

## Background / Regulatory Requirements

*This Chapter summarizes the impacts of development on stormwater quality and quantity and explains the post-construction stormwater control requirements for development projects.*

### 2.1 Stormwater Issues in Developed Areas

Throughout the country, stormwater runoff is a leading source of pollutants for water bodies that fail to meet water quality standards<sup>1</sup>. In the San Francisco Bay watershed, urban and agricultural runoff is currently considered to be the **largest source of pollutants** to aquatic systems.<sup>2</sup> Although stormwater runoff is part of the natural hydrologic cycle, human activities can alter natural drainage patterns, introduce pollutants, and increase erosion, degrading natural habitats.

#### 2.1.1 Stormwater Runoff in a Natural Setting

The natural water cycle circulates the earth's water from sky, to land, to sea, to sky in a never-ending cycle. In a pristine setting, soil consists of a complex matrix of mulch, roots and pores that absorb rainwater. As **rainwater infiltrates slowly into the soil**, natural biologic processes remove impurities. Because most rainstorms are not large enough to

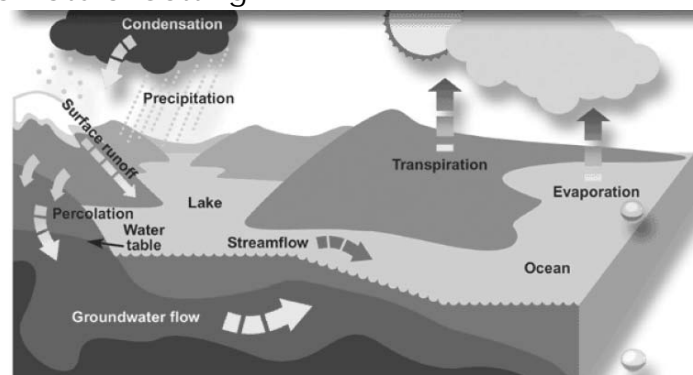


Figure 2-1: The Water Cycle (NGRDC/GDNR, 2005/06)

<sup>1</sup> See the USEPA's list of Stormwater Frequently Asked Questions, at [http://cfpub.epa.gov/npdes/faqs.cfm?program\\_id=6](http://cfpub.epa.gov/npdes/faqs.cfm?program_id=6)

<sup>2</sup> San Francisco Bay Regional Water Quality Control Board, Basin Plan, 2004

fully saturate the soil, only a small percentage of annual rainfall flows over the surface as runoff. The natural vegetation tends to slow the runoff and maintain a sheet flow condition, allowing suspended particles and sediments to settle. In the natural condition, the hydrologic cycle creates a stable supply of groundwater, and surface waters are naturally cleansed of impurities. Sediment is carried with the flow of stormwater runoff, but in a natural setting, creeks typically find an equilibrium in which sediment inflow to a given reach of stream generally equals sediment outflow from that reach.

### 2.1.2 Stormwater Runoff in Urban or Urbanizing Areas

In developed areas, impervious surfaces – such as roads, parking lots and rooftops – prevent water from infiltrating into the soil. **Most of the rainfall remains on the surface**, where it washes debris, dirt, vehicle fluids, chemicals, and other pollutants into the local storm drain systems. Once in the storm drain, polluted runoff flows directly into creeks and other natural bodies of water. Figure 2-2 contrasts the percentage of rainfall that becomes stormwater runoff in a natural vs. an urban setting.

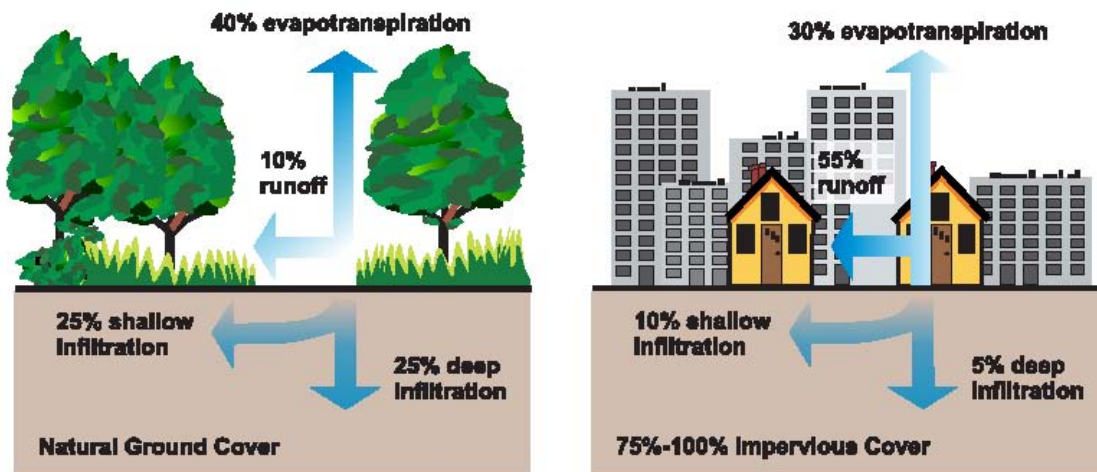


Figure 2-2: Change in volume of stormwater runoff after development. (USEPA, 2003)

Not only does urban stormwater runoff **wash pollutants into local waterways**, but it can also cause natural creek channels to erode. When impervious surfaces are built, rainwater runs off at **faster rates and in larger volumes** than in the natural condition. This effect is called hydrograph modification or hydromodification. Natural creek channels must suddenly handle much greater volumes of water traveling at much faster rates, greatly increasing the duration of erosive forces on their bed and banks. In response to these changes, creek channels enlarge by eroding and may also become less stable. Figures 2-3 and 2-4 contrast creek channels in the natural condition and creek channels subject to the effects of hydromodification.

## 2.2 Post-Construction Stormwater Controls

Various permanent control measures have been developed in order to **reduce the long-term impacts** of development on stormwater quality and creek channels. These permanent control measures are often called post-construction stormwater controls, low impact development (LID) techniques, or post-construction best management practices (BMPs) to distinguish them from the temporary construction BMPs that are used to control sedimentation and erosion while a project is being constructed. **LID techniques** reduce water quality impacts by preserving and re-creating natural landscape features, minimizing imperviousness, and then infiltrating, storing, detaining, evapotranspiring (evaporating stormwater into the air directly or through plant transpiration), and/or biotreating stormwater runoff close to its source, or onsite.



Figure 2-3: Creek with Natural Banks



Figure 2-4: Creek Impacted by Hydromodification

Post-construction stormwater control measures can be divided into four categories: site design measures, source control measures, stormwater treatment measures, and hydromodification management measures. Each of these categories is described below.

### 2.2.1 Site Design Measures

Site design measures are **site planning techniques** that help reduce stormwater pollutants and increases in the peak runoff flow and duration, by protecting existing natural resources and reducing impervious surfaces of development projects. Some examples of site design measures include:

- Minimize land disturbance and preserve high-quality open space;
- Minimize impervious surfaces by using narrow streets, driveways and sidewalks or construct them with pervious paving;
- Minimize impervious surfaces that are directly connected to the storm drain system by routing runoff to landscaped areas;
- Cluster structures and paved surfaces; and

- Use landscaping as a drainage feature.

### 2.2.2 Source Control Measures

Source control measures consist of either structural project features or operational “good housekeeping” practices that **prevent pollutant discharge and runoff** at the source, and keep pollutants from coming into contact with stormwater. Examples of structural source controls include:

- Roofed trash enclosures;
- Berms that control run-on to or runoff from a potential pollutant source; and
- Connecting areas used for washing equipment such as floor mats and storage racks to the sanitary sewer. (Note that any sanitary sewer connections must be approved by the local permitting authority.)

Examples of operational source controls include:

- Marking storm drain inlets with a “No Dumping” message;
- Street or parking lot sweeping; and
- Regular inspection and cleaning of storm drain inlets.

### 2.2.3 Stormwater Treatment Measures

Stormwater treatment measures are engineered systems that are designed to **remove pollutants from stormwater** using processes such as filtration, infiltration, and sedimentation. Stormwater treatment measures must be sized to comply with one of the hydraulic design criteria listed in MRP Provision C.3.d, which are described in Section 5.1 of this handbook.

Stormwater treatment measures can be categorized as either **low impact development (LID) treatment measures** or non-LID. LID treatment measures are designed to mimic a site’s predevelopment hydrology and provide stormwater treatment close to sources of runoff. The MRP requires the use of LID treatment measures in private development and identifies acceptable LID treatment measures as rainwater harvesting and use, infiltration, evapotranspiration, and biotreatment.

Chapter 6 provides technical guidance specific to treatment measures listed in Table 2-1.

<b>Table 2-1 Stormwater Treatment and Site Design Measures Described in Chapter 6</b>		
	<b>LID</b>	<b>Non-LID<sup>3</sup></b>
<b>Treatment Measures</b>		
Bioretention areas	✓	
Flow-through planters	✓	
Tree well filters	✓ If biotreatment soils are used	✓ If biotreatment soils not used
Infiltration trench	✓	
Subsurface infiltration system	✓	
Rainwater harvesting and use	✓	
Media filter		✓
Extended detention basins		✓
<b>Site Design Measures</b>		
Green roofs	✓	
Pervious pavement	✓	
Grid pavements	✓	

For very limited types of urban infill, high density and transit oriented development, referred to as “Special Projects,” use of non-LID tree well filters and media filters may be allowed. (See Section 2.3.3 for more information on Special Projects.)

#### 2.2.4 Hydromodification Management Measures

If a project will be increasing the amount of impervious surface on the site, compared to the pre-project condition, and is located in the drainage area to a creek that is susceptible to erosion, the project may need to implement hydromodification management (HM) measures, either on-site, off-site, or within the creek channel. HM measures include site design, hydrologic source control, and treatment measures that promote infiltration or otherwise **minimize the change in the peak flow, volume and duration of runoff**, when compared to the pre-project condition. HM measures may also include constructed facilities (such as basins, ponds, or vaults) that manage the flow rates and volumes of stormwater leaving a site (or from several sites that discharge to a regional facility), and under some conditions may also include re-engineering of at-risk channels downstream from the site. In some cases, a single stormwater control measure may be used to meet both the LID treatment and HM requirements for a project. More information on applicability and sizing of HM controls is provided in Chapter 7.

<sup>3</sup> Starting December 1, 2011, non-LID treatment measures are not allowed as stand-alone treatment (unless allowed in Special Projects), but non-LID treatment measures may be included as part of a “treatment train” (see Section 5.6).

## 2.3 Municipal Stormwater Permit Requirements

The development or redevelopment of a property represents an opportunity to incorporate post-construction controls that can reduce water quality impacts of the development over the life of the project. Since 2003, the Urban Runoff Program’s municipal agencies have required new development and redevelopment projects to incorporate post-construction stormwater site design, source control, and treatment measures in their projects. Since 2005, the hydromodification management measures have been required as well, where applicable.

The Municipal Regional Stormwater Permit (MRP), adopted by the San Francisco Bay Regional Water Quality Control Board in November 2015 includes requirements for incorporating LID-based post-construction stormwater control measures into new development and redevelopment projects. These requirements are included in Provision C.3 of the MRP. The text of Provision C.3 and the entire MRP (Order No. RB2-2015-0049) can be found at the following link:

[http://www.waterboards.ca.gov/sanfranciscobay/water\\_issues/programs/stormwater/Municipal/R2-2015-0049.pdf](http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/R2-2015-0049.pdf).

### 2.3.1 Do the C.3 Requirements Affect My Project?

Provision C.3.b establishes thresholds at which new development and redevelopment projects must comply with Provision C.3. However, Provision C.3 also states that “all projects, regardless of size should consider incorporating appropriate source control and site design measures that minimize stormwater pollutant discharges to the maximum extent practicable”. Thus, municipalities may include standard **stormwater conditions of approval** as needed for all projects that receive development permits. These conditions of approval may require site design and source control measures as appropriate.

Regardless of a project’s need to comply with Provision C.3, municipalities may apply standard **stormwater conditions of approval** to projects that receive development permits.

#### **PROVISION C.3 SIZE THRESHOLDS**

The thresholds for determining whether Provision C.3 applies to a project are based on the amount of impervious surface that is created and/or replaced by a project, as described below.

- Projects that create and/or replace **10,000 square feet or more** of impervious surface must comply with Provision C.3. These include construction of new roads (and associated bike lanes and sidewalks) and widening of existing roads with additional travel lanes.

- Projects involving Special Land Use Categories including uncovered parking areas (stand-alone or part of another use), restaurants, auto service facilities<sup>4</sup> and retail gasoline outlets that create and/or replace **5,000 square feet or more** of impervious surface must comply with Provision C.3.
- Projects that create and/or replace **1 acre or more** of impervious surface may need to comply with the hydromodification management requirements of Provision C.3.g.

### **CALCULATING IMPERVIOUS SURFACE**

An “impervious surface” is any material that prevents or substantially **reduces infiltration of water into the soil**. This includes building roofs, driveways, patios, parking lots, impervious decking, streets, sidewalks, and any other continuous watertight pavement or covering. Impervious surface is calculated in terms of square feet or, for larger sites, in acres. The area of building roofs includes not only the footprint of the main building or structure, but also garages and other accessory structures. Pervious pavement underlain with pervious soil and pervious storage material, such as a gravel layer sufficient to hold at least the Provision C.3.d volume of rainfall runoff, is not considered an impervious surface.

The municipalities use a “C.3 Data Form” to help project applicants perform these calculations and determine whether or which C.3 provisions apply to their projects. **Contact your local jurisdiction** to obtain its C.3 Data Form or equivalent. More discussion of the contents of the C.3 Data Form is provided in Chapter 3.

### **EXCLUSIONS FOR PENDING PROJECTS**

All projects that meet the descriptions of Regulated Projects in Provision C.3.b are required to implement LID source control, site design, and stormwater treatment requirements as described in Provisions C.3.c and C.3.d of the MRP. However, Provision C.3.b provides for grandfathering of projects that were approved under a previous municipal stormwater permit, have not yet been constructed, and meet specific criteria described as follows:

- Any Regulated Project that has been approved with stormwater treatment measures in compliance with Provision C.3.d (numeric sizing criteria) under a previous municipal stormwater permit is exempt from the requirements of Provision C.3.c (LID requirements) in the current MRP and may proceed with the approved treatment measures.
- Any Regulated Project that was approved with no Provision C.3 stormwater treatment measures under a previous municipal stormwater permit and has not begun construction by the January 1, 2016, is required to fully comply with the requirements of Provisions C.3.c and C.3.d. Permittees may grant exemptions from this requirement if:
  1. The project was previously approved with a vesting tentative map that confers a vested right to proceed with development in substantial compliance with the

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<sup>4</sup> Auto service facilities include the specific Standard Industrial Classification Codes, as follows:  
 5013: Wholesale distribution of motor vehicle supplies, accessories, tools, equipment, and parts.  
 5014: Wholesale distribution of tires and tubes for passenger and commercial vehicles.  
 7532: Repair of automotive tops, bodies, and interiors, or automotive painting and refinishing.  
 7533: Installation, repair, or sale and installation of automotive exhaust systems.  
 7534: Repairing and retreading automotive tires.  
 7536: Installation, repair, or sales and installation of automotive glass.  
 7537: Installation, repair, or sales and installation of automotive transmissions.

ordinance, policies, and standards in effect at the time the vesting tentative map was approved or conditionally approved, as allowed by State law; or

2. The local agency has no legal authority to require changes to previously granted approvals for the project, e.g., the project has been granted a building permit.

This exemption from the LID requirements of Provision C.3.c. may be granted to any Regulated Project as long as stormwater treatment with media filters is provided that comply with the hydraulic sizing requirements of Provision C.3.d.

**EXCLUSIONS FOR SPECIFIC TYPES OF PROJECTS**

Provision C.3.c of the municipal stormwater permit excludes specific types of projects from Provision C.3 requirements, even if they meet the threshold requirements described above. The list of excluded project types is shown in Table 2-2.

<b>Table 2-2 Projects Excluded from Provision C.3 Requirements</b>	
Residential	<ul style="list-style-type: none"> <li>• A detached single-family home project that is not part of a larger plan of development<sup>5</sup>.</li> </ul>
Road projects	<ul style="list-style-type: none"> <li>• Roadway reconstruction within the existing footprint;</li> <li>• Widening of a roadway that does NOT add one or more new lanes of travel;</li> <li>• Impervious trails with a width of 10 feet or less and located more than 50 feet from top of creek banks;</li> <li>• Sidewalks, bicycle lanes and trails that are not built as part of new roadways or are constructed with permeable surfaces;</li> <li>• Bicycle lanes hydraulically separated from a new roadway;</li> <li>• Sidewalks, bicycle lanes and impermeable trails that drain runoff to adjacent vegetated areas, preferably away from creeks; and</li> <li>• Caltrans highway projects and associated facilities<sup>6</sup>.</li> </ul>
Remodeling, repair or maintenance projects	<ul style="list-style-type: none"> <li>• Interior remodels;</li> <li>• Routine maintenance or repair, such as roof or exterior wall surface replacement; or</li> <li>• Pavement resurfacing within the existing footprint. This exclusion applies to any routine maintenance of paved surfaces within the existing footprint, including the repaving that occurs after conducting utility work under the pavement, and the routine reconstruction of pavement, which may include removal and replacement of the subbase. If a repaving project results in changes to the footprint, grade, layout or configuration of the paved surfaces, it would trigger</li> </ul>

<sup>5</sup> Beginning December 1, 2012, single family homes that create or replace 2,500 square feet or more of impervious surface will be required to implement one of six site design measures but not treatment or hydromodification control measures.

<sup>6</sup> Caltrans has its own statewide stormwater NPDES permit, but when a Caltrans project is located in the right-of-way of a municipality covered by the MRP, the project must comply with C.3 requirements.



<b>Table 2-2 Projects Excluded from Provision C.3 Requirements</b>	
	the requirements of Provision C.3. The pavement resurfacing exclusion also applies to the reconstruction of existing roads and trails.

### 2.3.2 What is Required by Provision C.3?

Except for the excluded projects listed in Table 2-2, new development projects that exceed the C.3 thresholds of impervious surface described in Section 2.3.1 must incorporate the stormwater controls listed below:

- Site design measures;
- Source control measures;
- Stormwater treatment measures; and
- Hydromodification management measures, if applicable.

In addition to the thresholds in Section 2.3.1 there are size thresholds for implementing the site design measures but not stormwater treatment or hydromodification management measures:

- Small projects that create and/or replace between 2,500 square feet and 10,000 square feet of impervious surface; and
- Detached single-family home projects that create and/or replace 2,500 square feet or more of impervious surface.

#### **REDEVELOPMENT PROJECTS**

If the project is located on a previously developed site and will **add or replace impervious surface**, then it is considered a redevelopment project and the following special provisions apply to it:

- **“50 Percent Rule:”** Projects that replace or alter less than 50 percent of the existing impervious surface need to treat stormwater runoff only from the portion of the site that is redeveloped. Projects that replace or alter 50 percent or more of the existing impervious surface are required to treat runoff from the entire site.
- A project that does not increase the total amount of impervious surface over the pre-project condition is not required to meet hydromodification management (HM) requirements.

#### **ROAD PROJECTS**

A new road project (including sidewalks and bicycle lanes built as part of the new road) that creates 10,000 square feet or more of newly constructed, contiguous impervious surface is subject to the requirements of Provision C.3. Impervious trails 10 feet wide or more that are constructed within 50 feet of the top of a creek bank are also subject to C.3 requirements. An existing road that is widened with additional traffic lanes is also subject to C.3 requirements, including the **“50 Percent Rule”** for stormwater treatment (see above). See Table 2-2 for types of road projects that are excluded from the requirements of Provision C.3.

**ALTERNATIVE COMPLIANCE**

The MRP allows projects to use “alternative compliance,” to meet stormwater treatment requirements offsite or through in-lieu fee programs. See Chapter 9 for more information.

**HOW DO PROJECTS MEET THE C.3 REQUIREMENTS?**

Permit application submittals must include detailed information showing how the Provision C.3 stormwater requirements will be met. Chapter 3 provides step-by-step instructions for incorporating C.3 stormwater submittals into your permit application.

## 2.3.3 Special Projects

The MRP recognizes that certain urban infill, high density, or transit-oriented development projects have inherent environmental benefits; that is, construction of such projects can either reduce existing impervious surfaces or create less “accessory” impervious areas and automobile-related pollutant impacts. On November 28, 2011, the Water Board adopted Order No. R2-2011-0083 which amended the MRP to allow LID treatment reduction credits for three categories of qualifying projects, known as “Special Projects.”<sup>7</sup> These projects are allowed to use specific types of non-LID treatment measures (tree well filters and media filters) to treat a certain percentage of the site’s runoff, if the use of LID treatment is first evaluated and then determined to be infeasible.

***Prior to granting any LID Treatment Reduction Credits, the municipal agency must first determine the infeasibility of treating 100% of the amount of runoff specified in Provision C.3.d.*** Project applicants must provide a detailed description of the technical evaluation demonstrating why it is infeasible to treat runoff with LID, on- or off-site, with their project submittal. If LID is deemed to be feasible, then it must be implemented as the method of treatment for the C.3.d amount of runoff.

The three categories of Special Projects are:

- Category A: Small Infill Projects ( $\leq \frac{1}{2}$  acre of impervious surface)
- Category B: Larger Infill Projects ( $\leq 2$  acres of impervious surface)
- Category C: Transit-Oriented Development

A Regulated Project that meets the criteria for one of the categories may apply the LID treatment reduction credits according to the project’s density, floor area ratio, and/or location relative to an existing or planned transit hub. (The project may not apply the credits for more than one category.) The criteria and LID treatment reduction credits for each category are described in Appendix J.

## 2.3.4 Site Design Requirements for Small Projects

Effective December 1, 2012, specific sizes of small projects must meet site design requirements in Provision C.3.i of the Municipal Regional Stormwater Permit (MRP). This applies to:

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<sup>7</sup>The “Special Projects” described in this section and in Appendix J are not the same as the “Special Land Use Category” projects described earlier in this chapter, for which the C.3 applicability threshold is 5,000 sq. ft. of impervious surface.

- Projects that create and/or replace at least 2,500 but less than 10,000 square feet of impervious surface; and
- Individual single family home projects that create and/or replace 2,500 square feet or more of impervious surface.

Applicable projects must implement at least one of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for use.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.

The requirements apply to your project if it meets the size thresholds described above, and it received ***final discretionary approval on or after December 1, 2012***. If your project does not require discretionary approval, such as tract map approval, conditional use permit, or design review, then the requirements apply if the building permit is issued on or after December 1, 2012.

Projects in the following four “***Special Land Use Categories***” that create and/or replace 5,000 square feet or more of impervious surface are considered Regulated Projects and are required to implement low impact development (LID) stormwater treatment, source control measures, AND site design measures:

- Restaurants;
- Retail gasoline outlets;
- Auto service facilities; and
- Surface parking (stand-alone or part of another use).

The LID site design and treatment measures implemented for Special Land Use Category projects will satisfy the C.3.i requirements.

Appendix K provides guidance to assist in selecting and implementing appropriate site design measures for small projects. Included in Appendix K are four fact sheets that provide detailed information for implementing the site design measures.