follow bioretention design requirements
- Operations and Maintenance manuals

→ Go to Section E.

Option 2: Alternative Treatment BMPs (must be prepared by a Registered Civil Engineer)

→ **Alternative BMPs used (check all that apply):**	
☐	Extended Detention Basin
☐	Infiltration Basin or Infiltration Trench
☐	High-Rate Biofilters (e.g. Tree wells or other) (1)
☐	High-Rate Media Filter (e.g. Vault unit with replaceable cartridges) (1)
☐	Other effective BMP (brief title here, explain in documentation):
(1) High-rate Biofilters or Media Filters are only allowed if bioretention or equivalent facility is proven to be infeasible for the project and if the following conditions apply: a) project is creating or replacing an acre or less and is located in an area that has at least 85% of the site covered by permanent structures; b) The proposed facility is receiving runoff solely from existing (pre-project) impervious areas.	

Alternative Treatment BMPs shall be designed using the flow-based or volume-based criteria specified in Section F.5.g.2.b (Numeric Sizing Criteria) of the Permit.

→ **Check one of the following volume or flow based criteria**

Volume-Based BMP Sizing Criteria:	
☐	The maximized stormwater capture volume for the tributary based on historical rainfall records and determined in accordance with Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (1998), pages 175-178 (the 85th percentile, 24-hour storm event) **OR:**
☐	The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with CASQA's Stormwater BMP Handbook for New and Redevelopment (2003) using local rainfall. **OR:**
Flow-Based BMP Sizing Criteria:	
☐	The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity **OR:**
☐	The flow of runoff produced from a rain event equivalent to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records.

Treatment Volume or Rate Required for Project: (If multiple DMA's please attach additional calculations to this table)	**Volume**		**Rate**	
		ft^3		ft./s

→ **Attach all supporting designs and calculations for Alternative Treatment BMPs. Include all relevant site maps, construction details, operations and maintenance manuals, and sizing calculations.**

→ **Go to Section E.**

Section E: Source Control BMPs

13) Does your project alter or create > 5,000 square feet of impervious surface area?	
☐	No. Congratulations, your checklist is complete.
☐	Yes. → **Fill out the table below.**

→Select all pollutant generating activities that apply to your project.

☐	Housekeeping for outdoor material storage and outdoor work areas	☐	Landscape management: irrigation runoff, erosion, green waste
☐	Spill control and cleanup for outdoor spills or leaks	☐	Food service management
☐	Marine activities	☐	Sanitary sewer overflows/ line blockages
☐	Loading dock management	☐	Onsite transportation of materials/waste
☐	Outdoor washing/ cleaning	☐	Surface cleaning/ pressure washing
☐	Fueling operations	☐	Outdoor painting and sandblasting
☐	Maintenance on equipment containing water (e.g., eyewash showers, boiler drain lines, condensate drain lines, rooftop equipment, and drainage sumps	☐	Storm water conveyance system management to prevent improper discharge into storm drains
☐	Equipment, vehicle, and boat maintenance	☐	Non-storm water discharges
☐	Trash management	☐	Integrated pest management
☐	Hazardous materials management	☐	Building repairs and remodeling
☐	Hazardous waste management	☐	Parking lot and storage area management
☐	Potable water system flushing	☐	Pools, decorative fountains, and other water features
☐	Fire sprinkler and hydrant testing/flushing		

→ Attach all documentation for the selected Source Control BMPs.

Source control BMPs must be designed consistent with the CASQA Stormwater BMP Handbook for New Development and Redevelopment (www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook).

Attachment A: Final Inspections Requirements

(To be filled out by EH&S)

Inspection Services

UC Berkeley's Inspections Services group* will perform inspections of storm water facilities during and after construction. Final construction inspections will focus on the following key points:

- Elevations of inlets and outlets
- Conformance with design plans

* If the site is located on the Berkeley Global Campus at Richmond Bay (BGC), inspections will be conducted by the BGC facilities groups.

EH&S Final Review

EH&S will perform a final review to make sure the project has submitted all required documents.

Has EH&S requested and received written verification (ie email) that Inspectors have inspected and approved the project's storm water treatment installation?	
☐	Yes. → Store a pdf copy of the email verification in the MS4 folder on the EH&S server.
☐	No. → Explain:

→ Check the box next to each document(s) received and store a copy in the MS4 folder on the EH&S server. NOTE: All documents are required for the documentation to be complete.

☐	Written agreement for Operations and Maintenance responsibility (from Project Manager)
☐	As-built drawings, if different from construction design plans
☐	Operations and Maintenance manuals

The aforementioned documentation is required in addition to these previously submitted documents:

- UC Berkeley Storm Water Management Checklist, with accompanying documentation
- Post-Construction Water Balance Calculator

Attachment B: Exemptions

The following projects are exempt from the Phase II Small MS4 permit storm water management requirements. If your project meets any of these exemptions, do NOT fill out this checklist.

1. Projects completed before July 1, 2014.

2. Regulated projects that have been designed, approved, and funded prior to July 1, 2014.

3. Interior remodels.

4. Routine maintenance or repair projects such as:

    a. Maintenance, repair, and replacement work on existing underground utilities such as sanitary sewer lines or other utilities.

    b. Exterior wall surface replacement.

    c. Roof replacement.

    d. Pavement or asphalt resurfacing within the existing footprint.

    e. Sidewalk replacement within an existing footprint to replace concrete that is causing a trip hazard.

    f. routine replacement/repair of damaged pavement/asphalt such as pothole repair

5. Bicycle lanes or pedestrian ramps on existing roads or sidewalks within existing footprint (e.g., no new impervious area).

6. Sidewalks built as a part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas.

7. Bicycle lanes that are built as part of new streets or roads that direct storm water runoff to adjacent vegetated areas.

8. Impervious trails built to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas.

9. Sidewalks, bicycle lanes or trails constructed with permeable surfaces.

10. Project runoff does not drain to the storm sewer system. Verify this exemption by contacting ehs-ep@berkeley.edu

Attachment C: Definitions

TERMS	DEFINITIONS
Bioretention Facility	An engineered system containing organic or plant based methods for cleaning sediment, metals or other contaminants from storm water.
BMPs	Best Management Practices (BMPs) are techniques widely accepted and utilized within a specific profession or industry.
CASQA	California Stormwater Quality Association
Hydromodification Measures	Site controls or mitigations factored into the design of stormwater conveyances associated with a project.
Impervious Surfaces	Hard surfaces that prevent rainwater infiltration into the soil beneath. Impervious surfaces include roofs, pavement, and other hard structures.
Low Impact Design	A stormwater management strategy that emphasizes conservation and use of existing natural site features integrated with distributed, small-scale stormwater controls to more closely mimic natural hydrologic patterns.
MRP	Municipal Regional Permit
MS4	Muncipal Separate Storm Sewer System
O & M	Operations and Maintenance.
Post Construction Stormwater Management	Permanent site infrastructure features related primarily to stormwater treatment.
Post Construction Water Balance Calculator	A tool developed by the State Water Quality Control Board for documenting or evaluating site design in relation to post construction runoff treatment requirements.
Regulated Projects	A term specific to the MS4 permit. Refers specifically to projects that create and/or replace greater than 5,000 square feet of impervious area.
RWQCB	Regional Water Quality Control Board, the local agency in charge of state water regulations.
Site Design Measures	Stormwater treatment practices described in the MS4 permit and outlined in Part B of this checklist.
SMARTS	Stormwater Multiple Application Reporting Tracking System
Source Control Measures	Methods of design that evaluate or help avoid potential negative impacts to the surrounding environment that could occur from an accidental release into the MS4 system.
Stormwater Runoff	Surface water flows created by precipitation such as rain, snow or melting ice.
Stormwater Treatment Facility	Any installation intended for capturing and/or treating stormwater. Stormwater treatment facilities encompass a range of techniques, including low-tech applications such as bioswales to more complicated mechanical systems such as rainwater-to-indoor plumbing.
WDID	Waste Discharge Identification number from State Water Quality Control Board.