STORMWATER MANAGEMENT GUIDANCE MANUAL FOR LOW IMPACT DEVELOPMENT & POST-CONSTRUCTION REQUIREMENTS

MAIN MANUAL

March 6, 2014
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This Guidance Manual is a supplement to the City of Morro Bay Department of Public Works Standard Drawings and Specifications

City of Morro Bay, California

APPROVED: _____ 23 August 2017

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Contents

Introduction

Post-Construction Stormwater Management Performance Requirements

The primary objective of these Post-Construction Stormwater Management Performance Requirements is to minimize the downstream impact of increased stormwater runoff that often occurs as the result of development or redevelopment projects. The Post-Construction Requirements emphasize protecting and, where degraded, restoring key watershed processes to create and sustain healthy watersheds. Maintenance and restoration of watershed processes is necessary to protect water quality and beneficial uses.

The intention of this Guidance Manual is to provide developers a tool to both determine the specific requirements for a given project and to plan and design the project so that those requirements are met as efficiently as possible. The requirements in this Manual are based on Resolution R3-2013-0032 and Attachments adopted July 12, 2013 by the Central Coast Regional Water Quality Control Board. In the event of conflict, the requirements of Resolution R3-2013-0032 shall take precedence over those contained in this Guidance Manual. Attachment 1 of the Resolution, which contains the referenced requirements, can be viewed or downloaded at: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/stormwater/docs/lid/hydromod_lid_docs/2013_0032_attach1_post_construction_requirements.pdf

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.

Discretionary Approval – A project approval which requires the exercise of judgment or deliberation when the MS4 decides to approve or disapprove a particular activity, as distinguished from situations where the MS4 merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

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.

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.

Gross Impervious Area – Impervious surfaces that are created or replaced by the project. Manufactured permeable surfaces (pervious paving, gapped paving stones, etc.) may be considered as a pervious surface and are considered on a case by case basis. Do not include the surface area of decks with gaps that allow runoff to drain to permeable surfaces below. Gross Impervious Area is used in the initial determination of performance requirements.

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. There are three methods of calculating impervious surface area, depending on the context of the calculation. For more details, see ***Net Impervious Area, Gross Impervious Area, and Equivalent Impervious Area*** definitions.

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.

Ministerial Approval – A project approval which involves little or no personal judgment by the MS4 as to the wisdom or manner of carrying out the project and only involves the use of fixed standards or objective measurements.

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 or Project Area – 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 Permittee'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, base course or foundation slab and replacement with new impervious surface. Replacement of impervious surfaces that are part of routine maintenance activities are not considered replaced impervious surfaces.

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 of native landscaping. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

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.

Single-Family Residence – The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

Stormwater Control Measures (SCM) – 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). A preliminary Stormwater Control Plan is required for Planning Permits and the final version is required prior to issuance of a Building Permit. See Appendix K for required contents.

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

Does My Project Need to Meet Post-Construction Performance Requirements?

Projects subject to these Post-Construction Performance Requirements include all New Development or Redevelopment projects that create and/or replace ≥15,000 square feet of impervious surface (collectively over the entire project site). In general, the larger the impervious surface created or replaced, the more rigorous the requirements become. However, the requirements are also dependent on project type and location. Consequently, these three elements (gross impervious area, project type, and project location) need to be determined and quantified as a first step in the process.

1. **Gross Impervious Area**: Gross Impervious Area is the total of newly created and replaced impervious surfaces. Existing impervious surfaces that are within the project site but are not being replaced are not included in this total. Impervious surfaces are any hard, non-vegetated surface areas that prevent or significantly limit the entry of water into the soil. 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. Manufactured permeable surfaces (pervious paving, gapped paving stones, etc.) may be considered as pervious surfaces and are considered on a case by case basis. Surface areas of decks with gaps that allow runoff to drain to permeable surfaces below are not considered imperious areas. For redevelopment projects, both new and replaced impervious surfaces are included. If the Gross Impervious Area is less than 15,000 square feet, the project is exempt from requirements.
2. **Type of Project**: A list of types of projects that are exempt for all stormwater requirements is detailed below, also see Appendix A. If not exempt:
    a. Is the project a new development or redevelopment project? Projects are classified as redevelopment if the project replaces or adds to existing impervious surfaces. Projects located on land with no existing impervious surfaces are considered new development.
    b. Does the project involve the construction or reconstruction of one or more detached single family residences (SFR)?
3. **Location**: The City is divided into several Watershed Management Zones. The map in Appendix B shows the boundaries of these zones. A Google Earth overlay is available on the City website for more precise project location.

The Performance Requirement Determination Form in Appendix C is provided to document the results of the above assessment. It shall be completed and filed with the Planning permit application. If the project is exempt, no further documentation is required. If not exempt, a calculation of the Net Impervious Area is required.

PROJECTS EXEMPT FROM STORMWATER REQUIREMENTS

Project that are exempt from the Post-Construction Performance are as follows (check any box on the list and no further action is required):

- ☐ Road and Parking Lot maintenance:
  - Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching
  - Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
  - Shoulder grading
  - Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems
  - Crack sealing
  - Resurfacing with in-kind material without expanding the road or parking lot
  - Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot
  - Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster
- ☐ 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
- ☐ Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas
- ☐ Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
- ☐ 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)
- ☐ Second-story additions that do not increase the building footprint
- ☐ Roof repair or replacement
- ☐ Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
- ☐ 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
- ☐ Temporary structures (in place for less than six months)
- ☐ Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices
- ☐ Above-ground fuel storage tanks and fuel farms with spill containment system

Net Impervious Area Calculation

Net Impervious Area is the Gross Impervious Area minus any reduction in total imperviousness from the pre-project to post-project condition: Net Impervious Area = (Gross 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. The result of this calculation is used to determine if a project is subject to PR.2 or in the case of an SFR project, subject to PR.3 requirements.

Examples of Calculating **Net Impervious Area**

Example 1:

The project is a property that is an existing commercial shopping center with 100,000 sf of impervious surface, including buildings, parking lot, etc. The new project will redevelop the site and have a total impervious area of 85,000 sf.
The **Reduced Imperious Area Credit** is 100,000 – 85,000 = 15,000 sf.
The **Net Impervious Area** is 85,000 – 15, 000 = 70,000 sf.
The **Net Impervious Area** is 70,000 sf which is greater than 5,000 sf .
The project is subject to PR.2.
Design the Water Quality Treatment measures to treat the water runoff from the 85,000 sf of impervious area.

Example 2:

The project is an existing commercial shopping center with 100,000 sf of impervious surface. The new project will redevelop the entire site leaving a gross impervious area of 52,000 sf. (they've added a lot of landscaping and used green roofs to reduce the impervious area by 48,000 sf).
The **Reduced Imperious Area Credit** is 100,000 – 52,000 = 48,000 sf.
The **Net Impervious Area** is 52,000 – 48,000 = 4,000 sf.
The **Net Impervious Area** is 4,000 sf which is less than 5,000 sf.
The project is **NOT** subject to PR.2 (though it may be subject to other PRs).

Once the Net Impervious Area Calculation is determined, use the following flow charts to determine the Post-Construction Performance Requirements for the project. Complete the Performance Requirement Determination Form (Appendix C) once the Flow Charts have been used to determine Performance Requirements.

Flow Charts

Performance Requirements Flow Chart
for non-exempt projects

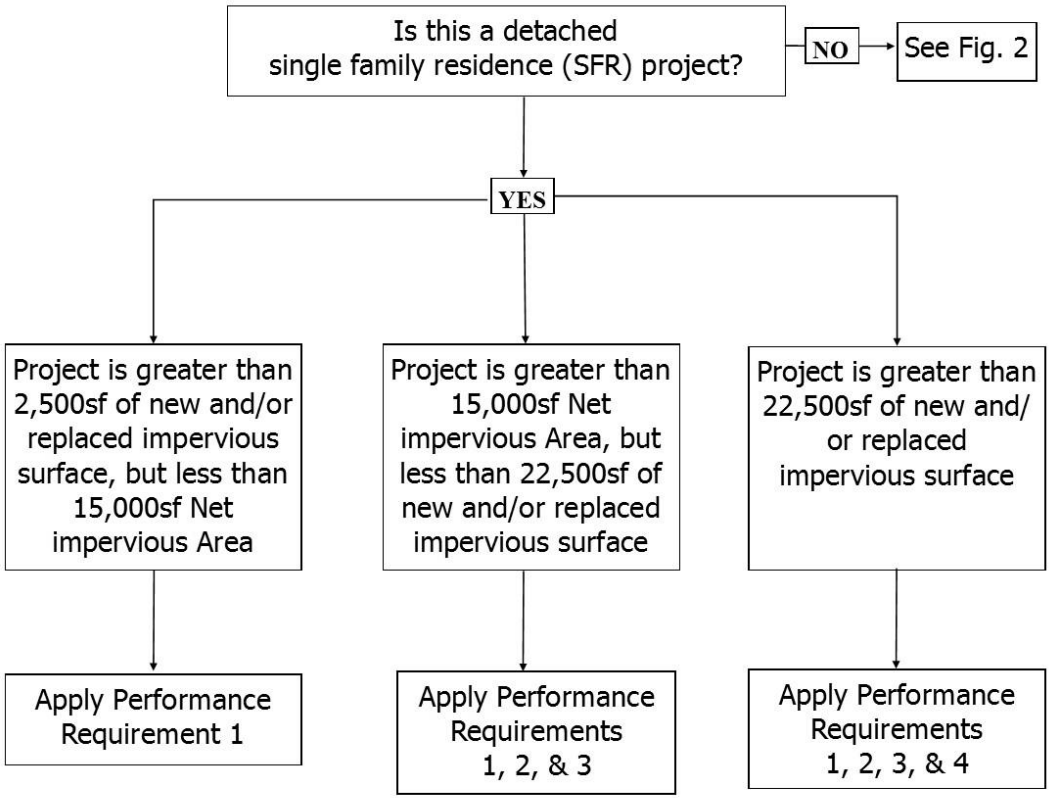


Figure 1

Performance Requirements Flow Chart
for non-exempt projects
(other than SFR projects)

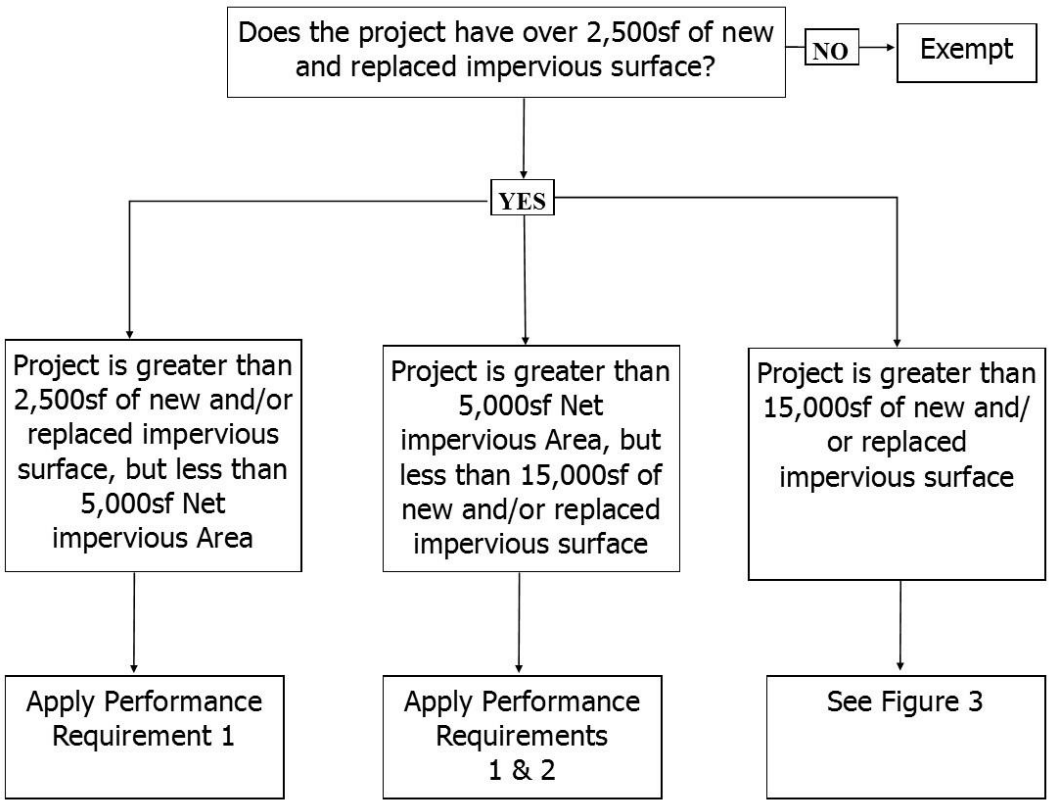


Figure 2

Performance Requirements Flow Chart for projects greater than 15,000sf of new and replaced impervious surface (other than SFR projects)

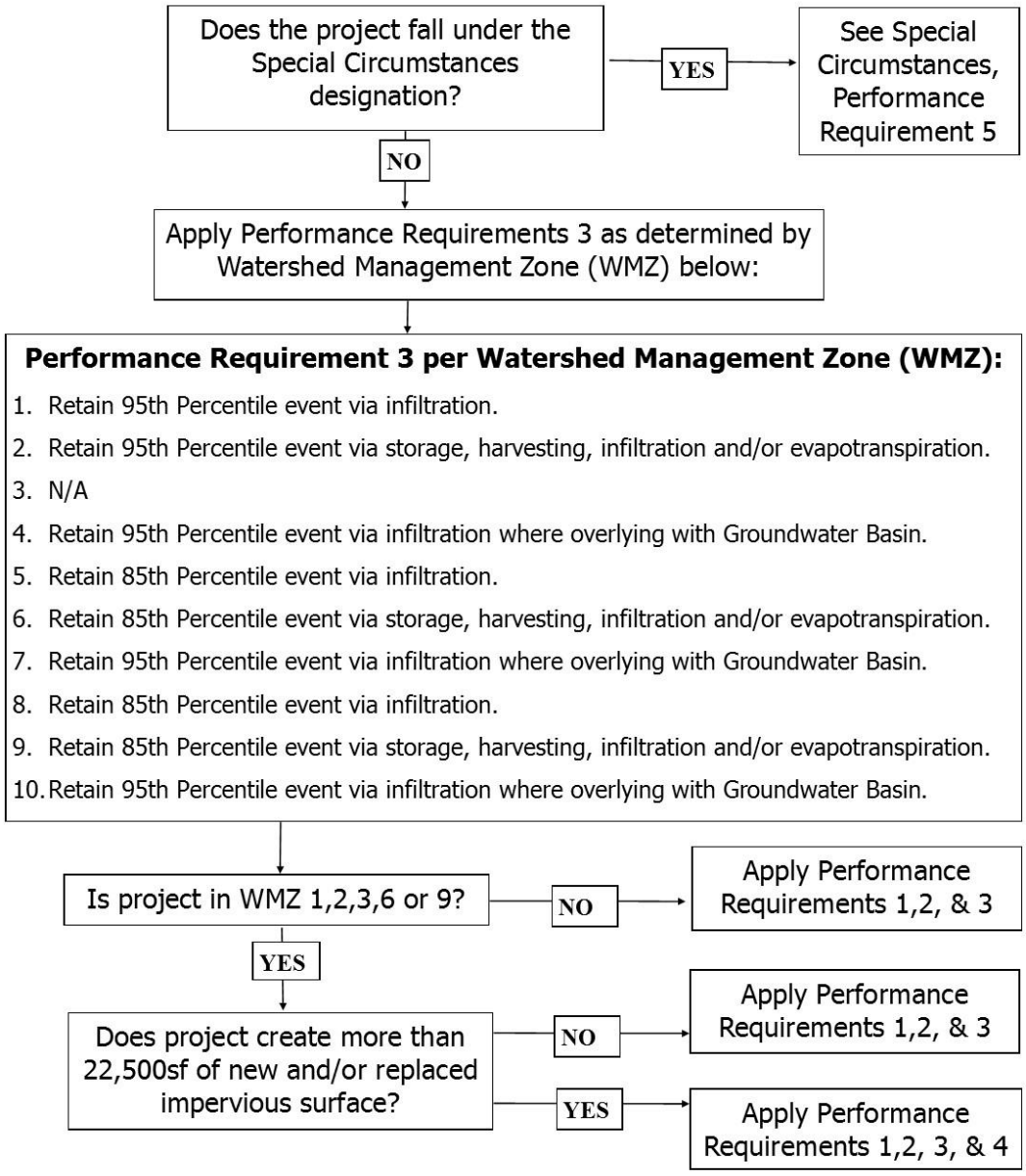


Figure 3

Section 1

Performance Requirement No. 1

Site Design and Runoff Reduction

Projects subject to Performance Requirement No. 1 (PR.1) are:

Projects that create and/or replace ≥ 2,500 square feet of impervious surface (collectively over the entire project site), including detached single-family homes.

The Project Engineer shall submit a stamped and signed copy of the Performance Requirement No.1 Certification, as included on the following page; certifying Low Impact Development design strategies are included in the project design. Each strategy that has been incorporated into the design should be initialed by the project engineer, or marked NA if not applicable.

PERFORMANCE REQUIREMENT NO. 1 CERTIFICATION		
	LOW IMPACT DEVELOPMENT (LID) DESIGN STRATEGY	INCORPORATED
1.	Limit disturbance of creeks and natural drainage features.	
2.	Minimize compaction of highly permeable soils.	
3.	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.	
4.	Minimize impervious surfaces by concentrating improvements on the least sensitive areas of the site, while leaving the remaining land in a natural undisturbed state.	
5.	Minimize stormwater runoff by implementing one or more of the following design measures:	
	a) Direct roof runoff into cisterns or rain barrels for reuse.	
	b) Direct roof runoff onto vegetated areas safely away from building foundations and footings.	
	c) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings.	
	d) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings.	
	e) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces.	

I, _____, acting as the Project Engineer for _____ project, located at _____, hereby state that the Site Design and Runoff Reductions design strategies initialed above have been incorporated into the design of the project.

_____ _____

Signature Date

Section 2

Performance Requirement No. 2

Water Quality Treatment

Projects subject to Performance Requirement No. 2 (PR.2) are:

Projects with ≥ 5,000 square feet of Net Impervious Area, except detached single-family homes.

Detached single-family homes ≥ 15,000 square feet of Net Impervious Area.

Projects subject to PR.2 are also subject to PR.1. Applicant is required to submit PERFORMANCE REQUIREMENT NO.1 CERTIFICATION.

PR.2 requires the applicant to provide Water Quality Treatment design measures to reduce pollutant loads and concentrations using physical, biological, and chemical removal.

A Stormwater Control Plan is required and must follow the outline provided in Appendix K. The Project Engineer shall identify which of the on-site water quality treatment measures on the following page is included in the design. The on-site water quality treatment measures are listed in order of preference. The plans shall clearly identify the type, location, and size of all on-site water quality treatment measures. Initial each on-site water quality treatment measure and note the page of the plans that shows the location and size, that has been incorporated into the design or mark NA if not applicable. Submit a stamped and signed copy of the PR.2 Certification together with the Stormwater Control Plan.

PERFORMANCE REQUIREMENT NO. 2 CERTIFICATION		
	ON-SITE WATER QUALITY TREATMENT MEASURES	INCORPORATED
1.	Low Impact Development (LID) Treatment Systems designed to retain stormwater runoff generated by the 85th percentile 24-hour storm (see Appendix I). Stormwater Control Measures Implemented (check all that apply, design documentation is required): ☐ Harvesting and Use, ☐ Infiltration, ☐ Evapotranspiration	
2.	Biofiltration Treatment Systems – 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 0.2 inches per hour intensity	
	(2) Follow Central Coast LIDI Bioretention Design Guidance for other parameters. If site conditions warrant, an underdrain with discharge to a storm drainage facility is allowed.	
3.	Non-Retention Based Treatment Systems – designed to meet at least one of the following hydraulic sizing criteria:	
	(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 (see Appendix I)	
	(b) Flow Hydraulic Design Basis – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat the flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.	
4.	Stormwater Control Plan is required – see Appendix K	

I, _____, acting as the Project Engineer for _____ project, located at _____, hereby state that the On-Site Water Quality Treatment Measures initialed above have been incorporated into the design of the project.

_____ _____

Signature Date

Section 3

Performance Requirement No. 3

Runoff Retention

Projects subject to Performance Requirement No. 3 (PR.3) are:

Single Family Residential Projects that create and/or replace ≥15,000 square feet of Net Impervious Area and other projects which create and/or replace ≥15,000 square feet of Gross Impervious Area in Watershed Management Zones (WMZ) 1, 2, 4*, 5, 6, 7* 8, 9, and 10*

(* Applicable only to those areas that overlay designated Groundwater Basins.)

PR. 3 requires the applicant to manage Runoff Retention from the site.

Adjustment to PR.3 Requirements for Redevelopment Projects – Where the Project includes replaced impervious surface, the following adjustment applies. This adjustment is accounted for in the Tributary Area calculation in Appendix E:

i) The total amount of replaced impervious surface shall be multiplied by 0.5 when calculating the volume of runoff subject to PR.3 requirements.

The Project Engineer shall certify that the Runoff Retention requirements were included in the design either onsite or through an Alternative Compliance agreement.

Compliance with PR.3:

- Identify WMZ and treatment requirements
- LID Site Assessment Check List
- LID Site Design Measures Certification
- A Stormwater Control Plan is required (see Appendix K) and shall include discrete Drainage Management Areas (DMAs), structural Stormwater Control Measures (SCM), hydraulic sizing calculations, and off-site mitigation.

Design Rainfall Events & Treatment Requirement for WMZs

WMZ	Treatment Options & Design Rainfall	Check Applicable WMZs
WMZ 1	Via Infiltration, prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 2	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 3	Not Applicable	
WM 4*, 7* & 10*	Via Infiltration, prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.	
WMZ 9	Via storage, rainwater harvesting, infiltration, and/or evapotranspiration, prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.	
* Applicable only to those areas that overlay designated Groundwater Basins		

LID Site Assessment Checklist

	Included
1. Site topography	
2. Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs	
3. Depth to seasonal high groundwater	
4. Locations of groundwater wells used for drinking water	
5. Depth to an impervious layer such as bedrock	
6. Presence of unique geology (e.g., karst)	
7. Geotechnical hazards	
8. Documented soil and/or groundwater contamination	
9. Soil types and hydrologic soil groups	
10. Vegetative cover/trees	
11. Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)	
12. Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains	
13. Structures including retaining walls	
14. Utilities	
15. Easements	
16. Covenants	
17. Zoning/Land Use	
18. Setbacks	
19. Open space requirements	
20. Other pertinent overlay(s)	

LID Site Design Measures

In addition to site design measures listed in PR1, the Project Engineer shall certify the Project design optimizes the use of the following design measures. Initial each runoff retention measure that has been incorporated and optimized into the design or mark NA if not applicable

PERFORMANCE REQUIREMENT NO. 3 CERTIFICATION OF LID SITE DESIGN MEASURES		
	DESIGN MEASURE	INCORPORATED/OPTIMIZED
1.	Defining the development envelope, identifying the protected areas, and identifying areas that are most suitable for development and areas to be left undisturbed	
2.	Identifying conserved natural areas, including existing trees, other vegetation, and soils (shown on the plans)	
3.	Limit the overall impervious footprint of the project	
4.	Design of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	
5.	Set back development from creeks, wetlands, and riparian habitats	
6.	Design conforms the site layout along natural landforms	
7.	Design avoids excessive grading and disturbance of vegetation and soils	

I, _____, acting as the Project Engineer for _____ project, located at _____, hereby state that LID Site Design Measures initialed above have been incorporated into the design of the project.

_____ _____

Signature Date

Drainage Management Areas (DMAs)

The site shall be designed to provide for decentralized stormwater management with discrete DMAs.

(1) Provide a map of the entire project site showing the discrete DMAs and detailing the drainage for the rainfall event specified.

(2) Drainage from each DMA shall be accounted for using the following measures:

(a) Undisturbed or areas planted with native vegetation that do not receive runoff from other areas are self-treating and no additional stormwater management is required.

(b) Runoff from impervious surfaces, generated by the rainfall events identified for PR.3, may be directed to undisturbed or natural landscaped areas. Where the design demonstrates 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, then no additional stormwater management is required for these impervious surfaces.

(c) Runoff that cannot be captured by the above methods must be managed by a structural stormwater control measure as described below.

Structural Stormwater Control Measures (SCM)

SCMs shall optimize retention and result in optimal protection and restoration of watershed processes. SCMs are typically small-scale, decentralized facilities designed to infiltrate, evapotranspirate, filter, or capture and use stormwater. SCMs shall be sized and designed as described in Appendix E.

Off-Site Mitigation

Off-site mitigation of full Retention Volume is not required where technical infeasibility, as described in the Alternate Compliance section (Section 7), limits on-site compliance with the Runoff Retention Performance Requirement AND ten percent of a project's Equivalent Impervious Surface Area [1] has been dedicated to retention-based Stormwater Control Measures. (NOTE: PR.2, the Water Quality Treatment Performance Requirement is NOT subject to this adjustment. Mitigation to achieve full compliance with the Water Quality Treatment Performance Requirement is required on- or off-site.)

[1] Calculate Equivalent Impervious Surface Area using guidance in Appendix F

- Use the Appendix F instructions to calculate the ten percent adjustment for applying the Runoff Retention Performance Requirement.

- Use the Appendix G instructions to calculate the Off-Site retention requirements when a Project subject to the Runoff Retention Performance Requirement cannot allocate the full ten percent of the project site's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.

Section 4

Performance Requirement No. 4

Peak Management

Projects subject to Performance Requirement No. 4 (PR.4) are:

- Projects that create and/or replace ≥22,500 square feet of gross impervious surface (collectively over the entire project site); and are In Watershed Management Zones 1, 2, 3, 6, or 9

PR. 4 requires the applicant to manage post-development peak stormwater runoff from the site.

The Project Engineer shall provide a Stormwater Control Plan that includes a Hydrology Analysis demonstrating that post-development stormwater runoff peak flows discharged from the site do not exceed pre-project peak flows for the 2- through 10- year storm events. If detention storage is required, use the same design method described in the following Section 5.

Section 5

Performance Requirement No. 5

Special Circumstances

Special Circumstances as defined by the Central Coast Regional Water Quality Control Board:

Projects that are subject to Special Circumstances based on certain site and/or receiving water conditions may be exempt 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.

Special Circumstances are defined as projects that discharge stormwater to the following:

- Highly Altered Channels
- Intermediate Flow Control Facility
- Historic Lake and Wetland

Projects subject to Special Circumstances must still comply with the Water Quality Treatment Performance Requirements if so required.

Section 6

Alternative Compliance

Technical Infeasibility

When on-site compliance is demonstrated to be technically infeasible, Water Quality Treatment (PR.2), Runoff Retention (PR.3), and Peak Management Performance Requirements (PR.4) may be achieved through off-site SCMs or through use of the Ten Percent Adjustment to Retention Requirement (Appendix F).

An application for approval of Alternative Compliance based on technical infeasibility shall include a site-specific hydrologic 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.

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[2]
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)

See Appendix H for methods of determining feasibility of infiltration measures.

[2] 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)

If the Technical Infeasibility analysis is approved, the use of the Ten Percent Adjustment to Retention Requirement method of compliance may be used (Appendix F). For off-site mitigation, a plan detailing the project(s) that will provide off-site mitigation shall be submitted. 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:

a) The location of the proposed off-site project(s), which 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.
b) A schedule for completion of offsite mitigation project(s), where the off-site mitigation project(s) has not been constructed.

Watershed or Regional Management Plan

The City of Morro Bay does not have an approved Watershed or Regional Management Plan**.**

Urban Sustainability Area

Projects located within an approved Urban Sustainability Area (USA) may apply for Alternative Compliance for numeric Runoff Retention and Peak Management Performance Requirements without demonstrating technical infeasibility; however the City of Morro Bay has not established an Urban Sustainability Area.

Application for approval of an Urban Sustainability Area may be made to the Central Coast Regional Water Quality Control Board. The Urban Sustainability Area may only encompass redevelopment in high density urban centers that are pedestrian-oriented and/or transit-oriented development projects intended to promote infill of existing urban areas. The USA proposal must include, at minimum:

i) A definition and delineation of the USA for high-density infill and redevelopment for which area-wide approval for Alternative Compliance is sought.
ii) Information and analysis that supports the intention to balance water quality protection with the needs for adequate housing, population growth, public transportation, land recycling, and urban revitalization.
iii) Demonstration that implementation of Alternative Compliance for Regulated Projects in the USA will meet or exceed the on-site requirements for Runoff Retention and Peak Management. The proposal must include quantitative analysis used to evaluate off-site compliance. Identification of specific off-site projects is not necessary for approval of the USA designation.

Projects in a USA may meet Water Quality Treatment Performance Requirements off-site only when:

i) It has been demonstrated that on-site water quality treatment is Technically Infeasible; AND
ii) The proposed off-site project(s) have been demonstrated to comply with the Water Quality Treatment Performance Requirements.

Off-Site Compliance Project(s) Requirements

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

Timing and Funding Requirements for Alternative Compliance Projects – A schedule for the completion of off-site mitigation projects, including milestone dates to identify funding, design, and construction of the off-site projects shall be submitted with the application for Alternative Compliance.

a) Complete the project(s) as soon as practicable and no longer than four years from the date of the certificate of occupancy for the project for which off-site mitigation is required, unless a longer period is otherwise authorized by the Central Coast Water Board Executive Officer.
b) The timeline for completion of the off-site mitigation project may be extended, up to five years with prior Central Coast Water Board Executive Officer approval. Central Coast Water Board Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement an Alternative Compliance project, such as having funds encumbered and applying for the appropriate regulatory permits.
c) Off-site mitigation projects on public property shall be fully funded by the applicants.
d) Off-site mitigation projects on private property shall include all documentation necessary to provide legal authority to use the property for the mitigation and shall include project bonding.

Section 7

Maintenance and Reporting

An Operation and Maintenance Plan (O&M) is required for all projects that utilize Structural Control Measures (SCMs) to satisfy Performance Requirements 2, 3, and/or 4. A maintenance program is essential to ensure that the stormwater facilities continue to function as designed to maintain water quality and prevent possible flooding and property damage.

A proper maintenance plan must include:

- Site map of all SCMs requiring O&M practices to function as designed
- Procedures are provided for each structural control measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices
- Short and long term maintenance requirements
- Estimated cost for maintenance

Appendix J has templates to aid in the development of the O&M Plan.

The SWCP and O&M plan shall be prepared under the direction of a professional civil engineer registered in the State of California. The plans shall be stamped, signed and include a certifying statement indicating that all stormwater BMPs have been designed to meet the City's stormwater quality requirements.

Applicants of regulated projects subject to Performance Requirements 2, 3, or 4 are required to demonstrate compliance with these requirements on an annual basis.

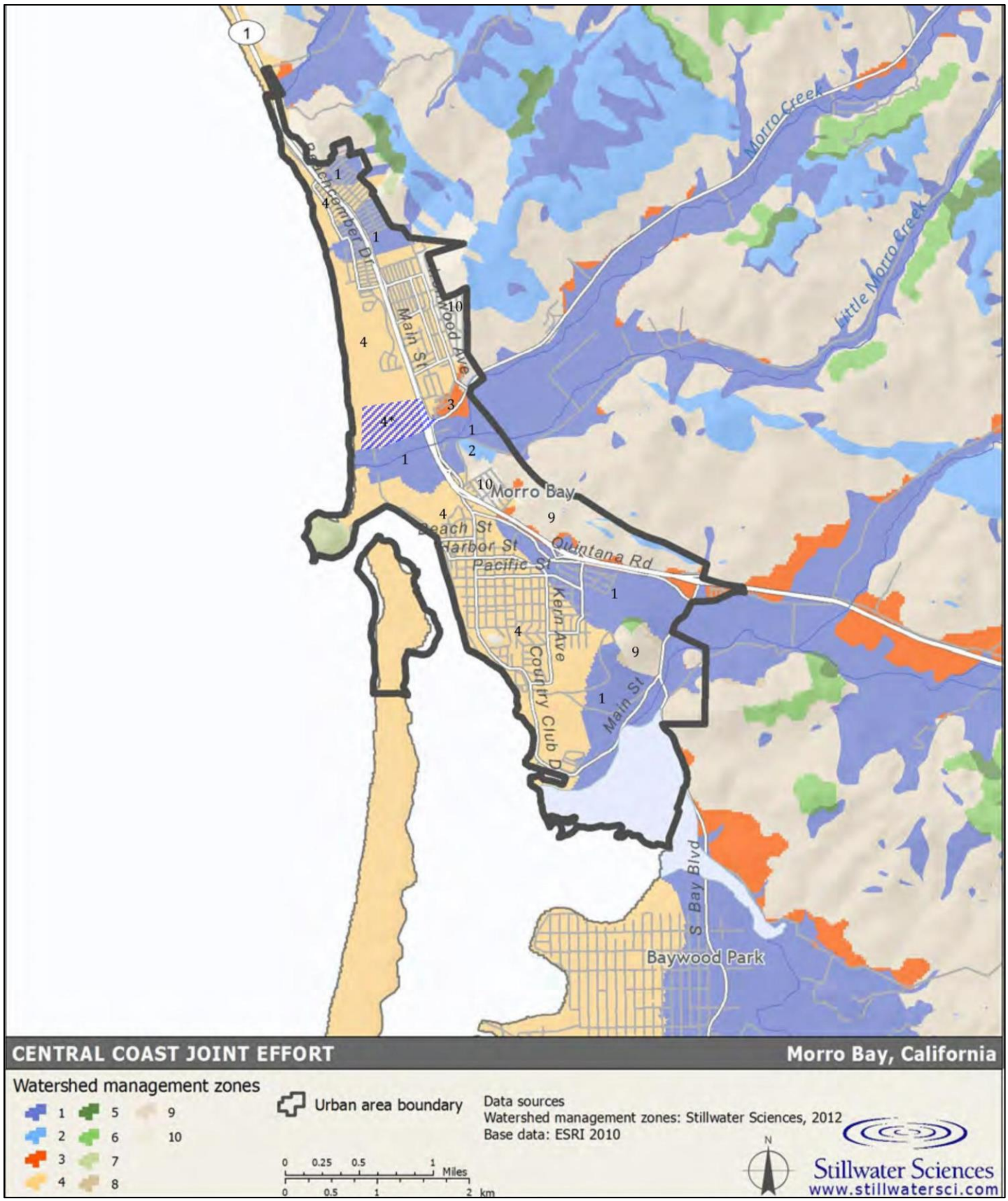
APPENDIX A

PROJECTS EXEMPT FROM STORMWATER REQUIREMENTS

Project that are exempt from the Post-Construction Performance are as follows (check any box on the list and no further action is required):

- ☐ Road and Parking Lot maintenance:
  - Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching
  - Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage
  - Shoulder grading
  - Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems
  - Crack sealing
  - Resurfacing with in-kind material without expanding the road or parking lot
  - Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot
  - Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster
- ☐ 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
- ☐ Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas
- ☐ Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
- ☐ 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)
- ☐ Second-story additions that do not increase the building footprint
- ☐ Roof repair and replacement
- ☐ Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
- ☐ 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
- ☐ Temporary structures (in place for less than six months)
- ☐ Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices
- ☐ Above-ground fuel storage tanks and fuel farms with spill containment system

APPENDIX B
WATERSHED MANAGEMENT ZONES



APPENDIX C

PERFORMANCE REQUIREMENT DETERMINATION FORM

The following form shall be completed for all development and redevelopment projects. Projects that are exempt from performance requirements are required to complete Sections 1 & 2 only.

Section 1: General Information	
Project name	
Project Address	
Assessor's Parcel Number(s)	
Name of Applicant	
Applicant email address:	
Applicant phone:	
Project Type (e.g. single-family residential, commercial, etc.)	
Section 2: Area Information	
Total Project Area	
Total Existing impervious surface area	
Proposed Gross Impervious Area (list only the surface areas that are being created or replaced)	
a. Rooftops	
b. Driveways	
c. Patios	
d. Parking Lots	
e. Other	
Total Gross Impervious Area	
If Gross Impervious Area <2,500 ft^2, write "EXEMPT". Otherwise continue to Sec. 3	
Section 3: PR Determination	
Watershed Management Zone (App. B)	
Net Impervious Area (from page 10)	
Performance Requirements (from Flow Charts)	

APPENDIX D

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.

Discretionary Approval – A project approval which requires the exercise of judgment or deliberation when the MS4 decides to approve or disapprove a particular activity, as distinguished from situations where the MS4 merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

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.

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.

Gross Impervious Area – Impervious surfaces that are created or replaced by the project. Manufactured permeable surfaces (pervious paving, gapped paving stones, etc.) may be considered as a pervious surface and are considered on a case by case basis. If sidewalks or new pavement in the City right of way is planned or required by code, these surfaces shall also be included in the total. Do not include the

surface area of decks with gaps that allow runoff to drain to permeable surfaces below. Gross Impervious Area is used in the initial determination of performance requirements.

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. There are three methods of calculating impervious surface area, depending on the context of the calculation. For more details, see ***Net Impervious Area, Gross Impervious Area, and Equivalent Impervious Area*** definitions.

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.

Ministerial Approval – A project approval which involves little or no personal judgment by the MS4 as to the wisdom or manner of carrying out the project and only involves the use of fixed standards or objective measurements.

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 Permittee'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.

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 of native landscaping. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

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.

Single-Family Residence – The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

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).

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

APPENDIX E

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 project applicant may 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 under Drainage Management Areas 2.a (in Section 3)

** As defined under Drainage Management Areas 2.b. (in Section 3)

a) 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 the Alternative Compliance Section. – 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, as described in the Alternative Compliance Section. – 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 (Appendix I)

c) Compute the Runoff Coefficient[3] "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[4]

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 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 Project engineer shall 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 Project is within a Watershed Management Zone where infiltration is required, SCM designs that optimize infiltration of the entire Retention Volume is required, 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

[3] 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.

[4] As defined in Post-Construction Requirements Attachment D.

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

Method 2: Routing Method

Use a hydrograph analysis[5] 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
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 on-site testing.
Rainfall Distribution	National Resources Conservation Service Type I[6] or based on local rainfall data
Time of Concentration	No less than 10 minutes
Time Increment	0.10 hour, unless otherwise justified to be more correct based on rainfall distribution

[5] 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.

[6] 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.

b) Demonstration of Compliance – Project engineer 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.

Compliance with Water Quality Treatment Performance Requirement – Projects that propose to use the retention-based structural Stormwater Control Measures, shall also meet the Water Quality Treatment Performance Requirement, and demonstrate in the Stormwater Control Plan, that the Water Quality Treatment Performance Requirement is being fully met.

APPENDIX F

Ten Percent Adjustment to Retention Requirement – Calculation Instructions

Where technical infeasibility, as described in the Alternative Compliance, prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention of the full Retention Volume per Section PR.3 is not required and the Project is required to dedicate no less than ten percent of the 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.,

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[7]; 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

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

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.

TABLE 1: Correction Factors[8] 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

[8] 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

APPENDIX G

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 Project subject to the Runoff Retention Performance Requirement, cannot allocate the full 10% of the project site's Equivalent Impervious Surface Area[9] 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[10] 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,

[9] Calculate Equivalent Impervious Surface Area using guidance in Post-Construction Requirements Attachment F

[10] Calculate Design Retention Volume using guidance in Post-Construction Requirements Attachment E, 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).

calculated per Appendix E, 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

APPENDIX H

Soil Infiltration Assessment

Introduction and Purpose

This document provides guidance for conducting a Soil Infiltration Assessment to support the use of shallow or deep infiltration based stormwater control measures (SCMs), such as low impact development. This guidance is intended to provide a universal starting point for assessment of the infiltration characteristics of each project site and provide useful data in a cost-effective manner. Consideration and discussion of the application of these guidelines among the jurisdiction, the design professional and the geotechnical engineer is encouraged. They should be modified using sound engineering and geologic judgment to accommodate the unique characteristics of each project as they relate to each unique site.

The guidelines walk the user through a step-wise process from an Initial Site Assessment to a level of soil/geotechnical methodology appropriate for the site. The concept is to obtain information to:

1. Assess the general potential within the site for infiltration based SCMs
2. Provide a preliminary methodology to obtain soil infiltration data while balancing the need for data with the cost of acquiring the data.
3. Provide an extended or more comprehensive soil/geotechnical methodology where the results from the preliminary methodology as well as other site considerations warrant a more thorough soil analysis to facilitate better SCM design.

Note: Throughout this document the term “boring” is used for the purpose of observing the soil profile. However, except as indicated otherwise, an “excavation” may be substituted for the same purpose. Similarly, the term “drill” is the term used as the means of creating the boring. Except as otherwise indicated, it is meant to be synonymous with “excavating” or “digging” of an excavation. The two methods are meant to be interchangeable.

THESE METHODS DO NOT ADDRESS HEALTH OR SAFETY ASPECTS ASSOCIATED WITH THEIR USE. HEALTH AND SAFETY OF PERSONEL CONDUCTING THE METHODOLOGIES AND OF PEDESTRIANS, PASSERS-BY, SITE OWNERS OR TENANTS, ETC. SHOULD BE CONSIDERED. IT IS THE RESPONSIBILITY OF THE USER TO COMPLY WITH ALL APPLICABLE HEALTH AND SAFETY LAWS, REGULATIONS, POLICIES AND PROCEDURES, AND TO ENSURE THAT THE METHODOLOGIES ARE USED SAFELY.

The methodologies are guidelines only for the means of assessing the infiltration rates. Aspects related to permits, disposal of soil cuttings and samples, backfill, compaction, site restoration, etc. are not addressed. It is incumbent on the user to follow all laws, regulations, policies and procedures in decommissioning the borings.

Step 1: Initial Site Assessment

Initial Site Assessment is encouraged early in the design of post-construction SCMs. Infiltration SCMs may be required to comply with State post-construction stormwater control requirements. Various characteristics of a site may limit or preclude the use of infiltration SCMs including soil and geotechnical constraints. Early in the project planning phase, the Project Applicant should identify all site characteristics that may influence (both positively and negatively), the ability of the site to infiltrate stormwater. The list below relates to soil and geotechnical feasibility only and the Project Applicant is encouraged review the full list of possible infeasibility constraints as provided by the municipality.

Initial Site Assessment related to infiltration potential should include, but is not limited to:

- Slope / topography of parcel
- Descending slopes nearby
- Protected Vegetation (endangered species, heritage oaks, etc.)
- Springs, seeps
- Bedrock outcrops
- Soil types from USDA Soil Charts, local geologic and geotechnical knowledge, etc.
- Area(s) available for infiltration
- Nearby wells
- Soil of groundwater contamination
- Other geotechnical constraints that may impact public safety or property

Step 2: Interpretation of Initial Site Assessment

If the Initial Site Assessment indicates that there is documentation of characteristics that entirely preclude the use of shallow or deep infiltration based SCMs, go to **Step 2A**. Examples of such characteristics might be unstable slopes throughout the site; high groundwater, shallow impervious bedrock throughout the site, etc. Note: poor soils do not necessarily preclude the use of infiltration based BMPs but may limit the amount of infiltration.

If the Initial Site Assessment indicates that site characteristics do not preclude the use of infiltration based SCMs, go to **Step 2B**.

Step 2A: Omit use of infiltration-based SCMs, Infiltration analysis complete.

When site conditions entirely preclude the use of infiltration-based SCMs, the Project Applicant will need to contact the municipal representative responsible for the project to determine any required documentation of the infiltration infeasibility and the adjusted post-construction requirements for the project.

Step 2B: Conduct Quick Infiltration Testing

If Initial Site Assessment indicates that use of shallow infiltration-based SCMs (e.g. vegetated swales, bioswales, bioretention facilities, shallow infiltration basins, etc.) may be feasible, a "Shallow Quick Infiltration Test" may provide information to refine shallow SCM siting within the project and associated sizing calculations. See **Attachment 1** for Shallow Quick Infiltration Test methodology.

If Initial Site Assessment indicates that use of deep SCMs (e.g. seepage pits, deep infiltration basins, etc.) may be feasible, a "Deep Quick Infiltration Test" may provide information to refine deep SCM siting within the project and associated sizing calculations. See **Attachment 2** for Deep Quick Infiltration Test methodology.

Step 2C: Interpretation of Quick Infiltration Test Results

If results of the "quick" test (shallow or deep) are 5 inches/hour or slower (moderate to poor soils), then no further data are needed and soil infiltration assessment is complete. Design of SCMs should be based upon the data acquired, as modified by appropriate factors (i.e. factors for size and scale of the SCM, anticipated maintenance, initial and final silt loading, etc.)

Similarly, if results of the Quick Infiltration Testing (shallow or deep) indicate good soils (infiltration rates faster than 5 inches/hour), AND no further data are considered to be necessary for the SCM design, soil infiltration assessment is complete. Design of SCMs should be based upon the data acquired, as modified by appropriate factors (i.e. factors for size and scale of the SCM, anticipated maintenance, initial and final silt loading, etc.).

If results of the Quick Infiltration Testing (shallow or deep) indicate good soils (i.e. infiltration rates faster than 5 inches/hour), AND other considerations may necessitate more soil data, then "Extended Infiltration Testing" should be conducted. See **Attachment 3** for Extended Infiltration Testing methodology.

ATTACHMENT 1

Shallow Quick Infiltration Testing Methodology

1. For small sites with limited areas for infiltration-based SCMs, drill 1 profile boring and 2 infiltration test borings in each potential SCM area.

2. For acreage and unconstrained sites:

   - Up to 5 acres: drill 1 profile boring and 2 infiltration test borings per acre potentially usable for SCMs.
   - Over 5 acres: drill 1 profile boring and 2 infiltration test borings per geologic unit that may be usable for SCMs, with 2 to 4 infiltration test borings associated with each profile boring.

3. Profile borings should be 6" to 12" diameter. Where the planned SCMs will be constructed near the site's existing grade, borings should be 10' to 15' deep. If significant cuts will be necessary to install the SCMs, the borings should extend 5' to 10' below the invert of the planned SCM. The boring cuttings should be observed and the soils in the borings sampled as necessary to allow accurate logging. Where excavations are utilized to determine the profile, they should be no wider than necessary to facilitate logging of the strata with the same level of detail as for borings.

4. All soil strata should be identified on the logs as to USCS classification, consistency, presence of moisture or free water, color, impermeable and permeable zones, and any other characteristics that may be pertinent to infiltration potential. All logs should include the boring identification, date of drilling, auger type and diameter, sampling methods, and surface elevation (known or assumed).

5. Infiltration test borings should also be 6" to 12" diameter. They should be of depths such that the zone tested will range from about the elevation of SCM invert, to about 2' below the elevation of the invert.

6. Infiltration test excavations should be dug by any means to approximately the elevation of the *top* of the planned SCM. From the elevation of the top of the planned SCM to 2' below the elevation of the *invert* of the SCM, a hand auger or hand shovel should be used to excavate the actual test zone. Preferably, the test zone should be 6" to 12" in diameter; if conditions mandate a larger diameter, it should be as close to 12" as is practicable.

7. A perforated pipe, of a diameter that will facilitate the taking of the test measurements should be placed in each test boring or in the test zone of each test excavation.

8. The annulus between each perforated pipe and the boring sidewall should be filled with fine gravel.

9. A suitable elevation datum should be established from which each measurement can be taken. The elevation of the datum relative to the elevation of the top of the SCM should be noted.

10. Using a hose equipped with a water meter, a graduated water tank, or other suitable means of measuring water volume, add water to the approximate elevation of *top* of the planned SCM and maintain the head for 30 minutes.

11. At the end of the 30-minute period, shut off water and record volume of water that entered the test boring.

12. As the water level falls, measure from the datum to the water level at suitable intervals. Measurements should be to the degree of precision practicable (usually 1/8-inch or 0.01 foot) for a period of 2 hours. Depending upon the rate of fall, intervals between measurements may need to be from 1 minute to 30 minutes. Intervals should be as uniform as is practicable, however, as the water level falls and the head is reduced, the infiltration rate may decrease and the measurement intervals may need to be incrementally lengthened.

13. If a test boring runs dry within 2-hour measurement period, refill the boring and continue measuring the falling head to end of original 2-hour period. If it runs dry again, refill and continue measurements to the end of the original 2-hour period. If it runs dry a third time, do not refill, the testing of that boring is complete.

14. If the fall recorded in any test boring is less than 6” in 2 hours, continue taking measurements for an additional 2 hours (4 hours total).

15. See **Attachment 4** for a discussion of how to report the test results.

ATTACHEMENT 2

Deep Quick Infiltration Testing Methodology

1. For small sites with limited areas for infiltration-based SCMs, drill 2 profile / test borings in each potential deep SCM area.

2. For acreage and unconstrained sites:
   - Up to 5 acres: drill 3 profile / test borings per acre potentially usable for SCMs.
   - Over 5 acres: drill 4 profile / test borings per geologic unit that may be usable for SCMs.

3. Profile / test borings should be 6" to 12" diameter. The borings should extend 5' to 10' below the bottom of the planned SCM. The boring cuttings should be observed and the soils in the borings sampled as necessary to allow accurate logging. Use of excavations for deep testing is probably not practical.

4. All soil strata should be identified on the logs as to USCS classification, consistency, presence of moisture or free water, color, permeable and impermeable zones, and any other characteristics that may be pertinent to infiltration potential. All logs should include the boring identification, date of drilling, auger type and diameter, sampling methods, and surface elevation (known or assumed).

5. A perforated pipe, of a diameter that will facilitate the taking of test measurements should be placed in each profile / test boring.

6. The annulus between each perforated pipe and the boring sidewall should be filled with fine gravel.

7. A suitable elevation datum should be established from which each measurement can be taken. The elevation of the datum relative to the elevation of the top of the SCM should be noted.

8. Using a garden hose equipped with a water meter, a graduated water tank, or other suitable means of measuring water volume, add water to approximate elevation of *top* of the planned SCM and maintain the head for 30 minutes.

9. At the end of the 30-minute period, shut off water and record volume of water that entered the test boring.

10. As the water level falls, measure from the datum to the water level at suitable intervals. Measurements should be to the degree of precision practicable

(usually 1/8-inch or 0.01 foot) for a period of 2 hours. Depending upon the rate of fall, intervals between measurements may need to be from 1 minute to 30 minutes. Intervals should be as uniform as is practicable, however, as the water level falls and the head is reduced, the infiltration rate may decrease and the reading intervals may need to be incrementally lengthened.

11. If a test boring runs dry within the 2-hour measurement period, refill the boring and continue measuring the falling head to end of original 2-hour period. If it runs dry again, refill and continue measurements to the end of the original 2-hour period. If it runs dry a third time, do not refill, the testing of that boring is complete.

12. If the fall recorded in any test boring is less than 6” in 2 hours, discontinue testing as deep infiltration is not practical.

13. See **Attachment 4** for a discussion of how to report the test results.

ATTACHMENT 3

Extended Test Methodology

The following "extended" methodology is intended to provide more comprehensive soil/geotechnical information where the results from the Initial Site Assessment and/or Quick methodology, as well as other site and design considerations warrant a more thorough soil analysis to facilitate better SCM design.

1. Extended test methodology for *deep* SCMs is too complex an issue to be adequately addressed in these guidelines. Test locations, depths, methods, etc. should be discussed among the jurisdiction, the design professional and the geotechnical engineer and a consensus reached as to the appropriate means of securing the data required for design of the deep SCMs on the specific site.

2. For *shallow* extended testing, locations, depths, continuity of subsurface conditions, etc. should be discussed among the jurisdiction, the design professional and the geotechnical engineer. Consideration should be given to drilling and testing at least twice as many test borings as recommended under Quick Testing.

3. Extended shallow test methodology should be essentially the same as Steps 3 through 14 under Quick Testing, except for the following:
    a. Consideration should be given to presoaking the test borings for up to 24 hours prior to commencing testing.
    b. Measurements for extended testing should continue for 4 hours or more, regardless of infiltration rates.
    c. The 30-minute constant head period may be excluded if adequate constant head data were obtained during Quick Testing.

4. See **Attachment 4** for a discussion of how to report the test results.

ATTACHMENT 4

Reporting of Test Results

1. Reporting of test results, whether quick or extended, shallow or deep, should contain essentially the same information.

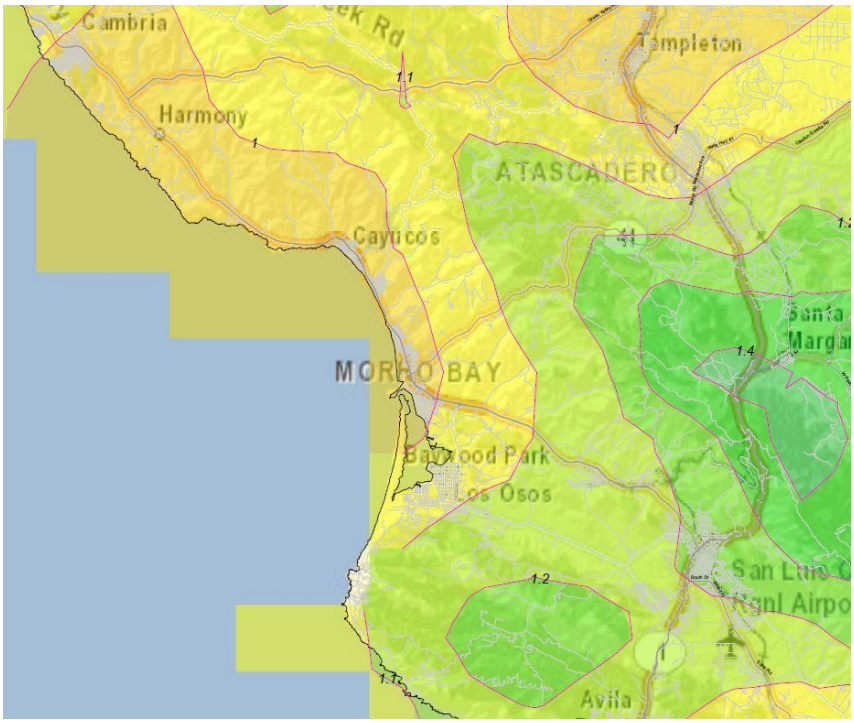
2. For each test boring, tabulate the test data showing:
   a. Test identification
   b. Date drilled
   c. Date tested
   d. Test boring diameter
   e. Perforated pipe diameter
   f. Test boring depth
   g. Stratum present in the test zone
   h. Elevation of top of SCM (known or assumed)
   i. Elevation of invert of SCM (known or assumed)
   j. Test duration
   k. Volume introduced between commencement of filling and the end of the 30-minute constant head period, typically in units of cubic feet
   l. Head during initial 30-minute period
   m. Time of the first falling head measurement and depth to the water surface
   n. Time of each subsequent measurement and depth to the water surface
   o. Intervals between measurements
   p. Incremental drop between measurements
   q. Infiltration rate between measurements, typically in units of inches per hour

3. Provide a map showing the approximate locations of all profile and test borings, as well as property lines, landmarks, planned improvements and SCM locations (if known), and other pertinent features that will help the user better understand the boring and testing program.

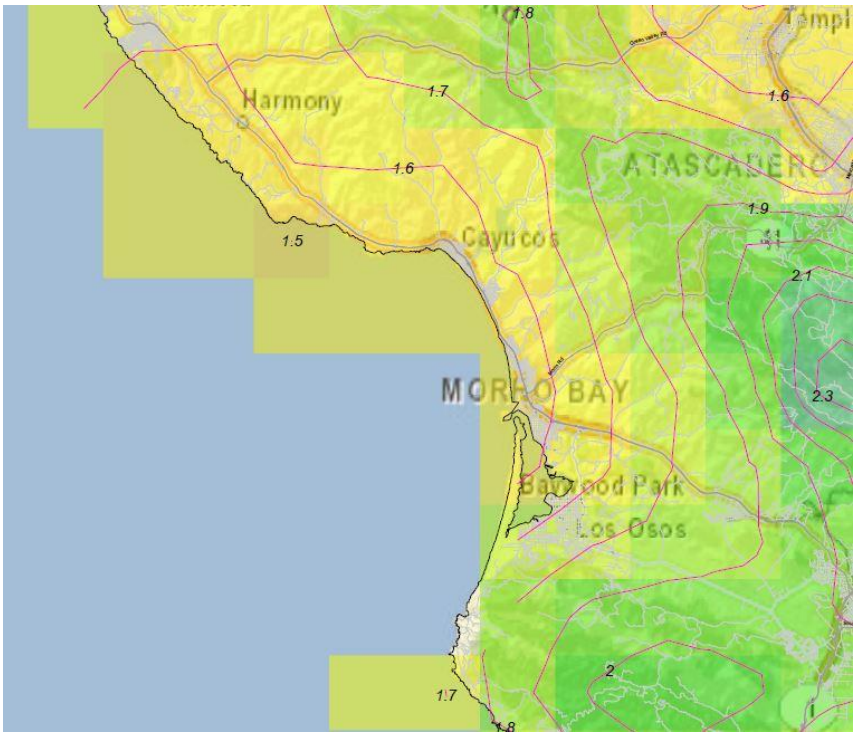
4. Provide log of each profile boring

5. Provide report summarizing data and discussing the potential for use of infiltration based SCMs on the site or area(s) tested.

APPENDIX I
85th and 95th Percentile 24-hr Rainfall Depth Maps



85th Percentile



95th Percentile

APPENDIX J
Operations, Maintenance and Reporting

POST CONSTRUCTION STORMWATER MANAGEMENT SYSTEM OPERATIONS AND MAINTENANCE FORMS INSTRUCTIONS

INSTRUCTIONS FOR RECORDING CONSTRUCTIVE NOTIFICATION

After determining a development is required to complete a Stormwater Control Plan (SWCP) with post construction Best Management Practices (BMPs) the applicant (land owner/developer) shall record a Constructive Notification for Private Stormwater Management System Operations and Maintenance with the San Luis Obispo County Clerk-Recorder's office. The constructive notification shall be recorded prior to occupancy.

The standard constructive notification and attachments can be obtained from the following locations:

- http://www.morro-bay.ca.us/stormwater
- Public Works Department 595 Harbor Ave., Morro Bay Ca 93442

The applicant shall fill out the constructive notification (per the instructions below) and submit to the City for review and approval. Following City approval, the applicant shall have the constructive notification notarized then filed with the County Clerk-Recorder. The property owner shall then complete annual self-inspections and submit to the Planning and Building Department.

OVERVIEW OF PROCEDURE

I. Complete Constructive Notification and Exhibits

The applicant shall fill out the three (3) part constructive notification prior to submitting for review and approval. (See DETAILED INSTRUCTIONS below for filling out the Constructive Notification, EXHIBIT A and EXHIBIT B forms.)

II. Submit the Constructive Notification & Exhibits to the Engineering Department

Upon completion of the draft constructive notification, the applicant shall submit a copy to the City for review and approval. The constructive notification shall be submitted to the following address (or submitted via email to the City contact person):

City of Morro Bay, Public Works Department
595 Harbor Avenue
Morro Bay, CA 93465

III. Revise and Resubmit (if applicable)

The applicant shall make any necessary modifications to the constructive notification based on the City's review. The revised constructive notification shall then be resubmitted to the City.

IV. Notarize Constructive Notification

Following City approval (including City Representative signature on EXHIBIT A), the constructive notification shall be notarized.

The applicant shall retain a notary public to notarize the constructive notification. The applicant shall sign the constructive notification and the notary shall complete and sign the constructive notification.

V. Record Constructive Notification

Following notarizing, the constructive notification (and Exhibits) shall be recorded with the County Clerk Recorders office located at:

County of San Luis Obispo Clerk-Recorder's Office
1055 Monterey Street Room D120
San Luis Obispo, CA 93408-3237

The Clerk-Recorder will keep the document for processing and mail the original back to the Public Services Department. The applicant may purchase a copy of the constructive notification.

For additional information on recording documents and associated fees, visit the County Clerk- Recorder's website at http://www.slocounty.ca.gov/clerk.htm.

VI. Inspections

Annually, the current property owner (or representative) shall complete a self-inspection of the Project Stormwater Management System. EXHIBIT B of the recorded constructive notification shall be completed and submitted annually by June 15th to:

City of Morro Bay
Public Works Department
Annual Reporting Requirements
955 Shasta Ave,
Morro Bay, CA 93442

-or-

pnewman@morrobayca.gov
Subject: Annual Reporting Requirements

For questions please contact the Engineering Department at (805) 772-6215 or the Public Services Department at (805) 772-6261.

DETAILED INSTRUCTIONS

CONSTRUCTIVE NOTIFICATION

The following information shall be completed:

- Property Address
- Property APN
- Permit/Project #
- Property Legal Description NOTE: The legal description is available in the property owner's title report.

See section IV above regarding Notarize Constructive Notification

EXHIBIT A - POST CONSTRUCTION STORMWATER MANAGEMENT SYSTEM OPERATIONS AND MAINTENANCE PLAN

PART 1A - GENERAL INFORMATION

1 **Property APN(s):** If the project has a shared Stormwater Management System (i.e. HOA), insert all the Property APNs served by the SYSTEM. Highlight the Property APN which contains the shared Structural Stormwater Control Measures (SCMs), such as a basin.

2 **Project Address(es):** where the Structural Stormwater Control Measures (SCMs) to be maintained are located.

3-6 Self-explanatory

7-8 **Designer** and **Company/Firm:** Insert name of the original designer of the stormwater management system. In the case that the Designer is not longer available or practicing, the Company/Firm to which the designer worked will be considered responsible to supply information regarding the SYSTEM.

9-11 Self-explanatory

12 **Estimated Annual Cost for Maintenance Once Established (Attach Cost Estimate Spreadsheet):** Designer to provide an estimate of annual cost to owner for services to inspect, maintain, and report on SYSTEM per instructions provide in this Exhibit. (Consider line item for inflation.)

13 **Other Pertinent Info:** For example, is the SYSTEM shared? Specifics of how will it be managed.

PART 1B - STRUCTURAL CONTROL MEASURE (SCM) DETAILS

General: Data provided on these sheets should match information provided in the Stormwater Control Plan (SWCP) or other plans approved by the City of Morro Bay for the permitted project.

A Structural Control Measure (SMC) is defined by the RWQCB as: *Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.*

Numbers for SCMs shall be assigned by the City of Morro Bay officials at approval of the project SWCP or other plan.

1 **Purpose(s) of SCM (check all that apply):** See City Morro Bay Stormwater Management Requirements.

2 Self explanatory

3 **Description & Location of SCM (As necessary, refer to PART 2 – Drawings & Photos):** The most effective means to describe the location of SCMs on a project site is in reference to a Drawing. (See Part 2 explanation.) If there is a basin serving multiple properties on its own lot, note which properties (by APN) the SCM serves.

4 **Drainage Design Criteria:** Per approved SWCP or Drainage Plan.

5 **Design Details (as applicable):** Per approved SWCP or Drainage Plan. If it does not apply, write N/A.

6 Self-explanatory

7 **SCM Inspection & Maintenance Requirements:** These requirements will be based on the design life and considerations of the SCMs ability to meet requirements for water quality and/or flow control as set out by RWQCB and the City Morro Bay.

Short Term Requirements include those things that will be required within a reporting year, i.e. clearing of debris, sediment or other obstructions to inlets.

Long-Term Requirements would be those things done on multiple-year schedule (2-year, 5 year, 10 year) to ensure the continual proper functioning of the SCM. For example, for a filter strip or biofiltration swale, include a plan ensuring the vegetation is healthy and method for replacement of plants (planting plan). For basins (infiltration or detention), provide a schedule for vegetation management and sediment removal. The replacement of inlet grates or other devices that could rust or degrade should be considered in this area, along with the design life.

PART 2 - DRAWINGS AND PHOTOS

The official documents related to the approved design of the Project's Stormwater Control Measure(s) (signed by the Engineer of Record) are required as a part of the Plan. If changes are made to the design of the SCM during construction, Record Drawings must be submitted. Include dated photos of the completed SCM with pertinent notes (i.e. direction from which the photo was taken.)

Reduced size Site and Drainage Plans and/or Details Sheets shall be provided. Any relevant details shall be copied at the original scale on 8.5x11 (for example, on an exhibit) for inclusion in the Plan. Ensure any exhibits include all the listed components.

PART 3 - CERTIFICATION AND APPROVAL

Along with the Owner and Designer, the designer or a 3rd party professional engineer, geologist, architect or landscape architect is required to field verify the Stormwater Control Measure(s) per RWQCB Resolution No. R3-2013-0032 Attachment 1, Section D. Field Verification of Post-Construction Stormwater Control Measures. Prior to the submittal of this Plan, it is recommended that the field verifier signatory and City official signatory visit the site together to inspect the SCMs, discuss the proposed plan and any potential issues prior to submittal.

EXHIBIT B - POST CONSTRUCTION STORMWATER MANAGEMENT SYSTEM OPERATIONS AND MAINTENANCE CHECKLIST TEMPLATE

General: The initial purpose of Exhibit B is to produce a template checklist which will be used for inspections and submitted to the City annually by June 15th. The approved template will be included in the recorded document, so consideration of checklist items that meet the short and long term maintenance requirements of the SCM is important. Since each SYSTEM design is different, it is the responsibility of the designer/engineer to advise the owner in completing the checklist, which must be approved by the City prior to recordation.

For this reason, the template can change in content to meet the particular SCM's maintenance needs. Two examples are included for a Biofiltration Area/Swale and Catch Basin(s).

Suggestions for Inspection Timing: Note that the official rainy season in California is October 15th – April 15th, so annual inspections of SYSTEMS would logically occur before October 15th to beat the possibility of a storm coming before any required maintenance is undertaken. Monthly inspections could be scheduled along with planned landscaping maintenance of the overall site, so the removal of vegetation debris or sediment could be done simultaneously. If the Project is a HOA-run development or similar, it will be beneficial to consider the project Operations & Maintenance schedule and add the SYSTEM maintenance therein.

Inspectors: It is required for a licensed Civil Engineer or Qualified SWPPP Practitioner (QSP) to sign off on the checklist annually. However, this does not prevent the signatory from delegating inspection responsibly to trained maintenance staff. All inspectors must be listed, and initialed to designate who did each inspection. However, the responsibility for certifying that the information provided is true & correct rests on the signatory.

Corrective Action/ Required Maintenance: Inspectors shall estimate how long it will take to rectify the situation in discussion with the owner, and re-inspect promptly. Any issues that are not addressed shall be recorded.

RECORDING REQUESTED BY:

WHEN RECORDED, PLEASE RETURN TO
County of San Luis Obispo Planning and Building Department
County Government Center, Room 208
San Luis Obispo, CA 93408
Ph: (805) 781-5600

NOTICE OF ADDITIONAL INFORMATION

Building Permit #_____ (*for office use–staff to provide*)

Property Address:

_____
(Street No. & Street Name, City, State, Zip)

Property APN: _____ **Permit/Project#:** _____

Property Legal Description:

_____

_____

Owner of the aforesaid property does here by give

CONSTRUCTIVE NOTIFICATION

For Private Stormwater Management System Operations and Maintenance

The Applicant (Individual, Married Person, a HOA, A for Profit, or non-Profit Corporation), herein after referred to as **"OWNER"** of the real property referenced above, hereby required by existing City codes and regulations to utilize "on-site stormwater management systems (i.e. structural and/or non-structural) to minimize runoff and pollutants in runoff and to provide permanent storm drainage to control, manage, retain, treat, infiltrate and dispose of" (1) "on-site storm drainage for the Project" and (2) "ancillary street and site drainage from the adjoining street and sites" as stipulated in the approved project plans and contained within the required Stormwater Management System Operations & Maintenance Plan.

The Owner is solely responsible for the **Private Stormwater Management System,** hereinafter referred to as "**SYSTEM**" and attached as Exhibit "A". The Owner agrees to the following conditions in compliance with all local, state, federal laws and regulations:

1. **MAINTENANCE**: OWNER shall maintain, monitor, inspect, clean and repair the SYSTEM as required in Exhibit "A" – Post Construction Stormwater Management System Operations & Maintenance Plan.
2. **DOCUMENT & REPORT:** OWNER shall document all maintenance, monitoring, inspections, cleanings and repairs made to the SYSTEM in the annual report **submitted to the City by June 15th of each year** in the form as approved by the City as detailed in Exhibit "B" – Post Construction Stormwater Management System Operations & Maintenance Checklist.

3. **CITY RIGHTS & AUTHORITY:** the City has the right and authority to inspect the SYSTEM to determine compliance with this constructive notification (i.e. maintenance, monitoring, inspections, cleanings, repairs,

documentation and reporting) which may result in enforcement activities and/or abatement if necessary pursuant to existing and future laws and regulations.

1. **FAILURE TO MAINTAIN, MONITOR, INSPECT, CLEAN, REPAIR AND REPORT SYSTEM:** Failure to maintain, monitor, inspect, clean, repair, or document and report as required herein shall constitute a public nuisance. The City may remedy such public nuisance through any of the applicable procedures as set forth in the City of Morro Bay Municipal Code, and/or may pursue any other legal or equitable remedies to abate such public nuisance.

5. **INDEMNIFICATION:** Owner further agrees to defend, indemnify, protect and hold the City and its agents, officers and employees harmless from and against any and all claims asserted or liability established for damages or injuries to any person or property, including to Owner's tenants, guests, invitees, agents or employees, which arise from or are connected with or caused or claimed by the acts or omissions of Owner, and its agents, employees or contractors, in performing the obligations specified herein, and all expenses of investigating and defending against same; provided, however, that Owner's duty to indemnify and hold harmless all not include any claims or liability arising from the established sole negligence or willful misconduct of the City, its agents, officers or employees.

6. **BINDING ON FUTURE <u>OWNERS</u>:** This covenant shall run with the land and shall be binding upon the undersigned owners, their heirs, executors, administrators, assigns and successors in interest.

OWNER(S) OF RECORD:

_____ _____

(Owner's Signature) (Owner's Signature)

_____ _____

(Owner Print Name & Title) (Owner Print Name & Title)

State of California
County of San Luis Obispo

On_____,20 ,before me,_____
_____ and _____

_____, personally appeared before___ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signatures(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____(Seal), Notary Public

City of Morro Bay

For Private Stormwater Management System Operations and Maintenance

EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan

The 'Stormwater Management System Operations & Maintenance Plan' is to be filled out by landowner/designer and attached to the Constructive Notification for Private Stormwater Management System Operations and Maintenance upon recording. **NOTE: EXHIBIT B – 'Post Construction Stormwater Management System Operations & Maintenance Checklist' template is to be attached to the Constructive Notification. The approved and recorded template shall be filled out by the owner and submitted to the City by June 15th of each year.**

PART 1A – General Information

General Information		
1	**Property APN(s):**	
2	**Project Address(es):**	
3	**Owner:**	
4	**Address:**	
5	**Phone:**	
6	**Email:**	
Stormwater Management System Information		
7	**Designer:**	☐CE ☐QSP ☐QSD ☐ Other
8	**Company/Firm:**	
9	**Address:**	
10	**Phone:**	
11	**Email:**	
12	**Estimated Annual Cost for Maintenance Once Established*:**	
13	**Other Pertinent Info:**	

***Attach Cost Estimate Spreadsheet**

PART 1B: STRUCTURAL CONTROL MEASURE (SCM) DETAILS

SCM#: _____

1. Purpose(s) of SCM (check all that apply):	☐ Water Treatment	☐ Runoff Retention	☐ Peak Management
2. Type(s) of SCM Installed:	☐ Retention/Infiltration Basin, Trench, or Swale ☐ Subsurface Basin ☐ Detention Basin	☐ Biofiltration Swale ☐ Catch Basin ☐ Filter Strip(s)	☐ Water Quality Unit ☐ Proprietary Devices ☐ Other: _____
3. Description & Location of SCM (As necessary, refer to PART 2 – Drawings & Photos):	☐ Onsite Description:	☐ Offsite	

4. Drainage Design Criteria:	Design Storm Flow (cfs):			
	Design Storm Capacity (ft^3):			
5. Design Details (As applicable):	Length (ft):		Surface Area (ft^2):	
	Width (ft):		Capacity/Volume (ft^3):	
	Depth (ft):		Vegetation Height (in):	
	Slope (ft/ft):		Design Life (yrs):	
6. SCM Product Specifications (attach applicable specification sheets):	Product Name:			
	Manufacturer/Model Number:			
	Number Installed:			
	Product Life:			
7. SCM Inspection & Maintenance Requirements:	Date of installation:			
	Short Term Required Maintenance (describe or attach plan):			
	Long Term Required Maintenance (describe or attach plan):			

Include additional pages for multiple SCMs as necessary.

Page ___ of ___

PART 2 – Drawings & Photos

In addition to the location description, provide a copy of drawings showing each Structural Control Measure. Provide a plan view showing SCM location(s) relative to the parcel property lines. Include any details of the SCM and any additional sheets, reduced site plans or dated post construction photos to clearly define the limits of the SCM(s).

Ensure the drawings include the following:

- ☐ North Arrow
- ☐ Scale or Dimensions
- ☐ Length/Width
- ☐ Volume Depth
- ☐ Slopes
- ☐ Surface Area
- ☐ Cross Section(s)
- ☐ Unique Number for Each Structural Control Measure (SCM) as assigned by the City

PART 3 – Certification and Approval

I certify the information provided in EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan and EXHIBIT B – Post Construction Stormwater Management System Operations & Maintenance Checklist to be true and correct.

Owner (Print Name)	Signature	Date
Designer (Print Name)	Signature	Date

The Post Construction Stormwater Management System has been reviewed, field verified and approved by (professional engineer, geologist, architect or landscape architect) :

Verifier (Print Name)	License No.	Signature	Date

The 'Post Construction Stormwater Management System Operations & Maintenance Plan' and 'Post Construction Stormwater Management System Operations & Maintenance Checklist' has been reviewed and approved by:

City Representative (Print Name, Title)	Signature	Date

EXAMPLE TEMPLATE

City of Morro Bay

For Private Stormwater Management System Operations and Maintenance

EXHIBIT B – Post Construction Stormwater Management System Operations & Maintenance Checklist

The following TEMPLATE shall be tailored to the Project SCMs and submitted with EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan for approval. Remove all unnecessary text or instructions such as 'EXAMPLE' prior to submission. Contact the City for electronic forms.

Completed forms shall be <u>submitted annually by June 15th</u> to:

City of Morro Bay
Public Works Department
955 Shasta Ave
Morro Bay, CA 93442

-or-

pnewman@morrobayca.gov
Subject: Annual Reporting Requirements

General Information			
Property APN(s):			
Project Address(es):			
Owner:			
Address:			
Phone:		**Email:**	
Report Year:			
Inspector(s) (First & Last Name, Initials):			
Date of Inspection(s):			
SCM Number(s) Inspected:			

I certify the provided information to be true and correct and that the Structural Stormwater Control Measures (SCMs) on my property have been maintained, monitored, inspected, cleaned and repaired as required in EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan.

Owner	**Inspecting Party Representative** ☐**Licensed Civil Engineer or** ☐**QSP No.**_____
Printed Name	Printed Name
Signature	Signature
Date	Date

During this reporting period (check all that apply):

☐ Completed inspections as required in EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan
☐ Completed required short and long term maintenance as required in EXHIBIT A
☐ Completed corrective action(s) per the inspection (if applicable)
☐ Updated the EXHIBIT A - Post Construction Stormwater Management System O&M Plan to reflect revised site conditions. (Attach any updates.)
☐ No spills or system upsets occurred on site.
☐ Cleaned all spills promptly and reported the spill as required. *

*For all site spills, list spill date, content, volume and resolution:

Date	Content	Volume	Resolution	Inspector's Initials

Property APN: _____ SCM # _____ Page ___ of ___

EXAMPLE 1: Biofiltration Areas /Swales

Inspection and Maintenance Checklist

Inspected by (Print Name, Initials): *If multiple, list all.*		Report Year:	
Areas Inspected: *(see SCM location map in Post Construction Stormwater Management System Operations & Maintenance Plan)*		*If corrective action is required AND a re-inspection is warranted, indicate* Re-check date:	

Inspection frequency key: A = Annually on_____ ___(*Specify Date, i.e. October 15th*) of each year, M = Monthly, S = after major storm events

Inspection Items	Inspection Frequency	Date Inspected	Inspectors Initials	Maintenance Needed? (Yes/No)	Comments/Description
Is there standing water longer than 1 week after a storm event?	S				
Evidence of erosion?	S				
Vegetation appropriate and healthy?	A				
Area free of debris?	M				
Inlets free of obstructions?	M				
Is there obviously trapped sediment in need of removal (covers vegetation or greater than 3-inches at any spot)?	A				

Inspector comments: *(Use additional sheets or back of this sheet if more room is necessary, include Inspector's initials.)*

Overall condition of facility: ☐ Acceptable ☐ Unacceptable

Corrective Action Needed	Due Date

The next routine inspection is scheduled for approximately: _____

Property APN: _____ SCM # _____ Page ___ of ___

EXAMPLE 2: Catch Basin(s)

Inspection and Maintenance Checklist

Inspected by (Print Name, Initials): *If multiple, list all.*		Report Year:	
Areas Inspected: *(see SCM location map in Post Construction Stormwater Management System Operations & Maintenance Plan)*		*If corrective action is required AND a re-inspection is warranted, indicate* Re-check date:	

Inspection frequency key: A = Annually on _____(*Specify Date, i.e. October 15th*) of each year, M = Monthly, S = after major storm events

Inspection Items	Inspection Frequency	Date Inspected	Inspector's Initials	Maintenance Needed? (Yes/No)	Comments/Description
Inlets free of obstructions?	A				
Basins free of obstructions, debris (vegetation)?	A				
Drainage area & slopes leading to catch basin free of sediment & debris?	A				
Is there obviously trapped sediment in need of removal (greater than 3 inches)?	A				

Inspector comments: *(Use additional sheets or back of this sheet if more room is necessary, include Inspector's initials.)*

Overall condition of facility: ☐ Acceptable ☐ Unacceptable

Corrective Action Needed	**Due Date**

The next routine inspection is scheduled for approximately: _____

APPENDIX K

STORMWATER CONTROL PLAN CHECKLIST

A Stormwater Control Plan (SWCP) prepared by a Professional Engineer is required for all non-exempt projects. A preliminary SWCP is required for Planning Permit approval and a final SWCP shall be required prior to issuance of a Building Permit. The SWCP shall include the following (check all that apply or mark N/A):

Preliminary SWCP for Planning Permit application	COMPLETED
1. Project Information	
a. Project name	
b. Application number	
c. Address and assessor's parcel number	
d. Name of Applicant	
e. Name of Owner	
f. Project Phase number (if project is being constructed in phases)	
g. Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description	
2. Project Areas	
a. Total project site area	
b. Total new impervious surface area	
c. Total replaced impervious surface area	
d. Total new pervious area	
e. Calculation of Net Impervious Area	
3. Acknowledgement of the Performance Requirements that apply:	
a. PR No.1 – Site Design and Runoff Reduction	
b. PR No.2 – Water Quality Treatment	
c. PR No. 3 – Runoff Retention	
d. PR No. 4 – Peak Management	
4. Site Assessment Summary	
5. Summary of Site Design and Stormwater Control Measures selected for the project.	
6. Location and general configuration of all SCMs used shown on the plans	

Final SWCP for Building Permit application (all of above plus the following):	COMPLETED
1. List and describe all LID Measures Used	
a. List all site design measure incorporated into the design of the project	
b. Location and detail for all runoff reduction measures used	
c. Location and detail for all post-construction structural SCMs	
2. Summary Table of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area and the entire site	
3. Supporting Calculations used to comply with the applicable on-site performance requirements	
4. Documentation demonstrating infeasibility where on-site compliance cannot be achieved	
5. Documentation demonstrating percentage of the project's Equivalent Impervious Surface Area dedicated to retention-based Stormwater Control Measures	
6. Documentation certifying that the selection, sizing, and design of the Stormwater Control Measures meet the applicable full or partial performance requirements.	
7. O&M Plan for all structural SCMs to ensure long-term performance	
8. Statement of Compliance: Statement that Performance Requirements 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 Performance Requirements through Alternative Compliance	