UC SANTA CRUZ

POST-CONSTRUCTION STORMWATER MANAGEMENT REQUIREMENTS

Rev. March 1, 2016
March 3, 2014

POST-CONSTRUCTION STORMWATER MANAGEMENT REQUIREMENTS

TABLE of CONTENTS

A. Watershed Management Zones (WMZs)

UCSC is categorized into 3 Watershed Management Zones (WMZs), based on common key watershed processes and receiving water type. Maps in Attachment 1 illustrate the WMZs for the Campus.

1) The design team shall determine the WMZ in which projects are proposed.

B. Post-Construction Requirements

The primary objective of these Post-Construction Stormwater Management Requirements (hereinafter, Post-Construction Requirements) is to ensure that the Campus is reducing pollutant discharges to the Maximum Extent Practicable and preventing stormwater discharges from causing or contributing to a violation of receiving water quality standards in all applicable development projects. The Post-Construction Requirements emphasize protecting and, where degraded, restoring key watershed processes to create and sustain linkages between hydrology, channel geomorphology, and biological health necessary for healthy watersheds. Maintenance and restoration of watershed processes impacted by stormwater management is necessary to protect water quality and beneficial uses.

1) Regulated Projects
   Regulated Projects include all New Development or Redevelopment projects that create and/or replace ≥2,500 square feet of impervious surface (collectively over the entire project site)
   a) Regulated Projects include, but are not limited to the following road projects/practices:
      i) Removing and replacing a paved surface resulting in alteration of the original line and grade, hydraulic capacity or overall footprint of the road
      ii) Extending the pavement edge, or paving graveled shoulders
      iii) Resurfacing by upgrading from dirt to asphalt, or concrete; upgrading from gravel to asphalt, or concrete; or upgrading from a bituminous surface treatment ("chip seal") to asphalt or concrete
   b) Regulated Projects do not include:
      i) Road and Parking Lot maintenance:
         (1) Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching
         (2) Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
         (3) Shoulder grading
         (4) Cleaning, repairing, maintaining, reshaping, or regrading drainage systems
         (5) Crack sealing
         (6) Resurfacing with in-kind material without expanding the road or parking lot
         (7) Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot
         (8) Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster
      ii) Sidewalk and bicycle path or lane projects, where no other impervious surfaces are created or replaced, built to direct stormwater runoff to adjacent vegetated areas
      iii) Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas
      iv) Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
      v) Curb and gutter improvement or replacement projects that are not part of any additional creation or replacement of impervious surface area (e.g., sidewalks, roadway)
      vi) Second-story additions that do not increase the building footprint

vii) Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
viii) Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated groundcover, or panel arrays with a buffer strip at the most down gradient row of panels
ix) Temporary structures (in place for less than six months)
x) Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices
xi) Above-ground fuel storage tanks and fuel farms with spill containment system

2) Performance Requirement No. 1: Site Design and Runoff Reduction
   a) All Regulated Projects that create and/or replace ≥ 2,500 square feet of impervious surface (collectively over the entire project site) must implement at least the following design strategies throughout the Regulated Project site:
      i) Limit disturbance of creeks and natural drainage features
      ii) Minimize compaction of highly permeable soils
      iii) Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection
      iv) Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state
      v) Minimize stormwater runoff by implementing one or more of the following site design measures:
         (1) Direct roof runoff into cisterns or rain barrels for reuse
         (2) Direct roof runoff onto vegetated areas safely away from building foundations and footings, consistent with California building code
         (3) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings, consistent with California building code
         (4) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings, consistent with California building code
         (5) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces
   b) The Design Team shall confirm that projects comply with Site Design and Runoff Reduction Performance Requirements by completing the Post Construction Storm Water Management Checklist accompanying 100% Design Development and 100% Construction Documents.

3) Performance Requirement No. 2: Water Quality Treatment
   a) The Design Team shall design projects ≥ 5,000 square feet Impervious Area to treat stormwater runoff as required in the Water Quality Treatment Performance Requirements in Section B.3.b. to reduce pollutant loads and concentrations using physical, biological, and chemical removal.
   b) The Design Team shall design project subject to Water Quality Treatment Performance Requirements to treat runoff generated by the Regulated Project site using the onsite measures below, listed in the order of preference (highest to lowest). Water Quality Treatment Performance Requirements shall apply to the runoff from existing, new, and replaced impervious surfaces on sites where runoff from existing impervious surfaces cannot be separated from runoff from new and replaced impervious surfaces.
      i) Low Impact Development (LID) Treatment Systems – Implement harvesting and use, infiltration, and evapotranspiration Stormwater Control Measures that collectively achieve the following hydraulic sizing criteria for LID systems:
         (1) Hydraulic Sizing Criteria for LID Treatment Systems – LID systems shall be designed to retain stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.

ii) Biofiltration Treatment Systems – Implement biofiltration treatment systems using facilities that must be demonstrated to be at least as effective as[1] a biofiltration treatment system with the following design parameters:
   (1) Maximum surface loading rate appropriate to prevent erosion, scour and channeling within the biofiltration treatment system itself and equal to 5 inches per hour, based on the flow of runoff produced from a rain event equal to or at least:
      (a) 0.2 inches per hour intensity; or
      (b) Two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depth
   (2) Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches
   (3) Minimum planting medium depth of 24 inches. The planting medium must sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal. A mixture of sand (60%-70%) meeting the specifications of American Society for Testing and Materials (ASTM) C33 and compost (30%-40%) may be used. A Regulated Project may utilize an alternative planting medium if it demonstrates its planting medium is equal to or more effective at attenuating pollutants than the specified planting medium mixture.
   (4) Proper plant selection[2]
   (5) Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches
   (6) Underdrain with discharge elevation at top of gravel layer
   (7) No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted)
   (8) No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible.

iii) Non-Retention Based Treatment Systems – Implement Stormwater Control Measures that collectively achieve at least one of the following hydraulic sizing criteria for non-retention based treatment systems:
   (1) Hydraulic Sizing Criteria for Non-Retention Based Treatment Systems:
      (a) Volume Hydraulic Design Basis – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.
      (b) Flow Hydraulic Design Basis – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:
         (i) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or
         (ii) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

c) Stormwater Control Plan Requirements – For each Regulated Project subject to the Water Quality Treatment Performance Requirement, the Design Team shall provide the below information in a Stormwater Control Plan. The Campus will not grant final project approval,

---

[1] Facilities or a combination of facilities, of a different design than in Section B.3.b.ii. may be permitted if all of the following measures of equivalent effectiveness are demonstrated: 1) equal or greater amount of runoff infiltrated or evapotranspired; 2) equal or lower pollutant concentrations in runoff that is discharged after biofiltration; 3) equal or greater protection against shock loadings and spills; and 4) equal or greater accessibility and ease of inspection and maintenance.

[2] Technical guidance for designing bioretention facilities is available from the Central Coast LID Initiative. The guidance includes design specifications. A plant lists appropriate for UCSC is available. (http://www.centralcoastlidi.org/Central_Coast_LIDI/LID_Structural_BMPs.html)

until the Stormwater Control Plan for the Regulated Project sufficiently demonstrates the Regulated Project design meets the Water Quality Treatment Performance Requirements.

i) Project name, project number
ii) Project Phase number (if project is being constructed in phases)
iii) Project Type (e.g., Institutional), and description
iv) Total project site area
v) Total new impervious surface area, total replaced impervious surface area, total new pervious area, and calculation of Net Impervious Area
vi) Statement of Water Quality Treatment Performance Requirements that apply to the Project
vii) Summary of Site Design and Runoff Reduction (Performance Requirement No. 1) measures selected for the project
viii) Description of all post-construction structural Stormwater Control Measures
ix) Supporting calculations used to comply with the applicable Water Quality Treatment Performance Requirements
x) Documentation certifying that the selection, sizing, and design of the Stormwater Control Measures meet the full or partial Water Quality Treatment Performance Requirement
xi) Water quality treatment calculations used to comply with Water Quality Treatment Performance Requirement and any analysis to support infeasibility determination
xii) Statement of Compliance:
    (1) Statement that Water Quality Treatment Performance Requirement has been met on-site, or, if not achievable:
        (a) Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements.
        (b) Statement of intent to comply with Water Quality Treatment Performance Requirement through Alternative Compliance

4) Performance Requirement No. 3: Runoff Retention
    a) Post project runoff volumes shall not exceed pre project runoff volumes for the 2 year 24-hr storm for regulated projects < 5000sf and the 10 year 24-hr storm for projects ≥ 5000sf < 15,000sf. If the specified volume reduction is not feasible or appropriate due to site conditions provide documentation from a licensed professional.
    b) Projects that create and/or replace ≥15,000 square feet of impervious surface, collectively over the entire project site in WMZs 1, 3, and 9, must meet the Runoff Retention Performance Requirements in Sections B.4.c. and B.4.d. using the LID Development Standards in Section B.4.e. for optimal management of watershed processes.
    c) Adjustments to the Runoff Retention Performance Requirements for Redevelopment – Where the Regulated Project includes replaced impervious surface, the below adjustments apply. These adjustments are accounted for in the Retention Tributary Area calculation in Attachment 3.
        i) Redevelopment Projects outside an approved Urban Sustainability Area, as described in Section C.3. – The total amount of replaced impervious surface shall be multiplied by 0.5 when calculating the volume of runoff subject to Runoff Retention Performance Requirements.
        ii) Redevelopment Projects located within an approved Urban Sustainability Area (Section C.3.) – The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.
    d) Regulated Projects, subject to the Runoff Retention Performance Requirements, shall meet the following Performance Requirements:
        i) Watershed Management Zone 1:

(1) Retain 95th Percentile Rainfall Event – Prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.[3]
(2) Compliance must be achieved by optimizing infiltration. Compliance for retention of the remaining volume must be achieved via storage, rainwater harvesting and/or evapotranspiration.

ii) Watershed Management Zone 2:
(1) Retain 95th Percentile Rainfall Event – Prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.
(2) Compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotranspiration.

iii) Watershed Management Zone 3:
(1) Post project runoff volumes shall not exceed pre project runoff volumes for the 10 year 24-hr storm. If the specified volume reduction is not feasible or appropriate due to site conditions provide documentation from a licensed professional.

iv) Watershed Management Zones 9:
(1) Retain 85th Percentile Rainfall Event – Prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.
(2) Compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotransporation

e) LID Development Standards –Regulated Projects, subject to Runoff Retention Performance Requirements, shall meet Runoff Retention Performance Requirements (Sections B.4.c. and B.4.d.) using the following LID Development Standards:

i) Site Assessment Measures – The Design Team shall complete the Post-Construction Storm Water Management Checklist to identify opportunities and constraints to implement LID Stormwater Control Measures, as appropriate to the development site:
- Site topography
- Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs
- Depth to seasonal high groundwater
- Locations of groundwater wells used for drinking water
- Depth to an impervious layer such as bedrock
- Presence of unique geology (e.g., karst)
- Geotechnical hazards
- Documented soil and/or groundwater contamination
- Soil types and hydrologic soil groups
- Vegetative cover/trees
- Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)
- Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains
- Structures including retaining walls
- Utilities
- Easements
- Covenants
- Zoning/Land Use
- Setbacks

[3] Use either the methodology provided in Part I.D of the December 2009 Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act, or, rainfall statistics provided by the Central Coast Water Board, whichever produces a more accurate value for rainfall depth.

- Open space requirements
- Other pertinent overlay(s)

ii) Site Design Measures – Design Teams shall optimize the use of LID site design measures, as feasible and appropriate at the project site. Regulated Projects subject to Performance Requirement No. 3 must augment design strategies required by Performance Requirement No. 1 (Section B.2.a.i-v) with the following:

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed
- Conserve natural areas, including existing trees, other vegetation, and soils
- Limit the overall impervious footprint of the project
- Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised
- Set back development from creeks, wetlands, and riparian habitats
- Conform the site layout along natural landforms
- Avoid excessive grading and disturbance of vegetation and soils

iii) Delineation of discrete Drainage Management Areas (DMAs) – The Design Team shall delineate DMAs to support a decentralized approach to stormwater management.

(1) The Design Team shall provide a map or diagram dividing the entire project site into discrete DMAs

(2) The Design Team shall account for the drainage from each DMA using measures identified in Sections B.4.d.iv. and B.4.d.v., below.

iv) Undisturbed and Natural Landscape Areas – Design Teams shall implement appropriate Site Design (Section B.4.d.ii.), and Runoff Reduction Measures in Performance Requirement No. 1, to reduce the amount of runoff for which retention and treatment is required. Runoff reduction measures that can be used to account for this reduction also include the below measures. The Retention Tributary Area calculation in Attachment 3 accounts for these reductions.

(1) Undisturbed or areas planted with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas may be considered self-treating and no additional stormwater management is required.

(2) Runoff from impervious surfaces, generated by the rainfall events identified in Section B.4.c, may be directed to undisturbed or natural landscaped areas. When the applicant can demonstrate that this runoff will be infiltrated and will not produce runoff to the storm drain system, or a surface receiving waterbody, or create nuisance ponding that may affect vegetation health or contribute to vector problems, then no additional stormwater management is required for these impervious surfaces.

v) Structural Stormwater Control Measures – Where the Design Team has demonstrated and confirmed in their Stormwater Control Plans that use of Site Design measures listed in Section B.4.d.ii., Runoff Reduction measures listed in Performance Requirement No.1, and undisturbed and natural landscape areas discussed in Section B.4.d.iv., has been maximized to the extent feasible, Structural Stormwater Control Measures designed for water quality treatment and/or flow control shall be used to comply with Performance Requirement No. 3.

(1) The Project shall use structural Stormwater Control Measures that optimize retention and result in optimal protection and restoration of watershed processes, such as Structural Control Measures associated with small-scale, decentralized facilities designed to infiltrate, evapotranspirate, filter, or capture and use stormwater.

vi) Hydrologic Analysis and Structural Stormwater Control Measure Sizing – To determine Stormwater Control Measure sizing and design, Design Teams shall use one of the following: 1) hydrologic analysis and sizing methods as outlined in Attachment 3; 2) locally/regionally calibrated continuous simulation model that results in equivalent

optimization of on-site runoff volume retention; or 3) hydrologic analysis and sizing methods, equally effective in optimizing on-site retention of the runoff generated by the rainfall event specified in Section B.4.c, that have been approved by the Central Coast Water Board Executive Officer.

f) Ten Percent Adjustment for Sites with Technical Infeasibility – Where technical infeasibility, as described in Section C.1.c., prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention of the full Retention Volume per Section B.4.d.vi. is not required and the Regulated Project is required to dedicate no less than ten percent of the Regulated Project's Equivalent Impervious Surface Area[4] to retention-based Stormwater Control Measures.
   i) Use the Attachment 4 instructions to calculate the ten percent adjustment for applying the Runoff Retention Performance Requirement.
   ii) The Water Quality Treatment Performance Requirement is not subject to this adjustment, i.e., mitigation to achieve full compliance with the Water Quality Treatment Performance Requirement is required on- or off-site.

g) Off-Site Mitigation – Off-site mitigation is required when Regulated Projects do not retain the full Retention Volume per Section B.4.b and B.4.c, and 1) fail to demonstrate technical infeasibility of full retention; or 2) demonstrate technical infeasibility of full retention AND fail to dedicate at least ten percent of the Regulated Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.
   i) Use the Attachment 5 instructions to calculate the Off-Site retention requirements when a Regulated Project subject to the Runoff Retention Performance Requirement does not allocate the full ten percent of the project site's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.

h) Reporting Requirements – For each Regulated Project subject to the Runoff Retention Performance Requirement, the Design Team shall provide the below information in a Stormwater Control Plan. The Campus will not grant final project approval, until the Stormwater Control Plan for the Regulated Project sufficiently demonstrates the Regulated Project design meets the Water Quality Treatment and Runoff Retention Performance Requirements.
   i) Project name, project number
   ii) Project Phase number (if project is being constructed in phases)
   iii) Project Type and description
   iv) Total project site area
   v) Total new and/or replaced impervious surface area
   vi) Statement of Water Quality Treatment and Runoff Retention Performance Requirements that apply to the Project
   vii) Adjusted Requirements based on the local jurisdiction's approval, that the Project is allowed a Special Circumstance, Watershed or Regional Plan, or Urban Sustainability Area designation
   viii) Site assessment summary
   ix) LID Measures used:
      (1) Site design measures
      (2) Runoff Reduction Measures
      (3) Post-construction structural Stormwater Control Measures
   x) Summary of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area, as well as for the entire site
   xi) Supporting calculations used to comply with the applicable Water Quality Treatment and Runoff Retention Performance Requirements

[4] Calculate Equivalent Impervious Surface Area using guidance in Attachment E

xii) Documentation demonstrating infeasibility where Site Design and Runoff Reduction measures cannot retain required runoff volume
xiii) Documentation demonstrating infeasibility where retention-based Stormwater Control Measures cannot retain and/or treat the required runoff volume
xiv) Documentation demonstrating infeasibility where on-site compliance cannot be achieved
xv) Documentation demonstrating percentage of the project's Equivalent Impervious Surface Area dedicated to retention-based Stormwater Control Measures
xvi) Documentation of certification that the selection, sizing, and design of the Stormwater Control Measures meets the applicable Water Quality Treatment and Runoff Retention Performance Requirement
xvii) O&M Plan for all structural Stormwater Control Measures to ensure long-term performance
xviii) Owner of facilities
xix) Statement of Compliance:
(1) Statement that the Water Quality Treatment and Runoff Retention Performance Requirements have been met on-site, or, if not achievable:
(a) Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance volume.
(b) Statement of intent to comply with Water Quality Treatment and Runoff Retention Performance Requirements through an Alternative Compliance agreement.

5) Performance Requirement No. 4: Peak Management
a) Regulated Projects, regardless of square footage of impervious surface, that do not meet Performance Requirement No. 3 shall apply the following Peak Management Performance Requirements:
i) Storm drainage design shall insure the post-construction storm water flow rate will not cause excessive erosion. One threshold for excessive erosion is defined as 20 percent of the pre-project 2-year peak flow rate for the 2- through 10-year storm events. If the flow rate is greater than the flow rate above, the designer shall demonstrate the project will not cause excessive erosion by using analysis of channel resistance. Each project shall also include design measures to avoid or minimize the increase in the volume of runoff discharged from the site to the maximum extent feasible.
b) Regulated Projects that create and/or replace $\geq$22,500 square feet of impervious surface (collectively over the entire project site) shall apply the following Peak Management Performance Requirements:
i) Post-development peak flows, discharged from the site, shall not exceed pre-project peak flows for the 2- through 10-year storm events.
c) Reporting Requirements – For each Regulated Project subject to the Peak Management Performance Requirement, the Design Team shall provide the below information in a Stormwater Control Plan. The Campus will not grant final project approval, until the Stormwater Control Plan for the Regulated Project sufficiently demonstrates the Regulated Project design meets the Water Quality Treatment, Runoff Retention, and Peak Management Requirements.
i) Project name, project number
ii) Project Phase number (if project is being constructed in phases)
iii) Project Type (e.g., Institutional), and description
iv) Total project site area
v) Total new and/or replaced impervious surface area
vi) Statement of Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements that apply to the Project

vii) Adjusted Requirements based on the local jurisdiction's approval, that the Project is allowed a Special Circumstance, Watershed or Regional Plan, or Urban Sustainability Area designation
viii) Site assessment summary
ix) LID Measures used:
(1) Site design measures
(2) Runoff Reduction Measures
(3) Post-construction structural Stormwater Control Measures
x) Summary of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area, as well as for the entire site
xi) Supporting calculations used to comply with the applicable Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements
xii) Documentation demonstrating infeasibility where on-site compliance cannot be achieved
xiii) Documentation of certification that the selection, sizing, and design of the Stormwater Control Measures meets the applicable Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements
xiv) O&M Plan for all structural SCMs to ensure long-term performance
xv) Owner of facilities
xvi) Statement of Compliance:
(1) Statement that the Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements have been met on-site, or, if not achievable:
(a) Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements.
(b) Statement of intent to comply with Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements through an Alternative Compliance agreement.

6) Performance Requirement No. 5: Special Circumstances
Regulated Projects may be designated as subject to Special Circumstances based on certain site and/or receiving water conditions. The Special Circumstances designation exempts a Regulated Project from Runoff Retention and/or Peak Management Performance Requirements where those Performance Requirements would be ineffective to maintain or restore beneficial uses of receiving waters. The Regulated Project subject to Special Circumstances must still comply with the Water Quality Treatment Performance Requirements.
a) Special Circumstances include:
i) Highly Altered Channel Special Circumstance:
Regulated Projects may be designated as subject to Special Circumstances for Highly Altered Channels for the following conditions:
(1) Project runoff discharges into stream channels that are concrete-lined or otherwise continuously armored from the discharge point to the channel's confluence with a lake, large river (>200-square mile drainage area).
(2) Project runoff discharges to a continuous underground storm drain system that discharges directly to a lake, large river (>200-square mile drainage area), the San Lorenzo River in the City of Santa Cruz, or marine nearshore waters
(3) Project runoff discharges to other areas identified by the Central Coast Water Board
(4) Under no circumstance described in 6.a.i. can runoff from the Regulated Project result in adverse impacts to downstream receiving waters
ii) Intermediate Flow Control Facility Special Circumstance:
(1) Regulated Projects may be designated as subject to Special Circumstances for Intermediate Flow Control Facilities if the project runoff discharges to an existing (as

of the date when the Central Coast Water Board approved Resolution R3-2012-0025) flow control facility that regulates flow volumes and durations to levels that have been demonstrated to be protective of beneficial uses of the receiving water downstream of the facility.

(2) The flow control facility must have the capacity to accept the Regulated Project's runoff.

(3) Demonstration of facility capacity to accept runoff and to regulate flow volumes and durations must include quantitative analysis based on numeric, hydraulic modeling of facility performance.

(4) Under no circumstance described in Section B.6.a.ii. can runoff from the Regulated Project result in adverse impacts to downstream receiving waters.

iii) Historic Lake and Wetland Special Circumstance:

(1) Regulated Projects may be designated as subject to Special Circumstances for Historic Lakes and Wetlands for the following conditions:

(a) Project is located where there was once a historic lake or wetland where pre-development hydrologic processes included filtration and storage but no significant infiltration to support downstream receiving water.

(b) The Special Circumstance has been established based on a delineation of the historic lake or wetland approved by the Central Coast Water Board Executive Officer

b) Performance Requirements for Highly Altered Channel and/or Intermediate Flow Control Facility Special Circumstances:

i) For Regulated Projects that: 1) create and/or replace ≥22,500 square feet of impervious surface; 2) are located in WMZ 1:

(1) Water Quality Treatment (Performance Requirement No. 2)

(2) Runoff Retention (Performance Requirement No. 3)

ii) For Regulated Projects that: 1) create and/or replace ≥22,500 square feet of impervious surface; and 2) are located in WMZ 9:

(1) Water Quality Treatment (Performance Requirement No. 2)

c) Performance Requirements for Historic Lake and Wetland Special Circumstances

i) For Regulated Projects that create and/or replace ≥15,000 and < 22,500 square feet of impervious surface and meet the Historic Lake and Wetland Special Circumstance:

(1) Water Quality Treatment (Performance Requirement No. 2)

(2) Detention: Detain runoff such that the post-project peak discharge rate does not exceed the pre-project rate for all runoff up to the 95th percentile 24-hr rainfall event, or a more protective rate consistent with the Universities development requirements

ii) For Regulated Projects that create and/or replace ≥22,500 square feet of impervious surface and meet the Historic Lake and Wetland Special Circumstance:

(1) Water Quality Treatment (Performance Requirement No. 2)

(2) Peak Management: Detain runoff such that the post-project peak discharge rate does not exceed the pre-project rate for the 95th percentile 24-hr rainfall event and the 2- through 10-yr storm events or a more protective rate consistent with the Universities development requirements.

d) Documentation and Approval of Special Circumstances – The Design Team shall provide reasonable documentation to justify that a Regulated Project is more appropriately categorized under the Special Circumstances category.

i) Historic Lake and Wetland Special Circumstance – Prior to granting a Regulated Project Special Circumstances, the Design Team shall submit a proposal to the University for review. The University will submit the proposal to the Central Coast Water Board Executive Officer for review and approval. The proposal shall include, at a minimum:

(1) Delineation of historic lakes and wetlands and any supporting technical information to substantiate the requested Special Circumstances designation; and

(2) Documentation that the proposal was completed by a registered professional engineer, geologist, architect, and/or landscape architect.

C. Alternative Compliance (Off-Site Compliance): See University Representative

Alternative Compliance refers to Water Quality Treatment, Runoff Retention and Peak Management Performance Requirements that are achieved off-site through mechanisms such as developer fee-in-lieu arrangements and/or use of regional facilities. Alternative Compliance may be allowed under the following circumstances:

1) Technical Infeasibility

Off-site compliance with Water Quality Treatment, Runoff Retention, or Peak Management Performance Requirements may be allowed when technical infeasibility limits or prevents use of structural Stormwater Control Measures.

a) To pursue Alternative Compliance based on technical infeasibility, the Regulated Project, for Regulated Projects outside of Urban Sustainability Areas, must submit a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect, demonstrating that compliance with the applicable numeric Post-Construction Stormwater Management Requirements is technically infeasible

b) The Regulated Project applicant must submit a description of the project(s) that will provide off-site mitigation. The proposed off-site projects may be existing facilities and/or prospective projects that are as effective in maintaining watershed processes as implementation of the applicable Post-Construction Stormwater Requirements on-site. The description shall include:

i) The location of the proposed off-site project(s) must be within the same watershed as the Regulated Project. Alternative Compliance project sites located outside the watershed may be approved by the Central Coast Water Board Executive Officer

ii) A schedule for completion of offsite mitigation project(s), where the off-site mitigation project(s) has not been constructed.

c) Technical infeasibility may be caused by site conditions, including:

i) Depth to seasonal high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures[5]

ii) Depth to an impervious layer such as bedrock limits infiltration

iii) Sites where soil types significantly limit infiltration

iv) Sites where pollutant mobilization in the soil or groundwater is a documented concern

v) Space constraints (e.g., infill projects, some redevelopment projects, high density development)

vi) Geotechnical hazards

vii) Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water

viii) Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility)

D. Field Verifications of Post-Construction Stormwater Control Measures

[5] According to the CASQA Frequently Asked Questions about LID, "some MS4 permits and BMP guidance manuals require anywhere from 3-10 feet of separation from the groundwater level for infiltration practices. This distance depends on the soil type, pollutants of concern, and groundwater use. In some cases, however, where there may be groundwater or soil contamination, LID infiltrative practices may be restricted completely. (p. 7 in https://www.casqa.org/Portals/0/LID/CA_LID_FAQ_06-28-2011.pdf)

1) The Design Team shall complete the Post Construction Storm Water Management Checklist to verify that structural Water Quality Treatment, Runoff Retention, and/or Peak Management controls are designed in accordance with these Post-Construction Stormwater Management Requirements
2) Prior to final project completion, the Design Team shall field verify that the Site Design, Water Quality Treatment, Runoff Retention, and/or Peak Management controls have been implemented in accordance with these Post-Construction Requirements.
   a) The Design Team may accept third-party verification of SCMs conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect

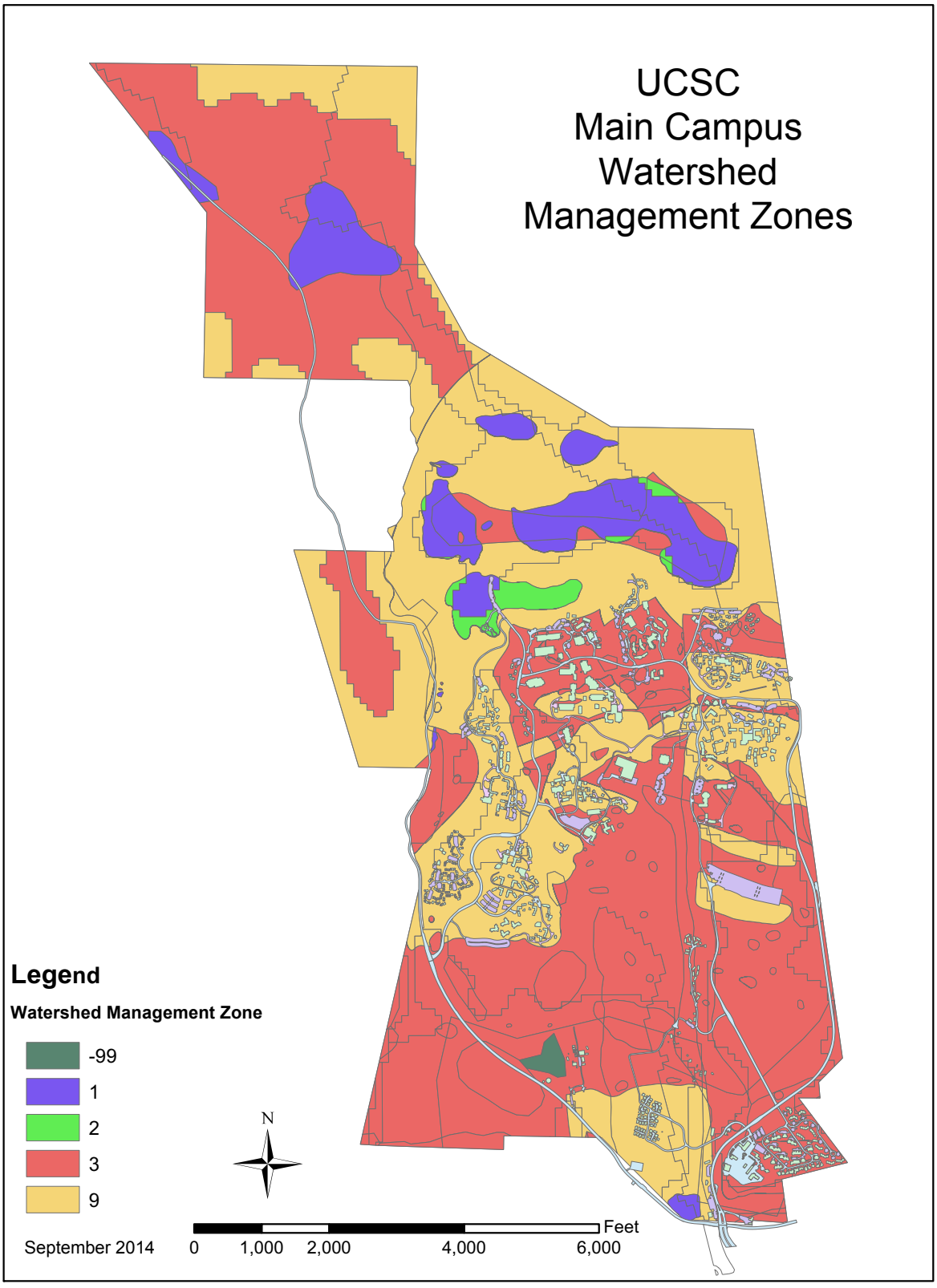
E. Operation and Maintenance for Structural SCMs

The Design Team shall provide:

1) O&M Plan
   The Regulated Project applicant shall develop and implement a written O&M Plan that, at a minimum, includes each component listed below. The Design Team must get University approval of the O&M Plan prior to final approval/occupancy. The O&M Plan must include, at minimum:
   a) A site map identifying all structural Stormwater Control Measures requiring O&M practices to function as designed
   b) O&M procedures for each structural stormwater control measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices.

   The O&M Plan will include short-and long-term maintenance requirements, recommended frequency of maintenance, and estimated cost for maintenance.
2) Structural Stormwater Control Measure O&M Database
   The Design Team shall develop a database with information regarding each structural Stormwater Control Measure installed per these Post-Construction Stormwater Management Requirements. The Database shall contain, at a minimum, fields for:
   a) SCM identification number and location/address
   b) Type of SCM
   c) Completion date of the following project stages, where applicable:
      i) Construction
      ii) Field verification of SCM
      iii) Final Project approval/occupancy
      iv) O&M plan approval by Design Team
   d) Location (physical and/or electronic) where the O&M Plan is available to view
   e) Any problems identified during inspections including any vector or nuisance problems

ATTACHMENT 1:



ATTACHMENT 2: Definitions Related to Post-Construction Requirements

Bioretention – A Stormwater Control Measure designed to retain stormwater runoff using vegetated depressions and soils engineered to collect, store, treat, and infiltrate runoff. Bioretention designs do not include underdrains.

Biotreatment or Biofiltration Treatment –A Stormwater Control Measure designed to detain stormwater runoff, filter stormwater through soil media and plant roots, and release the treated stormwater runoff to the storm drain system. Biotreatment systems include an underdrain.

Dispersion – The practice of routing stormwater runoff from impervious areas, such as rooftops, walkways, and patios, onto the surface of adjacent pervious areas. Stormwater runoff is dispersed via splash block, dispersion trench, or sheet flow and soaks into the ground as it moves slowly across the surface of the pervious area.

Drainage Management Area (DMAs) – Following the low impact development principle of managing stormwater through small-scale, decentralized measures, DMAs are designated individual drainage areas within a Regulated Project that typically follow grade breaks and roof ridge lines and account for each surface type (e.g., landscaping, pervious paving, or roofs). Stormwater Control Measures for runoff reduction and structural facilities are designed for each DMA.

Equivalent Impervious Surface Area – is equal to *Impervious Tributary Surface Area* (ft^2) + *Pervious Tributary Surface Area* (ft^2), where *Impervious Tributary Surface Area* is defined as the sum of all of the site's conventional impervious surfaces, and *Pervious Tributary Surface Area* is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient (see Attachment E for how to calculate).

Evapotranspiration (ET) – The loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues).

Flow-Through Water Quality Treatment Systems – Stormwater Control Measures that are designed to treat stormwater through filtration and/or settling. Flow-through systems do not provide significant retention or detention benefits for stormwater volume control.

Groundwater Basins – Groundwater basin areas defined by the California Department of Water Resources (DWR) and used in the Central Coast Water Board Joint Effort for Hydromodification Control to identify groundwater receiving-water issues and areas where recharge is a key watershed process. DWR based identification of the groundwater basins on the presence and areal extent of unconsolidated alluvial soils identified on a 1:250,000 scale from geologic maps provided by the California Department of Conservation, Division of Mines and Geology. DWR then further evaluated identified groundwater basin areas through review of relevant geologic and hydrogeologic reports, well completion reports, court-determined adjudicated basin boundaries, and contact with local agencies to refine the basin boundaries.

Impervious Surface – A hard, non-vegetated surface area that prevents or significantly limits the entry of water into the soil mantle, as would occur under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of Performance Requirements are exceeded. However, for modeling purposes, open,

uncovered facilities that retain/detain water (e.g., retention ponds, pools) shall be considered impervious surfaces.

Land recycling – The reuse of abandoned, vacant, or underused properties for redevelopment or repurposing

Landscaped Areas – Areas of soil and vegetation not including any impervious surfaces of ancillary features such as impervious patios, BBQ areas, and pools.

Large River – A river draining 200 square miles or more.

Low Impact Development (LID) – A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Native Vegetation – Vegetation comprised of plant species indigenous to the Central Coast Region and which reasonably could have been expected to naturally occur on the site.

Net Impervious Area – The sum of new and replaced post-project impervious areas, minus any reduction in total imperviousness from the pre-project to post-project condition: *Net Impervious Area = (New and Replaced Impervious Area) – (Reduced Impervious Area Credit),* where *Reduced Impervious Area Credit* is the total pre-project to post-project reduction in impervious area, if any.

New Development – Land disturbing activities that include the construction or installation of buildings, roads, driveways and other impervious surfaces. Development projects with pre-existing impervious surfaces are not considered New Development.

Percentile Rainfall Event (e.g., 85th and 95th) – A percentile rainfall event represents a rainfall amount which a certain percent of all rainfall events for the period of record do not exceed. For example, the 95th percentile rainfall event is defined as the measured rainfall depth accumulated over a 24-hour period, for the period of record, which ranks as the 95th percentile rainfall depth based on the range of all daily event occurrences during this period.

Permeable or Pervious Surface – A surface that allows varying amounts of stormwater to infiltrate into the ground. Examples include pasture, native vegetation areas, landscape areas, and permeable pavements designed to infiltrate.

Pre-Project – Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Project Site – The area defined by the legal boundaries of a parcel or parcels of land within which the new development or redevelopment takes place and is subject to these Post-Construction Stormwater Management Requirements.

Rainwater Harvest – Capture and storage of rainwater or stormwater runoff for later use, such as irrigation (without runoff), domestic use (e.g. toilets), or storage for fire suppression.

Receiving Waters – Bodies of water, surface water systems or groundwater that receive surface water runoff through a point source, sheet flow or infiltration.

Redevelopment – On a site that has already been developed, construction or installation of a building or other structure subject to the Design Team's planning and building authority including: 1) the creation or addition of impervious surfaces; 2) the expansion of a building footprint or addition or replacement of a structure; or 3) structural development including construction, installation or expansion of a building or other structure. It does not include routine road maintenance, nor does it include emergency construction activities required to immediately protect public health and safety.

Replaced Impervious Surface – The removal of existing impervious surfaces down to bare soil or base course, and replacement with new impervious surface. Replacement of impervious surfaces that are part of routine road maintenance activities are not considered replaced impervious surfaces.

Retention Tributary Area – The entire project area except for undisturbed areas, planted areas with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas, and impervious surface areas that discharge to infiltrating areas that will not produce runoff or create nuisance ponding. The Drainage Management Areas are smaller Retention Tributary Areas that cumulatively make up the Retention Tributary Area for the entire site.

Routine Road Maintenance – includes pothole and square cut patching; overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage; shoulder grading; reshaping/regrading drainage systems; crack sealing; resurfacing with in-kind material without expanding the road prism or altering the original line and grade and/or hydraulic capacity of the road.

Self-Retaining Areas – (also called "zero discharge" areas), are designed to retain some amount of rainfall (by ponding and infiltration and/or evapotranspiration) without producing stormwater runoff. Self-Retaining Areas may include graded depressions with landscaping or pervious pavement.

Self-Treating Areas – are a portion of a Regulated Project in which infiltration, evapotranspiration and other natural processes remove pollutants from stormwater. The self-treating areas may include conserved natural open areas and areas planted with native, drought-tolerant, or LID appropriate vegetation. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

Stormwater Control Measures – Stormwater management measures integrated into project designs that emphasize protection of watershed processes through replication of pre-development runoff patterns (rate, volume, duration). Physical control measures include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, minimal excavation foundations, vegetated roofs, and water use. Design control measures include but are not limited to conserving and protecting the function of existing natural areas, maintaining or creating riparian buffers, using onsite natural drainage features, directing runoff from impervious surfaces toward pervious areas, and distributing physical control measures to maximize infiltration, filtration, storage, evaporation, and transpiration of stormwater before it becomes runoff.

Stormwater Control Plan – A plan, developed by the Regulated Project applicant, detailing how the project will achieve the applicable Post-Construction Stormwater Management Requirements (for both onsite and offsite systems).

ATTACHMENT 3: Hydrologic Analysis and Stormwater Control Measure Sizing Guidance

Project site conditions will influence the ability to comply with the Water Quality Treatment and Runoff Retention Performance Requirements. This Appendix provides the acceptable Stormwater Control Measure (SCM) sizing methodology to evaluate runoff characteristics. This guidance provides a simple event-based approach and a runoff routing approach. Both of these approaches are based on sizing for a single-event and avoid the necessity of using calibrated, continuous simulation modeling. The Design Team can allow project applicants to use a locally/regionally calibrated continuous simulation-based model to improve hydrologic analysis and SCM sizing.

1) Determination of Retention Tributary Area

Determining the Retention Tributary Area is the basis for calculating the runoff volumes subject to Performance Requirement Number 3. Retention Tributary Area should be calculated for each individual Drainage Management Area to facilitate the design of SCMs for each Drainage Management Area. The generic equation below illustrates how various portions of the site are addressed when determining the Retention Tributary Area. The Retention Tributary Area calculation must also account for the adjustments for Redevelopment Projects subject to Performance Requirement No. 3.

a) Compute the Retention Tributary Area, using the equation:

Retention Tributary Area = (Entire Project Area) – (Undisturbed or Planted Areas) – (Impervious Surface Areas that Discharge to Infiltrating Areas)***

*As defined in Section B.4.d.iv.1.
** As defined in Section B.4.d.iv.2.

b) Adjustments for Redevelopment Project Retention Tributary Area – Where the Regulated Project includes replaced impervious surface, the following Retention Tributary Area adjustments apply:

i) Redevelopment Projects outside an approved Urban Sustainability Area, as described in Section C.3. – The total amount of replaced impervious surface area shall be multiplied by 0.5 when calculating the Retention Tributary Area.
ii) Redevelopment Projects located within an approved Urban Sustainability Area (Section C.3) – The replaced impervious surface areas may be subtracted from the Retention Tributary Area. The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

2) Determination of Retention Volume

a) Based on the Regulated Project's Watershed Management Zone, determine the Regulated Project's Runoff Retention Requirement (e.g., Retain 95th Percentile 24-hour Rainfall Event, or, Retain 85th Percentile 24-hour Rainfall Event).

b) Determine the 85th or 95th percentile 24-hour rainfall event:
Use either the methodology provided in Part I.D of the December 2009 Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act,[6] or, rainfall statistics provided by the Central Coast Water Board, whichever produces a more accurate value for rainfall depth.

[6] USEPA, 841-B-09-00. http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf

c) Compute the Runoff Coefficient[7] "C" for the area tributary to the SCMs, using the equation:

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

Where "i" is the fraction of the tributary area that is impervious[8]

d) Compute Retention Volume:

Retention Volume for 95th Percentile 24-hr Rainfall Depth = C x Rainfall Depth$_{95th}$ x Retention Tributary Area

or,

Retention Volume for 85th Percentile 24-hr Rainfall Depth = C x Rainfall Depth$_{85th}$ x Retention Tributary Area

All rainfall directly incident to each SCM must be considered in determining runoff, including: tributary landscaping, impervious areas, pervious pavements, and bioretention features.

Note: For redevelopment projects located within an approved Urban Sustainability Area (Section C.3.), the total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

3) Structural Stormwater Control Measure Sizing

The Design Team shall require the Regulated Project applicant to use structural SCMs that optimize retention and result in optimal protection and restoration of watershed processes, such as Structural Control Measures associated with small-scale, decentralized facilities designed to infiltrate, evapotranspirate, filter, or capture and use stormwater, to address the volumes calculated in 2 (above). Where the Regulated Project is within a Watershed Management Zone where infiltration is required, Design Teams must use SCM designs that optimize infiltration of the entire Retention Volume to minimize the potential need for off-site mitigation. Various resources provide design guidance for fully infiltrative SCMs including:

- The Contra Costa C.3 Manual
- The City of Santa Barbara LID BMP Manual
- The City of San Diego LID Design Manual, July 2011
- Central Coast LID Initiative Bioretention Design Guidance

a) Calculate SCM Capture Volume – Calculate the required SCM Capture Volume, associated with the Regulated Project's Runoff Retention Requirement, by one of the following methods:

Method 1: Simple Method

SCM Capture Volume = Retention Volume for 95th Percentile 24-hr Rainfall Depth

or,

SCM Capture Volume = Retention Volume for 85th Percentile 24-hr Rainfall Depth

[7] As set forth in WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178 and based on the translation of rainfall to runoff using a runoff regression equation developed using two years of data from more than 60 urban watersheds nationwide.

[8] As defined in Post-Construction Requirements Attachment C.

Method 2: Routing Method
Use a hydrograph analysis[9] to determine the SCM Capture Volume needed to retain the Retention Volume for 95th or 85th Percentile 24-hr Rainfall Depth calculated in 2 (above). The SCM Capture Volume shall be based on both the rate of flow from tributary areas into the SCM, and the rate of flow out of the SCM through infiltration into the underlying soil during the rain event. When conducting the hydrograph analysis, adhere to the criteria included in Table 1. The SCM shall be designed such that a single 95th or 85th Percentile 24-hr Rainfall Event will not overflow the SCM.

If the Retention Volume cannot infiltrate within 48-hours, a multiplier of 1.20 shall be applied to the SCM Capture Volume calculated through the routing method.

TABLE 1: Routing Method Criteria

Parameter	Criteria
Hydrograph Analysis Method	National Resources Conservation Service or Santa Barbara Urban Hydrograph
Pond Routing Method	Storage-indication, unless otherwise justified to be more correct based on site and storage conditions.
Infiltration Rate	Underlying soil saturated infiltration rate, as indicated by locally accepted data approved by the Design Team and/or by on-site testing, whichever is more accurate.
Rainfall Distribution	National Resources Conservation Service Type I[10] or based on local rainfall data
Time of Concentration	Design Team's current drainage and flood control standard
Time Increment	0.10 hour, unless otherwise justified to be more correct based on rainfall distribution

b) Demonstration of Compliance – Design Teams shall demonstrate that site SCMs: a) will infiltrate and/or evapotranspirate the Retention Volume or, b) will provide sufficient Capture Volume to retain the Retention Volume. Any outlet (i.e., underdrain) installed in a structural SCM shall be installed above the elevation of any portion of the structural SCM dedicated to Retention Volume storage.

c) Compliance with Water Quality Treatment Performance Requirement – Design Teams that propose to use the retention-based structural Stormwater Control Measures must also meet the Water Quality Treatment Performance Requirement, to demonstrate, in the Stormwater Control Plan, that the Water Quality Treatment Performance Requirement is being fully met.

---

[9] HydroCAD is an example of a commonly used and widely accepted program for performing hydrograph analyses and design of stormwater infrastructure. HydroCAD is based on U.S. Department of Agriculture Soil Conservation Service's (now Natural Resources Conservation Service) TR-55: Urban Hydrology for Small Watersheds.

[10] The National Resources Conservation Service developed standard 24-hour rainfall distributions for hydrograph analyses. These rainfall distributions were intended to represent intensities associated with shorter duration storms, ranging from durations of 30 minutes to 12 hours. The National Resources Conservation Service Type 1 storm applies to the California West Coast, including the Central Coast Region. The Type 1 rainfall distribution was derived using National Oceanic Atmospheric Administration Atlas 2 rainfall statistics for the 1-year through 100-year storm.

ATTACHMENT 4: Ten Percent Adjustment to Retention Requirement – Calculation Instructions

Where technical infeasibility, as described in Section C.1.c., prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention of the full Retention Volume per Section B.4.d.vi. is not required and the Regulated Project is required to dedicate no less than ten percent of the Regulated Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures. The Water Quality Treatment Performance Requirement is not subject to this adjustment, i.e., mitigation to achieve full compliance is required on- or off-site.

Calculating Ten Percent of a Project's Equivalent Impervious Surface Area

The area of the project that must be dedicated to structural SCMs to waive off-site compliance with the Runoff Retention Requirement is equal to ten percent of the project's Equivalent Impervious Surface Area, defined as:

Equivalent Impervious Surface Area (ft^2) = (Impervious Tributary Surface Area (ft^2) + (Pervious Tributary Surface Area (ft^2))

Impervious Tributary Surface Area is defined as the sum of all of the site's conventional impervious surfaces. When calculating Impervious Tributary Area:

- Do include: concrete, asphalt, conventional roofs, metal structures and similar surfaces
- Do not include: green roofs

Pervious Tributary Surface Area is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient. When calculating Pervious Tributary Surface Area:

- Do include surfaces such as: unit pavers on sand; managed turf[11]; disturbed soils; and conventional landscaped areas (see Table 1 for correction factors).
  Example:
  Project Site includes 500 ft^2 of unit pavers on sand.
  Pervious Tributary Surface Area = 500 ft^2 x C = 50 ft^2
  Where C = Correction Factor for unit pavers, 0.1, from Table 1.

- Do not include: Infiltration SCM surfaces (e.g., SCMs designed to specific performance objectives for retention/infiltration) including bioretention cells, bioswales; natural and undisturbed landscape areas, or landscape areas compliant with the Model Water Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7.), or a local ordinance at least as effective as the Model Water Efficient Landscape Ordinance.

[11] Managed Turf includes turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings.

TABLE 1: Correction Factors[12] for Use in Calculating Equivalent Impervious Surface Area

Pervious Surface	Correction Factor
Disturbed Soils/Managed Turf (dependent on original Hydrologic Soil Group)	A: 0.15 B: 0.20 C: 0.22 D: 0.25
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10

[12] Factors are based on runoff coefficients selected from different sources: Turf and Disturbed Soils from *Technical Memorandum: The Runoff Reduction Method.* Center for Watershed Protection & Chesapeake Stormwater Network. p.13, April 18, 2008. http://town.plympton.ma.us/pdf/land/scheuler_runoff_reduction_method_techMemo.pdf. All other correction factors from *C.3 Stormwater Handbook, Santa Clara Valley Urban Runoff Pollution Prevention Program, Appendix F*, p. F-9., May 2004. http://www.sanjoseca.gov/planning/stormwater/pdfs/appendices_files/Appendix_F_Final.pdf

ATTACHMENT 5: Calculating Off-Site Retention Requirements When Less Than 10 Percent of the Project Site Equivalent Impervious Surface Area is Allocated to Retention-Based Structural Stormwater Control Measures

The following instructions demonstrate how to determine the Off-Site Retention Requirements when a Regulated Project subject to the Runoff Retention Performance Requirement, cannot allocate the full 10% of the project site's Equivalent Impervious Surface Area[13] to retention-based Stormwater Control Measures (SCMs).

STEP A. Potential Off-Site Mitigation Retention Volume

First calculate the Potential Off-Site Mitigation Retention Volume, which represents the additional volume of runoff that would have been retained on-site, had the full 10% of Equivalent Impervious Surface Area been dedicated to retention-based SCMs.

Equation A:

Potential Off-Site Mitigation Retention Volume = (the portion of the 10% Equivalent Impervious Area not allocated on-site) X (the On-Site Retention Feasibility Factor)

Where:

- *The portion of the 10% Equivalent Impervious Surface Area not allocated on-site* is that portion not allocated to on-site structural retention-based SCMs. For example, if 10% of Equivalent Impervious Surface Area is 1,000 ft^2 and only 8% (800 ft^2) is allocated to retention-based SCMs, the remaining 2% (200 ft^2) is the value inserted in the equation.

- *The On-Site Retention Feasibility Factor* is the ratio of Design Retention Volume[14] managed on-site (ft^3), to actual area (ft^2) allocated to structural SCMs. This establishes the site's retained volume**:**area ratio, expressed as cubic feet of retained runoff volume per square foot of area. For example, if a project is able to infiltrate 3,500 ft^3 of runoff over an 800-ft^2 area, this ratio of 3,500**:**800, or 4.38, is the On-Site Retention Feasibility Factor.

STEP B. Actual Off-Site Mitigation Retention Volume

Next, determine the Actual Off-Site Mitigation Retention Volume, which may be less than the Potential Off-Site Mitigation Retention Volume. The Actual Off-Site Mitigation Retention Volume is the lesser of the volume calculated in Equation A, and the remaining portion of the Design Retention Volume, calculated per Attachment D, not controlled on-site. There are two possible outcomes when the Runoff Retention Performance Requirement is not met on-site and less than 10% of the site's Equivalent Impervious Surface Area is allocated to retention-based SCMs:

- Potential Off-Site Mitigation Retention Volume is the Actual Off-Site Mitigation Retention Volume
- Remaining Design Retention Volume represents Actual Off-Site Design Retention Mitigation Volume

---

[13] Calculate Equivalent Impervious Surface Area using guidance in Post-Construction Requirements Attachment E

[14] Calculate Design Retention Volume using guidance in Post-Construction Requirements Attachment D, or equivalent method. Final Design Retention Volumes should reflect the applicant's demonstrated effort to use non-structural design measures to reduce the amount of runoff (e.g., reduction of impervious surfaces) as required by the Post-Construction Requirements' LID Development Standards (Section B.4.d).

ATTACHMENT 6: UCSC Storm Water Control Plan

Instructions:

All new development or redevelopment projects that create and/or replace ≥ 2,500 square feet of impervious surface (collectively over the entire project site) must incorporate the Post-Construction Requirements as applicable.

As part of the Post-Construction Storm Water Management (PCSWM) requirements a Storm Water Control Plan (SWCP) must be submitted, including the following post-construction storm water management checklist. The SWCP must be included with 100% schematic design, 100% design development, and 100% construction drawings submittals.

An explanatory narrative description is required for every item in the checklist detailing what design strategy was used to incorporate the requirement.

Please note, the storm water control plan is only a means of demonstrating a projects compliance with the Campus Standards for Post-Construction Storm Water Management (PCSWM). Please refer the PCSWM document for project applicability; specific requirements for Performance Requirements 1 through 5, and storm water control plan reporting requirements.

UCSC
Post-Construction Storm Water Management Checklist
≥ 2,500sf <15,000sf

Project Name:
Project Type: Institutional
Total Project Site Area:
Total New and/or Replaced Impervious Surface Area:
Total New Pervious Surface Area:
Net Impervious Area:

Projects ≥ 2500sf **Performance Requirement No. 1:** **Site Design and Runoff Reduction** (all design strategies must be incorporated)	**Incorporated**	**Description** (include applicable drawing sheet number(s))
Limit disturbance of creeks and natural drainage features		
Minimize compaction of highly permeable soils		
Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection		
Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state		
Minimize stormwater runoff by implementing one or more of the following site design measures: (indicate which measures incorporated) (1) Direct roof runoff into cisterns or rain barrels for reuse (2) Direct roof runoff onto vegetated areas safely away from building foundations and footings, consistent with California building code (3) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings, consistent with California building code (4) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings, consistent with California building code (5) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces		

Projects ≥ 5000sf **Performance Requirement No. 2:** **Water Quality Treatment**	Incorporated	**Description** (include applicable drawing sheet number(s))
Low Impact Development (LID) Treatment Systems		
Biofiltration Treatment Systems		
Non-Retention Based Treatment		
Performance Requirement 3: **Runoff Retention**	**Incorporated**	**Description** (include drawing sheet number)
Post project runoff volumes shall not exceed pre project runoff volumes for the 2 year 24-hr storm for regulated projects < 5000sf and the 10 year 24-hr storm for projects ≥ 5000sf < 15,000sf.		

UCSC
Post-Construction Storm Water Management Checklist
≥15,000sf

Project Name:
Project Type: Institutional
Total Project Site Area:
Total New and/or Replaced Impervious Surface Area:
Total New Pervious Surface Area:
Net Impervious Area:

Performance Requirement 1: **Site Design and Runoff Reduction** (all design strategies must be incorporated)	**Incorporated**	**DMAs**	**Description** (include applicable drawing sheet number)
Limit disturbance of creeks and natural drainage features			
Minimize compaction of highly permeable soils			
Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection			
Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state			
Minimize stormwater runoff by implementing one or more of the following site design measures: (indicate which measures incorporated) (1) Direct roof runoff into cisterns or rain barrels for reuse (2) Direct roof runoff onto vegetated areas safely away from building foundations and footings, consistent with California building code (3) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings, consistent with California building code (4) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings, consistent with California building code (5) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces			

Performance Requirement 2: Water Quality Treatment	Incorporated	**Description**
Low Impact Development (LID) Treatment System		
Biofiltration Treatment Systems		
Non-Retention Based Treatment		

Performance Requirement 3: Runoff Retention	**Incorporated**	**Description** (include drawing sheet number)
WMZ 1: Retain 95th percentile rainfall event. Compliance must be achieved by optimizing infiltration.		
WMZ 2: Retain 95th percentile rainfall event. Compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotranspiration.		
WMZ 3: Post project runoff volumes shall not exceed pre project runoff volumes for the 10 year 24-hr storm.		
WMZ 9: Retain 85th percentile rainfall event. Compliance must be achieved via storage, rainwater harvesting, infiltration and/or evapotranspiration.		

Performance Requirement 3: Site Assessment Measures (opportunities and constraints to implementing LID on the project site)	**Opportunity**	**Constraint**	**Not Applicable**	**Description**
Site topography				
Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs				
Depth to seasonal high groundwater				
Locations of groundwater wells used for drinking water			X	
Depth to an impervious layer such as bedrock				
Presence of unique geology (e.g., karst)				
Geotechnical hazards				
Documented soil and/or groundwater contamination			X	

Performance Requirement 3: **Site Assessment Measures** (opportunities and constraints to implementing LID on the project site)	**Opportunity**	**Constraint**	**Not Applicable**	**Description**
Soil types and hydrologic soil groups				
Vegetative cover/trees				
Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)				
Existing drainage infrastructure for the site and nearby areas including the location of storm drains				
Structures including retaining walls				
Utilities				
Easements			X	
Covenants			X	
Zoning/Land Use			X	
Setbacks			X	
Open space requirements			X	
Other pertinent overlay(s)				

Performance Requirement 3: **Site Design Measures**	**Incorporated**	**DMAs**	**Description** (include applicable drawing sheet number)
Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed			
Conserve natural areas, including existing trees, other vegetation, and soils			
Limit the overall impervious footprint of the project			
Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised			
Set back development from creeks, wetlands, and riparian habitats			
Conform the site layout along natural landforms			
Avoid excessive grading and disturbance of vegetation and soils			

Performance Requirement 3: **Drainage Management Areas (DMAs)**	**Completed**	**Description** (include applicable drawing sheet number)

Performance Requirement 3: **Structural Control Measures**	**Incorporated**	**Description** (include applicable DMA and drawing sheet number)

Performance Requirement 3: **Hydrologic Analysis**	**Incorporated**	**Description**
Attachment D method		
Continuous simulation method		
Alternative method (approved by CCRWQCB)		

Performance Requirement 3: **Technical Infeasibility**	**Incorporated**	**Description**

Projects ≥ 22,500sf **Performance Requirement 4:** **Peak Management**	**Incorporated**	**Description**
Post development peak flows, discharged from the site, shall not exceed pre-project peak flows for the 2 – through 10 – year storm events		