STORM WATER STANDARDS

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DRAFT

THE CITY OF SAN DIEGO

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LIST OF ACRONYMS

ADT	Average Daily Traffic
BMPs	Best Management Practices
BIP	BMP Implementation Plan
CASQA	California Stormwater Quality Association
CIP	Capital Improvement Projects
City's	City of San Diego's
HMP	Hydromodification Management Plan
IMPs	Integrated Management Practices
IPM	Integrated pest management
LEAD	Localized Equivalent Area Drainage
LID	Low-Impact Development
NPDES	National Pollutant Discharge Elimination System
NOEC	no observed effects concentration
NOI	Notice of Intent
O&M	Operation & Maintenance
PDPs	Priority Development Projects
RWQCB	Regional Water Quality Control Board
RGOs	Retail Gasoline Outlets
SCCWRP	Southern California Coastal Water Research Project
SIC	Standard Industrial Classification
SUSMP	Standard Urban Storm Water Mitigation Plan
SWPPP	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Loads
WPCP	Water Pollution Control Plan
WQTR	Water Quality Technical Report

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1. Use of These Standards

This chapter describes the purpose of these standards and how they are to be applied.

1.1 Purpose of These Standards

The City of San Diego's (City's) storm water conveyance system, which collects runoff from City streets, rooftops, driveways, parking lots, and other impervious areas, flows directly to local creeks, bays and beaches. Since the City's storm water conveyance system is separate from the sanitary sewer system, the majority of urban runoff from the City is discharged without any form of treatment.

Runoff conveyed and discharged by municipal storm water systems has been identified by local, regional, and national research programs as one of the principal causes of water quality problems in urban areas such as the City of San Diego. This runoff potentially contains a host of pollutants including trash, debris, bacteria, viruses, oil, grease, sediments, nutrients, metals, and toxic chemicals. These contaminants can adversely affect the beneficial uses of receiving creeks, coastal waters, associated wildlife habitat, and public health. Urban runoff pollution is a problem during rainy seasons and also throughout the year due to urban water uses that discharge non-storm water runoff via dry weather flows to the storm water conveyance system.

Land development and construction activities introduce the following water quality concerns:

- Contribution of pollutants to receiving waters based on the creation of new impervious surfaces and the permanent "use" of the project site
- Contribution of pollutants to receiving waters based on the removal or change of vegetation during construction
- Contribution of pollutant based sediment transport caused by increased impervious cover and the resultant increased erosive force
- Significant alteration of drainage patterns

When residential, industrial, office, or recreational areas are developed, new impervious areas are created (roads, parking lots, structures, etc.). Since the natural landscape's ability to infiltrate and cleanse urban runoff is "capped" by the impervious surfaces, rainfall that would have normally percolated into the soil is instead converted to runoff that flows directly to downstream creeks, bays, and beaches. This phenomenon is especially pronounced at low intensity rainfall events. Increases in impervious cover can increase the frequency and intensity of storm water flows.

Additionally, new impervious surfaces often become a source of pollutants associated with development. Pollutants such as automotive fluids, cleaning solvents, hazardous chemicals, sediment, metals, pesticides, oil and grease, and food wastes can be conveyed via impervious surfaces to the receiving storm water conveyance system by urban runoff. Such pollutants often flow untreated through the storm water conveyance system and ultimately into the City's creeks, bays and beaches.

To mitigate the potential for pollution from urban runoff, local, state, and federal agencies have instituted regulations requiring development planning and BMP structural controls for construction and post-construction phases of a proposed project. These standards require treatment of storm water-related pollution from development and redevelopment projects prior to discharge to receiving waters.

The Municipal Storm Water National Pollutant Discharge Elimination System (NPDES) Permit – or Municipal Permit - was issued by the San Diego Regional Water Quality Control Board (RWQCB) on January 24, 2007 to the City, the County of San Diego, the Port of San Diego, and 18 other regional Copermittees (see Suggested Resources in Appendix A). Per the Permit order, the San Diego Copermittees are required to develop and implement storm water pollution regulations for private and public development projects. These regulations include requirements for Low-Impact Development (LID) design approaches and development of a Hydromodification Management Plan (HMP) to mitigate development-related erosion of receiving creeks and rivers.

To comply with the Permit, development projects are required to include storm water Best Management Practices (BMPs) during both the construction and post-construction (permanent) phase of the project. These BMPs shall be designed to reduce pollutants discharged from the project site to the maximum extent practicable (see Appendix E for examples of permanent BMPs and see Appendix H for examples of construction BMPs).

The San Diego Regional Copermittees, including the City, are required to adopt a municipal-specific local Standard Urban Storm Water Mitigation Plan (SUSMP) and ordinances consistent with the RWQCB approved Model SUSMP within 360 days of the Model SUSMP approval (Model SUSMP was approved on March 24, 2009).

The Countywide Model SUSMP (see Suggested Resources in Appendix A) is the general model for compliance with the land development requirements within the Municipal Permit. Each municipality has latitude in determining how to conform to this model standard. The approved Model SUSMP is available at the County of San Diego offices, or online at www.projectcleanwater.org.

This manual significantly conforms to the Model SUSMP and will continue to be used in its present forms until the next required permit update. The approved Model SUSMP contains useful methodologies which may be used to assist in the design of LID facilities in complying with this manual (see Appendix I for the Model SUSMP's LID Design Guide). Specifically, the "design documentation procedure" and "design sheets" for specific LID facilities may be used as a supplement to this manual.

As part of the Model SUSMP development process, the Copermittees collectively reviewed and updated BMP and LID requirements. Applicable SUSMP requirements are incorporated into Priority Project plans as part of the development plan approval process for discretionary projects. Similar requirements are incorporated into City capital improvement projects (CIP).

The primary objectives of the Storm Water Standards manual are as follows:

- Prohibit non-storm water discharges.
- Reduce the discharge of pollutants to storm water conveyance systems to the maximum extent practicable by implementing BMPs during the project's construction and post-development (permanent) phases.
- Provide consistency with the Model SUSMP approved on March 24, 2009.

- Provide guidance for proper implementation of LID facilities and design approaches.
- Provide guidance for conformance with regional hydromodification management requirements.

1.2 When to Apply These Standards

This manual provides processing information related to permanent and construction phase storm water quality requirements for the following project types and phases:

- Private projects processed through the Development Services Department
- Public capital improvements projects processed through the Engineering and Capital Projects Department
- Ongoing maintenance efforts, associated with permanent storm water facilities, to be coordinated by the Operations and Maintenance Department

This manual further guides the project applicant through the selection, design, and incorporation of storm water BMPs into the project's design plan.

1.3 Applicability of Updated Requirements

Construction BMPs

Updated requirements for construction BMPs shall apply to all construction sites that are active at the time of the updated requirement, and to all subsequent construction activity.

Permanent BMPS

The updated requirements for permanent BMPs will apply to project approvals based on the following effective dates with exceptions as outlined below:

Storm Water Standards Updates effective as of ***March 24, 2008***

- New requirement to include Low-Impact Development principles in the project design
- New requirement to use only those treatment control BMPs that are rated Medium of higher for removal efficiencies for the primary pollutants of concern
- New requirement to include hydromodification controls for projects greater than 50 acres

Storm Water Standards updates effective as of ***January 14, 2011***

- Updated hydromodification control requirements based on the Hydromodification Management Plan (HMP) approved by the Regional Water Quality Control Board on July 14, 2010, to be applied to all Priority Development Projects regardless of size unless qualifying for an exemption allowed within the approved HMP

Exceptions

The applicant ***need not comply with*** the above updated requirements if the following actions or approvals occurred before the effective date of the updated requirement:

Discretionary Permits:

1. Applications for tentative maps or development permits that have been deemed complete

2. Applications for extensions of time for tentative maps or development permits that have been deemed incomplete

Construction Permits

3. Applications for construction permits or extensions to construction permits have been deemed complete
4. Applications for Construction permits or extensions to construction permits that are entitled by a tentative map or development permit that has been deemed complete
5. Applications for extensions to construction permits where the construction is substantially complete as determined by the City Engineer or Building Official

CIP Projects

6. For City projects, when 30 percent design is complete and where accommodating the new requirements would cause the City to not meet a committed obligation for time of completion

2. Determining Requirements for Permanent Best Management Practices

Requirements for permanent BMPs are determined based on criteria set forth in the City's Storm Water Requirements Applicability Checklist. Projects are identified by three categories:

- Priority Development Project (see Section 2.1)
- Standard Development Project (see Section 2.2)
- Exempt (see Section 2.3)

Project applicants must complete the "Storm Water Requirements Applicability Checklist" in Appendix B[1] to determine if their project is subject to permanent and construction storm water BMP requirements. This form must be completed for all permit applications, even if previous approvals exist. The checklist must be signed by the responsible party for the project and submitted with the permit application.

Applicants may verify the project's storm water BMP requirements through a single discipline preliminary review of the project (see Development Services Department Information Bulletin No. 513). The project design must include all required permanent BMPs (as determined from the Storm Water Requirements Applicability Checklist) prior to deeming the application package complete.

2.1 Priority Development Project

The Municipal Permit requires specific criteria be applied to Priority Development Projects (PDPs). Table 2-1 below, which reflects criteria in the Storm Water Requirements Applicability Checklist, describes criteria used to classify projects as PDPs. Proposed projects on previously undeveloped land are classified as PDPs if they satisfy one or more of the categories listed in Table 2-1.

Table 2-1. Priority Development Project Determination

Yes	No		Is the project in any of these categories?
❑	❑	A	**Housing subdivisions of 10 or more dwelling units.** Examples: single-family homes, multi-family homes, condominiums, and apartments.
❑	❑	B	**Commercial development greater than one acre.** Examples: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.

[1] The Storm Water Requirements Applicability Checklist may also be obtained from the Development Services Department's Development Process: Step-by-Step website http://www.sandiego.gov/development-services/devprocess/define/application.shtml

Table 2-1. Priority Development Project Determination			
Yes	**No**		**Is the project in any of these categories?**
❑	❑	**C**	**Heavy industrial development greater than one acre.** Examples: manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas (bus, truck, etc.).
❑	❑	**D**	**Automotive repair shops.** A facility categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.
❑	❑	**E**	**Restaurants.** Any facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all Model SUSMP requirements except for structural treatment BMP numeric sizing criteria requirements and hydromodification requirements.
❑	❑	**F**	**Hillside developments greater than 5,000 square feet.** Any development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions or where the development will grade on any natural slope that is twenty-five percent or greater.
❑	❑	**G**	**Water Quality Sensitive Areas.** All development located within, directly adjacent to, or discharging directly to a Water Quality Sensitive Area (as depicted in Appendix C) in which the project either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" is defined as being situated within 200 feet of the Water Quality Sensitive Area. "Discharging directly to" is defined as outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.
❑	❑	**H**	**Parking lots with a minimum area of 5,000 square feet or a minimum of** 15 parking spaces and potential exposure to urban runoff.
❑	❑	**I**	**Street, roads, highways, and freeways.** Any new paved surface in excess of 5,000 square feet used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
❑	❑	**J**	**Retail Gasoline Outlets (RGOs)** that are: (a) 5,000 square feet or more or (b) have a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

To use Table 2-1, review each definition A through J. If any of the definitions match the proposed project, the project is a Priority Development Project. Note the following:

- Some thresholds are defined by square footage of impervious area created while others are defined by the total area of the proposed development.
- The City of San Diego may choose to designate projects not satisfying categories in Table 2-1 as PDPs, based on potential impacts to stormwater quality.
- If a new development project feature such as a parking lot falls into a Priority Development Project category, then the entire project footprint is subject to Priority Development Project requirements.

Redevelopment projects on previously developed sites are classified as PDPs if they meet all of the following criteria:

- If the project creates, adds, or replaces 5,000 square feet or more of impervious surface
- If the project definition matches any of the categories (A-J) listed in Table 2-1

Projects on previously developed sites may also need to retrofit storm water BMPs to treat runoff from all impervious areas of the entire site. For sites creating or replacing more than 5,000 square feet of impervious area, the "50% Rule" for previously developed projects would be in effect:

- If the new project increases or replaces 50 percent or more of the previously existing impervious surface and storm water BMP requirements did not apply to the existing development, then the entire project must be included in a retrofit BMP treatment design.
- If less than 50 percent of the previously existing impervious surface is increased or replaced, only new impervious area must be included in the BMP treatment design.

Figure 2-1 below outlines the process for determining whether a proposed redevelopment project is a Priority Development Project, Standard Development Project, or exempt from implementing permanent BMPs.

Effective January 24, 2010, the Municipal Permit requires additional projects to be subject to the Priority Development Project requirements for permanent BMPs. These additional PDPs shall include all other pollutant generating development projects that result in the disturbance of one acre or more of land. The Permit further defines "pollutant generating development projects" as those projects that generate pollutants at levels greater than background levels.

This additional requirement will apply to all development project deemed complete after January 24, 2010 or to Capital Improvement Projects for which design was initiated after January 24, 2010. Projects not considered to be new development or significant redevelopment (according to Definition provided in Appendix J of this manual) are excluded from this rule.

Generally, most projects which include impervious surfaces and/or incorporate landscaping that requires the use of fertilizers or pesticides are considered to generate pollutants above background levels. In most cases, linear pathway projects designed for infrequent vehicle use (such as emergency or maintenance access) or pedestrian or bicycle use are not considered to generate pollutants above background levels if they are built with pervious surfaces or if they sheet flow to pervious surfaces prior to discharge to receiving waters.

Requirements for PDPs are presented in Chapter 4 of this manual. PDPs are required to prepare a Water Quality Technical Report (WQTR) and guidelines for WQTR preparation are provided in Appendix F of this manual.

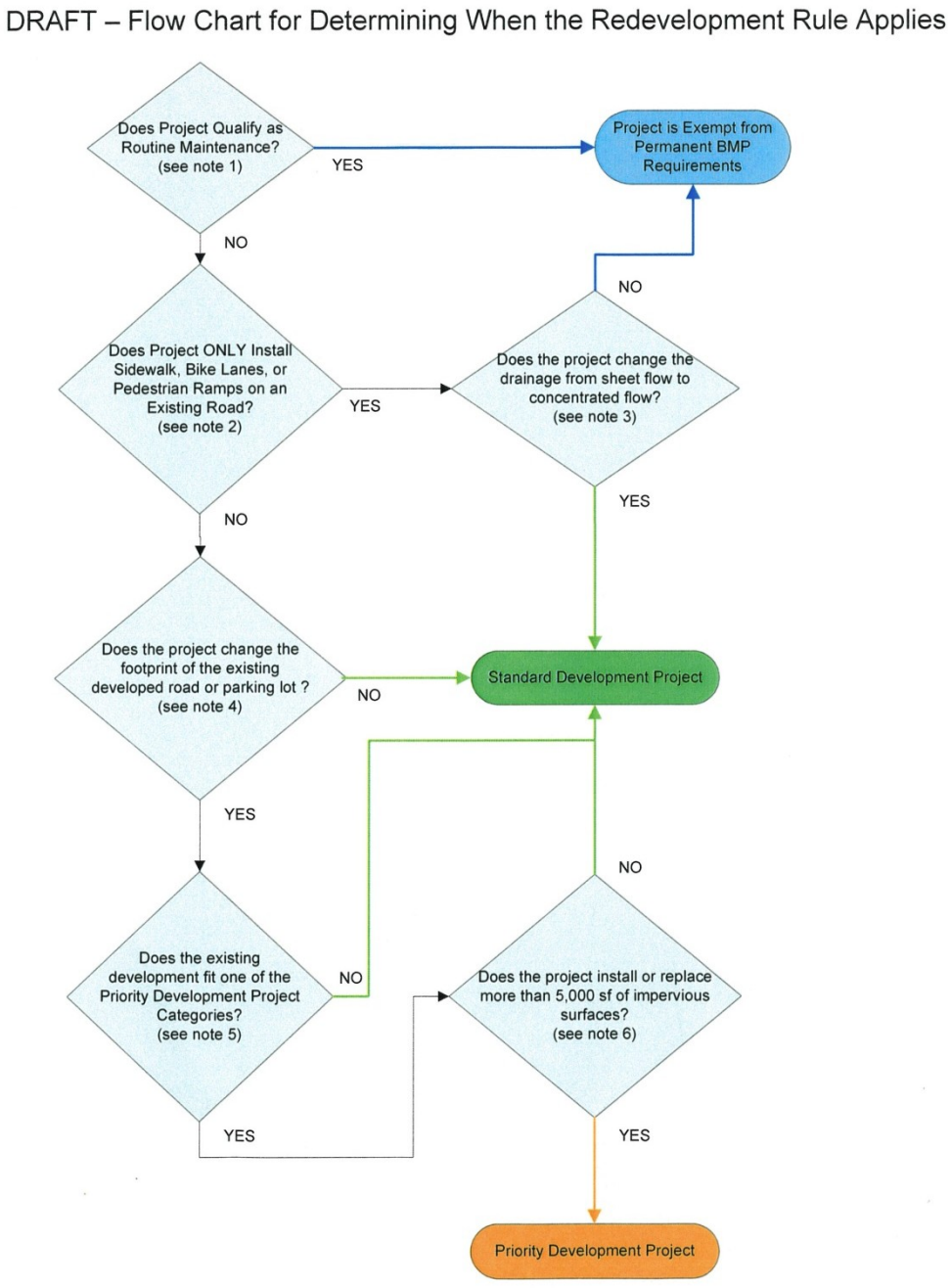

Figure 2-1. Flow Chart for Determining Applicability of Redevelopment Rule

2.2 Standard Development Project

Standard Development Projects include all projects not considered to be PDPs as defined in Section 2.1 and that do not qualify as an exempt project as defined in Section 2.3.

Table 2-2 below, which reflects criteria in the Storm Water Requirements Applicability Checklist, describes criteria used to classify projects as a Standard Development Project. Proposed projects are classified as Standard Development Projects if they satisfy one or more of the categories listed in Table 2-2.

Table 2-2. Standard Development Project Determination

Yes	No		Does the Project Include?
❑	❑	A	New impervious areas, such as rooftops, sidewalks, roads, parking lots, paths or driveways.
❑	❑	B	New pervious landscape areas and irrigation systems
❑	❑	C	Permanent structures within 100 feet of any natural water body
❑	❑	D	Trash storage areas
❑	❑	E	Liquid or solid material loading or unloading area
❑	❑	F	Vehicle or equipment fueling, washing or maintenance areas
❑	❑	G	Requirements for an NPDES Permit for Storm Water Discharges Associated with Industrial Activities (except construction)
❑	❑	H	Commercial or industrial waste handling or storage, excluding typical household or office waste
❑	❑	I	Any grading or ground disturbance during construction
❑	❑	J	Any new storm drains or alteration of existing storm drains

Redevelopment projects on previously developed sites are classified as Standard Development Projects if they meet all of the following criteria:

- If the project does not quality as a Priority Development Project as detailed in Section 2.1
- If the project definition matches any of the categories (A-J) listed in Table 2-2
- If the project alters the footprint of an existing developed road or parking lot

Requirements for Standard Development Projects are presented in Chapter 3 of this manual. Standard Development Projects are required to prepare a Water Pollution Control Plan (WPCP) and guidelines for WPCP preparation are provided in Appendix G of this manual.

2.3 Projects Exempt from Requirements for Permanent Best Management Practices

Requirements for permanent storm water BMPs are intended for land development, redevelopment, and capital improvements PDPs (Section 2.1) and Standard Development Projects (Section 2.2). Exempted projects include the following:

- Routine maintenance or repair projects, such as pothole repairs
- Routine replacement of roofs or exterior structure surfaces
- Routine pavement resurfacing
- Trenching and resurfacing associated with utility work
- Interior remodels
- Redevelopment projects that only install sidewalks, bike lanes, or pedestrian ramps on an existing road and do not change sheet flow condition to a concentrated flow condition (see Figure 2-1).

It should be noted the other requirements, such as source control BMP measures, still apply to the exempted project types listed above. See the Definitions section in Appendix J for further definition of these exempted categories.

3. Required Permanent Best Management Practices for Standard Development Projects

Standard Development Projects are subject to all requirements detailed in this chapter. Through application of these requirements the project applicant shall ensure that the project:

- Reduces discharges of pollutants to the City storm water conveyance system to the maximum extent practicable
- Does not cause or contribute to the violation of water quality standards in the receiving waters.

3.1 Source Control BMPs

Some everyday activities, such as trash recycling and disposal and the washing of vehicles and equipment, generate pollutants that eventually drain to the storm water conveyance system. These pollutants can be minimized by applying source control BMPs.

Such source control BMPs include permanent, structural features incorporated into the project plans as well as operational BMPs, including regular street sweeping and "good housekeeping" practices, which must be implemented by the site's occupant or user.

Standard Development Projects must detail source control BMPs to be incorporated into the project design or long-term project operations plan. Required source control BMPs are outlined below. Additional source control requirements will apply to PDPs as outlined in Section 4.2.

3.1.1 Use Efficient Irrigation Systems & Landscape Design

- Implement rain shutoff devices to prevent irrigation during and after precipitation events in accordance with Section 2.3-4 of the City of San Diego's Landscape Standards (see Suggested Resources in Appendix A).
- Reduce irrigation contribution to dry-weather runoff by avoiding spray irrigation patterns where overspray to paved surfaces or drain inlets will occur.
- To avoid overwatering and potential irrigation runoff, design irrigation systems to each landscape area's specific water requirement.
- Implement flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Avoid locating drain inlets in lawn areas, since such inlets tend to be sources or irrigation runoff and the transport mechanism for lawn care products. Design the grading and drainage systems such that drain inlets can be located outside of the lawn area, or include a non-turf buffer around the inlet.
- Add additional measures regarding the design of inlets in landscaped areas based upon recent studies conducted by the City (see Suggested Resources in Appendix A).

3.1.2 Design Trash Storage Areas to Reduce Pollution Contribution

Trash storage areas shall:

- Be paved with an impervious surface designed to prevent run-on from adjoining areas and screened or walled to prevent off-site transport of trash.
- Contain attached lids on all trash containers to prevent rainfall intrusion.
- Contain a roof or awning, at the discretion of the City, for high usage trash areas such as those for fast food establishments, convenience stores, and high-density residential developments.

3.1.3 Design Outdoor Material Storage Areas to Reduce Pollution Contribution

Materials with the potential to contaminate urban runoff shall be:

- Placed in an enclosure such as a cabinet, shed, or other structure that prevents contact with rainfall or runoff and prevents spillage to the storm water conveyance system.
- Protected by secondary containment structures such as berms, dikes, or curbs when the material storage area includes hazardous materials. The storage area shall be paved and sufficiently impervious to contain leaks and spills and be covered by a roof or awning to minimize direct precipitation within the secondary containment area.

3.1.4 Design Loading Docks to Reduce Pollution Contribution

Loading docks areas shall:

- Provide overhead cover where appropriate to prevent precipitation contact with debris and potential spills.
- Isolate drainage in the loading dock area through the use of paved berms and/or grade breaks to prevent adjacent runoff from entering the loading area and to prevent liquid spills from discharging from the loading area.

3.1.5 Employ Integrated Pest Management Principles

Integrated pest management (IPM) is an ecosystem-based pollution prevention strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as:

- Biological control
- Habitat manipulation
- Use of resistant plant varieties

Pesticides are used only after monitoring indicates they are needed according to established guidelines. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the surrounding environment. More information regarding pesticide application may be obtained at the following University of California-Davis website: http://www.ipm.ucdavis.edu/WATER/U/index.html.

To eliminate or reduce the need for pesticide use, the following strategies can be used:

- Plant pest-resistant or well-adapted plant varieties
- Discourage pests by modifying the site and landscaping design

IPM educational materials should be distributed to future site residents and tenants. These educational materials should address the following:

- Use of barriers, screens, and caulking to keep pests out of buildings and landscaping
- Physical pest elimination techniques, such as weeding, washing , or trapping pests
- Relying on natural enemies to eliminate pests
- Proper use of pesticides as a last line of defense

3.1.6 Provide Storm Water Conveyance System Stamping and Signage

- Concrete stamping, or approved equivalent method, shall be provided for all storm water conveyance system inlets and catch basins within the project area.
- Language associated with the stamping (e.g., "No Dumping – I Live in San Diego Bay") must be satisfactory to the City Engineer. Stamping may also be required in Spanish.
- Post signs and prohibitive language (with graphical icons) which prohibit illegal dumping at trailheads, parks, building entrances and public access points along channels and creeks within the project area.

3.1.7 Manage Fire Sprinkler System Discharges

For new buildings with fire sprinkler systems, design fire sprinkler systems as follows:

- Contain discharges from sprinkler systems' operational maintenance and testing and convey discharges to the sanitary sewer system.

3.1.8 Manage Air Conditioning Condensate

Air conditioning condensate is a source of dry-weather runoff and elevated copper levels. Include design features to manage this pollutant source, such as the following:

- Direct air conditioning condensate to the sanitary sewer system
- Direct air conditioning condensate to landscaping areas

3.1.9 Use Non-Toxic Roofing Materials Where Feasible:

- Avoid the use of galvanized steel or copper for roofs, gutters, and downspouts
- If using such materials, reduce the potential for leaching of metals by applying a coating or patina
- Avoid composite roofing materials that contain copper

3.1.10 Other Source Control Requirements

- Require implementation of post-construction soil stabilization practices, such as the re-vegetation of construction sites, in conformance with the approved Landscaping Plan and Grading Plans.

- Provide for pet waste collection dispensers where applicable.
- Provide trash receptacles in areas of high pedestrian traffic and in front of retail convenience stores

3.2 Low-Impact Development Design Practices

All Standard Development Projects shall be subject to the LID BMP requirements detailed in this section. Additional LID requirements will apply to PDPs as outlined in section 4.4.

The objectives of the Standard Development Project LID BMP requirements are to detain and filter runoff using natural features. Storm water retention for storm water reuse represents a potential added benefit of LID facilities, but is not specifically required as part of Standard Development Project LID requirements.

The applicability of Standard Development Project LID BMP requirements varies depending on project characteristics such as development density, site location, or other land use issues. While certain landscaping LID features may be incorporated into a detached residential or commercial project, they may not fit into the development footprint of other projects, such as urban high-rise developments.

Additional information regarding LID design approaches can be found in the Countywide Model SUSMP and the City's LID Design Manual (see Suggested Resources in Appendix A).

LID strategies for Standard Development Projects include:

1. Optimize the Site Layout

To minimize storm water related impacts, apply the following design principles to the layout of newly developed and redeveloped sites.

- Utilize existing topography to optimize the site layout and reduce the need for grading. Development envelopes should be focused in the upper elevations of a site to promote sheet flow and natural surface drainage to BMPs or Integrated Management Practices (IMPs) located at lower elevations of the site (IMPs are discussed in detail in Appendix I of this manual).
- Where possible, conform the site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, and replicate the site's natural drainage patterns. Set development sufficiently away from creeks, wetlands, and riparian habitats.
- Hillside areas should be considered more sensitive to development practices than flatter areas.
- Identify soils with high infiltration capacity and, if possible, locate storm water treatment facilities in these locations. Concentrate development on portions of the site with less permeable soils.
- Areas of the site where the erosive potential of the soil is high should be considered more sensitive to development practices than areas of the site where the erosive potential of the soil is lower.
- Conserve natural areas and vegetation. Define the development envelope and identify areas most suitable for development and areas that should be left undisturbed. Areas devoid of vegetation, including previously graded areas and agricultural fields, and areas of non-native vegetation where receiving waters are not present are typically suitable for development.

Conversely, areas of occupied habitat of sensitive species and wetlands areas are typically unsuitable for development.

- Preserve significant trees, especially native trees and shrubs, and identify locations for planting additional native or drought tolerant trees and large shrubs.

2. Minimize Impervious Footprint

For all types of development, limit the overall coverage of paving and roofs. Examine the site layout and circulation patterns to identify areas where landscaping areas can replace areas of proposed pavement.

- Increase building density (number of stories above or below ground) through the design of compact and taller structures.
- Construct walkways, trails, patios, overflow parking lots, alleys and other low-traffic areas with permeable surfaces. Such permeable surfaces could include pervious concrete, porous asphalt, unit pavers, etc..
- Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.
- Promote the implementation of shared driveways where possible.
- Design smaller parking lots with fewer stalls, smaller stalls, more efficient lanes.
- Design indoor or underground parking.
- Minimize the use of impervious surfaces in the landscape design.
- Consider the implementation of permeable pavements into the site design. Identify locations where permeable pavements, such as turf block, unit pavers, pervious concrete, or pervious asphalt could be substituted for impervious concrete or asphalt paving. The Operations and Maintenance Plan for the site must ensure that permeable pavements will not be sealed in the future.
- Potential benefits of vegetated or green roofs include lower heating and cooling costs and better sound insulation, in addition to air quality and water quality benefits. For SUSMP compliance purposes, runoff from vegetated roofs requires no further treatment or detention. For more information on vegetated roofs, see www.greenroofs.org.

3. Disperse Runoff to Adjacent Landscaping

Project designs should direct runoff from impervious areas to adjacent landscaping areas. The design, including consideration of slopes and soils, must reflect a reasonable expectation that an inch of rainfall will soak into the soil and produce no runoff.

Minimize directly connected impervious areas as follows:

- Drain rooftops into adjacent landscaping areas.
- Drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscaping areas.
- Reduce or eliminate curb and gutters from roadway sections, thus allowing roadway runoff to drain to adjacent pervious areas.

- Detain and retain runoff throughout the site. On flatter sites, landscaped areas and IMPs can be interspersed among the buildings and pavement areas. On hillside sites, drainage from upper areas may be collected in conventional catch basins and conveyed to landscaped areas and IMPs in lower areas of the site.
- Use depressed landscaping areas (also known as Self-Retaining Areas – see Appendix I), vegetated buffers, and bioretention areas as amenities and focal points within the site and landscaping design.

4. Construction Considerations

- Minimize soil compaction (see discussion in Countywide Model SUSMP) for landscaped areas of the project site designated for storm water treatment.
- Implement soil amendments. Landscape topsoil improvements play a significant role in maintaining plant and lawn health. Such soil amendments also improve the soil's capacity to retain moisture, which will reduce runoff from the water quality design storm and improve water quality.
- Additional information regarding construction considerations is located in the City's LID Design Manual.

5. Additional Considerations

- Stabilize the site. Vegetate disturbed soils and slopes with drought tolerant vegetation and stabilize permanent channel crossings.
- Convey runoff safely away from the tops of slopes (to prevent slope instability caused by infiltrated runoff)
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, or channels that discharge to unlined channels in accordance with applicable specifications to reduce the potential for erosion and minimize impacts to receiving waters.

3.3 Buffer Measures

According to the Municipal Permit, buffer zones surrounding natural water bodies should be utilized where feasible. Buffer areas, which can include bioretention areas, provide for reduced site imperviousness and opportunities to incorporate LID facilities into the site and landscape design.

Benefits of buffer zones include the following:

- Provides a buffer for aquatic resources from the potential negative impacts of human use of the adjacent land.
- Filters nonpoint source pollutants from incoming runoff.
- Provides habitat for a balanced, integrated, and adaptive community of riparian and aquatic organisms.
- Moderates fluctuations in stream temperature.

Buffer zones should be provided between the edge of the proposed development and the limits of the 100-year floodplain for a distance to be determined by the City. Where buffer zones are infeasible, other buffers such as trees, access restrictions, etc., should be used. Bioretention facilities may be placed in buffer zones, provided that the diffused incoming flow velocity is less than 3 feet per second.

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4. Required Permanent Best Management Practices for Priority Development Projects

PDPs are subject to all requirements of this chapter, except where specific exclusions are stated. Through application of these requirements the project applicant shall ensure that the project:

- Reduces discharges of pollutants to the City storm water conveyance system to the maximum extent practicable.
- Does not cause or contribute to violation of water quality standards in the receiving waters.
- Manages increases in runoff discharge rates and durations that are likely to cause increased erosion of stream beds and banks, silt pollution generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

4.1 Required Studies

4.1.1 Water Quality Technical Report

A Water Quality Technical Report is required for submittal with PDPs. Required elements of Water Quality Technical Reports are provided in Appendix F of this manual. Details from Sections 4.1.2 through 4.1.6 below are included in Water Quality Technical Reports.

4.1.2 Drainage Study

A drainage study prepared in accordance with the City of San Diego Drainage Design Manual shall demonstrate runoff calculations for each sized facility listed in the Water Quality Technical Report. The report shall include a map that clearly delineates the drainage areas that accompany the calculations. The following exceptions to the Drainage Design Manual shall apply to the sizing of water quality and hydromodification facilities:

- The sizing factor methods presented in this manual may be used in lieu of calculations using the rational method
- The storm size will be based on Section 4.3.3 of this manual whenever design requirements specify the “water quality design storm event
- The continuous simulation modeling methods described in the Hydromodification Management Plan shall be used whenever performing hydrology studies for hydromodification requirements
- The hydrologic soil type from a published USGS map, or as determined by a geotechnical engineer, may be used in rational method calculations
- A computerized sizing tool that the City has approved for purposes of sizing these facilities may be used, but adequate documentation of the software version and all input and output parameters must be provided in the report

Any runoff calculations performed for the purpose of sizing bypass, overflow and flood control facilities should be performed strictly by the methods and storm size requirements described in the Drainage Design Manual.

4.1.3 Hydromodification Management Plan

Required details for project-level HMPs are detailed in section 4.5 of this manual. As detailed in more depth in section 4.5, project applicants will first determine if the proposed project is subject to hydromodification criteria. If applicable, hydromodification management facilities shall be required to mitigate project-related increases to discharge rates and durations.

Projects applicants have the option of designing hydromodification management facilities so that discharge rates and durations are mitigated with the flow range of 10 percent of the 2-year flow to the 10-year flow. If a project applicant believes the receiving channel condition to be more stable than the conservative $0.1Q_2$ standard, then channel screening tools developed by the Southern California Coastal Water Research Project (SCCWRP) can be used to assess the receiving channel susceptibility to erosion. If the SCCWRP analysis shows the receiving channel to have a Medium or Low Susceptibility to erosion, then higher lower flow thresholds may be used to size the hydromodification management facilities ($0.3Q_2$ or $0.5Q_2$). The specific process is outlined in the San Diego HMP (see Suggested Resources in Appendix A) and summarized in section 4.5.

4.1.4 Geotechnical Study

The design of any LID or treatment control BMP which allows for infiltration of runoff should be accompanied by geotechnical investigation of the surrounding soils. A Geological Investigation Report should be attached to the Water Quality Technical Report and prepared in conformance with the City of San Diego Technical Guidelines for Geotechnical Reports.

To determine feasibility of a site to infiltrate runoff, the following conditions should be considered.

- Is the site subject to high groundwater groundwater conditions (within 10 feet of the base of infiltration facility)?
- Is the site is close proximity to contaminated soil or areas that use or store hazardous chemicals or materials?
- Is the site constructed on engineered compacted fill (structural fill) subject to hydro-consolidation?
- Does the site have infiltration rate less than 0.52 inches/hour[1]?
- Does the site have a clay percentage >20 percent?
- Does the site have a silt plus clay percentage >40 percent?
- Is the site underlain by impermeable bedrock?
- Is the site within 100 feet of a drinking water well?
- Is the site within 100 feet of an on-site septic system or designated expansion area?
- Does the site have slopes steeper than 25 percent (4 horizontal to 1 vertical)?
- Is the site near slopes prone to instability?

If the answer the any of questions 1-11 above is "Yes," then the site is infeasible for infiltration and infiltration-based facilities should not be constructed.

[1] Stormwater Best Management Practice Design Guide, 2004, EPA/600/R-04/121B http://www.epa.gov/nrmrl/pubs/600r04121/600r04121b.pdf

If the answers to questions 1-11 are all "No," then the site may be feasible for infiltration and a Geotechnical Investigation Report should be prepared in conformance with Appendix F of the City's Geotechnical Guidelines.

The Geotechnical Investigation Report shall:

- Identify areas of the project site where infiltration is likely to be feasible and provide justifications for selection of those areas based on soil types, slopes, proximity to existing features, etc..
- Investigate, evaluate and estimate the vertical infiltration rates and capacities. The site may be broken into sub-basins, each of which has different infiltration rates or capacities. Develop potential infiltration rates and capacities at the sub-basins to be used for design.
- Investigate and estimate the lateral migration rates and pathways of infiltrated water.
- Investigate the subsurface geological conditions and geotechnical conditions that would affect infiltration or migration of water toward structures, slopes, utilities, or other features.
- Investigate depth to groundwater and the nature of the groundwater. Include an estimate of the high seasonal groundwater elevations.
- Estimate the maximum allowable infiltration rates and volumes that could occur at the site that would avoid damage to existing and proposed structures, utilities, slopes, or other features.
- Provide guidance for the selection and location of infiltration BMPs, including the minimum separations between such infiltration BMPs and structures, streets, utilities, manufactured and existing slopes, engineered fills, utilities or other features. Include guidance for measures that could be used to reduce the minimum separations or to mitigate the potential impacts of infiltration BMPs.

Where the site evaluation indicates potential feasibility for on-site stormwater infiltration, field investigation will be necessary to demonstrate suitability. Details for subsurface exploration and testing for stormwater infiltration BMPs are included in Appendix F of the Geotechnical Guidelines.

4.1.5 Identification of Anticipated Project Pollutants

Using Table 4-1 below, identify the project's anticipated pollutants by determining which general project category most closely fits the proposed project type. Projects meeting the definition of more than one general project categories shall identify all general pollutant categories that apply. Descriptions of the general pollutant categories listed in Table 4-1 are listed in Appendix J under the definition of "pollutants of concern."

Designations in Table 4-1 are consistent with the corresponding table in the Countywide Model SUSMP.

Table 4-1. Anticipated and Potential Pollutants Generated by Land Use Type.

General Project Categories	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Housing Development	X	X			X	X	X	X	X

Table 4-1. Anticipated and Potential Pollutants Generated by Land Use Type.

General Project Categories	General Pollutant Categories								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development	P(1)	P(1)	X	P(2)	X	P(5)	X	P(3)	P(5)
Industrial Development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	P(1)
Steep Hillside Developments	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X	X	P(1)
Retail Gasoline Outlets (RGO)			X	X	X	X	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

4.1.6 Identification of Pollutants of Concern for the Receiving Water

For PDPs, the following analysis shall be conducted and reported in the project's Water Quality Technical Report:

- For each of the proposed project discharge points, identify the receiving waters (including hydrologic unit basin numbers) as identified in the most recent version of the *Water Quality Control Plan for the San Diego Basin*[2], prepared by the RWQCB (see Suggested Resources in Appendix A).

[2] To view a copy of the Basin Plan, go to: http://www.swrcb.ca.gov/rwqcb9/programs/basinplan.html

- Identify any receiving waters included in the *2006 CWA Section 303(d) List of Water Quality Limited Segments*[3], approved by the State Water Resources Control Board on October 25, 2006. List all pollutants for which the receiving waters are impaired. To assist in determining a project's pollutants of concern, the City created a reference map showing 303d listed water bodies and associated pollutants. This map, titled, "2006 Clean Water Act Section 303(d) Water Quality Limited Segments," is provided for reference on the SANGIS website[4]. A reduced copy of the map is also included in Appendix D.
- Identify any receiving waters for which Total Maximum Daily Loads (TMDL) have been developed. List all pollutants for which the TMDL was developed.

Note: Some 303(d) listings do not identify a pollutant causing impairment, but instead identify a condition, such as Eutrophic, Benthic Community Degradation, Toxicity, or Sediment Toxicity. To assist in determining the pollutant that would likely cause the 303(d) listing, the following table identifies probable pollutants associated with impairments identified in *2006 CWA Section 303(d) List of Water Quality Limited Segments.*

Table 4-2. Probable Pollutants Causing Clean Water Act Section 303(d) Impairment Listing

Probable Pollutants	303(d) Impairment Listing				
	Eutrophic	Benthic Community Degradation	Sediment Toxicity	Toxicity (in Storm Water Runoff)	Low Dissolved Oxygen
Sediment					
Nutrients	X				X
Heavy Metals		X	X		
Organic Compounds		X	X		X
Trash and Debris					X
Oxygen Demanding Substances	X				X
Oil and Grease					
Bacteria and Viruses					
Pesticides				X	

4.2 Source Control BMPs

Some everyday activities, such as trash recycling and disposal and the washing of vehicles and equipment, generate pollutants that eventually drain to the storm water conveyance system. These pollutants can be minimized by applying source control BMPs.

[3] To view the 2006 303(d) List of Impaired Water Bodies, go to: www.waterboards.ca.gov/tmdl/303d_lists2006.html

[4] To view the City's map titled, "(To be updated) 2006 Clean Water Act Section 303(d) Water Quality Limited Segments," go to: www.sangis.org

Such source control BMPs include permanent, structural features incorporated into the project plans as well as operational BMPs, including regular street sweeping and "good housekeeping" practices, which must be implemented by the site's occupant or user.

PDPs must detail source control BMPs to be incorporated into the project design or long-term project operations plan. Required source control BMPs are outlined below.

Projects shall adhere to each of the individual Priority Development Project category requirements that apply to the project (e.g., a restaurant with more than 15 parking spaces could be required to incorporate the requirements for Dock Areas, Equipment Wash Areas, and Surface Parking Areas' into the project design).

4.2.1 Maintenance Bays

Maintenance bays shall include at least one of the following:

- Repair/ maintenance bays shall be indoors; or,
- Drainage system designed to preclude urban run-on and runoff.

Maintenance bays shall include a repair/maintenance bay drainage system to capture all wash water, leaks, and spills. Drains shall be connected to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm water conveyance system is prohibited.

4.2.2 Vehicle and Equipment Wash Areas

Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be:

- Self-contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and
- Properly connected to a sanitary sewer.

4.2.3 Outdoor Processing Areas

Outdoor processing areas shall:

- Cover or enclose areas that would be the most significant source of pollutants;
- Slope the area toward a dead-end sump; or
- Discharge to the sanitary sewer system.

Berms or site grading shall be utilized to prevent run-on from surrounding areas. Installation of storm drains in areas of equipment repair is prohibited.

4.2.4 Retail and Non-Retail Fueling Areas

Retail and non-retail fueling areas shall be:

- Paved with Portland cement concrete or equivalent smooth impervious surface (asphalt concrete is prohibited);
- Designed to extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less;
- Sloped to prevent ponding;

- Separated from the rest of the site by a grade break that prevents run-on of adjacent urban runoff; and
- Designed to drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.

The overhanging roof structure or canopy shall be:

- Equal to or greater than the area within the fuel dispensing area's grade break; and
- Designed to drain away form the fuel dispensing area.

4.2.5 Steep Hillside Landscaping

Steep hillside areas disturbed by project development shall be landscaped with deep-rooted, drought tolerant and/or native plant species selected for erosion control, in accordance with the Landscape Technical Manual.

4.2.6 Use Efficient Irrigation Systems & Landscape Design

- Implement rain shutoff devices to prevent irrigation during and after precipitation events in accordance with section 2.3-4 of the City of San Diego's Landscape Standards (see Suggested Resources in Appendix A).
- Reduce irrigation contribution to dry-weather runoff by avoiding spray irrigation patterns where overspray to paved surfaces or drain inlets will occur.
- To avoid overwatering and potential irrigation runoff, design irrigation systems to each landscape area's specific water requirement.
- Implement flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Avoid locating drain inlets in lawn areas, since such inlets tend to be sources or irrigation runoff and the transport mechanism for lawn care products. Design the grading and drainage systems such that drain inlets can be located outside of the lawn area, or include a non-turf buffer around the inlet.

4.2.7 Design Trash Storage Areas to Reduce Pollution Contribution

Trash storage areas shall:

- Be paved with an impervious surface designed to prevent run-on from adjoining areas and screened or walled to prevent off-site transport of trash.
- Contain attached lids on all trash containers to prevent rainfall intrusion.
- Contain a roof or awning, at the discretion of the City, for high usage trash areas such as those for fast food establishments, convenience stores, and high-density residential developments.

4.2.8 Design Outdoor Material Storage Areas to Reduce Pollution Contribution

Materials with the potential to contaminate urban runoff shall be:

- Placed in an enclosure such as a cabinet, shed, or other structure that prevents contact with rainfall or runoff and prevents spillage to the storm water conveyance system, and

- Protected by secondary containment structures such as berms, dikes, or curbs when the material storage area includes hazardous materials. The storage area shall be paved and sufficiently impervious to contain leaks and spills and be covered by a roof or awning to minimize direct precipitation within the secondary containment area.

4.2.9 Design Loading Docks to Reduce Pollution Contribution

Loading docks areas shall:

- Provide overhead cover where appropriate to prevent precipitation contact with debris and potential spills, and
- Isolate drainage in the loading dock area through the use of paved berms and/or grade breaks to prevent adjacent runoff from entering the loading area and to prevent liquid spills from discharging from the loading area.
- Include an acceptable method of spill containment such as a shut-off valve and containment areas.

4.2.10 Employ Integrated Pest Management Principles

Integrated pest management (IPM) is an ecosystem-based pollution prevention strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as:

- Biological control
- Habitat manipulation
- Use of resistant plant varieties

Pesticides are used only after monitoring indicates they are needed according to established guidelines. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the surrounding environment. More information regarding pesticide application may be obtained at the following University of California-Davis website: http://www.ipm.ucdavis.edu/WATER/U/index.html.

To eliminate or reduce the need for pesticide use, the following strategies can be used:

- Plant pest-resistant or well-adapted plant varieties
- Discourage pests by modifying the site and landscaping design

IPM educational materials should be distributed to future site residents and tenants. These educational materials should address the following:

- Use of barriers, screens, and caulking to keep pests out of buildings and landscaping
- Physical pest elimination techniques, such as weeding, washing , or trapping pests
- Relying on natural enemies to eliminate pests
- Proper use of pesticides as a last line of defense

4.2.11 Provide Storm Water Conveyance System Stamping and Signage

- Concrete stamping, or approved equivalent method, shall be provided for all storm water conveyance system inlets and catch basins within the project area.
- Language associated with the stamping (e.g., “No Dumping – I Live in San Diego Bay”) must be satisfactory to the City Engineer. Stamping may also be required in Spanish.

- Post signs and prohibitive language (with graphical icons) which prohibit illegal dumping at trailheads, parks, building entrances and public access points along channels and creeks within the project area.

4.2.12 Manage Fire Sprinkler System Discharges

For new buildings with fire sprinkler systems, design fire sprinkler systems as follows:

- Contain discharges from sprinkler systems' operational maintenance and testing and convey discharges to the sanitary sewer system, or

4.2.13 Manage Air Conditioning Condensate

Air conditioning condensate is a source of dry-weather runoff and elevated copper levels. Include design features to manage this pollutant source, including the following:

- Direct air conditioning condensate to the sanitary sewer system
- Direct air conditioning condensate to landscaping areas

4.2.14 Other Source Control Requirements

- Require implementation of post-construction soil stabilization practices, such as the re-vegetation of construction sites, in conformance with the approved Landscaping Plan and Grading Plans.
- Provide for pet waste collection dispensers where applicable.
- Restrict the use of galvanized and copper roofing materials.

4.3 Low-Impact Development Design Practices

Priority Development Projects (PDP) are subject to Low-Impact Development (LID) design standards listed in this section. LID features attempt to mimic predevelopment hydrologic conditions (see Definitions in Appendix J) for the water quality design storm.

The Water Quality Technical Report shall include a detailed analysis to determine the amount of runoff volume reduction that can feasibly be achieved using LID features. The analysis need consider a variety of features that promote storm water infiltration, evapotranspiration, and rainwater harvesting. When possible, the runoff reduction benefit should be quantified using the 85th percentile water quality design storm. After quantifying the feasible amount of runoff reduction, a treatment control method shall be selected and sized for the remaining runoff quantity using the methods described in Section 4.4. Further analysis of runoff reduction may be needed in order to meet hydromodification control requirements in Section 4.5.

In lieu of performing such an analysis, the applicant may choose to follow the procedure outline in Appendix I (the Countywide Model SUSMP approach). This method has the advantage of providing a step-by-step method for complying with the LID, treatment control, and where applicable, hydromodification control requirements in a single integrated approach.

4.3.1 Partial List of Suitable Facilities

LID facilities that retain, reuse, or promote evapotranspiration of storm water include but are not limited to, the following:

- Retention and detention systems that utilize evaporation and evapotranspiration of the retained or detained water without overflowing from sequential water quality design storm events (see Section 3.1.2 of The County of San Diego Low Impact Development Handbook).
- Use of biofilters and pervious surfaces (including vegetated roofs) that have underdrain systems and promote evapotranspiration of as much water as feasible following the rainfall event.
- Incorporating trees and other plants that add foliage material to the landscaping for rainwater interception and evapotranspiration.
- Increasing the water holding capacity of the soil used in landscape areas by minimizing compaction and using soil amendments.
- Use of cisterns and/or rain barrels to capture rain water and release it for irrigation or other uses without overflowing from sequential water quality design storm events.

Site features and BMPs that promote evapotranspiration and/or treat runoff, such as planter boxes with overflow drains, will receive credit as LID BMPs for the entire volume of water that is managed by such systems.

It may be possible to create a site-specific design that uses cisterns to achieve storm water flow control, storm water treatment, and rainwater reuse for irrigation or indoor uses (water harvesting). Such a design could expand the multiple benefits of LID to include water conservation. The following should be considered:

- Facilities must meet criteria for capturing and treating the runoff volume. This volume must be allowed to empty within 24 hours so runoff from additional storms, which may follow, is also captured and treated. Additional volume may be required if the system also stores runoff for longer periods for reuse.
- Storage of water for longer than 72 hours creates the potential for mosquito harborage. Cisterns must be designed to prevent entry by mosquitoes.
- Indoor uses of non-potable water may be restricted or prohibited. Check with City of San Diego regarding such clarifications.

All analyses and justifications prepared for the LID treatment control approach shall be detailed in the project's Water Quality Technical Report.

PDP LID strategies also include the Standard Development Project LID requirements detailed in Section 3.2 and included below.

4.3.2 Additional Guidance on Low-Impact Development Design

Priority Development Projects are required to incorporate all Low-Impact Development principles that may be applicable to the specific project site. The applicant shall consider all of the guidance below, and include these considerations within the Water Quality Technical Report when applicable.

1. Optimize the Site Layout

To minimize storm water related impacts, apply the following design principles to the layout of newly developed and redeveloped sites.

- Utilize topography to optimize the site layout and reduce the need for grading. Development envelopes should be focused in the upper elevations of a site to promote sheet flow and natural surface drainage to BMPs or Integrated Management Practices (IMPs) located at lower elevations of the site (IMPs are discussed in detail in Appendix I of this manual).
- Where possible, conform the site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, and replicate the site's natural drainage patterns. Set development sufficiently away from creeks, wetlands, and riparian habitats.
- Hillside areas should be considered more sensitive to development practices than flatter areas.
- Identify soils with high infiltration capacity and, if possible, locate storm water treatment facilities in these locations. Concentrate development on portions of the site with less permeable soils.
- Areas of the site where the erosive potential of the soil is high should be considered more sensitive to development and areas that should be left undisturbed. Areas devoid of vegetation, including previously graded areas and agricultural fields, and areas of non-native vegetation where receiving waters are not present are typically suitable for development. Conversely, areas of occupied habitat of sensitive species and wetlands areas are typically unsuitable for development.
- Preserve significant trees, especially native trees and shrubs, and identify locations for planting additional native or drought tolerant and large shrubs.

2. Minimize Impervious Footprint

For all types of development, limit the overall coverage of paving and roofs. Examine the site layout and circulation patterns to identify areas where landscaping areas can replace areas of proposed pavement.

- Increase building density (number of stories above or below ground) through design of compact and taller structures.
- Construct walkways, trails, patios, overflow parking lots, alleys and other low-traffic areas with permeable surfaces. Such permeable surfaces could include pervious concrete, porous asphalt, unit pavers, etc.
- Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.
- Promote the implementation of shared driveways where possible.
- Design of smaller parking lots with fewer stalls, smaller stalls, more efficient lanes.
- Design of indoor or underground parking.
- Minimize the use of impervious surfaces in the landscape design.

3. Disperse Runoff to Adjacent Landscaping and IMPs

Project designs should direct runoff from impervious areas to adjacent landscaping areas. The design, including consideration of slopes and soils, must reflect a reasonable expectation that an inch of rainfall will soak into the soil and produce no runoff.

Minimize directly connected impervious areas as follows:

- Drain rooftops into adjacent landscaping areas.
- Drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscaping areas.
- Reduce or eliminate curb and gutters from roadway sections, thus allowing roadway runoff to drain to adjacent pervious areas.
- Detain and retain runoff through the site. On flatter sites, landscaped areas and IMPs can be interspersed among the buildings and pavement areas. On hillside sites, drainage from upper areas may be collected in conventional catch basins and conveyed to landscaped areas and IMPs in lower areas of the site.
- Use depressed landscaping areas (also known as Self-Retaining Areas—see Appendix I), vegetated buffers, and bioretention areas as amenities and focal points within the site and landscaping design.

4. Design and Implementation of Pervious Surfaces

- Consider the implementation of permeable pavements into the site design. Identify locations where permeable pavements, such as turf block, unit pavers, pervious concrete, or pervious asphalt could be substituted for impervious concrete or asphalt paving. The Operations and Maintenance Plan of the site must ensure that permeable pavements will not be sealed in the future.
- Potential benefits of vegetated or green roofs include lower heating and cooling costs and better sound insulation, in addition to air quality and water quality benefits. For SUSMP compliance purposes, runoff from vegetated roofs requires no further treatment or detention. For more information on vegetated roofs, see www.greenroofs.org.

5. Construction Considerations

- Minimize soil compaction (see discussion in Countywide Model SUSMP) for landscaped areas of the project site designated for storm water treatment.
- Implement soil amendments. Landscape topsoil improvements play a significant role in maintaining plan and lawn health. Such soil amendments also improve the soil's capacity to retain moisture, which will reduce runoff from the water quality design storm and improve water quality.
- Additional information regarding construction considerations is located in the City of San Diego's LID Design Manual.

6. Additional Considerations

- Stabilize the site. Vegetate disturbed soils and slopes with drought tolerant vegetation and stabilize permanent channel crossings.
- Convey runoff safely away from the tops of slopes (to prevent slope instability caused by infiltrated runoff).
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, or channels that discharge to unlined channels in accordance with applicable specifications to reduce the potential for erosion and minimize impacts to receiving waters.

Finding the right location for LID treatment facilities on the proposed site involves a careful and creative integration of several factors:

- To make the most efficient use of the site and to maximize aesthetic value, integrate IMPs with site landscaping. Many local zoning codes may require landscape setbacks or buffers, or may specify that a minimum portion of the site be landscaped. It may be possible to locate some or all of the site's treatment and flow-control facilities within this same area, or within utility easements or other non-buildable areas.
- Planter boxes and bioretention areas must be level or nearly level all the way around. Bioretention areas configured as swales may be gently sloped in the linear direction, but opposite sides must be at the same elevation.
- For effective, low-maintenance operation, locate facilities so that drainage into and out of the device is by gravity flow. Pumped systems are feasible, but are expensive, require more maintenance, are prone to untimely failure, and can cause mosquito control problems. Most IMPs require 3 feet or more of head.
- If property is being subdivided now or in the future, the facility should be in a common, accessible area. In particular, avoid locating facilities on private residential lots. Even if the facility will serve only one site owner or operator, make sure the facility is located for ready access by inspectors from the City of San Diego and the County of San Diego's vector control department.
- The facility must be accessible to equipment needed for maintenance. Access requirements for maintenance will vary with the type of facility selected. Planter boxes and bioretention areas will typically need access for the same types of equipment used for landscape maintenance.

4.4 Treatment Control BMPs

Structural treatment control BMP facilities are designed to remove pollutants contained in storm water runoff. Methods of pollutant removal include sedimentation settling, filtration, plant uptake, adsorption, and bacterial decomposition. Floatable pollutants such as oil and debris can be removed with separator structures. Treatment control facilities may need to be used in series as a "Treatment Train" to achieve the desired level of pollutant removal for different pollutants.

After LID site design and source control BMPs have been incorporated into the project design, applicants of PDPs shall design treatment control BMPs designed to infiltrate, filter, and/or treat runoff from the remaining project areas requiring treatment. These treatment control BMPs shall be sized to numeric sizing treatment standards listed in this section. The required LID BMPs may be applied towards the numeric sizing treatment standards satisfactory to the City Engineer. Treatment controls may be strategically located within a drainage basin outside the project boundary.

Structural treatment control BMPs shall meet the following requirements:

- Be designed to remove pollutants to the maximum extent possible based on ratings for pollutant removal efficiency (see section 4.3.1)
- Meet a minimum criteria of "medium removal efficiency" for the most significant pollutants of concern for the project (see section 4.3.1)
- Be correctly sized according to numeric sizing requirements (see section 4.3.3)
- Be implemented close pollutant sources to the extent feasible

Table 4-3 summarizes structural treatment control BMPs available to project applicants. Many of the structural treatment control BMPs shown in Table 4-3 are associated with LID strategies. Project proponents should refer to Appendix I of this manual to assist with the selection of LID structural BMPs listed in Table 4-3.

Alternative storm water BMPs not currently identified in Table 4-3 may be approved at the discretion of the City Engineer, provided the alternative BMP is as effective in removal of pollutants of concern as other feasible BMPs listed in Table 4-3. Once the City Engineer approves a specific BMP for a specific pollutant and sizing standard, then that BMP will be approved under the same conditions for future projects.

Structural treatment control BMPs may be located on- or off-site, used singularly or in combination, or shared by multiple new developments, pursuant to the following criteria:

- All structural treatment control BMPs shall infiltrate, filter, and/or treat the required runoff volume or flow prior to discharging to any receiving water body supporting beneficial uses.
- Shared BMPs shall be operational prior to the use of any dependent development or phase of development. The shared BMPs shall only be required to treat the dependent developments or phases of development that are in use.
- Interim storm water BMPs that provide equivalent or greater treatment than is required may be implemented by a dependent development until each shared BMP is operational. If interim BMPs are selected, the BMPs shall remain in use until permanent BMPs are operational.

In cases where no feasible treatment controls are available to achieve medium or high removal efficiencies for a pollutant, the project proponent shall include additional source controls including, but not limited to one or more of the following:

- Modify landscape or site design so that fertilizers, pesticides, or substances containing the pollutant(s) of concern do not need to be added to the outdoor portions of the site. Include provisions in the maintenance agreement requiring the maintenance of such site design features and prohibiting the outdoor use of materials containing the pollutant(s) of concern without approval from the City Engineer.
- Specify the use of alternative non-chemical products on outdoor portions of the site that do not generate the pollutant(s) of concern in the maintenance agreement. Prohibit the use of other materials outdoors in the maintenance agreement.
- Design the site grading and irrigation system to prevent runoff of irrigation water. Specify the use of irrigation controllers that adjust the amount of irrigation based on weather and estimated evapotranspiration. Specify the timing and rate of irrigation to prevent runoff of irrigation water. Design and specify pressure-triggered shutoff valves in the irrigation system that would shut off heads or zones should flows increase suddenly. Specify application of fertilizers, pesticides, or the substance introducing the pollutant of concern such that, if applied outdoors, they are applied at rates and times that would prevent runoff of these substances during irrigation or during rainfall events. Incorporate these specifications in the maintenance agreement.

4.4.1 Application of Localized Equivalent Area Drainage (LEAD) Method

The selection of treatment control BMPs shall be based on the following criteria, in conjunction with the performance ratings provided in Table 4-3:

- For the anticipated project pollutants identified in section 4.1.5, the highest performing BMPs available shall be considered. Site constraints that limit the selection shall be described in the WQTR.
- The most significant pollutants of concern for the project are those that both are anticipated, according to section 4.1.5, and are a concern for the receiving water, according to section 4.1.6. The minimum performance for the most significant pollutants of concern is "medium removal efficiency."

4.4.2 Structural Treatment BMP Selection Procedure

The selection of treatment control BMPs shall be based on the following criteria, in conjunction with the performance ratings provided in Table 4-3:

- For the anticipated project pollutants identified in section 4.1.5, the highest performing BMPs available shall be considered. Site constraints that limit the selection shall be described in the WQTR.
- The most significant pollutants of concern for the project are those that both are anticipated, according to section 4.1.5., and are a concern for the receiving water, according to section 4.1.6. The minimum performance for the most significant pollutants of concern is "medium removal efficiency".

Table 4-3. Structural BMP Treatment Control Selection Matrix									
BMP	LID	HMP Control	Sediment	Nutrients	Trash	Metals	Bacteria	Oils and Grease	Organics
Infiltration Basin	Y	Y	H	H	H	H	H	H	H
Bioretention Basin	Y	Y	H	M	H	H	H	H	H
Cistern Plus Bioretention	Y	Y	H	M	H	H	H	H	H
Vault plus Bioretention	Y	Y	H	M	H	H	H	H	H
Self-retaining Area	Y	Y	H	H	H	H	H	H	H
Dry Wells	Y	Y	H	H	H	H	H	H	H
Constructed Wetlands	Y	Y	H	M	H	H	H	H	H
Extended Detention Basin	Y	Y	M	L	H	M	M	M	M
Vegetated Swale	Y	N	M	L	L	M	L	M	M
Vegetated Buffer Strips	Y	N	H	L	M	H	L	H	M
Flow-Through Planter Boxes	Y	Y	H	M	H	H	H	H	H

H High removal efficiency
M Medium removal efficiency
L Low removal efficiency

4.4.3 Restrictions on the Use of Infiltration Treatment BMPs

Treatment control BMPs that are designed to function as infiltration devices shall meet the following conditions (these conditions do not apply to treatment BMPs which allow incidental infiltration and are not designed to function primarily as infiltration devices, such as grassy swales, detention basins, vegetated buffer strips, constructed wetlands, etc.):

- Urban runoff from commercial developments shall undergo pretreatment to remove both physical and chemical contaminants prior to infiltration.
- All dry weather flows shall be diverted from infiltration devices except for those non-storm water discharges authorized pursuant to 40 CFR 122.26(d)(2)(iv)(B)(1):
  - Diverted stream flows
  - Rising ground waters
  - Uncontaminated ground water infiltration [as defined at 40 CFR 35.2005(20)] to storm water conveyance systems
  - Uncontaminated pumped ground water
  - Foundation drains

  - Springs
  - Water from crawl space pumps
  - Footing drains
  - Air conditioning condensation
  - Flow from riparian habitats and wetlands
  - Water line flushing
  - Landscape irrigation
  - Discharges from potable water sources other than water main breaks, irrigation water, individual residential car washing, and dechlorinated swimming pool discharges.
- Pollution prevention and source control BMPs shall be implemented at a level appropriate to protect groundwater quality at sites where infiltration structural treatment-control BMPs will be implemented.
- The vertical distance from the base of any infiltration structural treatment BMP to the seasonal high groundwater mark shall be at least 10 feet. Where groundwater does not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained.
- The horizontal distance between the base of any infiltration structural BMP and any water supply wells shall be no less than 100 feet.
- Notification to neighboring jurisdictions may be required where staff determines the infiltration BMPs may impact the groundwater in a neighboring jurisdiction.
- Geotechnical concerns discussed in section 4.1.4 may further limit the use of infiltration BMPs.

4.4.4 Structural Treatment Limited Exclusions

Limited exclusions to the structural treatment control BMP requirements include:

- Proposed restaurants, where the land area for development or redevelopment is less than 5,000 square feet, are excluded from the numerical sizing criteria requirements listed in Table 4-3.
- Where significant redevelopment results in an increase of less than 50 percent of the impervious surfaces of a previously existing development, and the existing development was not subject to Priority Development Project requirements, the numeric sizing criteria apply only to the addition, and not to the entire development.

4.4.5 Numeric Sizing Requirements for Treatment Control BMPs

Treatment control BMPs shall be sized to infiltrate, filter, or treat the water quality design storm event.

For volume-based treatment control BMPs, the water quality design storm event is defined as follows:

- The volume of runoff produced from an 85th percentile storm event. Isopluvial maps for the 85th percentile storm event are provided in the County of San Diego Hydrology Manual. See the County of San Diego's 85th percentile isopluvial map at:

  www.sdcounty.ca.gov/dpw/docs/pct85.pdf

  [Note: Applicants may calculate the 85th percentile storm event using local rain data, when available.];

- The volume of runoff produced by the 85th percentile storm event, determined as the maximized capture urban runoff volume for the area, from the formula recommended in Urban Runoff Quality Management (see Suggested Resources in Appendix A); or
- The volume of annual runoff based on unit basin storage volume to achieve 90 percent or more volume treatment by the method recommended in the latest edition of the California Stormwater Best Management Practices Handbook (see Suggested Resources in Appendix A).

For flow-based treatment control BMPs, the water quality design storm event is defined as follows:

- The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event; or
- The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
- The maximum flow rate of runoff, as determined from the local historical rainfall record, which achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

4.5 Hydromodification Management Requirements

Priority Development Projects (Table 4-1) must be designed so that runoff rates and durations are controlled to maintain or reduce pre-project downstream erosion conditions and protect stream habitat.

4.5.1 HMP Applicability Requirements

To determine if a proposed project must implement hydromodification controls, refer to the HMP Decision Matrix in Figure 4-1. The HMP Decision Matrix can be used for all projects. For redevelopment projects, flow controls would only be required if the redevelopment project increases impervious area or peak flow rates as compared to pre-project conditions.

It should be noted that all Priority Development Projects will be subject to the Permit's LID and water quality treatment requirements even if hydromodification flow controls are not required.

As noted in Figure 4-1, projects may be exempt from HMP criteria under the following conditions.

- If the project is not a Priority Development Project
- If the proposed project does not increase the impervious area or peak flows to any discharge location.
- If the proposed project discharges runoff directly to an exempt receiving water such as the Pacific Ocean, San Diego Bay, an exempt river reach, an exempt reservoir, or a tidally-influenced area.
- If the proposed project discharges to a stabilized conveyance system that extends to the Pacific Ocean, San Diego Bay, a tidally-influenced area, an exempt river reach or reservoir.
- If the contributing watershed area to which the project discharges has an impervious area percentage greater than 70 percent
- If an urban infill project discharges to an existing hardened or rehabilitated conveyance system that extends beyond the "domain of analysis," the potential for cumulative impacts in the watershed are low, and the ultimate receiving channel has a Low susceptibility to erosion as defined in the SCCWRP channel assessment tool.

If the proposed project decreases the pre-project impervious area and peak flows to each discharge location, then a flow-duration analysis is implicitly not required. If continuous simulation flow-frequency and flow duration curves were developed for such a scenario, the unmitigated post-project flows and durations would be less as compared to pre-project curves.

Proposed exemptions for projects discharging runoff directly to the Pacific Ocean, San Diego Bay or to hardened conveyance systems which transport runoff directly to the Pacific Ocean or San Diego Bay are referred to the 2007 Municipal Permit. Per the Permit, hardened conveyance systems can include existing concrete channels, storm drain systems, etc.

The Municipal Permit also contains language to support exemptions for projects located in highly urbanized areas where the impervious percentage exceeds 70 percent (as calculated for the sub-watershed between the project outfall downstream to the exempt receiving water).

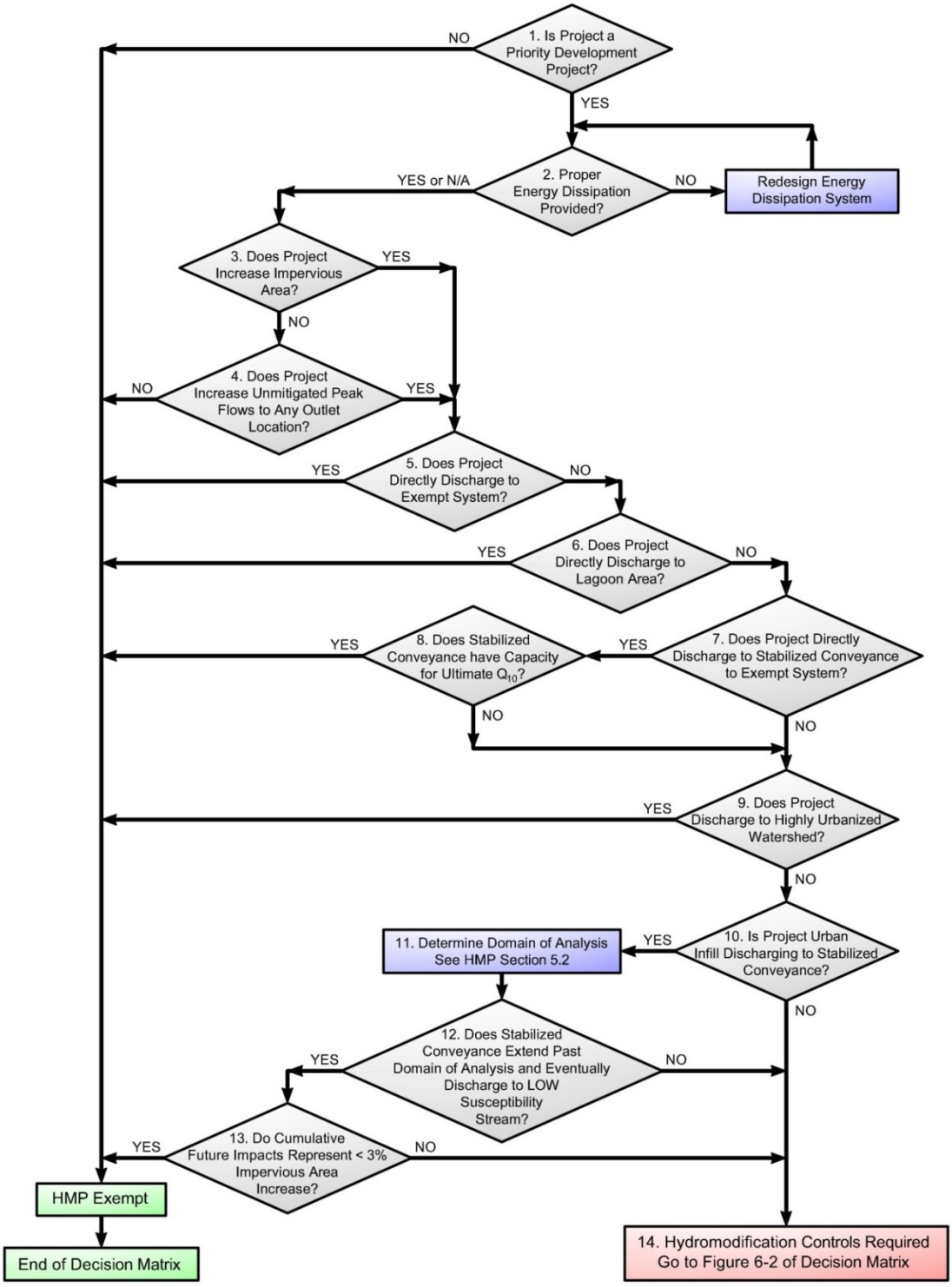

Figure 4-1. HMP Applicability Determination

- *Figure 4-1, Node 1 – Hydromodification mitigation measures are only required if the proposed project is a Priority Development Project.*

- ***Figure 4-1, Node 2 –*** *Properly designed energy dissipation systems are required for all project outfalls to unlined channels. Such systems should be designed in accordance with the County of San Diego's Drainage Design Manual to ensure downstream channel protection from concentrated outfalls.*
- ***Figure 4-1, Nodes 3 and 4 –*** *Projects may be exempt from hydromodification criteria if the proposed project reduces the pre-project impervious area and if unmitigated post-project outflows (outflows without detention routing) to each outlet location are less as compared to the pre-project condition. The pre and post-project hydrologic analysis should be conducted for the 2 and 10-year design storms and follow single-event methodology set forth in the San Diego Hydrology Manual. This scenario may apply to redevelopment projects in particular.*
- ***Figure 4-1, Node 5 –*** *Potential exemptions may be granted for projects discharging runoff directly to an exempt receiving water, such as the Pacific Ocean, San Diego Bay, an exempt river system (detailed in Table 4-2), or an exempt reservoir system (detailed in Table 4-3). To qualify for this exemption, projects must discharge runoff at an elevation, to be determined by the governing municipality, below the 10-year floodplain elevation for a river exemption or below the typical water surface level in a reservoir system. Copermittees may grant, on a case-by-case basis, additional exemptions for projects discharging runoff in the immediate vicinity of exempt river or reservoir systems provided that a stabilized, natural conveyance (non-hardened) is provided between the project discharge location and exempt river or reservoir water surface elevation.*
- ***Figure 4-1, Node 6 –*** *For projects discharging runoff directly to a tidally-influenced lagoon, potential exemptions may also be granted. To qualify for this exemption, projects must discharge runoff at an elevation, to be determined by the governing municipality, below the typical water surface level in the lagoon system (such as the mean high tide elevation). Copermittees may grant, on a case-by-case basis, additional exemptions for projects discharging runoff in the immediate vicinity of lagoon systems provided that a stabilized, natural conveyance (non-hardened) is provided between the project discharge location and typical lagoon water surface elevation. Exemptions related to runoff discharging directly to tidally-influenced areas were drafted based upon precedent set in the Santa Clara HMP. Regarding the potential exemption, additional analysis would be required to assess the effects of the freshwater / saltwater balance and the resultant effects on lagoon-system biology. This assessment, which would be required by other permitting processes such as the Army Corps of Engineers, California Department of Fish and Game, etc., must be provided by a certified biologist or other specialist as approved by the governing municipality. Such discharges would include an energy dissipation system (riprap, etc.) designed to mitigate 100-year outlet velocities based upon a free outfall condition. Such a design would be protective of the channel bed and bank from an erosion standpoint.*
- ***Figure 4-1, Nodes 7 and 8 –*** *For projects discharging runoff directly to a hardened conveyance or rehabilitated stream system that extends to exempt receiving waters detailed in Node 5, potential exemptions from hydromodification criteria may be granted. Such hardened or rehabilitated systems could include existing storm drain systems, existing concrete channels, or stable engineered unlined channels. To qualify for this exemption, the existing hardened or rehabilitated conveyance system must continue uninterrupted to the exempt system. In other words, the hardened or rehabilitated conveyance system cannot discharge to an unlined, non-engineered channel segment prior to discharge to the exempt system. Additionally, the project proponent must demonstrate that the hardened or rehabilitated conveyance system has capacity to convey the 10-year ultimate condition flow through the conveyance system. The 10-year flow should be calculated based upon single-event hydrologic criteria as detailed in the San Diego County Hydrology Manual.*
- ***Figure 4-1, Node 9 –*** *As allowed per the Municipal Permit, projects discharging runoff to a highly urbanized watershed (defined as an existing, pre-project impervious percentage greater than 70 percent) may be eligible for an exemption from hydromodification criteria.*

  Watershed impervious area calculations for this potential exemption will be measured between the project site discharge location and the connection to a downstream exempt receiving conveyance system, such as the Pacific Ocean, San Diego Bay, or an exempt river system. If a tributary area connects with the main line drainage path between the project site and the exempt system, then the entire watershed area contributing to the tributary shall be included in the calculation. Initial review of County land use indicates that this exemption will likely only apply in a limited number of urbanized coastal areas.

  Percent imperviousness will be calculated based on an area-weighted average of impervious areas associated with commercial, industrial, single-family residential, multi-family residential, open space, and other miscellaneous areas (schools, churches, etc.) representative for the watershed. Representative percent imperviousness values for each land use type may correspond to values recommended in Table 3-1 of the County of San Diego's Hydrology Manual and detailed below or by more specific representative percent impervious calculations (using GIS, etc.), which are often required to represent impervious area percentages for park, school and church sites.
- ***Figure 4-1, Nodes 10 through 13 –*** *For urban infill projects discharging runoff to an existing hardened or rehabilitated conveyance system, potential limited exemptions from hydromodification criteria may apply where the existing impervious area percentage in the watershed exceeds 40 percent. For the potential exemption application, the domain of analysis must be determined and the existing hardened or rehabilitated conveyance system must extend beyond the downstream terminus of the domain of analysis. The hardened or rehabilitated conveyance system must discharge to a receiving channel with a Low potential for channel susceptibility for this exemption to be granted (channel susceptibility determined using SCCWRP tool). Finally, continuous simulation sensitivity analysis shows that an exemption could only be granted if the potential future development impacts in the watershed would increase the watershed's impervious area percentage by less than 3 percent (as compared to the existing condition in the year 2010). If the potential future cumulative impacts in the watershed could increase the impervious area percentage by more than 3 percent (as compared to existing condition), then no exemption could be granted based on this*

item. Watershed impervious area calculations for this potential exemption, in which a project discharges to a watershed with an existing impervious areas greater than 40 percent, will be measured upstream from the outfall of the urban conveyance system (to a non-crete, non-riprap-lined or non-engineered channel) to the contributing watershed boundary (the entire watershed contributing to the discharge outfall).

Percent imperviousness will be calculated based on an area-weighted average of impervious areas associated with commercial, industrial, single-family residential, multi-family residential, open space, and other miscellaneous areas (schools, churches, etc.) representative for the watershed. Representative percent imperviousness values for each land use type may correspond to values recommended in Table 3-1 of the County of San Diego's Hydrology Manual and detailed below or by more specific representative percent impervious calculations (using GIS, etc.), which are often required to represent impervious area percentages for park, school and church sites.

Exemptions related to runoff discharging directly to certain river reaches were initially based upon the majority TAC opinion that such river reaches were depositional (aggrading) and that the effects of cumulative watershed impacts to these reaches is minimal. Subsequent justifications for the river reach exemptions were the result of a flow duration curve analysis for the San Diego River

Potential river reaches that would be exempt from hydromodification criteria include only those reaches for which the contributing drainage area exceeds 100 square miles and which have a 100-year design flow in excess of 20,000 cfs. For reference, proposed Caltrans HMP criteria allows for river/creek exemptions for drainage areas of only 10 square miles.

Per recommendations from members of the TAC, San Diego river systems meeting the drainage area and peak flow criteria are typically aggrading (depositional) and have very wide floodplain areas when in the natural condition. In all cases, river reaches meeting the drainage area and peak flow criteria are located downstream of large reservoir systems which effectively block outflows for most storm events. In addition, the river systems meeting these criteria typically have very low gradients. The combination of low gradients, significant peak flow attenuation, and wide floodplain areas translate to a low potential for channel erosion at the upper limit of the proposed geomorphic flow range (10-year flow event).

All exempt river reaches, which are presented in Table 4-2, have drainage areas in excess of 100 square miles and 100-year flow rates in excess of 20,000 cfs. In addition, all proposed river reaches are subject to significant upstream reservoir flow regulation, have wide floodplain or stabilized channel areas, and low gradients. This combination of factors, in association with field observations and years of historical perspective from the TAC members, justifies exemptions for direct discharges to the exempt river reaches provided that properly sized energy dissipation is provided at the outfall location.

Table 4-2. Summary of Exempt River Reaches in San Diego County

River	Downstream Limit	Upstream Limit
Otay River	Outfall to San Diego Bay	Lower Otay Reservoir Dam
San Diego River	Outfall to Pacific Ocean	Confluence with San Vicente Creek
San Dieguito River	Outfall to Pacific Ocean	Lake Hodges Dam
San Luis Rey River	Outfall to Pacific Ocean	Upstream river limit of Basin Plan subwatershed 903.1 upstream of Bonsall and near Interstate 15
Sweetwater River	Outfall to San Diego Bay	Sweetwater Reservoir Dam

Table 4-3 provides a summary of exempt reservoirs in San Diego County. Large reservoirs can be exempt systems from a hydromodification standpoint since reservoir storm water inflow velocities are naturally mitigated by the significant tailwater condition in the reservoir. HMP exemptions would only

be granted for projects discharging runoff directly to the exempt reservoirs. Each municipality must define "direct discharge" based on the project site conditions. To qualify for the potential exemption, the outlet elevation must be at or below either the normal operating water surface elevation or the reservoir spillway elevation and properly designed energy dissipation must be provided.

Table 4-3. Summary of Exempt Reservoirs in San Diego County

Reservoir	Watershed
Barrett Lake	Tijuana River
El Capitain Reservoir	San Diego River
Lake Dixon	Escondido Creek
Lake Heneshaw	San Luis Rey River
Lake Hodges	San Dieguito River
Lake Jennings	San Diego River
Lake Murray	San Diego River
Lake Poway	San Dieguito River
Lake San Marcos	San Marcos Creek
Lake Wohlford	Escondido Creek
Loveland Reservoir	Sweetwater River
Lower Otay Reservoir	Otay River
Miramar Lake	Los Penasquitos Creek
San Vicente Reservoir	San Diego River
Sweetwater Reservoir	Sweetwater River
Upper Otay Reservoir	Otay River

The final exemption category focuses on small urban infill projects where the potential for future cumulative watershed impacts is minimal.

Urban infill projects may be exempt from HMP criteria if:

1. The potential future development impacts within the sub-watershed, as measured from the entire sub-watershed area draining to the existing conveyance system outfall, would not increase the composite impervious area percentage of the sub-watershed by more than 3 percent
2. The project discharges runoff to an existing hardened or rehabilitated conveyance system (storm drain, concrete channel, or engineered vegetated channel) that extends beyond the Domain of Analysis determined for the project site, and
3. The stabilized conveyance system eventually discharges to a channel with a Low susceptibility to erosion, as designed by the SCCWRP channel assessment tool.

4.5.2 Flow Control Performance Criteria

Figures 4-2 and 4-3, which are part of the HMP Decision Matrix and are presented on the following pages, detail how lower flow thresholds would be determined for a project site. Figures 4-4 and 4-5, which detail the SCCWRP lateral and vertical channel susceptibility requirements, complete the HMP Decision Matrix.

The project applicant must first determine whether field investigations will be conducted pursuant to the SCCWRP channel screening tools. If the screening tools are not completed for a proposed project, then the site must mitigate peak flows and durations based on a pre-project condition lower flow threshold of 0.1Q2. While a project applicant would be held to the 0.1Q2 standard if channel screening tools and assessments are not conducted, less restrictive standards are possible for more erosion-resistant receiving channel sections if the screening tools are completed and the SCCWRP method indicates either a Medium or Low susceptibility to channel erosion .

In such a scenario, the project applicant would also use the critical shear stress calculator to assist in determination of the predicted lower flow threshold. The SCCWRP screening tools and critical shear stress calculator work in concert to determine the lower flow threshold for a given site. Lower flow limits determined by the calculator have been grouped into one of three thresholds – 0.1Q2, 0.3Q2 or 0.5Q2. "Low" susceptibilities from the SCCWRP tool generally correspond to the 0.5Q2 threshold, "Medium" susceptibilities generally correspond to the 0.3Q2 threshold, and "High" susceptibilities generally correspond to the 0.1Q2 threshold. The SCCWRP channel screening tools are required to identify channel conditions not considered by the critical shear stress calculator, which focuses on channel material and cross section. Conversely, the SCCWRP channel screening tools considers other channel conditions including channel braiding, mass wasting, and proximity to the erosion threshold. In cases where the critical shear stress calculator and the SCCWRP screening tools return divergent values, then the most conservative value shall be used as the lower flow threshold for the analysis.

Low-Impact Development (LID) and extended detention facilities are required to meet peak flow and duration controls as follows:

1. For flow rates ranging from 10 percent, 30 percent or 50 percent of the pre-project 2-year runoff event ($0.1Q_2$, $0.3Q_2$, or $0.5Q_2$) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10 percent over and more than 10 percent of the length of the flow duration curve. The specific lower flow threshold will depend on results from the SCCWRP channel screening study and the critical flow calculator.
2. For flow rates ranging from the lower flow threshold to Q_5, the post-project peak flows shall not exceed pre-project peak flows. For flow rates from Q_5 to Q_{10}, post-project peak flows may exceed pre-project flows by up to 10 percent for a 1-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10 percent for the interval from Q_9 to Q_{10} or from $Q_{5.5}$ to $Q_{6.5}$, but not from Q_8 to Q_{10}..

This HMP recommends the use of LID facilities to satisfy both 85th percentile water quality treatment as well as HMP flow control criteria. The Copermittees and the consultant team have developed detailed standards for LID implementation. These standards are provided in the San Diego County Model SUSMP.

The following methods may be used to meet mitigation requirements.

- Install BMPs that meet design requirements to control runoff from new impervious areas. BMPs including bioretention basins, vegetated swales, planter boxes, extended detention basins, etc. shall be designed pursuant to standard sizing and specification criteria detailed in the Model SUSMP and the HMP/LID Sizing Calculator to ensure compliance with hydromodification criteria.
- Use of the automated sizing calculator (San Diego Sizing Calculator) that will allow project applicants to select and size LID treatment devices or flow control basins. The tool, akin to the sizing calculator developed for compliance with the Contra Costa HMP, uses pre-calculated sizing

factors to determine required footprint sizes for flow control BMPs. Continuous simulation hydrologic analyses are currently being developed to determine the sizing factors for various flow control options and development scenarios. The Sizing Calculator also includes an automated pond sizing tool to assist in the design of extended detention facilities for mitigation of hydromodification effects. Because of the Sizing Calculator's ease of implementation, and since hydromodification BMPs can also serve as treatment BMPs, it is anticipated that most project applicants will choose this option instead of seeking compliance through site-specific continuous simulation model preparation. The HMP/LID Sizing Calculator is an implementation tool, which is currently under development by the consultant team and will be completed by the time final HMP criteria go into effect.

- Prepare continuous simulation hydrologic models and compare the pre-project and mitigated post-project runoff peaks and durations (with hydromodification flow controls) until compliance to flow control standards can be demonstrated. The project applicant will be required to quantify the long-term pre- and post-project runoff response from the site and establish runoff routing and stage-storage-discharge relationships for the planned flow control devices. Public domain software such as HSPF, HEC-HMS and SWMM can be used for preparation of a continuous simulation hydrologic analysis.
- Points of compliance must be selected to conduct the comparisons of pre-project and post-project flows and durations. Generally, points of compliance are selected at locations along the project boundary where concentrated flows discharge from the project site. If a point of compliance is selected downstream of the project boundary, then the governing municipality should be consulted in advance of the hydromodification analysis. For projects which convey offsite runoff through the site, it is assumed that the offsite runoff would be separated from site runoff. If this is not the case, then the governing municipality should be consulted to further refine the points of compliance for the site (an interior project site point of compliance could be required in such a scenario).

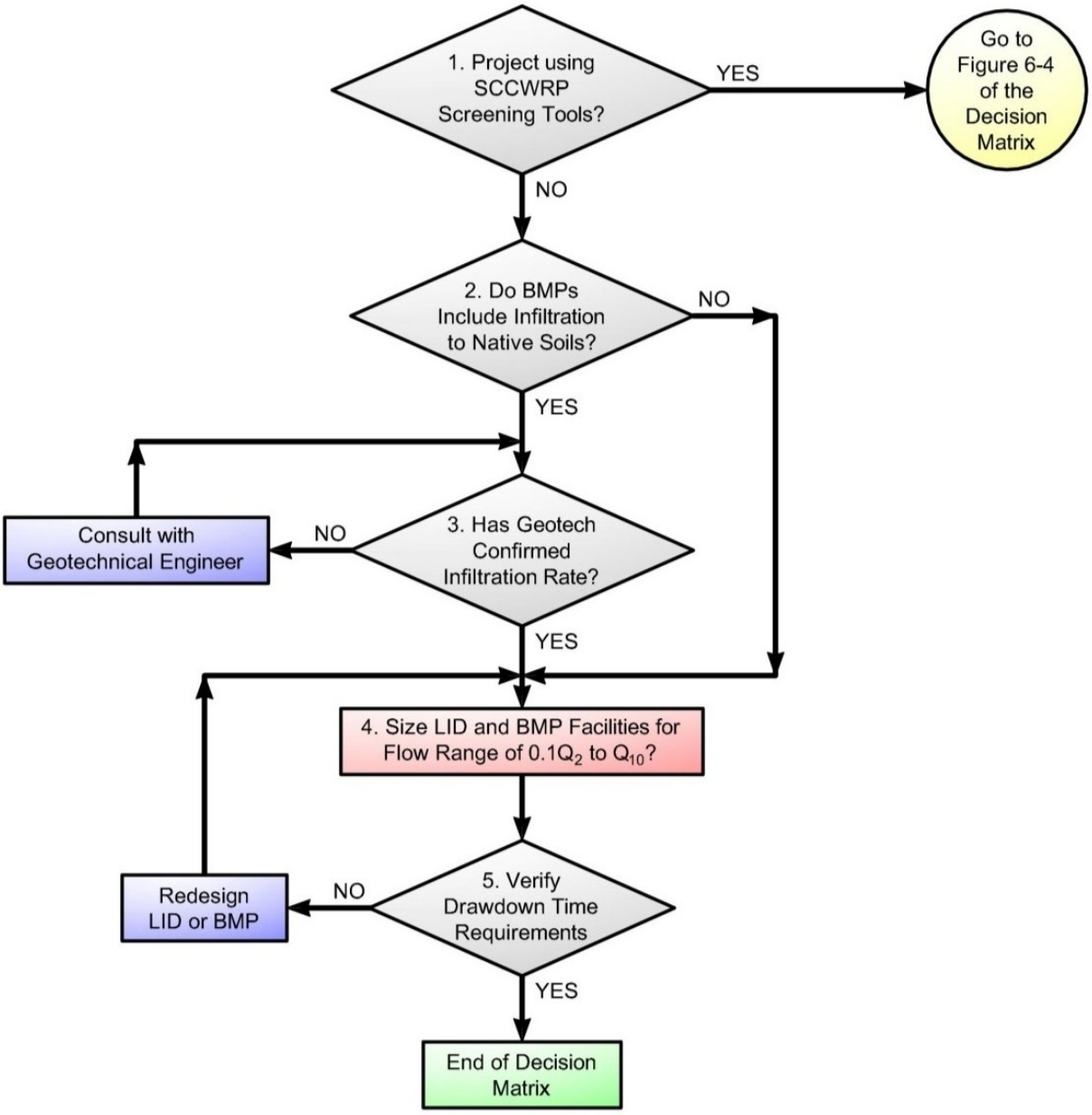

Figure 4-2. Mitigation Criteria and Implementation

- ***Figure 4-2, Node 1*** *– If the project applicant chooses to complete SCCWRP channel screening tools, then the applicant moves to Figures 1-4 and 1-5 to assess the vertical and lateral susceptibility of the receiving channel systems. Depending on the results of the SCCWRP screening tools and critical flow calculator, it is possible that lower flow thresholds in excess of 0.1Q2 may be used. If the project applicant chooses not to complete the SCCWRP channel assessment, then the applicant proceeds with Figure 4-2 of the Decision Matrix.*
- ***Figure 4-2, Node 2 –*** *If the project's LID or BMP approach accounts for the infiltration of runoff to native surrounding soils (below amended soil layers), then consultation with a geotechnical engineer is required (Box 3). If the project mitigation approach does not account for infiltration of runoff, then the applicant would proceed to Box 4.*
- ***Figure 4-2, Node 3 –*** *A geotechnical engineer should determine the allowable infiltration rates to be used for the design of each LID or BMP facility. The geotechnical assessment should also identify potential portions of the project which are feasible for infiltration of runoff.*
- ***Figure 4-2, Node 4 –*** *In this scenario, the SCCWRP channel assessment was not conducted. Therefore, the project applicant would be held to the 0.1Q2 lower flow threshold. LID and extended detention facilities must be sized so that the mitigated post project flows and durations do not exceed pre-project flows and durations for the geomorphically-significant flow range of 0.1Q2 to Q10.*
- ***Figure 4-2, Node 5 -*** *The Decision Matrix includes language regarding a drawdown time requirements so that standards set forth by the County's Department of Environmental Health are met. As a side note, the County's Department of Environmental Health has stated that the drawdown requirement would be applied to underground vaults in addition to extended detention basins and the surface ponding areas of LID facilities. Proper maintenance of hydromodification mitigation facilities is essential to guard against potential vector issues as well potential safety issues resulting from long-term standing water. If mitigation facility outlets clog, then runoff will bypass the system and potentially result in additional erosion problems downstream of a site. The County Department of Environmental Health recently amended its drawdown time requirement to 96 hours.*

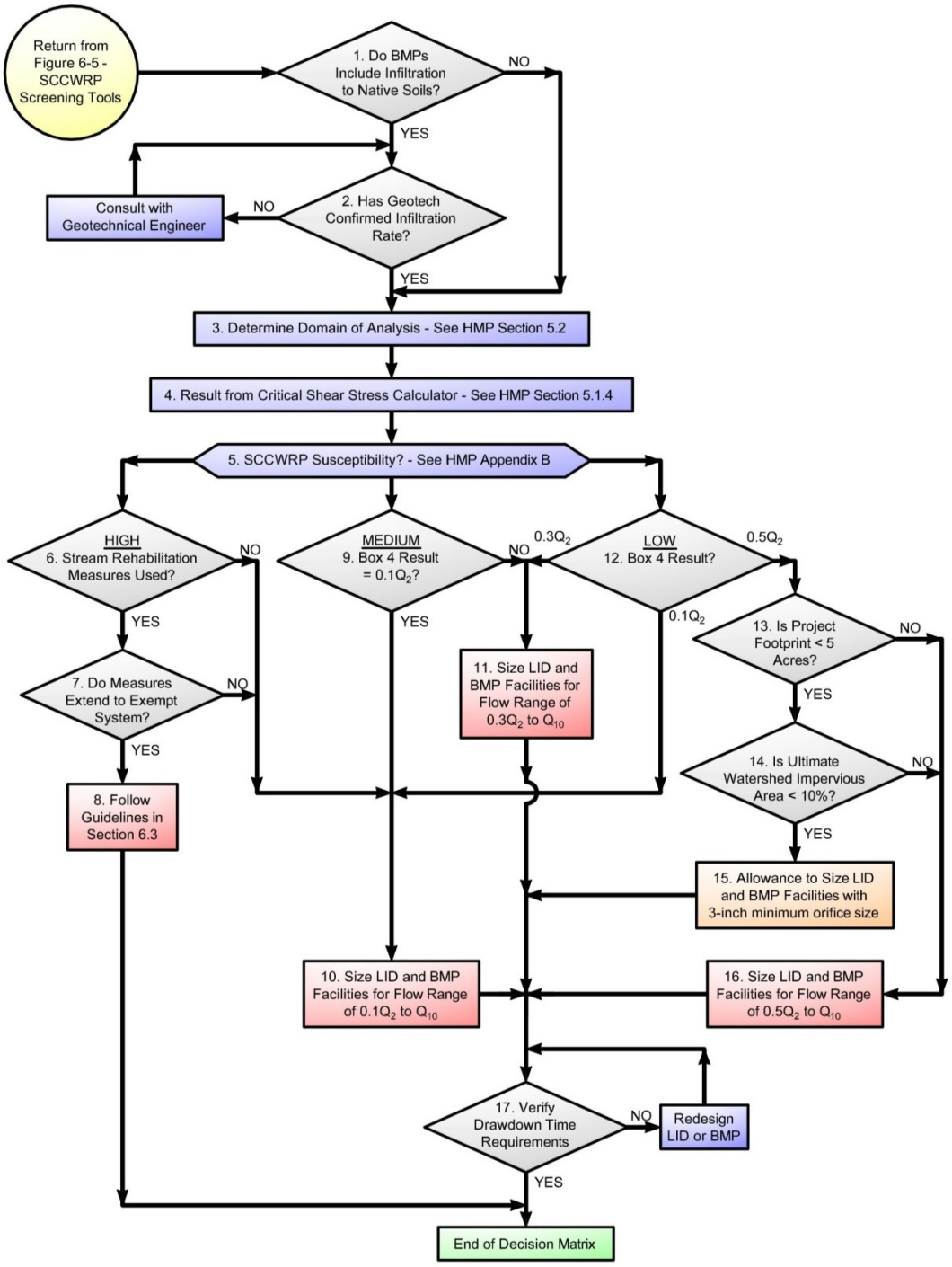

Figure 4-3. Mitigation Criteria and Implementation

- ***Figure 4-3, Node 1*** *– Use of Figure 4-3 assumes that the project applicant conducted the SCCWRP channel assessment. Box 1 would begin following completion of both the lateral and vertical susceptibility flow charts depicted in Figures 1-4 and 1-5. Box 1 is a decision box asking if the project's LID or BMP approach accounts for the infiltration of runoff to native surrounding soils (below amended soil layers). If the answer is Yes, then consultation with a geotechnical engineer is required (Box 2). If the project mitigation approach does not account for infiltration of runoff, then the applicant would proceed to Box 3.*
- ***Figure 4-3, Node 2 –*** *A geotechnical engineer should determine the allowable infiltration rates to be used for the design of each LID or BMP facility. The geotechnical assessment should also identify potential portions of the project which are feasible for infiltration of runoff.*
- ***Figure 4-3, Node 3 –*** *Pursuant to criteria detailed in HMP Section 5.2, the Domain of Analysis is determined downstream and upstream of the project site. This determination is used to ascertain the required reach length for data collection (channel bed and bank material, channel cross section data, etc.) required for the critical flow calculator (see Box 4),*
- ***Figure 4-3, Node 4 –*** *Pursuant to criteria detailed in HMP Section 5.1.4, the project applicant would run the critical shear stress calculator to determine if the recommended critical flow threshold should be 0.1Q2, 0.3Q2, or 0.5Q2. This result will be compared to the result from the SCCWRP screening analysis (Box 5) to determine the final lower flow threshold for the project.*
- ***Figure 4-3, Node 5 –*** *Pursuant to criteria detailed in HMP Appendix B, the project applicant would determine both the lateral and vertical channel susceptibility rating per guidelines set forth by SCCWRP. If the lateral and vertical tools returned divergent results, then the more conservative result would be used. SCCWRP susceptibility ratings include "High," "Medium" and "Low."*
- ***Figure 4-3, Node 6 –*** *A project applicant would arrive at Box 6 if the SCCWRP channel susceptibility rating was determined to be "High." This decision box inquires as to whether stream rehabilitation measures such as grade control and channel widening will be used as a mitigation measure instead of flow control. It should be noted that stream rehabilitation options are only allowed if the existing receiving channel susceptibility is considered to be "High."*
- ***Figure 4-3, Node 7 –*** *Stream rehabilitation measures are only allowed if the proposed mitigation project extends to a downstream exempt system (such as an exempt river system). If the mitigation measure did not extend to an exempt system, then the potential for cumulative watershed impacts would be more pronounced.*
- ***Figure 4-3, Node 8 –*** *If stream rehabilitation measures are allowed, then guidelines outlined in Section 6.3 of the HMP should be followed to design the in-stream mitigation approach.*
- ***Figure 4-3, Node 9 -*** *A project applicant would arrive at Box 9 if the SCCWRP channel susceptibility rating was determined to be "Medium." If the result from the critical shear stress calculator is also "Medium" (or 0.3Q2), then the lower flow threshold would be 0.3Q2 (Box 11). If the result from the critical shear stress calculator is "High" (or 0.1Q2), then the more conservative value would be used and the lower flow threshold would be 0.1Q2 (Box 10).*
- ***Figure 4-3, Node 10 –*** *For stream reaches determined by either the critical flow calculator or the SCCWRP screening tools to have a "High" susceptibility to erosion, LID and extended detention flow control facilities should be sized so that the mitigated post project flows and durations do not exceed pre-project flows and durations for the geomorphically-significant flow range of 0.1Q2 to Q10.*
- ***Figure 4-3, Node 11 -*** *For stream reaches determined by either the critical flow calculator or the SCCWRP screening tools to have a "Medium" susceptibility to erosion, LID and extended detention flow control facilities should be sized so that the mitigated post project flows and durations do not exceed pre-project flows and durations for the geomorphically-significant flow range of 0.3Q2 to Q10.*
- ***Figure 4-3, Node 12 -*** *A project applicant would arrive at Box 12 if the SCCWRP channel susceptibility rating was determined to be "Low." If the result from the critical shear stress calculator is also "Low" (or 0.5Q2), then the lower flow threshold would be 0.5Q2 (Box 16 – note potential waiver in Box 13). If the result from the critical shear stress calculator is "High" (or 0.1Q2), then the more conservative value would be used and the lower flow threshold would be 0.1Q2 (Box 10). If the result from the critical flow calculator is "Medium" (or 0.3Q2), then the more conservative value would be used and the lower flow threshold would be 0.3Q2 (Box 11).*
- ***Figure 4-3, Node 13 –*** *In some limited situations, namely small developments in rural or lightly developed areas, an allowance for a minimum outlet orifice size may be granted when the receiving channel susceptibility is "Low." This criteria may potentially be used for project footprints less than 5 acres. If the project footprint is greater than 5 acres, then the allowance may not be granted and the applicant would proceed to Box 16.*
- ***Figure 4-3, Node 14 –*** *The potential allowance discussed in Box 13 could only be granted if the ultimate potential impervious area in the sub-watershed is less than 10 percent. If there is potential for the sub-watershed impervious area to exceed 10 percent, then the minimum orifice size criteria may not be granted.*
- ***Figure 4-3, Node 15 –*** *If Boxes 12, 13, and 14 are satisfied, then mitigation facilities may be designed using a 3-inch minimum outlet orifice size.*
- ***Figure 4-3, Node 16 -*** *For stream reaches determined by either the critical flow calculator or the SCCWRP screening tools to have a "Low" susceptibility to erosion – and for projects where the minimum outlet orifice criteria does not apply - LID and extended detention flow control facilities should be sized so that the mitigated post project flows and durations do not exceed pre-project flows and durations for the geomorphically-significant flow range of 0.5Q2 to Q10.*

- ***Figure 4-3, Node 17 –*** *For all hydromodification mitigation designs, the Decision Matrix includes language regarding drawdown time requirements so that standards set forth by the County's Department of Environmental Health are met. As a side note, the County's Department of Environmental Health has stated that the drawdown requirement would be applied to underground vaults in addition to extended detention basins and the surface ponding areas of LID facilities. Proper maintenance of hydromodification mitigation facilities is essential to guard against potential vector issues as well potential safety issues resulting from long-term standing water. If mitigation facility outlets clog, then runoff will bypass the system and potentially result in additional erosion problems downstream of a site. The County Department of Environmental Health recently amended its drawdown time requirement to 96 hours.*

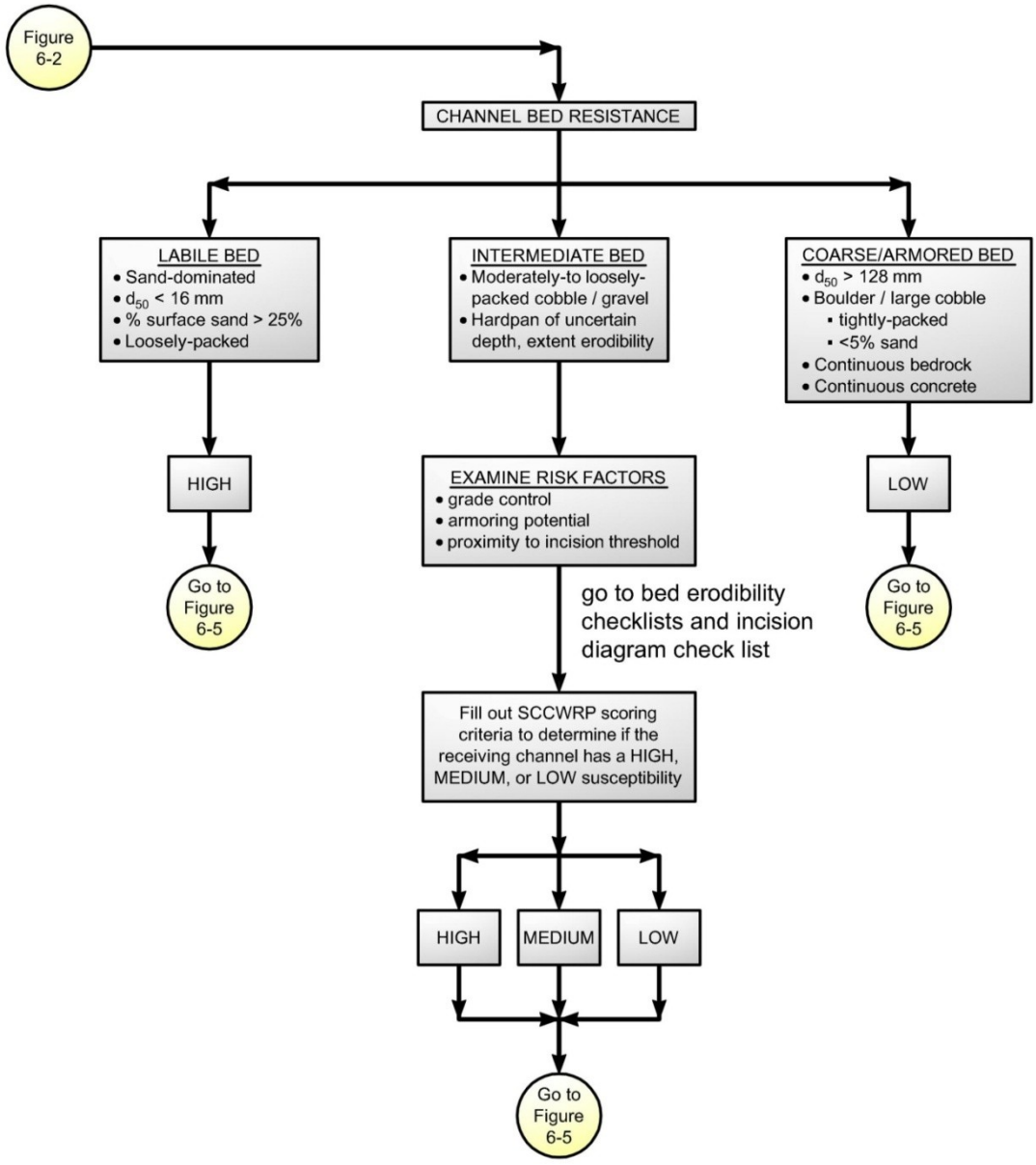

Figure 4-4. SCCWRP Vertical Susceptibility

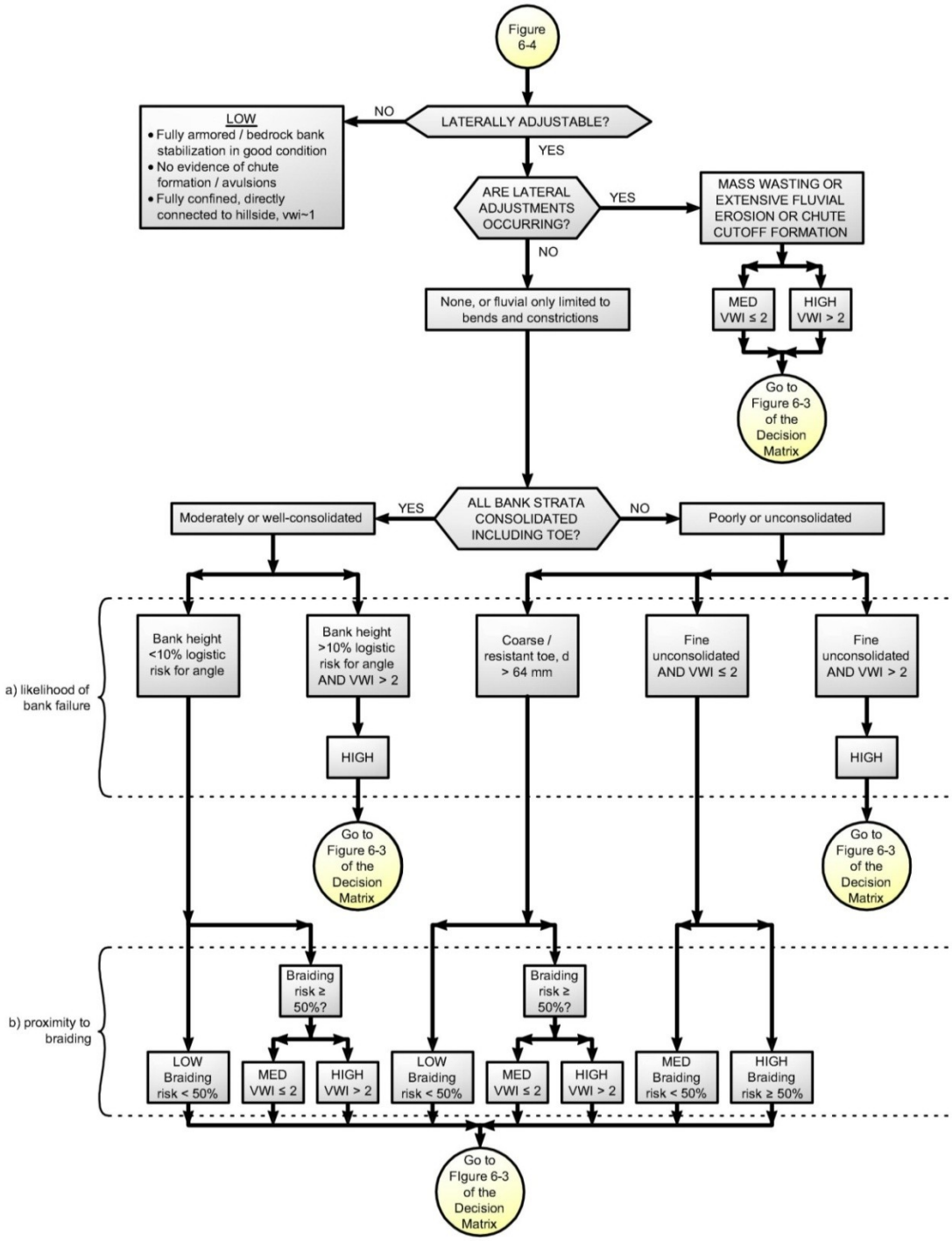

Figure 4-5. Lateral Channel Susceptibility

4.6 Buffer Measures

According to the Municipal Permit, buffer zones surrounding natural water bodies should be utilized where feasible. Buffer areas, which can include bioretention areas, provide for reduced site imperviousness and opportunities to incorporate LID facilities into the site and landscape design.

Benefits of buffer zones include the following:

- Provides a buffer for aquatic resources from the potential negative impacts of human use of the adjacent land
- Filters nonpoint source pollutants from incoming runoff
- Provides habitat for a balanced, integrated, and adaptive community of riparian and aquatic organisms
- Moderates fluctuations in stream temperature

Buffer zones should be provided between the edge of the proposed development and the limits of the 100-year floodplain for a distance to be determined by the City. Where buffer zones are infeasible, other buffers such as trees, access restrictions, etc., should be used. Bioretention facilities may be placed in buffer zones, provided that the diffused incoming flow velocity is less than 3 feet per second.

4.7 Proof of Mechanism for Long-Term Maintenance of Structural Permanent BMPs

Following approval of a project-specific BMP design approach by the City Engineer, applicants must ensure BMP implementation and maintenance. Projects that include permanent BMPs shall be conditioned to require the applicant or designee to execute a maintenance agreement for ongoing permanent BMP maintenance prior to the issuance of any construction permits.

The municipal storm water NPDES permit requires each Copermittee to verify that all treatment and flow-control facilities are adequately maintained. Facilities installed as part of project implementation will be verified for effectiveness and proper performance.

Operation and maintenance of storm water facilities involves the following process:

- Determine the responsible party for the maintenance of treatment facilities. Identify the means by which ongoing maintenance will be assured (for example, a maintenance agreement that runs with the land).
- Identify typical maintenance requirements, and allow for these requirements in the project planning and preliminary design phases.
- Prepare a maintenance plan for the site incorporating detailed requirements for each treatment and flow-control facility.
- Maintain the facilities from the time they are constructed until ownership and maintenance responsibility is formally transferred.
- Formally transfer operation and maintenance responsibility to the site owner or occupant. A warranty, secured by a bond, or other financial instrument, may be required to secure against lack of performance due to flaws in design or construction.
- Maintain the facilities in perpetuity and comply with the City's self-inspection, reporting, and verification requirements.

Applicants shall propose a maintenance agreement assuring all permanent BMPs, including LID facilities, will be maintained throughout the life of a project site, satisfactory to the City Engineer (see Appendix H for a list of potential mechanisms). City-approved methods of permanent BMP maintenance shall be incorporated into, and shall be consistent with, permits issued by resource agencies prior to approval of discretionary actions.

For projects requiring only construction permits, the City-approved method of permanent BMP operation and maintenance procedures shall be executed prior to the issuance of any construction permits. The maintenance procedures shall be noted on the construction plans. The verification mechanism will include the applicant's signed statement accepting responsibility for all permanent BMP maintenance, repair, and replacement.

The maintenance agreement shall include the following:

Operation & Maintenance (O&M) Plan. The applicant shall include an Operation & Maintenance (O&M) plan, prepared to the satisfaction of the City Engineer, with the approved maintenance agreement. The Operation and Maintenance Plan must:

- Describe the designated responsible party to manage the storm water BMPs
- Outline employees' training program and duties
- Outline operating schedule, maintenance frequency, and specific maintenance activities
- Include copies of resource agency permits
- Provide inspection and maintenance schedule of all permanent treatment BMPs on an annual basis
- Provide implementation schedule for non-structural BMPs, such as source control BMPs
- Include inspection procedures, elements to inspect, inspection frequencies, and maintenance triggers
- Identify the maintenance activity to be implemented upon observation of a maintenance trigger during an inspection
- Describe the BMP types
- Provide exhibits showing locations of BMPs as well as surrounding topography and land uses
- Quantify drainage areas to BMPs
- Quantify volumes and peak flows through BMPs during design storm events
- Quantify bypass flows around BMPs and explain what storm events would bypass the BMPs
- List sizes and dimensions of proposed BMPs
- Explain how the BMPs are designed to mitigate pollutants
- Explain how the BMPs' performance can degrade between maintenance cycles
- Explain the types of activities or events that can cause the BMPs to fail or require more frequent maintenance
- Establish an appropriate inspection and maintenance schedule

The project proponent or City-approved maintenance entity shall complete and maintain O&M forms to document all maintenance requirements. Parties responsible for the O&M plan shall retain records for

at least 5 years. These documents shall be made available to the City for inspection upon request at any time.

Access Easement/Agreement. Unless the project applicant accepts permanent maintenance responsibility, the applicant shall execute an access easement to the official maintenance entity. This easement shall be binding on the land throughout the life of the project, until such time that the permanent treatment BMP requiring access is no longer required to be in use (as determined by the City Engineer).

5. Construction Storm Water BMP Performance Standards

5.1 General Requirements for All Construction Projects

This current version of the Storm Water Standards Manual follows requirements set by both the City of San Diego and the NPDES General Construction Storm Water Permit (Water Quality Order 99-08-DWQ). A new version of the Storm Water Standards Manual, which will integrate new requirements from the new NPDES General Construction Storm Water Permit (Order No. 2009-0009-DWQ, adopted by the State Water Resources Control Board on September 2, 2009), will be released next year that integrates new requirements from the new NPDES General Construction Storm Water Permit (Water Order No. 2009-0009-DWQ) that was adopted by the State Water Resources Control Board on September 2, 2009 and that will become effective subsequent to the permit effective date of on July 1, 2010.

Those projects that have been determined to require construction BMPs must identify the construction BMPs to be implemented in accordance with the performance standards in this section. For projects disturbing more than 1 acre, the construction BMPs must be identified in a Storm Water Pollution Prevention Plan (SWPPP) or while a Water Pollution Control Plan (WPCP) is required for projects disturbing more than or less than 1 acres, respectively. Because all projects require BMPs during construction, those projects that disturb less than acre are required to have a Water Pollution Control Plan (WPCP) which identifies the pollution prevention measures that will be taken. These plans must be prepared in accordance with the guidelines in Appendix E.

It is the responsibility of the property owner or his/her designee to select, install, and maintain appropriate BMPs. A list of construction BMPs is provided for reference in Appendix F. BMPs must be installed in accordance with an industry recommended standard or in accordance with the requirements of the State General Construction Permit. More information about BMPs is provided in the Model Construction Program for San Diego Copermittees, the City of Los Angeles "Reference Guide for Stormwater Best Management Practices," State Storm Water BMP Manuals, and the California Stormwater Quality Association (CASQA) handbook.

BMP requirements differ between the rainy wet season (October 1 to April 30) and the dry season (May 1 to September 30), the project development type, of the project and topography of the site, as described below.

5.1.1 Site Management Requirements

Construction is a dynamic operation where changes are expected. Storm water BMPs for construction sites are typically temporary measures that require frequent maintenance to maintain effectiveness. These facilities may require relocation, revision and re-installation, particularly as project grading progresses. Therefore, owner/contractor self-inspections are required. They shall be performed by the owners/contractor's Qualified Contact Person specifically trained in storm water pollution prevention site management and storm water BMPs, including the installation and maintenance of sediment and erosion control measures. Additional qualified persons may assist with the inspection activities under

the direction of the Qualified Contact Person. A Qualified Contact Person is required for all sites during both wet and dry weather conditions.

The four primary purposes of self-inspections conducted by owners and contractors include the following:

- To ensure that the owner/contractor takes full responsibility for managing storm water pollution caused by the project site's construction activities.
- To ensure that storm water BMPs are properly documented, implemented, and functioning effectively.
- To identify maintenance (e.g., sediment removal) and repair needs.
- To ensure that project proponents implement site-specific storm water pollution prevention plans.

A self-inspection checklist, noting date, time, conditions and inspection date, must be kept on-site and made available for inspection upon request (note: the State General Construction Permit has additional inspection requirements that must be met to comply with the Permit).

Self-inspections must be performed by a Qualified Contact Person according to the following schedule:

- Daily forecasting at all times
- At 24-hour intervals during extended rainfall events
- Daily evaluations as grading operations are being conducted during the rainy season
- Weekly (every 7 days) evaluations in the dry season during grading operations.

Storm water pollution prevention site management requirements include:

- A Qualified Contact Person, who is trained and competent in the use of BMPs, shall be on site daily to evaluate conditions of the site with respect to storm water pollution prevention. This Qualified Contact Person shall represent the contractor/ owner on storm water issues.
- The Qualified Contact Person shall implement conditions of the Storm Water Pollution Prevention Plan, contract documents and/or local ordinances with respect to erosion and sediment control and other waste management regulations.
- The Qualified Contact Person is responsible for monitoring the weather and implementation of any emergency plans as needed. Weather conditions shall be monitored on a 5-day forecast plan and a full BMP protection plan shall be activated when there is a 40 percent or greater chance of rain.
- The Qualified Contact Person is responsible for overseeing site grading operations and evaluating the effectiveness of the BMPs. This person shall modify the BMPs as necessary to maintain site compliance. This person is responsible for checking the BMPs routinely for potential maintenance issues and documenting the BMPs being implemented.

5.1.2 Performance Standards

The City of San Diego will evaluate the adequacy of the owner/contractor's construction site management for storm water pollution prevention, inclusive of BMP implementation. These evaluations will be based on performance standards for storm water BMPs. Performance standards shall include:

- Pollution prevention measures designed so that there is no measurable increase of pollution (including sediment) in runoff from the site.
- Prevention of slope erosion.
- Mitigation of runoff discharge velocity less than or equal to pre-construction levels.
- Preservation of natural hydraulic features and riparian buffers where possible.

A site will be considered inactive if construction activities have ceased for a period of 7 or more consecutive calendar days. At any time of year, an inactive site must be fully protected from erosion and discharges of sediment. It is also the owner/contractor's responsibility (for both active and inactive sites) to implement a plan to address all potential non-storm water discharges.

Regardless of inspections conducted by the City, property owners or contractors are required to prevent any construction-related materials, wastes, spills or residues from entering a storm water conveyance system and to apply for coverage under the State General Construction Permit as applicable for the site.

5.1.2.1 Permanent BMP Maintenance Agreement Requirements

Applicants shall propose a maintenance agreement assuring all permanent BMPs, including LID facilities, will be maintained throughout the life of a project site, satisfactory to the City Engineer (see Appendix H for a list of potential mechanisms). City-approved methods of permanent BMP maintenance shall be incorporated into, and shall be consistent with, permits issued by resource agencies prior to approval of discretionary actions.

For projects requiring only construction permits, the City-approved method of permanent BMP operation and maintenance procedures shall be executed prior to the issuance of any construction permits. The maintenance procedures shall be noted on the construction plans. The verification mechanism will include the applicant's signed statement accepting responsibility for all permanent BMP maintenance, repair and replacement.

The maintenance agreement shall include the following:

1. Operation & Maintenance (O&M) Plan

The applicant shall include an Operation & Maintenance (O&M) plan, prepared to the satisfaction of the City Engineer, with the approved maintenance agreement. The Operation and Maintenance Plan must:

- Describe the designated responsible party to manage the storm water BMPs
- Outline employees' training program and duties
- Outline operating schedule, maintenance frequency, and specific maintenance activities
- Include copies of resource agency permits
- Provide inspection and maintenance schedule of all permanent treatment BMPs on an annual basis.
- Provide implementation schedule for non-structural BMPs, such as source control BMPs
- Include inspection procedures, elements to inspect, inspection frequencies, and maintenance triggers.
- Identify the maintenance activity to be implemented upon observation of a maintenance trigger during an inspection

- Describe the BMP types
- Provide exhibits showing locations of BMPs as well as surrounding topography and land uses
- Quantify drainage areas to BMPs
- Quantify volumes and peak flows through BMPs during design storm events
- Quantify bypass flows around BMPs and explain what storm events would bypass the BMPs
- List sizes and dimensions of proposed BMPs
- Explain how the BMPs are to designed to mitigate pollutants,
- Explain how the BMPs' performance can degrade between maintenance cycles
- Explain the types of activities or events that can cause the BMPs to fail or require more frequent maintenance
- Establish an appropriate inspection and maintenance schedule.

The project proponent or City-approved maintenance entity shall complete and maintain Operation and Maintenance forms to document all maintenance requirements. Parties responsible for the Operation and Maintenance plan shall retain records for at least 5 years. These documents shall be made available to the City for inspection upon request at any time.

2. Access Easement/Agreement

Unless the project applicant accepts permanent maintenance responsibility, the applicant shall execute an access easement to the official maintenance entity. This easement shall be binding on the land throughout the life of the project, until such time that the permanent treatment BMP requiring access is no longer required to be in use (as determined by the City Engineer).

5.2 Seasonal Requirements

The following requirements are the minimum standards for a construction site. Additional BMPs may be required to comply with the Performance Standards detailed in section 5.1. The City Engineer or designee may further amend these requirements on a case by case basis. Note that the contractor may utilize phased grading or advanced treatment as BMPs at their discretion in accordance with the provisions herein.

Year round requirements include but are not limited to:

- Perimeter protection BMPs must be installed and maintained to comply with performance standards from Section 5.1...
- Sediment control BMPs must be installed and maintained to comply with performance standards from Section 5.1.
- BMPs to control sediment tracking must be installed and maintained at entrances/exits to comply with performance standards from Section 5.1.
- Materials needed to install standby BMPs necessary to completely protect the exposed portions of the site from erosion, and to prevent sediment discharges, must be stored on site. Areas already protected from erosion through implementation of physical stabilization or established

vegetation stabilization BMPs (as described below) are not considered to be "exposed" for purposes of this requirement.

- The owner/contractor must have an approved "weather triggered" action plan and have the ability to deploy standby BMPs as needed to completely protect the exposed portions of the site within 24 hours of prediction of a storm event (a predicted storm event is defined as a forecasted 40 percent or greater chance of rain). On request, the owner/contractor must provide proof of this capability that is acceptable to the City of San Diego. The owner/contractor shall also show the area that will be cleared, graded and left exposed at any given time will be limited to the area that the owner/contractor can adequately protect prior to a predicted rainstorm.
- Deployment of physical or vegetation erosion control BMPs must commence as soon as grading and/or excavation is completed for any portion of the site. The project proponent may not continue to rely on the ability to deploy standby BMP materials to prevent erosion of graded areas that have been completed.
- Protect and stabilize all slopes during rain events.
- A washout area shall be designated and maintained for materials such as concrete, stucco, paint, caulking, sealants, drywall plaster, etc.
- Properly protected designated storage areas are required for materials and wastes.
- Trash and debris shall be removed and properly stored or disposed of daily.
- Storage, service, cleaning and maintenance areas for vehicles and equipment shall be identified and protected accordingly.
- Materials for spill control/containment must be stockpiled onsite.
- Non-storm water discharges must be eliminated or controlled to the maximum extent practicable.

Additional requirements for the rainy season (October 1 to April 30) include but are not limited to:

- Erosion control BMPs must be upgraded, if necessary, to provide sufficient protection for storms likely to occur during the rainy season.
- Perimeter protection and sediment control BMPs must be upgraded, if necessary, to provide sufficient protection for storms likely to occur during the rainy season.
- Adequate physical or vegetation erosion control BMPs must be installed and established for all graded areas prior to the start of the rainy season. These BMPs must be maintained throughout the rainy season. If a selected BMP fails, it must be repaired and improved, or replaced with an acceptable alternate as soon as it is safe to do so. The failure of a BMP shows that the BMP, as installed, was not adequate and the design should be corrected or modified as necessary. Repairs or replacements must therefore implement a more effective BMP.
- All vegetation erosion control must be established prior to the rainy season to be considered as a BMP.
- Should the contractor elect to grade more than five (5) acres prior to issuance of any grading permits, a weather triggered action plan should be submitted along with a BMP Implementation Plan (BIP). The BIP must quantify how sufficient BMPs will be deployed to control site erosion and prevent sediment discharge from the site within 24 hours of a 40 percent or greater probability of rain as reported by the National Weather Service. The BIP shall show the types of BMPs, the quantities of materials, and the labor that will be deployed upon initiation per the weather

triggered action plan. The BIP shall be maintained at the construction site for City inspection. Contractors shall allow City inspectors access to the site, applicable documents, and locations of BMPs so that City inspectors can verify the contractor is implementing BIP and other elements of the weather triggered action plan.

- A disturbed area, that is not completed but is not being actively graded, must be fully protected from erosion if left idle for 7 or more calendar days. The ability to deploy standby BMP materials is not sufficient for these areas. BMPs must actually be deployed.

5.3 Requirements for Projects Also Subject the Statewide Industrial and Construction General Permit

Following approval of a project-specific BMP design approach by the City Engineer, applicants must ensure BMP implementation and maintenance. In addition, any project that will require a "General NPDES Permit for Storm Water Discharges Associated with Industrial Activities" shall include the following note on the plans and in the conditions of permit/approval:

> "The Permittee or designee shall provide evidence of coverage under the General Industrial National Pollutant Discharge Elimination System Permit, in the form of a Notice of Intent (NOI) filed with the State Water Resources Control Board, prior to the issuance of any construction permits."

Additional BMP requirements include:

Permanent BMP Requirements. Projects that include permanent BMPs shall be conditioned to require the applicant or designee to execute a maintenance agreement for ongoing permanent BMP maintenance in accordance with the program outlined in the "Permanent Storm Water BMP Maintenance Agreement Requirements" detailed in section 5.1, satisfactory to the City Engineer and prior to the issuance of any construction permits. This requirement shall be noted on the plans for the discretionary action. The permanent BMPs shall be graphically shown on the plans and BMP implementation shall be made a condition of the project's permit/approval.

Construction BMP Requirements. Projects seeking discretionary approvals are not required to graphically demonstrate construction BMP requirements on the project plans. Instead, the discretionary action shall include the following standard condition, which shall also be noted on the plans:

> "The Permittee or designee shall incorporate construction best management practices (BMPs) necessary to comply with Chapter 14, Article 2, Division 1 (Grading Regulations) of the Land Development Code into the construction plans and/or specifications, satisfactory to the City Engineer and prior to the issuance of any construction permits."

The following criteria exist for construction permits:

Construction Permits for Projects Under 1 Acre. Projects that disturb less than 1 acre during construction shall include construction requirements on the plans. Construction BMPs that cannot be shown graphically on the plans shall be either noted on, or stapled to, the plans and Water Pollution Control Plan. The project's construction priority ranking (see Appendix A) must also be noted on the construction plans. Applicants proposing projects that include permanent BMPs must prepare and

execute a maintenance agreement, prepared satisfactory to the City and following the program outlined in section 5.1 prior to the issuance of any construction permits. The permanent BMPs shall be graphically shown on the plans, where possible. The permanent BMP's operation and maintenance requirements (O & M plan discussed below) shall also be noted on the plans.

Construction Permits for Projects Over 1 Acre. Projects that disturb more than 1 acre during construction shall include all construction BMPs in a Storm Water Pollution Prevention Plan, prepared in accordance with Appendix E, "Storm Water Pollution Prevention Plan Guidelines." The construction BMPs shall also be shown on the plans. BMPs that cannot be shown graphically on the plans shall be either noted or stapled to the plans. The project's construction priority ranking (see Appendix A) must also be noted on the construction plans. Applicants proposing projects that include permanent BMPs must prepare and execute a maintenance agreement, prepared satisfactory to the City and following the program outlined in section 5.1 prior to the issuance of construction permits. The permanent BMPs shall be graphically shown on the plans. Permanent BMP operation and maintenance requirements (O & M plan discussed above) shall also be noted on the plans.

5.4 Additional Requirements for Special Situations

Additional requirements for special situations are noted below, including grading greater than 5 acres during the rainy season and advanced treatment.

5.4.1 Grading Greater than 5 Acres in the Rainy Season

Should the contractor elect to grade more than five (5) acres prior to issuance of any grading permits, a weather triggered action plan should be submitted along with a BMP Implementation Plan (BIP). The BIP must quantify how sufficient BMPs will be deployed to control site erosion and prevent sediment discharge from the site within 24 hours of a 40 percent or greater probability of rain as reported by the National Weather Service. The BIP shall show the types of BMPs, the quantities of materials, and the labor that will be deployed upon initiation per the weather triggered action plan. The BIP shall be maintained at the construction site for City inspection. Contractors shall allow City inspectors access to the site, applicable documents, and locations of BMPs so that City inspectors can verify the contractor is implementing BIP and other elements of the weather triggered action plan.

5.4.2 Advanced Treatment

Advanced Treatment systems shall consist of:

- Sufficient water retention and treatment processes to treat all construction site runoff generated from the 2-year, 24-hour storm as determined from local rainfall records, using methods in accordance with the San Diego County Hydrology Manual with parameters including time of concentration appropriate to the site and watershed conditions.
- Bypass to be provided around the advanced treatment system to accommodate extreme storm events.
- Sediment and turbidity discharge limitations
  - For projects representing an exceptional threat to water quality (as defined in these standards), sufficient treatment to meet an effluent criteria of turbidity less than or equal to

the turbidity water quality objective listed in the basin plan for the receiving water to which the system discharges.

- Sufficient treatment to achieve maximum extent practicable reduction in sediment and turbidity, which shall consist of visibly clear water for projects not representing an exceptional threat to water quality as defined in these standards.

- Sufficient treatment technologies and controls to meet the objectives listed above while also not causing any impairments to water quality due to operation of the treatment process itself. In addition, treatment chemicals, if used:
  - Must be approved by EPA for potable water use or by another "reputable agency" engaged in the regulation and enforcement of water quality. Such an agency must specifically evaluate the use of such chemicals on stormwater runoff, an example being the State of Washington Department of Ecology. Selection of the reputable agency is at the discretion of the City Engineer.
  - Chemicals and treatment systems are to be used and operated in accordance with provisions established by such reputable agencies. Such provisions include dosing rates, sizing requirements, mixing rates and requirements, among other requirements.
  - If an approval is not available from a reputable agency selected by the City Engineer, the contractor is to complete site-specific testing of chemicals in accordance with the following provisions:.
    - Prior to authorization for field use, the chemically treated stormwater shall be tested for acute aquatic toxicity. Whole Effluent Toxicity Testing shall be used using Fathead minnow, Pimephales promelas (96 hour static-renewal test, method: EPA/600/4-90/027F) and Daphnid, Ceriodaphnia dubia, Daphnia pulex, or Daphnia magna (48 hour static test, method: EPA/600/4-90/027F). Testing shall use stormwater from the construction site at which the treatment chemical is proposed for use or a water solution using soil from the proposed site.
    - The proposed maximum dosage of chemicals shall be at least a factor of five lower than the no observed effects concentration (NOEC). Approval of a proposed treatment chemical shall be conditional, subject to full-scale bioassay monitoring of treated stormwater at the construction site where the proposed treatment chemical is to be used.
    - Proposed operational parameters such as dosing, mixing rates, hold and retention times must be established through pilot operations or process modeling to show that effluent concentrations will not exceed NOEC at any point during startup, operation, and shutdown activities.
    - Chemical discharge limits shall be those concentrations shown to not exceed NOEC.
    - Operators shall have 40 hours of training during operation of an active system with the same equipment as that to be used. Certifications shall be provided showing that operator training has occurred.

- The following monitoring activities shall be conducted (test results shall be recorded on a daily log kept on site):

- **Operational Monitoring** – twice per day when operating
  - pH, conductivity (as a surrogate for alkalinity), turbidity and temperature of the untreated stormwater
  - Total volume treated and discharged
  - Discharge time and flow rate
  - Type and amount of chemical used for pH adjustment
  - Type and amount of chemicals or polymer used for treatment
  - Settling time
- **Compliance Monitoring**
  - pH and turbidity of the treated stormwater once per day during discharges
  - pH and turbidity of the receiving water once per day during discharges at a location point no more than 50 feet downstream of the point of discharge into receiving water.
  - Analysis for the chemical added to the system once per day during discharges; or whole effluent toxicity testing using Fathead minnow, Pimephales promelas (96 hour static-renewal test, method: EPA/600/4-90/027F) and Daphnid, Ceriodaphnia dubia, Daphnia pulex, or Daphnia magna (48 hour static test, method: EPA/600/4-90/027F) once per discharge or once every seventh day should discharge occur for more than 7 days.

5.4.3 Projects Discharging to Impaired or Sensitive Water Bodies

Projects likely to discharge to impaired or sensitive water bodies are those tributary 303(d) listed impaired water body segments or adjacent to or discharging directly to coastal lagoons or other receiving waters in Water Quality Sensitive Areas. Such projects shall include, but not be limited to, the following:

1. Shall use high performance erosion control methods such and bonded fiber matrix or anchored erosion control blankets on all exposed slopes.
2. Shall ensure a sufficient vegetated buffer between the grading activity and the protected water body.
3. Where site drainage is directed to an inlet that conveys flow to the impaired or sensitive water body, or to a down gradient perimeter near the impaired or sensitive water body, there shall be at least two lines of defense for sediment control. Such defenses could include two parallel lines of silt fence along the perimeter or silt fence barriers strategically located upstream of a protected inlet. Each line of defense shall be designed to independently control sediment to the maximum extent practicable.
4. Stockpiles shall be fully protected and shall be located at a sufficient distance from the perimeter that is near the sensitive water body.
5. The Qualified Contact Person shall perform a site drainage analysis to confirm that, at each significant interim stage of grading, no flow concentration points are present that could scour unprotected soil areas or overwhelm erosion and sediment control measures. Such analysis shall be revisited during construction at significant decision points or changes in the grading sequence.

6. Special Provisions for Exceptional Threats to Water Quality - Where exceptional threats to water quality are anticipated, the contractor/owner shall implement Advanced Treatment An "exceptional threat" to water quality is defined as all of the following:

- Site is greater than five acres;
- Site is located within, adjacent to, or a portion of the site is within 200 feet of waters listed on the 303(d) list as impaired for sedimentation or turbidity;
- Site soils have greater than 10% (by weight of particle sizes) distribution of less than 20 microns;
- Site slopes to be disturbed by construction activities average greater than six percent. Averages shall be calculated as area weighted averages for those areas that drain toward the receiving water; and
- An absence of source control BMPs, consisting of all of the following:
  - Maintain vegetative cover by developing the project in a phased approach to reduce the amount of exposed soil at any one time.
  - Limit the areas of active construction to five acres at any one time.
  - Provide 100 percent soil cover for all areas of inactive construction throughout the entire construction phase, on a year-round basis.
  - Provide perimeter control at all appropriate locations along the site perimeter and at all inlets to the storm drain system at all times during the rainy season.
  - Provide vegetated buffer strips between the active construction area and any water bodies.
  - Provide stabilized construction entrances and limit all vehicle and foot traffic to those entrances.

APPENDIX A

Suggested Resources

APPENDIX B

Storm Water Requirements Applicability Checklist

APPENDIX C

Water Quality Sensitive Areas within the City Of San Diego

APPENDIX D

Map and Tables

APPENDIX E

Example Permanent Storm Water Best Management Practices

APPENDIX F

Water Quality Technical Report Guidelines

APPENDIX G

Storm Water Pollution Prevention Plan / Water Pollution Control Plan Guidelines

APPENDIX H

Example Construction Best Management Practices

APPENDIX I

Low Impact Development Design Guide

APPENDIX J

Definitions