



**COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS  
BUILDING AND SAFETY DIVISION - DRAINAGE & GRADING SECTION**

**STANDARD URBAN STORMWATER MITIGATION PLAN (SUSMP)  
REVIEW SHEET**

Urban and storm water runoff is considered to be one of the largest sources of pollution to both local waterways and coastal areas of the United States. Los Angeles County was issued a National Pollutant Discharge Elimination System permit for municipal stormwater and urban runoff discharges within the County of Los Angeles on December 13, 2001, by the Los Angeles Regional Water Quality Control Board. Under this permit, the County is required to prohibit the discharge of pollutants from private property developments. Preventing these pollutants from entering stormwater discharge system will be accomplished by requiring the installation and maintenance of post-construction treatment control Best Management Practices (BMPs) on qualifying projects.

**PROJECT INFORMATION**

|                                        |               |              |                                 |
|----------------------------------------|---------------|--------------|---------------------------------|
| _____                                  | _____         | _____        | _____                           |
| SITE ADDRESS                           | CITY/LOCATION | DISTRICT NO. | GRADING/BUILDING PLAN CHECK NO. |
| _____                                  | _____         |              | _____                           |
| DESIGN ENGINEER/APPLICANT              |               |              | TELEPHONE NO.                   |
| _____                                  | _____         |              | _____                           |
| OWNER/DEVELOPER                        |               |              | TELEPHONE NO.                   |
| _____                                  | _____         |              | _____                           |
| PLAN CHECKER                           |               |              | ENTRY DATE                      |
| _____                                  |               |              |                                 |
| PROJECT DESCRIPTION/PROPOSED OCCUPANCY |               |              |                                 |

- The project as proposed is exempt from the requirements of the Development Construction provisions of the County NPDES permit.

**The following is a list of new development and redevelopment projects/activities requiring the incorporation of Best Management Practices (BMPs) into the project plans. If the proposed new development or redevelopment and/or activity falls into one of these categories as indicated below, BMPs shall be incorporated into project plans to satisfy SUSMP requirements. Details of SUSMP provisions must be prepared and submitted as part of the project building or grading plans (see Section 106.4.3 of the Los Angeles County Building Code).**

Project/Activities requiring BMPs under the SUSMP provisions:

- Single family hillside development. "Hillside" means property located in an area where the development contemplates grading on any natural slope that is twenty-five percent or steeper.
- Industrial/Commercial development that creates an area of one acre or more of impermeable area.
- Retail gasoline outlet, gas station, or fuel dispensing.
- Automotive repair shop, automotive and/or equipment maintenance areas.
- Restaurant, outdoor food handling or processing.
- Parking lot creating 5,000 square feet or more of surface area, or with 25 or more parking spaces and potentially exposed to stormwater runoff.
- Projects located within, directly adjacent to, or directly tributary to an environmentally sensitive area.

- ❑ Automotive or equipment washing or cleaning area(s).
- ❑ Outdoor hazardous material, waste handling or storage.
- ❑ Commercial or industrial waste.
- ❑ Outdoor manufacturing areas such as equipment or product fabrication including welding, cutting, sawing, metal fabrication, assembly, application of paints, coatings, or finishes, pre-cast concrete fabrication, equipment or machinery repair and/or maintenance, etc.
- ❑ Outdoor horticulture activities.
- ❑ Animal slaughtering, animal confinement, pet care facilities, stables, kennels, etc.
- ❑ Ten or more unit homes.

- **REDEVELOPMENT PROJECTS**

"Redevelopment" means land-disturbing activity that results in creation, addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to, the expansion of a building footprint, addition or replacement of a structure; replacement of impervious surface that is not part of a routine maintenance activity; and land disturbing activities related with structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety. Where redevelopment results in an alteration to less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to these SUSMP requirements, the Design Standards apply only to the alteration, and not to the entire development. Where redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to the SUSMP requirements, the Design Standards apply to the entire project.

**REDEVELOPMENT:** Redevelopment projects covered under the project/activities categories indicated above may require BMPs under the SUSMP provisions. Your redevelopment project is:

- ❑ **Exempt:** (Impervious surface area replaced, added, or created is < 5,000 square feet) Proposed improvements are less than 5,000 square feet or maintain original line and grade and the original purpose of the facility. Project is, therefore, exempt from SUSMP requirements.
- ❑ **BMPs to meet SUSMP requirements must be incorporated into Design Plans:** (Impervious surface area replaced, added, or created is > 5,000 square feet.) Proposed improvements are greater than or equal to 5,000 square feet or do not maintain original line and grade. Project is, therefore, subject to SUSMP requirements.

**Your redevelopment project requires the following:**

- ❑ **BMPs must be incorporated in project plans for the newly developed area only.** Required when an alteration results in an increase of less than 50 percent of the impervious surfaces of the previously existing development, and the existing development was not subject to SUSMP requirements.
- ❑ **BMPs must be incorporated in project plans for the newly developed and existing areas.** Required when an alteration results in an increase of greater than 50 percent of the impervious surfaces of the previously existing development.

**AGENCY REFERRALS**

- ❑ Submit and obtain approval from Environmental Programs Division, Industrial Waste Unit, for all structural BMPs selected to treat onsite pollutants for the proposed non-residential project. An annual operating permit may be required. Environmental Programs Division, Industrial Waste Unit - 900 S. Fremont, Alhambra, Annex Building, 3rd floor, (626) 458-3517. Please contact Environmental Programs Division for required fees and minimum submittal requirements. Please note: prior to obtaining approval from Environmental Programs Division the location and the design flows for all BMPs must be shown on plans and approved by Building and Safety.
- ❑ Obtain an encroachment permit for the proposed construction and/or discharge of drainage in the road right of way. Construction Division, Permits Section - 900 S. Fremont, Alhambra, 8th Floor, (626) 458-3129.
- ❑ Obtain a connection permit or approval for the proposed connection to the Los Angeles County Flood Control District Drain\_\_\_\_\_. Construction Division, Permits Section, 900 S. Fremont, Alhambra, 8<sup>th</sup> Floor, (626) 458-3129.
- ❑ Obtain an encroachment/connection permit for the proposed construction/connection or discharge of drainage in road right of way. City of \_\_\_\_\_/Caltrans.  
\_\_\_\_\_
- ❑ This project is located within the City of \_\_\_\_\_. Obtain approval from the City for SUSMP requirements. (Required for all Cities that do not contract this service from the Los Angeles County Department of Public Works).

**HYDRAULIC and HYDROLOGY REQUIREMENTS**

- ❑ Provide a hydrology analysis to determine the design flow rate ( $Q_{PM}$ ) or Volume (VM) for the first 3/4-inch of rainfall that must be treated. See Appendix 1 for calculation of  $Q_{PM}$ .
- ❑ Submit site specific hydraulic calculations along with the recommended structural BMP manufacturer’s product specifications to verify the BMP will adequately handle the minimum design flow required for treatment. Note: The proposed project improvements must provide the required minimum level of flood protection.
- ❑ Provide Hydraulic analysis for the following: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- ❑ Outlet velocities from proposed drainage devices must be designed to minimize erosion. Energy dissipation is required for all devices. Calculations for the sizing of dissipaters must be provided. Soils analysis may be required to determine the site conditions and susceptibility to erosion.

**GENERAL COMMENTS**

- ❑ For building plans, all SUSMP requirements and associated details for the proprietary or non-proprietary BMPs shall be shown on the building site plan. (Plan scale shall be 1"=40' or better.)
- ❑ For grading plans, all SUSMP requirements and associated details for the proprietary or non-proprietary BMPs shall be shown on the grading plans.

- The project must mitigate the first 3/4-inch of rainfall for each storm event and be designed to minimize the introduction of pollutants from the site runoff into the stormwater conveyance system. (Reference 1)

In addition to those items required on the site grading and/or building drainage plans, the following SUSMP information shall be incorporated on the plans:

- Show the location of proposed BMPs on plans. All necessary manufacturer’s installation notes and construction requirements and/or details must be included on the plans for all treatment and holding facilities. This includes model, size, material type, dimensions, volumetric capacity, and manufacturer’s treatment capacity.
- For non-proprietary BMPs, in addition to the items indicated above, provide details of all organic materials including plants, filter materials and specifications. Planting and irrigation details for any vegetated BMP must be indicated on the plans.
- Specify all elevations for proposed BMPs, inverts or flow lines as applicable.
- Specify on the plans for each drainage device, the total design flow,  $Q_{total}$ , and the peak mitigation flow rate,  $Q_{PM}$  (See Reference 1 for additional information).
- Clearly show driveway/access road drainage and provide BMPs for treatment of driveway flows. Provide elevations, cross sections, or slopes as applicable.
- Show proposed drainage in paved areas. Provide spot elevations, slopes, and flow arrows to intended outlet(s). If offsite tributary flows are not included in onsite treatment, show how flows will be directed away from proposed BMPs. Provide topography, elevations, cross sections, slopes, and details as applicable.
- For commercial properties, all catch basins and inlets that discharge into an existing or proposed storm drain must be labeled to discourage illegal dumping of pollutants. See Appendix 3 for stencil information.
- Direct rooftop runoff to pervious areas such as yards, vegetated open channels, or areas where practical. Provide BMP solution for treatment of roof runoff.
- Add the following SUSMP NOTES to the site grading and/or building drainage plans.

**SUSMP NOTES:**

1. Determine and provide the pre and post development pervious and impervious areas created by the proposed development. Show the following table on Plans:
2. All structural BMPs shall be accessible for inspection and maintenance and shall bear a “No Dumping – Drains to Ocean” symbol in traffic rated paint per detail herein. Stencils are available at the local Building and Safety District office.
3. Prior to commencement of any work within the road right of way and/or connection to a County-maintained storm drain an encroachment permit from Construction Division is required. For more information call (626) 458-3129.
4. Prior to commencement of any work and/or discharge of drainage to a watercourse, a permit from both the California Department of Fish and Game and U.S. Army Corps of Engineers may be required.

|                         |        |
|-------------------------|--------|
| <b>POST DEVELOPMENT</b> |        |
| Impervious Area _____   | Acres, |
| Pervious Area _____     | Acres, |
| <b>PRE DEVELOPMENT</b>  |        |
| Impervious Area _____   | Acres, |
| Pervious Area _____     | Acres, |

5. STATEMENTS OF UNDERSTANDING

As the Architect/Engineer of the project, I have reviewed the Development Planning for Storm Water Management–A manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), and have proposed the implementation of the permanent Best Management Practices (BMPs) applicable to effectively minimize the negative impacts of the project’s stormwater runoff. The selected BMPs will be installed per the approved plans and as recommended by the product manufacturer as applicable.

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Signature - Architect/Engineer of Record      Date

**CERTIFICATIONS AND PROOF OF ONGOING MAINTENANCE**

- ❑ Project Civil Engineer/Architect must complete the **STATEMENTS OF UNDERSTANDING**, see SUSMP general note number 5 which must be signed and added to proposed plans.
- ❑ Project Civil Engineer/Architect must submit the **OPERATION AND MAINTENANCE GUIDELINES** for review and approval prior to recordation. The Operation and Maintenance Guidelines shall include the designated responsible party to manage the SUSMP devices, employee’s training program and duties, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities, copies of resource agency permits, and any other necessary activities. At a minimum, maintenance shall require inspection and servicing of all SUSMP devices on an annual basis.
- ❑ Provide recorded and certified copies of the **MAINTENANCE COVENANT FOR SUSMP DEVICES** and **OPERATION AND MAINTENANCE GUIDELINES** to provide for ongoing operation and maintenance of SUSMP devices. Refer to Appendix 4 for Covenant.
- ❑ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DESIGN SUGGESTIONS**

- Examples of BMPs can be found in Appendix 2.
- Wherever practical, use natural drainage areas/systems to convey flows.
- Utilize permeable materials for sidewalks, driveways, and parking lots where practicable.
- Employ the use of detention basins, infiltration basins, and infiltration trenches where applicable.
- Concentrate or cluster proposed developments on portions of site while leaving the greatest area of land in a natural undisturbed condition.
- Conserve natural areas by minimizing the amount of site clearing and grading of native vegetation required for development.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

## **AREAS OF SPECIAL ATTENTION**

For commercial developments, the items indicated below are reviewed by Environmental Programs Division, Industrial Waste Unit. The following requirements are provided for reference only:

### **Properly Design Material Storage Areas:**

- Provide a roof above the material storage area. If the roof structure does not include side walls, then the roof's overhang must extend a minimum of 20 percent of the roof's height. Elimination of roof cover will be reviewed on a case-by-case basis.
- The storage area must be paved and sufficiently impervious to contain leaks and spills. Provide and show on plans all storage areas for chemicals and/or waste materials stored at the subject facility, with a tank/drum schedule indicating tank capacities, materials of construction, and contents. Provision for spill containment is required where such materials may potentially enter the sewer system, storm drain, or contaminate the soil. Spill containment should be designed for the volume of the largest tank or 10 percent of the drum total (whichever is greater), plus 6 inches of rainfall over the containment area (if outdoors). Submit a typical detail of the containment curb and specify the materials of construction.
- All tanks containing incompatible materials such as acids, bases, reactive or flammable materials must have separate spill containment systems.
- Interior wall and floors within all spill containment areas shall be cleaned, repaired and sealed with an epoxy or equivalent type sealant which is compatible with the materials located within said areas. Provide manufacturer's literature of selected sealant and indicate on drawings areas to be sealed.
- The contact joint for spill containment walls or dikes constructed on existing concrete, masonry or asphalt shall be bonded to the existing surface. Provide manufacturer's literature of the selected bonding agent and indicate on drawings areas to be bonded.
- Materials collected in the spill containment area must be controlled until a determination is made regarding their quality and legal disposal method.

### **Properly Design Loading/Unloading Areas:**

- Provide a roof above the loading dock area. If the roof structure doesn't include side walls, then the roof's overhang must extend a minimum of 20 percent of the roof's height. Elimination of the roof cover will be reviewed on a case-by-case basis.
- Design drainage to minimize stormwater runoff onto loading/unloading area.
- Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

### **Properly Design Repair/Maintenance Bays:**

- Repair/maintenance bays must be indoors or designed in such a way that does not allow stormwater runoff onto the wash bay.
- Design repair/maintenance bay drainage system to capture all wash water, leaks and spills. Show on plans all proposed drain connections for collection and disposal. Direct connection of the repair/maintenance bay outlet drain to the storm drain system is prohibited.
- If wastewater is generated, the person responsible for the discharge must file for an Industrial Waste Disposal Permit.

### Properly Design Vehicle/Equipment Wash Areas:

- Vehicle/equipment wash areas are subject to Industrial Waste Discharge Permit plan review.
- Vehicle/equipment wash areas shall be provided with a clarifier and a sample box. The discharge must be routed to the sanitary sewer line. Details, as applicable, must be indicated on plans.
- Provide a roof above the vehicle/equipment wash area. If the roof structure does not include side walls, then the roof's overhang must extend a minimum of 20 percent of the roof's height. Elimination of the roof cover will be reviewed on a case-by-case basis.
- If a cover is not feasible, provide an approved rainwater diversion system along with a clarifier and a sample box (County Standard Plan 2043-0, enclosed). Diverted flow may require pretreatment, verification of pollutant removal and/or storage prior to discharge to the storm drain.

### Properly Design Fueling Areas:

- The fuel dispensing area must be covered with a roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
- Fuel dispensing areas must be paved with Portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- Propose a spill collection and cleanup maintenance plan for the fueling area. Flows from washing-down of the fueling area entering the storm drain system are prohibited.

### Properly Design Refuse Collection Areas:

- If drains are proposed in the refuse collection area, these shall be connected to the sanitary sewer with proper pretreatment facilities. Surrounding areas shall be graded to drain away from the refuse collection area.
- Drainage from adjoining roofs must be diverted away from the refuse collection area.
- Refuse collection areas must be screened or walled to prevent off-site transport of refuse.

### Properly Design Parking Areas:

- Infiltration runoff that may potentially contaminate soil is not acceptable.
- Provide a pretreatment facility to treat stormwater flows prior to entering the storm drain system.

## **REFERENCES**

1. Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works
2. California Stormwater Best Management Practices Handbook
3. Caltrans Stormwater Quality Handbook: Planning and Design Staff Guide
4. Manual for Stormwater Management in Washington State
5. The Maryland Stormwater Design Manual
6. Florida Development Manual: A Guide to Sound Land and Water Management
7. Denver Urban Storm Drainage Criteria Manual
8. USEPA Report No. EPA-840-B-92-002

# APPENDICES

## **APPENDIX 1      3/4" PEAK MITIGATED FLOW RATE ( $Q_{PM}$ )**

This Appendix provides a step-by-step approach for calculating the 3/4" peak mitigated flow rate,  $Q_{PM}$ .

## **APPENDIX 2      EXAMPLES OF BMPs**

This Appendix contains example BMPs and design suggestions that may be incorporated into the project to satisfy the requirement for minimizing the release of pollutants from each new development. Additional examples may be found in reference one on the enclosed list.

## **APPENDIX 3      STENCIL FOR LABELING OF INLETS INTO DRAINAGE SYSTEM**

Inlets to closed storm drains must be clearly labeled to indicate dumping of improper materials into stormwater conveyance system is prohibited. The attached "No Dumping-This Drains to Ocean" graphical icon is acceptable for stenciling or labeling of drain inlets. Stencils may be purchased at the local Building and Safety District Office. Refer to fee code "CB" when purchasing the stencil.

## **APPENDIX 4      SUSMP MAINTENANCE COVENANT**

The purpose of the SUSMP Maintenance Covenant and the Operation and Maintenance Guidelines is to ensure that all current and future owners of a development are made aware that the site contains SUSMP BMPs that must remain operational and be maintained. These documents shall be recorded against the subject property. **THE SUSMP MAINTENANCE COVENANT AND OPERATION AND MAINTENANCE GUIDELINES MUST BE SIGNED, NOTARIZED, AND RECORDED.** Applicant must provide copy of the recorded documents stamped by the County Recorder's office.

RECORDATION is the responsibility of the applicant. The main Recorder's office is located at 12400 Imperial Highway in the City of Norwalk. Additional branch offices for recording documents are available.

Information for the County Recorder's offices can be obtained on the Internet at <http://regrec.co.la.ca.us/main.htm> or by calling (562) 462-2125 for more information.



# APPENDIX 1

## DETERMINING THE 3/4 INCH PEAK MITIGATED FLOW RATE ( $Q_{PM}$ ):

For compliance with SUSMP requirements, use the Modified Rational Method to calculate the peak mitigated flow rate ( $Q_{PM}$ ). The  $Q_{PM}$  may be calculated by hand or by using the County of Los Angeles Department of Public Works'  $T_c$  Calculator. Both methods are described below.

### $T_c$ Calculator Method

The  $T_c$  Calculator may be downloaded from the following website:  
[dpw.lacounty.gov/wrd/publication/](http://dpw.lacounty.gov/wrd/publication/)

The  $T_c$  Calculator calculates the full modified rational runoff method yielding peak runoff rates and volumes. The figure to the right shows the interface for the  $T_c$  calculator. To calculate the  $Q_{PM}$ , fill out the boxes in the upper left hand corner of the calculator under "Subarea Parameters Manual Input" and use 0.75 as the Rainfall Isohyet. Click on the "Calculate  $T_c$ " button in the lower right to display the results. To calculate multiple subareas simultaneously, the  $T_c$  calculator can also accept Excel spreadsheets as input files containing a number of subareas. Please refer to the Hydrology Manual for more information.

### Hand Calculation Method

The Hydrology Manual may be downloaded from the following website:  
[dpw.lacounty.gov/wrd/publication/](http://dpw.lacounty.gov/wrd/publication/)

By trial and error, determine the time of concentration ( $T_c$ ), as shown below:

### CALCULATION STEPS:

1. Determine subarea boundaries and then calculate flow path length, flow path slope, and area.

$$L = \text{_____ feet}$$

$$S = \text{_____ feet / feet}$$

$$A = \text{_____ acres}$$

2. Assume an initial value for  $T_c$

$$T_c = \text{_____ minutes}$$

3. Using Table 1, look up the assumed  $T_c$  value and select the corresponding intensity,  $I_t$

$$I_t = \text{_____ in/hr}$$

4. Determine the undeveloped runoff coefficient,  $C_u$ , using the runoff coefficient curve corresponding to the predominant soil type in Appendix C of the County of Los Angeles Department of Public Works Hydrology Manual.

$$C_u = \underline{\hspace{2cm}}$$

5. Determine the developed runoff coefficient,  $C_d$

$$C_d = (0.9 \times \text{IMP}) + [(1.0 - \text{IMP}) C_u]$$

where,  $C_d$  = Developed area runoff coefficient

IMP = Percent impervious

$C_u$  = Undeveloped area runoff coefficient

$$C_d = \underline{\hspace{2cm}}$$

6. Calculate the time of concentration,  $T_c$

$$T_c = \frac{0.31L^{0.483}}{(C_d * I_t)^{0.519} * S^{0.135}}, \quad T_c = \underline{\hspace{2cm}} \text{ minutes}$$

7. Compare the initial  $T_c$  assumption with the calculated  $T_c$ . If the difference is not within 0.5 minutes, use the new  $T_c$  value and begin at Step 3 to complete another iteration. If the difference is within 0.5 minutes, round the  $T_c$  value to the nearest minute.

The acceptable  $T_c$  range is from 5 to 30 minutes. If a  $T_c$  of less than 5 minutes is calculated, use 5 minutes. If a  $T_c$  greater than 30 minutes is calculated, the subarea must be divided into two or more subareas.

Acceptable  $T_c$  value =  $\underline{\hspace{2cm}}$  minutes

**TABLE FOR ITERATIONS:**

| Iteration No. | Initial $T_c$<br>(min) | $I_t$<br>(in/hr) | $C_u$ | $C_d$ | Calculated $T_c$<br>(min) | Difference<br>(min) |
|---------------|------------------------|------------------|-------|-------|---------------------------|---------------------|
| 1             |                        |                  |       |       |                           |                     |
| 2             |                        |                  |       |       |                           |                     |
| 3             |                        |                  |       |       |                           |                     |
| 4             |                        |                  |       |       |                           |                     |
| 5             |                        |                  |       |       |                           |                     |
| 6             |                        |                  |       |       |                           |                     |
| 7             |                        |                  |       |       |                           |                     |
| 8             |                        |                  |       |       |                           |                     |
| 9             |                        |                  |       |       |                           |                     |
| 10            |                        |                  |       |       |                           |                     |

8. Calculate the peak mitigated flow rate,  $Q_{PM}$

$$Q_{PM} = C_d * I_t * A, \quad Q_{PM} = \underline{\hspace{2cm}} \text{ cfs}$$

**TABLE 1**

**INTENSITY – DURATION DATA FOR 0.75-INCH OF RAINFALL**

| Duration, $T_c$ (min) | Rainfall Intensity, $I_t$ (in/hr) |
|-----------------------|-----------------------------------|
| 5                     | 0.447                             |
| 6                     | 0.411                             |
| 7                     | 0.382                             |
| 8                     | 0.359                             |
| 9                     | 0.339                             |
| 10                    | 0.323                             |
| 11                    | 0.309                             |
| 12                    | 0.297                             |
| 13                    | 0.286                             |
| 14                    | 0.276                             |
| 15                    | 0.267                             |
| 16                    | 0.259                             |
| 17                    | 0.252                             |
| 18                    | 0.245                             |
| 19                    | 0.239                             |
| 20                    | 0.233                             |
| 21                    | 0.228                             |
| 22                    | 0.223                             |
| 23                    | 0.218                             |
| 24                    | 0.214                             |
| 25                    | 0.210                             |
| 26                    | 0.206                             |
| 27                    | 0.203                             |
| 28                    | 0.199                             |
| 29                    | 0.196                             |
| 30                    | 0.193                             |

**PEAK MITIGATED FLOW RATE,  $Q_{PM}$ , EXAMPLE**

Proposed Project Characteristics:

Drainage area                      1.2 acres  
 Type of development            Commercial  
 Predominant soil type #        006  
 % of project impervious        90%

**By trial and error, determine the time of concentration ( $T_c$ ), as shown below:**

- Determine subarea boundaries and then calculate flow path length, flow path slope, and area**

L = 320 feet  
 S = 0.035 feet / feet  
 A = 1.2 acres

**2. Assume an initial value for  $T_c$**

$$T_c = \underline{10} \text{ minutes}$$

**3. Using Table 1 on page IV, look up the assumed  $T_c$  value and select the corresponding intensity,  $I_t$**

$$I_t = \underline{0.323} \text{ in/hr}$$

**4. Using the runoff coefficient curves in Appendix C of the County of Los Angeles Department of Public Works Hydrology Manual, determine the undeveloped runoff coefficient,  $C_u$ , corresponding to the predominant soil type**

$$C_u = \underline{0.10}$$

**5. Determine the developed runoff coefficient,  $C_d$**

$$C_d = (0.9 \cdot \text{IMP}) + [(1.0 - \text{IMP}) \cdot C_u]$$

where,  $C_d$  = Developed area runoff coefficient

IMP = Percent impervious

$C_u$  = Undeveloped area runoff coefficient

$$C_d = (0.9 \cdot 0.9) + [(1.0 - 0.9) \cdot 0.1] = \underline{0.82}$$

**6. Calculate the time of concentration,  $T_c$**

$$T_c = \frac{0.31 \cdot L^{0.483}}{(C_d \cdot I_t)^{0.519} \cdot S^{0.135}}, \quad T_c = \frac{0.31 \cdot (320)^{0.483}}{(0.82 \cdot 0.323)^{0.519} \cdot (0.035)^{0.135}} = \underline{15.75} \text{ minutes}$$

**7. Compare the initial  $T_c$  assumption with the calculated  $T_c$ . If the difference is not within 0.5 minutes, use the new  $T_c$  value and begin at Step 3 to complete another iteration. If the difference is within 0.5 minutes, round the  $T_c$  value to the nearest minute.**

Initial  $T_c = \underline{10}$  minutes, Calculated  $T_c = \underline{15.75}$  minutes, Difference = 5.75 minutes

Since the difference is greater than 0.5 minutes, 15.75 minutes is rounded to 16 minutes and used as the new  $T_c$  value. Beginning at Step 3, additional iterations are performed until the initial and calculated  $T_c$  values are within 0.5 minutes. See results below.

| Iteration No. | Initial $T_c$<br>(min) | $I_t$<br>(in/hr) | $C_u$ | $C_d$ | Calculated $T_c$<br>(min) | Difference<br>(min) |
|---------------|------------------------|------------------|-------|-------|---------------------------|---------------------|
| 1             | 10                     | 0.323            | 0.10  | 0.82  | 15.75                     | 5.75                |
| 2             | 16                     | 0.259            | 0.10  | 0.82  | 17.67                     | 1.67                |
| 3             | 18                     | 0.245            | 0.10  | 0.82  | 18.18                     | 0.18                |

Acceptable  $T_c$  value = 18 minutes

**8. Calculate the peak mitigated flow rate,  $Q_{PM}$**

$$Q_{PM} = C_d \cdot I_t \cdot A, \quad Q_{PM} = 0.82 \cdot 0.245 \cdot 1.2 = \underline{0.24} \text{ cfs}$$

# APPENDIX 2

## EXAMPLE BEST MANAGEMENT PRACTICES (BMPs)

The following are examples of BMPs that can be used for minimizing the introduction of pollutants of concern that may result in significant impacts, generated from site runoff to the storm water conveyance system. (See Reference 1: Suggested resources for additional sources of information):

- Provide reduced width sidewalks and incorporate landscaped buffer areas between sidewalks and streets. However, sidewalk widths must still comply with regulations for the Americans with Disabilities Act and other life safety requirements.
- Design residential streets for the minimum required pavement widths needed to comply with all zoning and applicable ordinances to support travel lanes; on-street parking; emergency, maintenance, and service vehicle access; sidewalks; and vegetated open channels.
- Comply with all zoning and applicable ordinances to minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.
- Use permeable materials for private sidewalks, driveways, parking lots, or interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.).
- Use open space development that incorporates smaller lot sizes.
- Reduce building density.
- Comply with all zoning and applicable ordinances to reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.
- Comply with all zoning and applicable ordinances to reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.
- Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the stormwater conveyance system.
- Vegetated swales and strips
- Extended/dry detention basins
- Infiltration basin
- Infiltration trenches
- Wet ponds
- Constructed wetlands
- Oil/Water separators
- Catch basin inserts
- Continuous flow deflection/separation systems
- Storm drain inserts
- Media filtration
- Bioretention facility
- Dry-wells
- Cisterns
- Foundation planting
- Catch basin screens
- Normal flow storage/separation systems
- Clarifiers
- Filtration systems
- Primary waste water treatment systems

APPENDIX 3



RECORDING REQUESTED BY AND MAIL TO:

COUNTY OF LOS ANGELES  
DEPARTMENT OF PUBLIC WORKS  
BUILDING AND SAFETY DIVISION  
900 S. FREMONT AVENUE, 3RD FLOOR  
ALHAMBRA, CA 91803-1331

Space above this line is for Recorder's use

**MAINTENANCE COVENANT FOR STANDARD URBAN STORMWATER MITIGATION PLAN  
(SUSMP) REQUIREMENTS**

Pursuant to Section 106.4.3 of the County of Los Angeles Building Code and Title 12, Chapter 12.80 of the Los Angeles County Code relating to the control of pollutants carried by stormwater runoff, structural and/or treatment control Best Management Practices (BMPs) have been installed on the following property:

LEGAL DESCRIPTION

ASSESSOR'S ID # \_\_\_\_\_ TRACT NO. \_\_\_\_\_ LOT NO. \_\_\_\_\_

ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

REFERENCE

PLAN CHECK NO.: \_\_\_\_\_ DISTRICT OFFICE NO.: \_\_\_\_\_

I (we) \_\_\_\_\_, hereby certify that I (we) am (are) the legal owner(s) of  
(Legal Name of Property Owners)  
property indicated above, and as such owners for the mutual benefit of future purchasers, their heirs, successors, and assigns, do hereby fix the following protective conditions to which their property, or portions thereof, shall be held, sold and/or conveyed.

That owner(s) shall maintain the drainage devices such as paved swales, bench drains, inlets, catch basins, downdrains, pipes, and water quality devices on the property indicated above and as shown on plans permitted by the Los Angeles County Department of Public Works and as outlined in the attached "OPERATION AND MAINTENANCE GUIDELINES", in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

That owner(s) shall conduct maintenance inspection of all Structural or Treatment Control BMPs on the property at least once a year and retain proof of the inspection. Said maintenance inspection shall verify the legibility of all required stencils and signs and shall repaint and label as necessary.

That owner(s) shall provide printed educational materials with any sale of the property that provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s):

By: \_\_\_\_\_ Date: \_\_\_\_\_

By: \_\_\_\_\_ Date: \_\_\_\_\_

(PLEASE ATTACH NOTARY)