

Appendix I



Water Resources Technical Reports

Appendix I.1

Hydrology/LID Report

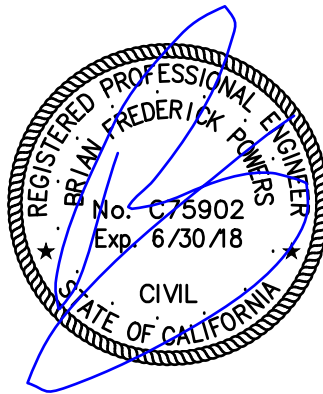




LACMA PHASE III PROJECT

WATER RESOURCES TECHNICAL REPORT: HYDROLOGY/LID

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1. INTRODUCTION

1.1. PROJECT DESCRIPTION

The Los Angeles County Museum of Art, partially located in Hancock Park in the Wilshire Community Plan Area of the City of Los Angeles and within the Miracle Mile, is the largest art museum in the western United States. Museum Associates, a private nonprofit public benefit corporation organized under California law and doing business as the Los Angeles County Museum of Art (LACMA), manages, operates and maintains the LACMA buildings under the authority of the County of Los Angeles. In partnership with the County of Los Angeles, Museum Associates proposes to construct the LACMA Building for the Permanent Collection (the Museum Building) within the eastern portion of the LACMA Campus (LACMA East) and adjacent properties.

The proposed 387,500 gross square-foot Museum Building would replace four buildings within LACMA East collectively comprising approximately 392,871 gross square feet. One of the four buildings to be removed includes the Bing Theater, which currently provides 600 seats. Overall, the Project would result in a decrease in the square footage of museum buildings by approximately 5,371 square feet and a reduction in the maximum theater size from 600 seats to 300 seats.

The Museum Building is proposed to consist of seven semi-transparent Pavilions supporting an elevated, continuous, transparent main gallery level extending over Wilshire Boulevard to the property on the southeast corner of Wilshire Boulevard and Spaulding Avenue (referred to as the Spaulding Lot). The design of the Museum Building would also enhance the outdoor experience by including new outdoor landscaped plazas, public programming and educational spaces, sculpture gardens, and native and drought tolerant vegetation that would be integrated with the Museum Building and the existing uses within Hancock Park. Approximately 148,000 square feet of covered outdoor space would also be provided. In addition, a new parking facility providing approximately 260 parking spaces would be developed southwest of the intersection of Ogden Drive and Wilshire Boulevard on three contiguous parcels owned by Museum Associates (referred to as the Ogden Lot). This new parking facility (referred to as the Ogden Parking Structure) would replace the surface parking area on the Spaulding Lot and would provide the same number of spaces currently located on the Spaulding Lot.

The Museum Building and the Ogden Parking Structure, together, comprise the Project. The Museum Building would be permitted by the Building and Safety Division of the LACDPW. The Ogden Parking Structure would be permitted by the City of Los Angeles Department of Building and Safety.

1.2. SCOPE OF WORK

This report provides a description of the existing surface water hydrology and surface water quality at the Project Site. In addition, the Report includes an analysis of the Project's potential impacts related to surface water hydrology and surface water quality.

2. SURFACE WATER HYDROLOGY

2.1. REGULATORY FRAMEWORK

County of Los Angeles Hydrology Manual

Per the City of Los Angeles (City)'s Special Order No. 007-1299, December 3, 1999, the City has adopted the Los Angeles County (County) Department of Public Works Hydrology Manual as its basis of design for storm drainage facilities. The Hydrology Manual requires that a storm drain conveyance system be designed for a 25-year storm event and that the combined capacity of a storm drain and street flow system accommodate flow from a 50-year storm event. Areas with sump conditions are required to have a storm drain conveyance system capable of conveying flow from a 50-year storm event.¹ The County also limits the allowable discharge into existing storm drain facilities based on the MS4 Permit and is enforced on all new developments that discharge directly into the County's storm drain system. Any proposed drainage improvements of County owned storm drain facilities such as catch basins and storm drain lines requires the approval/review from the Los Angeles County Flood Control District (LACFCD).

Los Angeles Municipal Code

Any proposed drainage improvements within the street right of way or any other property owned by, to be owned by, or under the control of the City requires the approval of a B-permit (Section 62.105, LAMC). Under the B-permit process, storm drain installation plans are subject to review and approval by the City of Los Angeles Department of Public Works Bureau of Engineering. Additionally, any connections to the City's storm drain system from a property line to a catch basin or a storm drain pipe requires a storm drain permit from the City of Los Angeles Department of Public Works, Bureau of Engineering.

2.2. ENVIRONMENTAL SETTING

2.2.1. REGIONAL

The Project Site is located within the greater Los Angeles area within the Ballona Creek Watershed. Ballona Creek is a 9 mile long flood protection channel that drains the Los Angeles basin, from the Santa Monica Mountains on the north, the Harbor Freeway (I-110/SR-110) on the east, and the Baldwin Hills on the south. The Ballona Creek Watershed totals about 130 square miles. It borders the crest of the Santa Monica Mountains on the north, the Ventura-Los Angeles County line, and extends to downtown Los Angeles. To the south, the Watershed extends to the south across the Los Angeles plain to include the area north of Baldwin Hills. The major tributaries to the Ballona Creek include Centinela

¹ Los Angeles County Department of Public Works Hydrology Manual, January 2006, <http://ladpw.org/wrd/publication/index.cfm>, accessed May 13, 2016.

Creek, Sepulveda Canyon Channel, Benedict Canyon Channel, and numerous storm drains. Refer to Figure 6 for Ballona Creek Watershed Map.

2.2.2. LOCAL

Underground storm drainage facilities located offsite along Wilshire Boulevard (a 30" City of Los Angeles main line) are owned and maintained by City of Los Angeles. Underground storm drainage facilities located offsite along Ogden Drive (a 96" / 87" Los Angeles County main line) are owned and maintained by the LACFCD. Stormwater runoff enters offsite catch basins and underground storm drainage pipes which convey stormwater through underground pipe networks into Ballona Creek. Ballona Creek flows generally southwest, ultimately discharging into the Pacific Ocean at the Santa Monica Bay. Ballona Creek is designed to discharge to Santa Monica Bay approximately 71,400 cubic feet per second from a 50-year frequency storm event. The existing catch basin and stormwater infrastructure located in Wilshire Boulevard, Spaulding Avenue, and Ogden Drive have sufficient capacity to accept the stormwater runoff from the existing conditions.

2.2.3. ON SITE

The existing site north of Wilshire Boulevard (Main Campus) consists of existing buildings on the LACMA campus. The existing site south of Wilshire Boulevard at the southeast corner of Wilshire Boulevard and Spaulding Avenue (Spaulding Lot) consists of an at grade parking lot. The existing site south of Wilshire Boulevard on the west side of Ogden Drive (Ogden Lot) consists of an at grade parking lot.

The LACMA East Campus drains into onsite storm drainage infrastructure that drains into City owned and maintained storm drainage infrastructure in two locations. The east portion of the LACMA East Campus referred below as LACMA East Campus Site 1 includes a tributary area upstream from Site 1 which discharges through an existing 30-inch city storm drain at Project Discharge Point #1. LACMA East Campus Site 2 to the west discharges to an existing City of LA catch basin on Wilshire Boulevard at Project Discharge Point #2. The City storm drainage infrastructure eventually ties into the Los Angeles County mainline BI 0493 on Ogden Drive.

The Spaulding Lot sheet flows to the west into Spaulding Avenue at Discharge Point #3, where it drains south and enters a catch basin at the north-east corner of Spaulding Avenue and 8th Street.

In the existing condition, the Ogden Lot is on temporary lease to the Metropolitan Transit Authority (MTA) as a temporary construction staging zone. As such, drainage from the Ogden Lot is currently managed by MTA, and discharges to Project Discharge Point #4 where it rains through a curb drain and into the curb and gutter on Ogden Drive.

Refer to Figure 1A and Figure 1B for existing on-site drainage pattern.

As shown in Table 1, the Project Site has been analyzed as discharging to four discharge points. Existing runoff was analyzed for a 50-year storm event.

Table 1- Existing Drainage Stormwater Runoff Calculations		
Drainage Area	Area (Acres)	Q50 (cfs) (volumetric flow rate measured in cubic feet per second)
Discharge Point #1	12.17	25.80
• Eastern Portion	4.01	10.01
• Upstream Tributary	8.16	15.79
Discharge Point #2	4.63	11.81
• Western Portion	2.62	7.49
• North Wilshire	2.01	4.32
Discharge Point #3	2.23	6.37
• Spaulding Lot	2.02	5.77
• South Wilshire	0.21	0.60
Discharge Point #4	0.44	1.37

The existing catch basin and stormwater infrastructure located in Wilshire Boulevard, Spaulding Avenue, and Ogden Drive have sufficient capacity to accept the stormwater runoff from the existing conditions. The City of LA does not provide Qallowable for their catch basin and stormwater infrastructure. Instead, catch basin capacity is determined by the hydraulic capacity of the downstream connector pipe. Thus, the capacity of existing lines is only analyzed in detail when flows are expected to increase, as is consistent with analyzing the incremental impact of a project. See Figure 12 for City of LA Storm Drain Capacity calculations.

2.3. SIGNIFICANCE THRESHOLDS

With respect to surface water hydrology, the CEQA Guidelines inquire whether the Project would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as result of the failure of levee or dam;
- Result in the construction of new water or wastewater treatment facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or,
- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow.

2.4. METHODOLOGY

The Project Site is located in the Mid-Wilshire area under the jurisdiction of both the LACDPW Flood Control Division and the City of Los Angeles Department of Public Works Bureau of Engineering. Drainage collection, treatment and conveyance are regulated by the County and the City. As discussed above, the County utilizes its Hydrology Manual as its basis of design for storm drainage facilities. Per the City's Special Order No. 007-1299, December 3, 1999, the City has also adopted the Hydrology Manual as its basis of design for storm drainage facilities. The Hydrology Manual requires projects to have drainage facilities that meet the Urban Flood level of protection. The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed. A 25-year frequency design storm has a probability of 1/25 of being equaled or exceeded in any year. The City's CEQA Threshold Guide, however, establishes the 50-year frequency design storm event as the threshold to analyze potential impacts on surface water hydrology as a result of development. This is in part because the City of Los Angeles uses the 50-year storm event to plan the existing and planned stormwater drainage systems. Consequently,

the use of the 50-year frequency design storm event in this analysis is in line with the CEQA threshold to determine if the project “[exceeds] the capacity of existing or planned stormwater drainage systems or provide[s] additional sources of polluted runoff.”

Modified Rational Method was used to calculate stormwater runoff. The “peak” (maximum value) runoff for a drainage area is calculated using the formula, $Q = CIA$

Where,

Q = Volumetric flow rate (cfs)

C = Runoff coefficient (dimensionless)

I = Rainfall Intensity at a given point in time (in/hr)

A = Basin area (acres)

The Modified Rational Method assumes that a steady, uniform rainfall rate will produce maximum runoff when all parts of the basin area are contributing to outflow. This occurs when the storm event lasts longer than the time of concentration. The time of concentration (Tc) is the time it takes for rain in the most hydrologically remote part of the basin area to reach the outlet.

The method assumes that the runoff coefficient (C) remains constant during a storm. The runoff coefficient is a function of both the soil characteristics and the percentage of impervious surfaces in the drainage area.

The LACDPW developed a time of concentration calculator, HydroCalc, to automate time of concentration calculations as well as the peak runoff rates and volumes using the Modified Rational Method design criteria as outlined in the Hydrology Manual. The data input requirements include: sub-area size, soil type, land use, flow path length, flow path slope and rainfall isohyet. The HydroCalc Calculator was used to calculate the stormwater peak runoff flow rate for the Project conditions by evaluating an individual sub-area independent of all adjacent subareas. See Figure 3 and Figure 4 for the HydroCalc Calculator results and Figure 5 for Isohyet Map.

The City of LA does not provide Qallowable for their catch basin and stormwater infrastructure. Instead, catch basin capacity is determined by the hydraulic capacity of the downstream connector pipe.

2.5. PROJECT IMPACT ANALYSIS

2.5.1. CONSTRUCTION

Construction activities for the Project would include excavating down on the order of 28.5 feet (approximately 140.5 above MSL) for subterranean parking, basement levels, building up the structure, and hardscape and landscape around the structure. It is anticipated that grading activities of approximately 188,540 net cubic yards of soil would be involved in construction of the Project (including LACMA East Campus, Spaulding Lot, and Ogden

Parking Structure scopes of work). This includes 127,600 cubic yards of export at the LACMA East Campus and Spaulding Lot and 23,540 cubic yards of export at the Ogden Lot, as well as 37,400 cubic yards of import at the LACMA East Campus and Spaulding Lot. These activities have potential to temporarily alter existing drainage patterns and flows on the Project Site by exposing the underlying soils, modifying flow direction, and making the Project Site temporarily more permeable. Also, exposed and stockpiled soils could be subject to erosion and conveyance into nearby storm drains during storm events. In addition, on-site watering activities to reduce airborne dust could contribute to pollutant loading in runoff.

However, as the construction site would be greater than one acre, the Project would be required to obtain coverage under the NPDES Construction General Permit. In accordance with the requirements of this permit, the Project would implement a SWPPP that specifies BMPs and erosion control measures to be used during construction to manage runoff flows and prevent pollution. BMPs would be designed to reduce runoff and pollutant levels in runoff during construction. The NPDES and SWPPP measures are designed to (and would in fact) contain and treat, as necessary, stormwater or construction watering on the Project Site so runoff does not impact off-site drainage facilities or receiving waters. Construction activities are temporary, and flow directions and runoff volumes during construction will be controlled.

In addition, the Project would be required to comply with all applicable Los Angeles County grading permit regulations that require necessary measures, plans, and inspections to reduce sedimentation and erosion. Thus, through compliance with all NPDES Construction General Permit requirements, including preparation of a SWPPP, implementation of BMPs, and compliance with applicable Los Angeles County grading regulations, the Project would not substantially alter the Project Site drainage patterns in a manner that would result in substantial erosion, siltation, flooding on- or off-site. Similarly, adherence to standard compliance measurements in construction activities would mitigate potential impact, such that the Project would not cause flooding, substantially increase or decrease the amount of surface water flow from the Project Site into a water body, or result in a permanent, adverse change to the movement of surface water. Therefore, construction-related impacts to surface water hydrology would be less than significant.

2.5.2. OPERATION

The Project will decrease the percentage of impervious area. The Project Site is currently existing buildings and hardscape (LACMA East Campus) with approximately 90% impervious surface coverage and two paved parking lots (Spaulding Lot and Ogden Lot) with approximately 95% impervious surface coverage. The Project will develop several buildings surrounded by hardscape and landscape; the post-project condition will be approximately 84% impervious at the LACMA East Campus, approximately 95% impervious at the Spaulding Lot, and approximately 95% impervious at the Ogden Lot.

In the existing condition, stormwater sheet flows from the Project Site without filtration or capture devices from the LACMA East Campus and Spaulding Lot. As stated above, the Ogden Lot is on temporary lease to the Metropolitan Transit Authority (MTA) as a temporary construction staging zone. As such, drainage from the Ogden Lot is currently managed by MTA in the existing condition. The Project is designed implementing a biofiltration flow through planter system to treat the first flush of stormwater runoff and meet all LID requirements. Refer to Section 3: Low Impact Development below for additional information on the LID BMP strategy. Refer to Figure 2A and Figure 2C for an illustration of where water is captured and discharged.

Table 2 shows the existing 50-year frequency design storm event peak flow rate within the Project Site and the proposed 50-year frequency design storm event peak flow rate within the Project Site. A comparison of the pre and post Project peak flow rates indicates slight decrease in stormwater runoff to Project Discharge Point #1, slight increase in stormwater runoff to Project Discharge Point #2, and no stormwater runoff increase to Project Discharge Point #3 and Project Discharge Point #4. The net Project Area increases due to the inclusion of the 0.21 acre Roof Area #3 over Wilshire Boulevard.

Table 2 –Proposed Drainage Stormwater Runoff Calculations Summary					
Drainage Area	Pre-Project Area (Acres)	Post-Project Area (Acres)	Pre-Project Q ₅₀ (cfs)	Post-Project Q ₅₀ (cfs)	Incremental Increase from Existing to Proposed Condition
Discharge Point #1	12.17	11.88	25.80	25.08	<0%
• Site 1/Roof 1	4.01	3.72	10.01	9.29	
• Offsite	8.16	8.16	15.79	15.79	
Discharge Point #2	4.63	4.92	11.81	12.17	3.0%
• Site 2/Roof 2	2.62	3.13	7.49	8.32	
• North Wilshire	2.01	1.79	4.32	3.85	
Discharge Point #3	2.23	2.23	6.37	6.37	0%
• Site 3/Roof 3	2.02	2.23	5.77	6.37	
• South Wilshire	0.21	0.00	0.60	0.00	
Discharge Point #4	0.44	0.44	1.37	1.37	0%

Site 1/Roof 1 will sheet flow to Project catch basins and the onsite stormwater infrastructure. The onsite stormwater infrastructure will tie into LA City Mainline 1 at Project Discharge Point #1. Additionally, offsite tributary area will be piped through the Project Site, as in the existing condition. The total Drainage Area that discharges to Project Discharge Point #1 will remain approximately the same as a result of an increase due to

the inclusion of a portion of Wilshire Boulevard that previously flowed to the catch basin at the northeast corner of the vacated Ogden Drive and Wilshire Boulevard, herein referred to as LA City catch basin #1, but a decrease in area due to a minimal reconfiguration of drainage areas as shown on the Proposed Hydrology Study/LID Figure 2A. As shown in Table 2 above, there is no expected increase in total flow to Project Discharge Point #1, and thus the Project will not significantly impact this storm drain infrastructure.

Site 2/Roof 2 will sheet flow to Project catch basins and the onsite stormwater infrastructure. The onsite stormwater infrastructure will connect to the back of the LA City catch basin at the northeast corner of the vacated Ogden Drive and Wilshire Boulevard at Project Discharge Point #2. Offsite tributary area will be reduced by the corresponding area roof area over North Wilshire, but will otherwise continue to sheet flow to LA City Catch Basin #1 as in the existing condition. The total Drainage Area that discharges to Project Discharge Point #2 will increase due to a reconfiguration of drainage areas. However, as shown on Figure 2A, the resulting flow is less than the capacity of the downstream LA City pipe. Since the City of LA determines the flow capacity of a catch basin based on the hydraulics of the discharging connector pipe, both the catch basin and the connector pipe will not be significantly impacted. Downstream of the connector pipe, the LA City Mainline 1 shows no increase in flow. Thus the Project will not significantly impact this storm drain infrastructure.

Site 3/Roof 3 will sheet flow to Project catch basins and the onsite stormwater infrastructure. The onsite stormwater infrastructure will discharge to the curb face along Spaulding Avenue at Project Discharge Point #3. The Drainage Area tributary to Spaulding Avenue is not expected to increase, because the southern portion of Wilshire flows to Spaulding Avenue in the existing condition and will continue to do so in the post-project condition.

Site 4 will sheet flow to Project catch basins and the onsite stormwater infrastructure. The onsite stormwater infrastructure will discharge to the curb face along Ogden Drive at Project Discharge Point #4. Since no increase in Discharge has been identified, there is no significant impact to storm drain infrastructure.

See Figure 2A for proposed hydrology map which shows how the Project in the post-condition directs flow to existing storm drain infrastructure. Therefore, the Project would not cause flooding during a 50-year storm event or result in an adverse change to the movement of surface water on the Project Site.

As noted above, the Project will implement biofiltration treatment systems to treat the first flush of runoff from building roof drains and site hardscape areas. Therefore, the anticipated volume of stormwater runoff from the existing condition would decrease, but not significantly in the 50-year storm event scenario. The post-project condition will manage stormwater flow to discharge points and existing catch basins located on the adjacent public streets as shown on Figure 2A and 2C.

The Project will mitigate existing offsite upstream tributary run-on conditions as shown on Figure 1A by maintaining existing offsite and onsite stormwater infrastructure in the proposed condition as shown on Figure 2A. As in the existing condition at the LACMA East Campus, offsite stormwater run-on tributary to Site 1 will be captured and discharged through Project Discharge Point #1 to an unnamed City owned and maintained mainline shown on P-22017 Sheet 3, herein referred to as “LA City Mainline 1”.

As stated above, the existing catch basin and stormwater infrastructure located in Wilshire Boulevard, Spaulding Avenue, and Ogden Drive have sufficient capacity to accept the stormwater runoff from the existing conditions. The City of LA does not provide Qallowable for their catch basin and stormwater infrastructure. Instead, catch basin capacity is determined by the hydraulic capacity of the downstream connector pipe. As noted above, the Project would not increase the rate or volume of stormwater runoff. In other words, the Project would not substantially reduce or increase the amount of surface water in the existing infrastructure or any water body. Therefore, impacts related to stormwater infrastructure improvements would be less than significant.

The Project would not impact existing storm drain infrastructure serving the Project Site and runoff would continue to follow the same discharge paths and drain to the same storm systems. Consequently, the Project would not cause flooding during the 50-year developed storm event, would not create runoff which would exceed the capacity of existing or planned drainage systems, would not require construction of new stormwater drainage facilities or expansion of existing facilities, would not substantially reduce or increase the amount of surface water in a water body, or result in a permanent adverse change to the movement of surface water. Therefore, potential impacts to site surface water hydrology would be less than significant.

In addition, the Project Site is not located within a 100-year flood plain (Refer to Figure 7A and 7B in the Appendix) or within an area that could be impacted by a tsunami (Refer to Figure 8 in the Appendix). Large bodies of uncovered water such as reservoirs, lakes or ponds are not located up gradient, in the vicinity of the Project Site. The nearest body of water potentially inducing a seiche hazard is the Hollywood Reservoir, approximately 4 miles to the northeast of the Project Site. Thus, hazards related to seiches are considered remote to the Project Site.²

There are two bodies of water present at the LACMA Campus. The larger of the two is the small lake located along Wilshire Boulevard, east of the Bing Building. The existing grades in the vicinity of the lake are on the order of two to seven feet higher than the water surface elevation. The lowest area is in the northwestern area of the lake. Although seiche is not anticipated, the water could flow from the lake toward the existing Bing Building. The second body of water is a small pond near the north eastern corner of the Hammer Building. The pond is within a topographic low area that includes La Brea Tar Pits “Pit 91.” Although seiche is not anticipated, the water could flow from the small pond toward Pit 91. Due to

² Geotechnical report titled “Preliminary Geotechnical Evaluation” revised September 6, 2017, by AECOM.

the onsite topography described above, in the case of both the lake and the pond, the potential for seiche of the onsite bodies of water to impact the Project is negligible.²

The Project Site is not located within areas designated by the state geologist where previous occurrence of landslide movement or local topographic, geological, geotechnical and subsurface conditions indicate a potential for permanent ground displacement to the extent that mitigation would be required. The potential for slope stability hazards (i.e. mudflows) at the Project Site is negligible.²

Therefore, impacts related to the above potential issues are less than significant.

The Project Site is within the potential inundation area of the Hollywood Reservoir according to the City of Los Angeles General Plan Safety Element, Exhibit G: Inundation & Tsunami Hazard Areas (Refer to Figure 11 in the Appendix). Dam safety regulations are the primary means of reducing damage or injury due to inundation occurring from dam failure. The California Division of Safety of Dams regulates the siting, design, construction, and periodic review of all dams in the State. In addition, dams and reservoirs are monitored during storms and measures are instituted in the event of potential overflow. These measures include seismic retrofits and other related dam improvements completed under the requirements of the 1972 State Dam Safety Act. Further, in the event of a dam failure at the Hollywood Reservoir, existing urban development north of the Project Site, including the US 101 Freeway, would serve as a physical barrier likely to redirect flows away from the Project Site. Additionally, the reservoir is located approximately 4 miles toward the northeast, decreasing the risk to the Project.³ Therefore, the risk of flooding from inundation by dam failure is considered low and impacts are less than significant.

2.5.3. CUMULATIVE IMPACT ANALYSIS

The geographic context for the cumulative impact analysis on surface water hydrology is the Ballona Creek Watershed. The Project in conjunction with forecasted growth in the Ballona Creek Watershed could cumulatively increase stormwater runoff flows. However, as noted above, the Project does not have an adverse impact on stormwater flows. Also, in accordance with City and County of Los Angeles requirements, related projects and other future development projects would be required to implement BMPs to manage stormwater in accordance with LID guidelines. Furthermore, the City of Los Angeles Department of Public Works, and where applicable the County of Los Angeles Department of Public Works, would review each future development project on a case-by-case basis to ensure sufficient local and regional infrastructure is available to accommodate stormwater runoff. Therefore, potential cumulative impacts associated with Project on surface water hydrology would be less than significant.

³ Geotechnical report titled "Preliminary Geotechnical Evaluation" revised September 6, 2017, by AECOM.

3. LOW IMPACT DEVELOPMENT

3.1. REGULATORY FRAMEWORK

Clean Water Act

The Clean Water Act was first introduced in 1948 as the Water Pollution Control Act. The Clean Water Act authorizes Federal, state, and local entities to cooperatively create comprehensive programs for eliminating or reducing the pollution of state waters and tributaries. The primary goals of the Clean Water Act are to restore and maintain the chemical, physical, and biological integrity of the nation's waters and to make all surface waters fishable and swimmable. As such, the Clean Water Act forms the basic national framework for the management of water quality and the control of pollutant discharges. The Clean Water Act also sets forth a number of objectives in order to achieve the above-mentioned goals. These objectives include regulating pollutant and toxic pollutant discharges; providing for water quality that protects and fosters the propagation of fish, shellfish and wildlife; developing waste treatment management plans; and developing and implementing programs for the control of non-point sources of pollution.⁴

Since its introduction, major amendments to the Clean Water Act have been enacted (e.g., 1961, 1966, 1970, 1972, 1977, and 1987). Amendments enacted in 1970 created the U.S. Environmental Protection Agency (USEPA), while amendments enacted in 1972 deemed the discharge of pollutants into waters of the United States from any point source unlawful unless authorized by a USEPA National Pollutant Discharge Elimination System (NPDES) permit. Amendments enacted in 1977 mandated development of a "Best Management Practices" Program at the state level and provided the Water Pollution Control Act with the common name of "Clean Water Act," which is universally used today. Amendments enacted in 1987 required the USEPA to create specific requirements for discharges.

In response to the 1987 amendments to the Clean Water Act and as part of Phase I of its NPDES permit program, the USEPA began requiring NPDES permits for: (1) municipal separate storm sewer systems (MS4) generally serving, or located in, incorporated cities with 100,000 or more people (referred to as municipal permits); (2) 11 specific categories of industrial activity (including landfills); and (3) construction activity that disturbs five acres or more of land. Phase II of the USEPA's NPDES permit program, which went into effect in early 2003, extended the requirements for NPDES permits to: (1) numerous small municipal separate storm sewer systems,⁵ (2) construction sites of one to five acres, and

⁴ Non-point sources of pollution are carried through the environment via elements such as wind, rain, or stormwater and are generated by diffuse land use activities (such as runoff from streets and sidewalks or agricultural activities) rather than from an identifiable or discrete facility.

⁵ A small municipal separate storm sewer system (MS4) is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" as defined by the Bureau of the Census (unless waived by the NPDES permitting authority), and on a case-by-case basis those small MS4s located outside of urbanized areas that the NPDES permitting authority designates.

(3) industrial facilities owned or operated by small municipal separate storm sewer systems. The NPDES permit program is typically administered by individual authorized states.

In 2008, the USEPA published draft Effluent Limitation Guidelines (ELGs) for the construction and development industry. On December 1, 2009 the EPA finalized its 2008 Effluent Guidelines Program Plan.

In California, the NPDES stormwater permitting program is administered by the State Water Resources Control Board (SWRCB). The SWRCB was created by the Legislature in 1967. The joint authority of water distribution and water quality protection allows the Board to provide protection for the State's waters, through its nine Regional Water Quality Control Boards (RWQCBs). The RWQCBs develop and enforce water quality objectives and implement plans that will best protect California's waters, acknowledging areas of different climate, topography, geology, and hydrology. The RWQCBs develop "basin plans" for their hydrologic areas, issue waste discharge requirements, enforce action against stormwater discharge violators, and monitor water quality.⁶

Federal Anti-Degradation Policy

The Federal Anti-Degradation Policy (40 Code of Federal Regulations 131.12) requires states to develop statewide anti-degradation policies and identify methods for implementing them. Pursuant to the Code of Federal Regulations (CFR), state anti-degradation policies and implementation methods shall, at a minimum, protect and maintain (1) existing in-stream water uses; (2) existing water quality, where the quality of the waters exceeds levels necessary to support existing beneficial uses, unless the state finds that allowing lower water quality is necessary to accommodate economic and social development in the area; and (3) water quality in waters considered an outstanding national resource.

California Porter-Cologne Act

The Porter-Cologne Water Quality Control Act established the legal and regulatory framework for California's water quality control. The California Water Code authorizes the SWRCB to implement the provisions of the CWA, including the authority to regulate waste disposal and require cleanup of discharges of hazardous materials and other pollutants.

As discussed above, under the California Water Code (CWC), the State of California is divided into nine RWQCBs, governing the implementation and enforcement of the CWC and CWA. The Project Site is located within Region 4, also known as the Los Angeles

⁶ USEPA. U.S. Environmental Protection Agency - Clean Water Act. July 2011
<<http://www.epa.gov/lawsregs/laws/cwa.html>>.

Region. Each RWQCB is required to formulate and adopt a Basin Plan for its region. This Plan must adhere to the policies set forth in the CWC and established by the SWRCB. The RWQCB is also given authority to include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

California Anti-Degradation Policy

The California Anti-Degradation Policy, otherwise known as the *Statement of Policy with Respect to Maintaining High Quality Water in California* was adopted by the SWRCB (State Board Resolution No. 68-16) in 1968. Unlike the Federal Anti-Degradation Policy, the California Anti-Degradation Policy applies to all waters of the State, not just surface waters. The policy states that whenever the existing quality of a water body is better than the quality established in individual Basin Plans, such high quality shall be maintained and discharges to that water body shall not unreasonably affect present or anticipated beneficial use of such water resource.

California Toxics Rule

In 2000, the EPA promulgated the California Toxics Rule, which establishes water quality criteria for certain toxic substances to be applied to waters in the State. The EPA promulgated this rule based on the EPA's determination that the numeric criteria are necessary in the State to protect human health and the environment. The California Toxics Rule establishes acute (i.e., short-term) and chronic (i.e., long-term) standards for bodies of water such as inland surface waters and enclosed bays and estuaries that are designated by the LARWQCB as having beneficial uses protective of aquatic life or human health.

Board Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties

As required by the California Water Code, the LARWQCB has adopted a plan entitled “Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties” (Basin Plan). Specifically, the Basin Plan designates beneficial uses for surface and ground waters, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy, and describes implementation programs to protect all waters in the Los Angeles Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. Those of other agencies are referenced in appropriate sections throughout the Basin Plan.⁷

The Basin Plan is a resource for the RWQCB and others who use water and/or discharge wastewater in the Los Angeles Region. Other agencies and organizations involved in

⁷ Los Angeles Regional Water Quality Control Board. LARWQCB Basin Plan<http://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/> accessed May 13, 2016.

environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues.

NPDES Permit Program

The NPDES permit program was first established under authority of the CWA to control the discharge of pollutants from any point source into the waters of the United States. As indicated above, in California, the NPDES stormwater permitting program is administered by the SWRCB through its nine RWQCBs.

The Construction General Permit

SWRCB Order No. 2012-0006-DWQ known as the “Construction General Permit” was adopted on July 7, 2012. This NPDES permit establishes a risk-based approach to stormwater control requirements for construction projects by identifying three project risk levels. The main objectives of the Construction General Permit are to:

1. Reduce erosion
2. Minimize or eliminate sediment in stormwater discharges
3. Prevent materials used at a construction site from contacting stormwater
4. Implement a sampling and analysis program
5. Eliminate unauthorized non-stormwater discharges from construction sites
6. Implement appropriate measures to reduce potential impacts on waterways both during and after construction of projects
7. Establish maintenance commitments on post-construction pollution control measures

California mandates requirements for all construction activities disturbing more than one acre of land to develop and implement Stormwater Pollution Prevention Plans (SWPPP). The SWPPP documents the selection and implementation of Best Management Practices for a specific construction project, charging Owners with stormwater quality management responsibilities. A construction site subject to the Construction General Permit must prepare and implement a SWPPP that meets the requirements of the Construction General Permit.⁸⁹

⁸ State Water Resources Control Board. State Water Resources Control Board. July 2011 <http://www.swrcb.ca.gov/water_issues/programs/npdes/>.

⁹ USEPA. U.S. Environmental Protection Agency - NPDES. July 2011 <<http://cfpub.epa.gov/npdes/>>.

Los Angeles County Municipal Storm Water System (MS4) Permit

As described above, USEPA regulations require that MS4 permittees implement a program to monitor and control pollutants being discharged to the municipal system from both industrial and commercial projects that contribute a substantial pollutant load to the MS4.

On November 8, 2012, the LARWQCB adopted Order No. R4-2012-0175 under the CWA and the Porter-Cologne Act. This Order is the NPDES Permit or MS4 permit for municipal stormwater and urban runoff discharges within Los Angeles County. The requirements of this Order (the “Permit”) cover 84 cities and most of the unincorporated areas of Los Angeles County. Under the Permit, the Los Angeles County Flood Control District (LACFCD) is designated as the Principal Permittee. The Permittees are the 84 Los Angeles County cities (including the City of Los Angeles) and Los Angeles County. Collectively, these are the “Co-Permittees”. The Principal Permittee helps to facilitate activities necessary to comply with the requirements outlined in the Permit but is not responsible for ensuring compliance of any of the Permittees.

Stormwater Quality Management Program (SQMP)

In compliance with the Los Angeles County MS4 Permit, the Co-Permittees are required to implement a stormwater quality management program (SQMP) with the goal of accomplishing the requirements of the Permit and reducing the amount of pollutants in stormwater runoff. The SWMP requires the County of Los Angeles and the 84 incorporated cities to:

- Implement a public information and participation program to conduct outreach on storm water pollution;
- Control discharges at commercial/industrial facilities through tracking, inspecting, and ensuring compliance at facilities that are critical sources of pollutants;
- Implement a development planning program for specified development projects;
- Implement a program to control construction runoff from construction activity at all construction sites within the relevant jurisdictions;
- Implement a public agency activities program to minimize storm water pollution impacts from public agency activities; and
- Implement a program to document, track, and report illicit connections and discharges to the storm drain system.

The MS4 Permit contains the following provisions for implementation of the SQMP by the Co-Permittees:

1. General Requirements:

- Each permittee is required to implement the SQMP in order to comply with applicable stormwater program requirements.
- The SQMP shall be implemented and each permittee shall implement additional controls so that discharge of pollutants is reduced.

2. Best Management Practice Implementation:

- Permittees are required to implement the most effective combination of BMPs for stormwater/urban runoff pollution control. This should result in the reduction of storm water runoff.

3. Revision of the SQMP:

- Permittees are required to revise the SQMP in order to comply with requirements of the RWQCB while complying with regional watershed requirements and/or waste load allocations for implementation of Total Maximum Daily Loads (TMDL)s for impaired waterbodies.

4. Designation and Responsibilities of the Principal Permittee:

The Los Angeles County Flood Control District is designated as the Principal Permittee who is responsible for:

- Coordinating activities that comply with requirements outlined in the NPDES Permit;
- Coordinating activities among Permittees;
- Providing personnel and fiscal resources for necessary updates to the SQMP;
- Providing technical support for committees required to implement the SQMP; and
- Implementing the Countywide Monitoring Program required under this Order and assessing the results of the monitoring program.

5. Responsibilities of Co-Permittees:

Each co-permittee is required to comply with the requirements of the SQMP as applicable to the discharges within its geographical boundaries. These requirements include:

- Coordinating among internal departments to facilitate the implementation of the SQMP requirements in an efficient way;

- Participating in coordination with other internal agencies as necessary to successfully implement the requirements of the SQMP; and
- Preparing an annual Budget Summary of expenditures for the storm water management program by providing an estimated breakdown of expenditures for different areas of concern, including budget projections for the following year.

6. Watershed Management Committees (WMCs):

- Each WMC shall be comprised of a voting representative from each Permittee in the Watershed Management Area (WMA).
- Each WMCs is required to facilitate exchange of information between co-permittees, establish goals and deadlines for WMAs, prioritize pollution control measures, develop and update adequate information, and recommend appropriate revisions to the SQMP.

7. Legal Authority:

- Co-permittees are granted the legal authority to prohibit non-stormwater discharges to the storm drain system including discharge to the MS4 from various development types.

Standard Urban Stormwater Mitigation Plan (SUSMP)

Under the Los Angeles County Municipal NPDES Permit, permittees are required to implement a development planning program to address storm water pollution. These programs require project applicants for certain types of projects to implement Standard Urban Stormwater Mitigation Plans (SUSMP) throughout the operational life of their projects. The purpose of SUSMP is to reduce the discharge of pollutants in storm water by outlining BMPs which must be incorporated into the design plans of new development and redevelopment. A project is subject to SUSMP if it falls under one of the categories listed below:

1. Single-family hillside homes
2. Ten or more unit homes (including single family homes, multifamily homes, condominiums, and apartments).
3. Automotive service facilities
4. Restaurants
5. 100,000 or more square-feet of impervious surface in industrial/commercial development

6. Retail gasoline outlet
7. Parking lots with 5,000 square feet or more of surface area or with 25 or more parking spaces
8. Redevelopment projects in subject categories that meet redevelopment thresholds
9. Location within or directly adjacent to or discharging directly to an environmentally sensitive area if the discharge is likely to impact a sensitive biological species or habitat and the development creates 2,500 square feet or more of impervious surface.

Low Impact Development – LA County (LID)

In October 2008, the County adopted an LID Ordinance into the Los Angeles County Code Title 12, Chapter 84 to require the use of LID principles in all development projects except road and flood infrastructure projects. With the 2012 MS4 Permit, it became necessary for the County to modify this ordinance to reflect the new stormwater runoff water quality and hydromodification requirements for new development and redevelopment projects. In November 2013, the County amended the Los Angeles County Code Title 12, Chapter 84 to incorporate the requirements of the 2012 MS4 Permit. The November 2013 LID Ordinance became effective December 5, 2013, and requires that all Designated, Non-Designated, street and road construction, and single-family hillside home projects comply with Los Angeles County Code Title 12, Chapter 84. The 2014 LID Standards Manual was prepared to complement and be consistent with the November 2013 LID Ordinance requirements.

Ultimately, a project applicant must submit a comprehensive LID Plan and analysis demonstrating compliance with the LID Standards Manual (which also constitutes compliance with the November 2013 LID Ordinance) for review and approval by the Director of Public Works.¹⁰

Low Impact Development – City of LA (LID)

In October 2011, the City of Los Angeles passed an ordinance (Ordinance No. 181899) amending City of Los Angeles Municipal Code Chapter VI, Article 4.4, Sections 64.70.01 and 64.72 to expand the applicability of the existing SUSMP requirements by imposing rainwater Low Impact Development (LID) strategies on projects that require building permits. The LID ordinance became effective on May 12, 2012.

LID is a stormwater management strategy with goals to mitigate the impacts of increased runoff and stormwater pollution as close to its source as possible. LID promotes the use of natural infiltration systems, evapotranspiration, and the reuse of stormwater. The goal of these LID practices is to remove nutrients, bacteria, and metals from stormwater while also

¹⁰ Los Angeles County. "Low Impact Development Standards Manual." February, 2014

reducing the quantity and intensity of stormwater flows. Through the use of various infiltration strategies, LID is aimed at minimizing impervious surface area. Where infiltration is not feasible, the use of bioretention, rain gardens, green roofs, and rain barrels that will store, evaporate, detain, and/or treat runoff may be used.¹¹

The intent of the City of Los Angeles LID standards is to:

- Require the use of LID practices in future developments and redevelopments to encourage the beneficial use of rainwater and urban runoff;
- Reduce stormwater/urban runoff while improving water quality;
- Promote rainwater harvesting;
- Reduce offsite runoff and provide increased groundwater recharge;
- Reduce erosion and hydrologic impacts downstream; and
- Enhance the recreational and aesthetic values in our communities.

The City of Los Angeles Bureau of Sanitation, Watershed Protection Division will adopt the Low Impact Development (LID) standards as issued by the LARWQCB and the City of Los Angeles Department of Public Works. The LID Ordinance will conform to the regulations outlined in the NPDES Permit and SUSMP.

3.2. ENVIRONMENTAL SETTING

3.2.1. REGIONAL

As stated above, the Project Site lies within the Ballona Creek Watershed. Constituents of concern listed for Ballona Creek under California's CWA Section 303(d) List include Cadmium (sediment), Chlordane (Tissue & Sediment), Coliform Bacteria, Copper (Dissolved), Cyanide, DDT, Lead, PAHs, PCBs, Selenium, Sediment Toxicity, Shellfish Harvesting Advisory, Silver, Toxicity, Trash, Viruses (Enteric), and Zinc.

3.2.2. LOCAL

In general, urban stormwater runoff occurs following precipitation events with the volume of runoff flowing into the drainage system depends on the intensity and duration of the rain event. Contaminants that may be found in stormwater from developed areas include sediments, trash, bacteria, metals, nutrients, organics and pesticides. The source of contaminants includes surface areas where precipitation falls, as well as the air it falls

¹¹ City of Los Angeles. "Low Impact Development Best Management Practices Handbook." June, 2011

through. Contaminants on surfaces such as roads, maintenance areas, parking lots, and buildings, which are usually contained in dry weather conditions, may be carried by rainfall runoff into drainage systems. The City has installed catch basins with screens to capture debris before entering the storm drain system. In addition, the City conducts routine street cleaning operations as well as periodic cleaning and maintenance of catch basins to reduce stormwater pollution within the City.

3.2.3. ON SITE

The LACMA East Campus currently does not implement structural BMPs and apparently has no means of treatment for stormwater runoff. As stated above, the LACMA East Campus drains into onsite storm drainage infrastructure that drains into City owned and maintained storm drainage infrastructure. The City storm drainage infrastructure ties into the Los Angeles County mainline BI 0493 on Ogden Drive.

An existing infiltration system does not exist because existing conditions of high groundwater and naturally occurring tar sands prevent the feasibility of such a system.¹²

It appears the Spaulding Lot currently sheet flows to the west into Spaulding Avenue, where it drains south and enters a catch basin at the north-east corner of Spaulding Avenue and 8th Street.

The Ogden Lot is currently maintained by MTA. Construction BMPs are the responsibility of MTA.

Refer to Figure 1A and Figure 1B for existing on-site drainage pattern.

The LACMA East Campus and Spaulding Lot portions of the Project Site currently do not have structural BMPs for the treatment of stormwater runoff from existing impervious surfaces such as building roof areas and pavements, there are a range of non-structural BMPs and environmental water qualities that are currently utilized at the Project Site to minimize the impact of pollutant sources. These include general housekeeping practices such as regular trash collection, spill prevention and response activities where applicable; proper storage of hazardous materials and wastes; and substituting environmentally friendly products for environmentally hazardous products, such as soaps, solvents, and pesticides. In addition, stormwater runoff from the minimal existing pervious surfaces such as the landscaped areas and lawns is naturally treated to some extent by existing vegetation and the absorptive properties of the existing soils. Based on the existing operations within the Project Site, the on-site runoff likely contains the following pollutants of concern: sediment, nutrients, pesticides, metals, pathogens, and oil and grease.

¹² Geotechnical report titled "Preliminary Geotechnical Evaluation" revised September 6, 2017, by AECOM.

3.3. SIGNIFICANCE THRESHOLDS

With respect to water quality, the CEQA Guidelines inquire whether the Project would:

- Violate any water quality standard or waste discharge requirements; or
- Otherwise substantially degrade water quality.

3.4. METHODOLOGY

3.4.1. CONSTRUCTION

Construction BMPs will be designed and maintained as part of the implementation of the SWPPP in compliance with the Construction General Permit. The SWPPP shall begin when construction commences and before any site clearing or demolition activity. During construction, the SWPPP will be referred to regularly and amended as changes occur throughout the construction process. The Notice of Intent (NOI), Amendments to the SWPPP, Annual Reports, Rain Event Action Plans (REAPs), and Non-Compliance Reporting are posted to the State's SMARTS website in compliance with the requirements of the Construction General Permit. In addition, as part of the NOI application a risk level evaluation will be performed to determine the risk level category (risk level 1, 2, or 3) for the Project based on a detailed construction schedule, soil type, site slope, and location. Each of the three risk level categories establishes specific monitoring and testing requirements.

3.4.2. OPERATION

The Project is committed to meet all applicable stormwater management requirements through compliance with City of Los Angeles' LID standards and the Los Angeles County LID Standards Manual. LID standards are used to analyze the stormwater peak mitigated flow rate and volume. Both City and County of Los Angeles LID standards require that projects select source control and treatment control BMPs from a priority list approved by the RWQCB. The selected BMPs must control peak flow discharge to provide stream channel and over bank flood protection, based on LID flow design criteria. Furthermore, the source and treatment control BMPs will be sufficiently designed and constructed to collectively treat, infiltrate, capture and use, or filter stormwater runoff to meet or exceed the requirements of the City Watershed Protection Division and the LACDPW Watershed Division.

As discussed above, due to site constraints, infiltration is deemed infeasible. Feasibility of capture and use system to satisfy LID requirements is also assessed and is described below. Though the Project design is ongoing, it is expected that the irrigation demand for the Project may be minimal. For the purposes of conservative analysis, the Project irrigation demand is assumed to be negligible.

As shown on Figure 2, the total SWQDv for the LACMA East Campus and Spaulding Lot is 28,330 cu-ft (211,908 gallons). The plumbing engineer has estimated the Project water use to range from 6,000-12,000 gpd in the building through toilet flushing and cooling tower uses. For the purpose of conservative analysis, the volume of stormwater runoff reliably retained on-site is assumed to be zero. The calculation below determines the number of days required to use the SWQDv.

$$\frac{211,908 \text{ gallons}}{6,000 \text{ gpd}} < 36 \text{ days}$$

$$\frac{211,908 \text{ gallons}}{12,000 \text{ gpd}} < 18 \text{ days}$$

As stated above, the irrigation demand of Ogden Lot is also assumed to be negligible. Additionally, the new parking structure at the Ogden Lot is not assumed to generate water demand. As shown on Figure 2, the total SWQDv for the Ogden Lot is 1498 cu-ft (11,205 gallons). For the purpose of conservative analysis, the volume of stormwater runoff reliably retained on-site is assumed to be zero.

According to LA County Department of Public Works Low Impact Development Handbook, the SWQDv must be drawn down (or reused) completely within 96 hours. Therefore, capture and use is deemed infeasible for both the LACMA East Campus and Spaulding Lot, as well as the Ogden Parking Structure.

Therefore, biofiltration basins are considered appropriate for the Project. According to the City's LID Handbook, all cisterns shall be sized to capture the runoff generated from the greater of the 85th percentile storm and the 0.75-inch storm event at a minimum. Biofiltration basins shall be sized to treat the runoff generated from 1.5 times the volume generated from the greater of the 85th percentile storm and the 0.75-inch storm event at a minimum:

$$V_{\text{design}} \text{ (gallons)} = (85^{\text{th}} \text{ percentile or } 0.75 \text{ inch} * 7.48 \text{ gallons/cubic foot}) * \text{Catchment Area (sq. ft.)}$$

Where:

$$\text{Catchment Area} = (\text{Impervious Area} * 0.9) + [(\text{Pervious Area} + \text{Undeveloped Area}) * 0.1]$$

For catchment areas given in acres, multiply the above equation by 43,560 sq. ft./acre.¹³

¹³ The Development Best Management Practices Handbook, Part B Planning Activities, 4th edition was adopted by the City of Los Angeles, Board of Public Works on July 1, 2011 to reflect LID requirements that took effect May 12, 2012., http://www.lastormwater.org/wp-content/files_mf/lidhandbookfinal62212.pdf, accessed August 17, 2016.

According to the Los Angeles County LID Standards Manual, the design storm, from which the Stormwater Quality Design Volume (SWQDv) is calculated, is defined as the greater of:

- The 0.75-inch, 24-hour rain event; or
- The 85th percentile, 24-hour rain event as determined from the Los Angeles County 85th percentile precipitation isoheytal map.¹⁴

The volume of stormwater runoff that must be retained at a project site is calculated using MODRAT. MODRAT uses the design storm and a time of concentration to calculate the stormwater runoff at different times during a storm. By calculating the stormwater runoff flows based on the rainfall distribution, a hydrograph can be developed. The area under the hydrograph curve is the volume of stormwater runoff. The procedure for calculating the stormwater runoff using the MODRAT is an iterative process. LACDPW has developed a regression equation to calculate the time of concentration. The procedures for calculating the time of concentration and SWQDv using MODRAT is described below¹⁵:

Step 1: Assume Initial Time of Concentration

Assume an initial time of concentration (tc).

Step 2: Calculate Rainfall Intensity

Calculate the rainfall intensity using the assumed initial time of concentration as the duration from the following equation:

$$I_t = I_{1440} * \left(\frac{1440}{t}\right)^{0.47}$$

Where:

t = Duration = Assumed initial time of concentration [min];

I_t = Rainfall intensity for the duration [in/hr]; and I₁₄₄₀ = 24-hour rainfall intensity [in/hr].

Step 3: Calculate Impervious Area and Stormwater Runoff Coefficient

¹⁴ The 85th percentile storm event (1.1 inches) is greater than the 0.75 inch storm event. Therefore, for the purposes of calculations, only the 85th percentile storm event was considered.

¹⁵ County of Los Angeles Department of Public Works, Low Impact Development Standards Manual, February 2014, <https://dpw.lacounty.gov/idd/lib/fp/Hydrology/Low%20Impact%20Development%20Standards%20Manual.pdf> accessed August 17, 2016.

Determine the impervious area of the project site from the following equation or from Appendix D of the 2006 Hydrology Manual:

$$IMP = \frac{\sum_{i=1}^n (IMP_i * A_i)}{A_T}$$

Where:

IMP = Project site-specific percent impervious;

IMP_i = Impervious area, i;

A_i = Area, i [ft²]; and

A_T = Total project site area [ft²]

Determine the undeveloped stormwater runoff coefficient, C_u, using the soil curve data from Appendix C and the rainfall intensity calculated in Step 2. Calculate the developed stormwater runoff coefficient using the following equation:

$$C_d = (0.9 * IMP) + (1.0 - IMP) * C_u$$

Where:

C_d = Developed project site stormwater runoff coefficient;

IMP = Site-specific percent impervious for project site; and

C_u = Undeveloped project site stormwater runoff coefficient.

Step 4: Calculate the Time of Concentration (T_c)

Calculate the time of concentration using the following equation:

$$T_c = \frac{0.31 * L^{0.483}}{(C_d * I_t)^{0.519} * S^{0.135}}$$

Where:

T_c = Time of concentration [min];

L = Longest flow path length from watershed boundary to outlet [ft];

C_d = Developed project site stormwater runoff coefficient;

I_t = Rainfall intensity for the duration [in/hr]; and

S = Slope of longest flow path [ft/ft].

Step 5: Compare Initial Assumption with T_c

If the calculated time of concentration (Step 4) is within 0.5 minutes of the assumed time of concentration (Step 1), then the value is sufficient. If the calculated and estimated times of concentration differ by more than 0.5 minutes, round the calculated time of concentration (Step 4) to the nearest minute and use that value as the assumed time of concentration (Step 1) and restart the calculation again from Step 2.

Step 6: Calculate Peak Flow Rate

Round the calculated time of concentration to the nearest minute and recalculate the rainfall intensity and developed project site stormwater runoff coefficient. Calculate the peak flow rate using the rational equation:

$$Q = \frac{C_d * I * A}{43,560}$$

Where:

Q = Peak flow rate [cfs];

C_d = Developed project site stormwater runoff coefficient;

I = Rainfall intensity [in/hr]; and

A = Project area [ft²].

Step 7: Calculate SWQDv

MODRAT relies on temporal rainfall distribution and the time of concentration to generate hydrographs. The steps for calculating stormwater runoff are presented in the 2006 Hydrology Manual. Manual calculations for generating hydrographs require a lot of time and careful organization. The calculations are ideally suited for a computer program, and have been included in the HydroCalc program discussed below. Use of this program is encouraged to reduce the time required to reach a solution.

HydroCalc Program

LACDPW developed a hydrologic calculator (HydroCalc), which is available at <http://dpw.lacounty.gov/wrd/publication/>. HydroCalc completes the full MODRAT calculation process and produces the peak stormwater runoff flow rates and volumes for single subareas. Because HydroCalc does not have reach routing capabilities, it is limited to watersheds and project areas up to 40 acres.

The SWQDv is first obtained by inputting the 85th percentile rainfall depth and the other relevant parameters into the HydroCalc Program. However, due to the implementation of biofiltration basins, the Project must mitigate 1.5 times the SWQDv to comply with LA County LID requirements. To accomplish this, the 85th percentile rainfall depth is increased such that the HydroCalc output volume matches the 1.5 times the SWQDv. The biofiltration basins are then sized to mitigate this 1.5 SWQDv. See Section 3.5.2 Operation below for further details and calculations.

3.5. PROJECT IMPACT ANALYSIS

3.5.1. CONSTRUCTION

Construction activities such as earth moving, maintenance/operation of construction equipment, expected dewatering, and handling/storage/disposal of materials could contribute to pollutant loading in stormwater runoff. However, as previously discussed, construction contractors disturbing greater than one acre of soil would be required to obtain coverage under the NPDES Construction General Permit. In accordance with the requirements of the permit, the Project Applicants would prepare and implement a site-specific SWPPP adhering to the California Stormwater Quality Association (CASQA) BMP Handbook. The SWPPP would specify BMPs to be used during construction. BMPs would include but not be limited to: erosion control, sediment control, non-stormwater management, and materials management BMPs. Refer to Exhibit 1 for typical SWPPP BMPs to be implemented during construction of the Project.

As discussed below, the Project is expected to require dewatering during construction. Dewatering operations are practices that discharge non-stormwater, such as ground water, that must be removed from a work location to proceed with construction into the drainage system. Discharges from dewatering operations can contain high levels of fine sediments, which if not properly treated, could lead to exceedance of the NPDES requirements. During construction, temporary pumps and filtration would be utilized in compliance with the NPDES permit. The temporary system would comply with all relevant NPDES requirements related to construction and discharges from dewatering operations.

Due to the presence of the naturally occurring tar in the subsurface soils, petroleum impacted groundwater may be encountered when performing basement and foundation excavations. For dewatering at the Project Site, the groundwater will have to be chemically analyzed in order to determine the appropriate treatment and/or disposal methods.¹⁶The Project will implement BMPs in accordance with NPDES requirements including capture, filtration, and discharge of encountered groundwater.

With the implementation of site-specific BMPs included as part of the SWPPP, the Project would reduce or eliminate the discharge of potential pollutants from the stormwater runoff. In addition, the Project Applicant would be required to comply with Los Angeles County grading permit regulations at the LACMA East Campus and Spaulding Lot, as well as City of Los Angeles grading permit regulations at the Ogden Lot, which require necessary measures, plans (including a wet weather erosion control plan if construction occurs during the rainy season), and inspection to reduce sedimentation and erosion. Therefore, with compliance with NPDES requirements, Los Angeles County grading regulations and City of Los Angeles grading permit regulations, construction of the Project would not result in discharge that would violate any water quality standard or waste discharge requirements, or otherwise substantially degrade water quality. Furthermore, construction of the Project

¹⁶ Geotechnical report titled "Preliminary Geotechnical Evaluation" revised September 6, 2017, by AECOM.

would not result in discharges that would cause regulatory standards to be violated in Ballona Creek. Therefore, temporary construction-related impacts on surface water quality would be less than significant.

3.5.2. OPERATION

The Project Site will not increase concentrations of the items listed as constituents of concern for the Ballona Creek Watershed.

The Project will implement BMPs for managing stormwater runoff in accordance with both the current Los Angeles County LID Standards Manual and the current City of Los Angeles LID Ordinance LID requirements. Compliance with both regulations is possible because both comply with the MS4 permit issued under NPDES. Since it appears there are no existing onsite BMPs, stormwater run-off from the Project will result in improved surface water quality.

The LID requirements for the Project Site would outline the stormwater treatment post-construction BMPs required to control pollutants associated with storm events up to the 85th percentile storm event or 0.75-inch, whichever is larger, per the Los Angeles County LID Standards Manual and City of Los Angeles LID Ordinance. As mentioned above, Biofiltration planters have been selected as the appropriate BMP in accordance with the LA County LID ordinance. The Project BMPs will control stormwater runoff with no increase in runoff resulting from the Project. Specifically, these planters will be designed as open bottom flow-through planters per the LA County LID Manual to allow incidental infiltration. Though stormwater infiltration BMPs are deemed infeasible, incidental infiltration is acceptable per the latest geotechnical report.¹⁷ Due to maintenance considerations, LACMA may propose an impermeable liner under the LID planters. Introduction of such a liner would be subject to both LA County and Regional Board approval. The Project may also implement a downstream capture and reuse system to satisfy additional water conservation goals subject to LA County approval. Refer to Figure 2A and 2C for Biofiltration LID BMPs. These Figures show areas allocated to three biofiltration basin areas for the LACMA East Campus and Spaulding Lot, and one biofiltration basin area for the Ogden Lot to meet the aforementioned requirements for the Project Site. The Project will divert only low flows to the BMPs where possible. Where this cannot be implemented, the Project will pretreat all flows to BMPs as required. As shown on Exhibit 2, CDS units and catch basin filter inserts are anticipated to be used to pretreat flows where required.

Due to the incorporation of the LID biofiltration basin BMP (Flow Through Planter BMP), operation of the Project would not result in discharges that would violate any water quality standard or waste discharge requirements, or otherwise substantially degrade water quality. The Project Site will be allocated to the required LID Biofiltration (Flow Through Planter)

¹⁷ Geotechnical report titled "Preliminary Geotechnical Evaluation" revised September 6, 2017, by AECOM.

BMP(s) specifically intended to control and treat stormwater runoff in compliance with LID requirements.

The calculation below determines the Biofiltration volume required. As stated above, V_R is assumed to be zero.

$$V_B = 1.5 * (SWQDv - V_R)$$

Where:

V_B = Biofiltration volume;

$SWQDv$ = Stormwater quality design volume; and

V_R = Volume of stormwater runoff reliably retained on-site.

$$V_B = 1.5 * (211,908 \text{ gallons} - 0) = 317,863 \text{ gallons (42,492.1 cubic feet)}$$

Assuming the entire Biofiltration volume will flow through the Biofiltration basins over the duration of the storm according to the HydroCalc hydrograph shown in Figure 5 and Figure 6, calculations summarized on Figure 7 determine the minimum area of biofiltration required. This calculation assumes a maximum ponding depth of 1.5 feet and a specified percolation rate of 5 inches per hour.

Based on the results of the calculations described above, the Project will include at least 5,191 square feet of biofiltration area for the LACMA East Campus and Spaulding Lot as specified in Biofiltration Fact Sheet (BIO-1) in Appendix E of the 2014 LA County LID Standards Manual.

Provided the sizing requirements stated above, the Project would satisfy the LA County LID requirements for the LACMA East Campus and Spaulding Lot. Downstream of the biofiltration basins, the Project may utilize a portion of the filtered water for reuse within the proposed building according to the recent amendments to the LA County Plumbing Code. The remaining stormwater overflow from the biofiltration basins are expected to discharge to the Hydrology/LID study shown on Figure 2A.

As shown on Figure 2C, the total $SWQDv$ for the Ogden Lot is 1,498 cu. ft. (11,209 gallons). For the purpose of conservative analysis, the volume of stormwater runoff reliably retained on-site is assumed to be zero. Therefore, one option has been proposed which will utilize On-Site Biofiltration to provide treatment of stormwater runoff prior to discharge.

The calculation below determines the Biofiltration volume required. As stated above, V_R is assumed to be zero.

$$V_B = 1.5 * (SWQDv - V_R)$$

Where:

V_B = Biofiltration volume;

SWQD_v = Stormwater quality design volume; and

V_R = Volume of stormwater runoff reliably retained on-site.

$$V_B = 1.5 * (11,209 \text{ gallons} - 0) = 16,813 \text{ gallons (2247 cubic feet)}$$

Assuming the entire Biofiltration volume will flow through the biofiltration basins over the duration of the storm according to the HydroCalc hydrograph shown in Figure 5 and Figure 6, calculations summarized on Figure 7 determine the minimum area of biofiltration required. This calculation assumes a maximum ponding depth of 1.5 feet and a specified percolation rate of 5 inches per hour.

Based on the results of the calculations described above, the Project will include at least 276 square feet of biofiltration area for the Ogden Lot as specified in Biofiltration Fact Sheet (BIO-1) in Appendix E of the 2014 LA County LID Standards Manual.

Thus, the total minimum biofiltration area required for the project is 5,467 square feet.

As stated above, it appears the existing site discharges without any means of treatment at the LACMA East Campus and the Spaulding Lot. Drainage for the Ogden Lot is under the jurisdiction of the Metropolitan Transit Authority. Runoff will now be directed to biofiltration basins to be used in accordance with the options described above. Regardless of whether the biofiltration liners or downstream collection tanks described above are incorporated into final project designs and approved by authorities having jurisdiction, there is no additional environmental impact over the standard LID BMP.

As a result of the implementation of the LID BMPs, there will be no operational impacts on surface water quality.

3.5.3. CUMULATIVE IMPACT ANALYSIS

Future growth in the Ballona Creek Watershed would be subject to NPDES requirements relating to water quality for both construction and operation. In addition, since the Project Site is located in a highly urbanized area, future land use changes or development are not likely to cause substantial changes in regional surface water quality. As noted above, the Project does not have an adverse impact on water quality, and would in fact improve the quality of on-site flows due to the introduction of new BMPs that would collect, treat, and discharge runoff from the Project Site (most of which is not treated before being discharged under existing conditions). Also, it is anticipated that the Project and other future development projects would also be subject to LID requirements and implementation of measures to comply with total maximum daily loads. Increases in regional controls

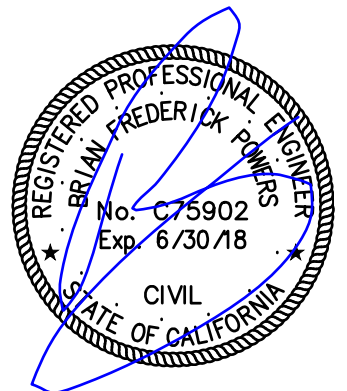
associated with other elements of the MS4 Permit would improve regional water quality over time. Therefore, based on the fact that the Project does not have an adverse impact and through compliance with all applicable laws, rules and regulations, cumulative impacts to surface water quality would be less than significant.

4. LEVEL OF SIGNIFICANCE

Based on the analysis contained in this report no significant impacts have been identified to surface water hydrology or low impact development requirements for this Project.

APPENDIX

Hydrology/LID Figures and Calculations



LACMA
Building for the
Permanent Collection

5905 WILSHIRE BOULEVARD
LOS ANGELES, CA 90036

LOS ANGELES COUNTY MUSEUM OF ART
5905 WILSHIRE BOULEVARD
LOS ANGELES, CA 90036

KPFF Consulting Engineers
700 South Flower St, Ste 2100, Los Angeles, CA 90017

ATELIER PETER ZUMTHOR & PARTNER
CH-7023 Haldenstein, Süsswinkel 20
Switzerland

SKIDMORE, OWINGS & MERRILL
14 Wall Street
New York, NY 10005

CONZETT BRONZINI PARTNER
Bahnhofstrasse 3, 7000
Chur, Switzerland

SKIDMORE, OWINGS & MERRILL
1 Front Street
San Francisco, CA 94111

BURO HAPPOLD ENGINEERING
800 Wilshire Blvd, Bldg D
Los Angeles, CA 90066

DIRECTIONAL LOGIC
71 Stevenson St, Ste 400
San Francisco, CA 94105

BPI
302 5th Ave
New York, NY 10001

SM&W
33 New Montgomery Street, Suite 1040
San Francisco, CA 94105

AUERBACH POLLOCK FRIEDLANDER
225 Green Street
San Francisco, CA 94111

GEOSYNTEC
3990 Old Town Ave, Suite A-101
San Diego, CA 92110

THE OLIN STUDIO
5900 Wilshire Blvd, Suite 401
Los Angeles, CA 90036

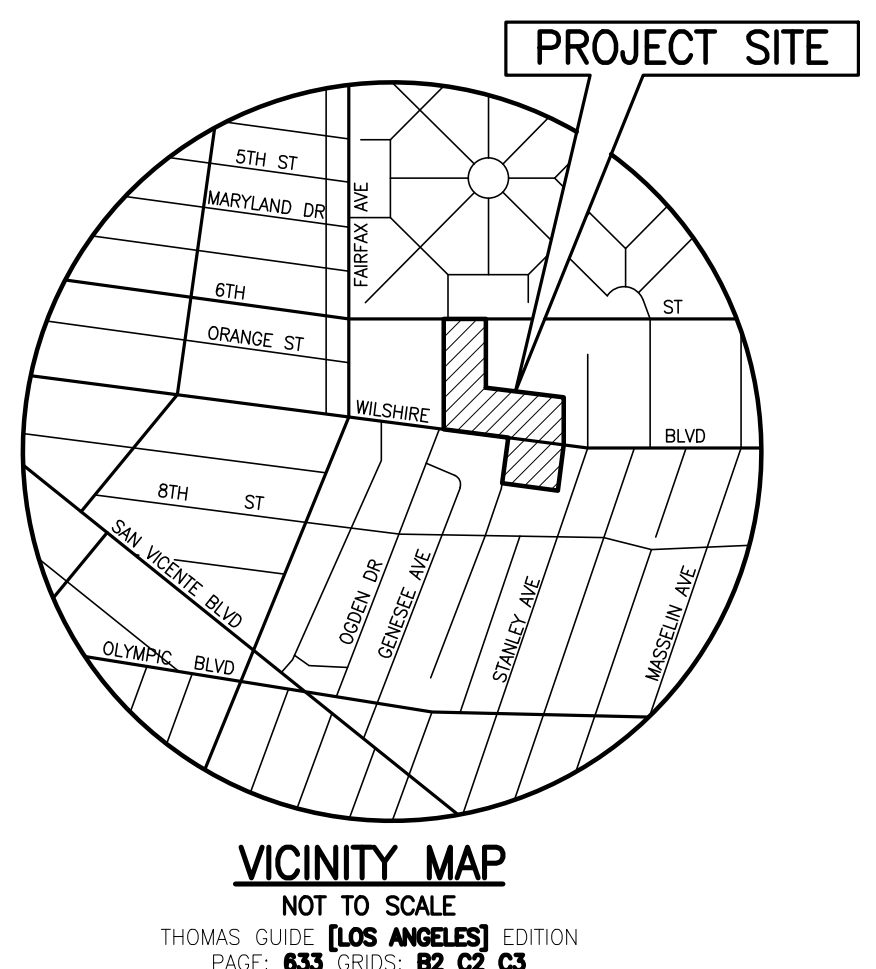
- LEGEND:**
- LIMIT OF WORK
 - SITE AREA
 - SUB-DRAINAGE AREA
 - DIRECTION OF FLOW
 - STORM DRAIN FLOW DIRECTION
 - OVERLAND FLOW PATH
 - ON-SITE STORM DRAIN
 - CITY OWNED STORM DRAIN
 - COUNTY OWNED STORM DRAIN
 - ABANDONED EXISTING STORM DRAIN
 - ⊕ PROJECT SITE DISCHARGE POINT
 - ☐ CATCH BASIN (N.T.S.)

- ABBREVIATIONS:**
- PF PLANT FACTOR (SEE LID MANUAL)
 - SQ.FT. SQUARE FEET
 - GAL GALLONS
 - ℙ PROPERTY LINE



PRE DEVELOPMENT PEAK FLOW HYDROLOGIC ANALYSIS

PROJECT SITE DISCHARGE POINT	AREA (AC.)	STORM FREQUENCY	RAINFALL DEPTH	SOIL TYPE	% IMPERVIOUS	Q (CFS)
#1 (EASTERN PORTION +UPSTREAM TRIBUTARY)	12.17	50-YEAR	5.80	13	56	25.80
#2 (WESTERN PORTION + NORTH WILSHIRE TRIBUTARY)	4.63	50-YEAR	5.80	13	99	11.81
#3 (SPAULDING LOT AND SOUTH WILSHIRE TRIBUTARY)	2.23	50-YEAR	5.80	13	95	6.37
TOTAL Qpre=43.98 CFS						



KEYPLAN

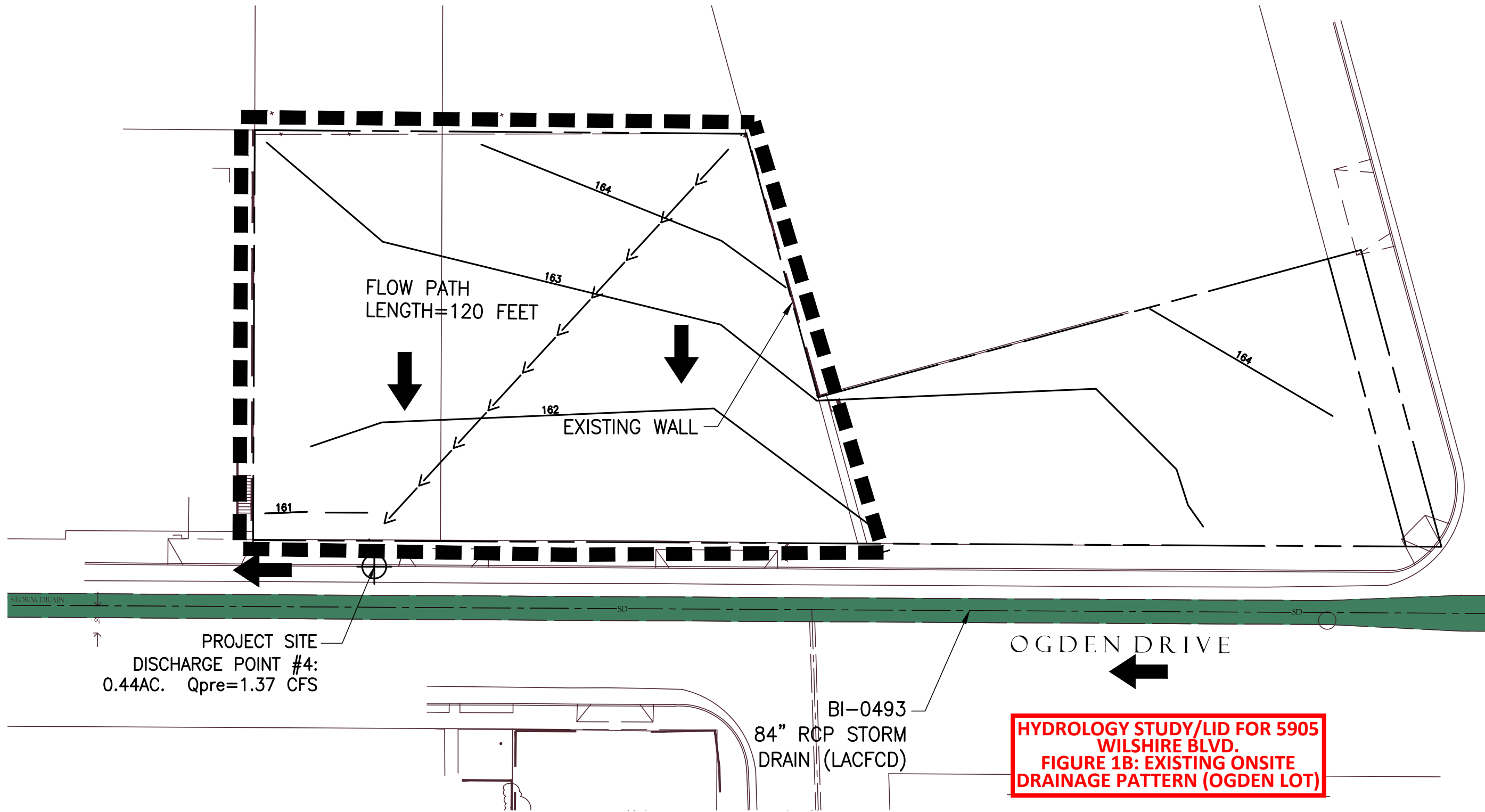
DATE DESCRIPTION

EXISTING HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.

DRAWING NUMBER

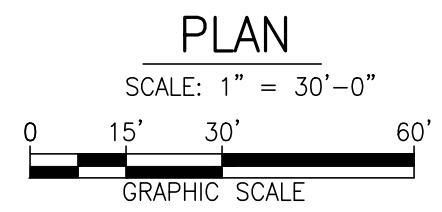
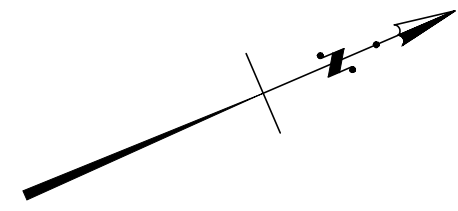
FIGURE 1A

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PROJECT SITE
 DISCHARGE POINT #4:
 0.44AC. $Q_{pre}=1.37$ CFS

**HYDROLOGY STUDY/LID FOR 5905
 WILSHIRE BLVD.
 FIGURE 1B: EXISTING ONSITE
 DRAINAGE PATTERN (OGDEN LOT)**



- LEGEND:**
- ■ ■ ■ ■ LIMIT OF WORK
 - - - - - EXISTING WALL
 - SD — COUNTY OWNED STORM DRAIN
 - ➔ FLOW

LACMA
Building for the
Permanent Collection

5905 WILSHIRE BOULEVARD
LOS ANGELES, CA 90036

OWNER



LOS ANGELES COUNTY MUSEUM OF ART
5905 WILSHIRE BOULEVARD
LOS ANGELES, CA 90036

CIVIL & SURVEY CONSULTANT

KPFF Consulting Engineers
700 South Flower St, Ste 2100, Los Angeles, CA 90017

ATELIER PETER ZUMTHOR & PARTNER
CH-7023 Haldenstein, Süsswinkler 20
Switzerland

COLLABORATING ARCHITECT

SKIDMORE, OWINGS & MERRILL
14 Wall Street
New York, NY 10005

STRUCTURAL ENGINEER

CONZETT BRONZI PARTNER
Bahnhofstrasse 3, 7000
Chur, Switzerland

MECHANICAL ENGINEER

SKIDMORE, OWINGS & MERRILL
1 Front Street
San Francisco, CA 94111

MEDICAL WATER RESILIENCE SAFETY ENGINEERING

BURO HAPPOLD ENGINEERING
800 Wilshire Blvd Bldg D
Los Angeles, CA 90066

MECHANICAL ENGINEER

DIRECTIONAL LOGIC
71 Stevenson St, Ste 400
San Francisco, CA 94105

LIGHTING DESIGNER

BPI
302 5th Ave
New York, NY 10001

AHVT SECURITY AND ACoustics

SM&W
33 New Montgomery Street, Suite 1040
San Francisco, CA 94105

CREATOR PLANNING CONSULTANT

AUERBACH POLLOCK FRIEDLANDER
225 Green Street
San Francisco, CA 94111

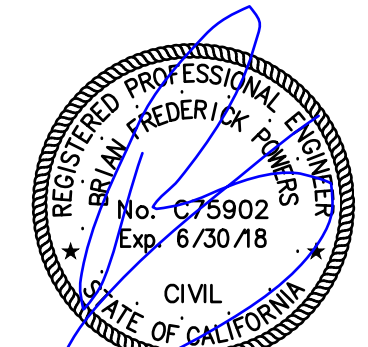
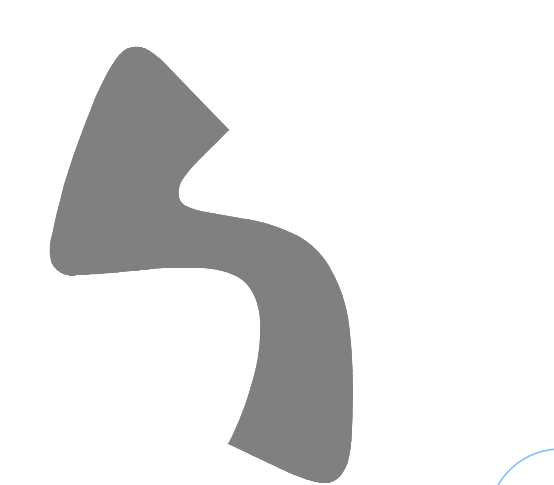
MECHANICAL CONSULTANT

GEO SYNTEC
3900 Old Town Ave, Suite A-101
San Diego, CA 92110

LANDSCAPE ARCHITECT

THE OLIN STUDIO
5900 Wilshire Blvd, Suite 401
Los Angeles, CA 90036

MECHANICAL



NO. DATE DESCRIPTION

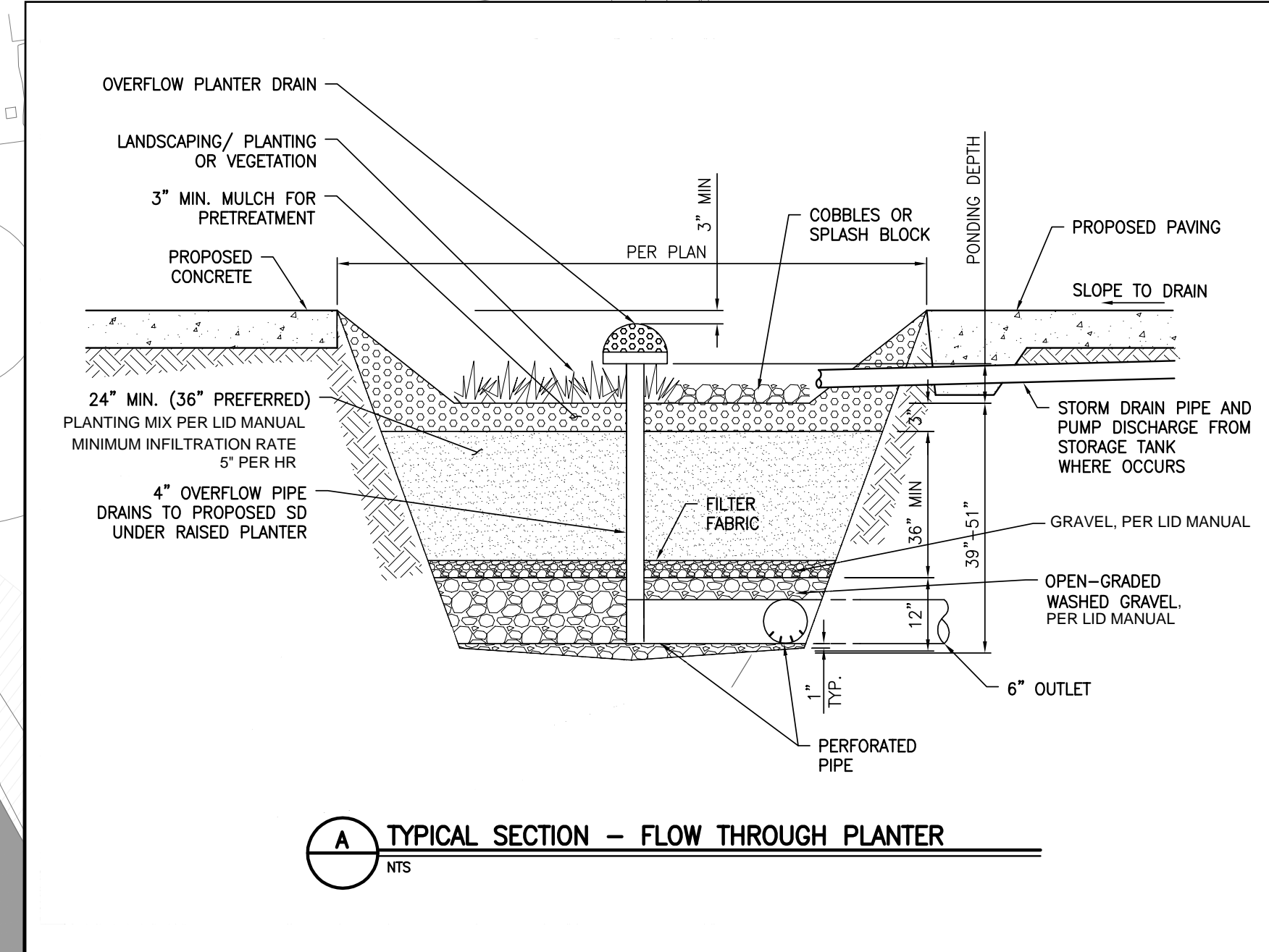
DRAWING TITLE

PROPOSED HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.

DRAWING NUMBER

FIGURE 2A

- LEGEND:**
- LIMIT OF WORK
 - - - OFFSITE DRAINAGE
 - CITY OWNED STORM DRAIN
 - COUNTY OWNED STORM DRAIN
 - EXISTING FLOW THROUGH STORM DRAIN
 - CATCH BASIN (N.T.S.)
 - AD-1 AREA DRAIN WITH FILTER INSERT PRETREATMENT DEVICE
 - BMP DEVICE
 - ROOF 1
 - ROOF 2
 - ROOF 3
 - SITE 1
 - SITE 2
 - SITE 3
 - PROJECT SITE DISCHARGE POINT
 - DIVERSION STRUCTURE
 - PRETREATMENT DEVICE
- ABBREVIATIONS:**
- PF PLANT FACTOR (SEE LID MANUAL)
 - SQ.FT. SQUARE FEET
 - GAL GALLONS
 - PL PROPERTY LINE

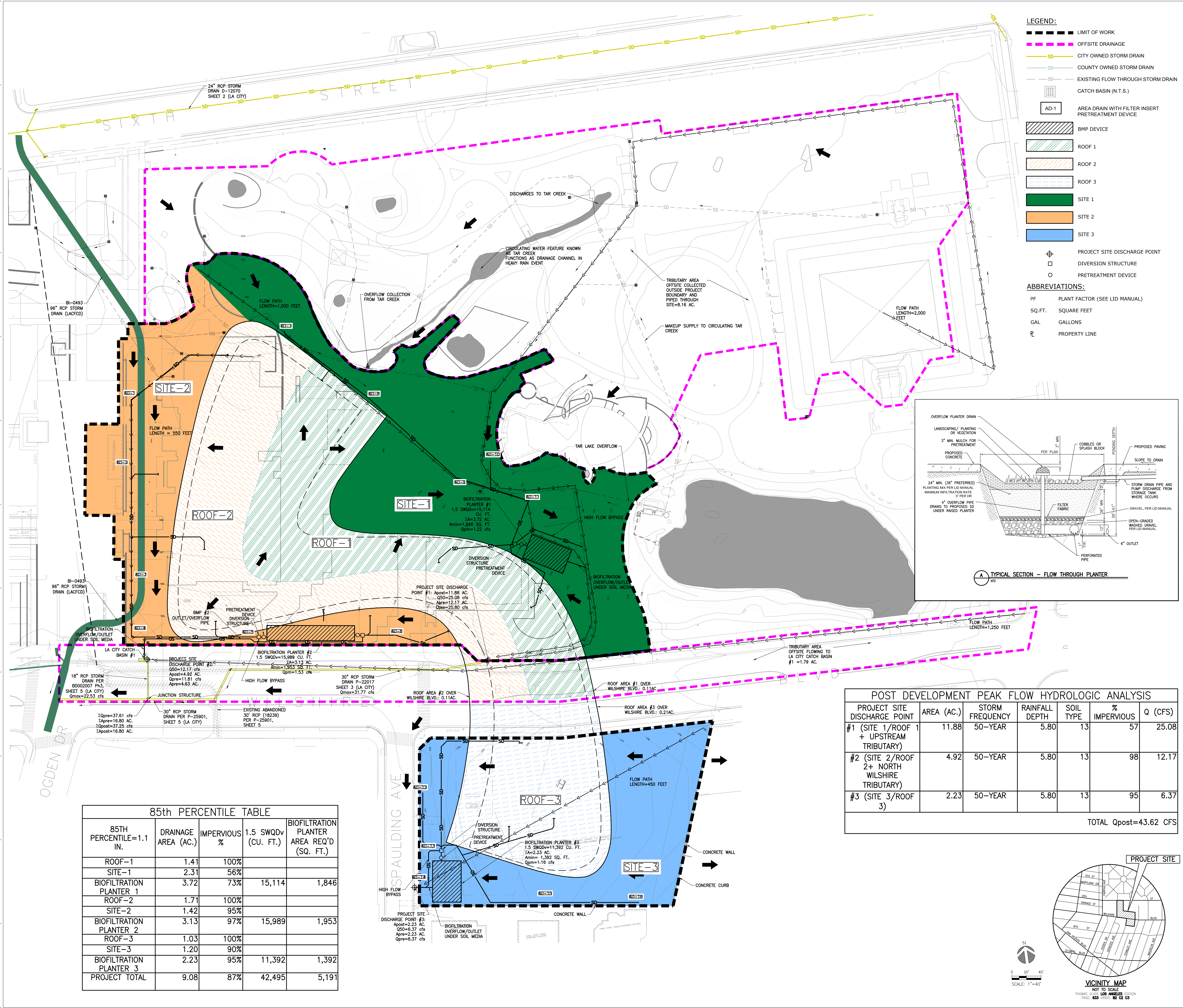
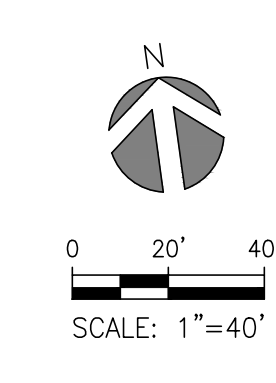
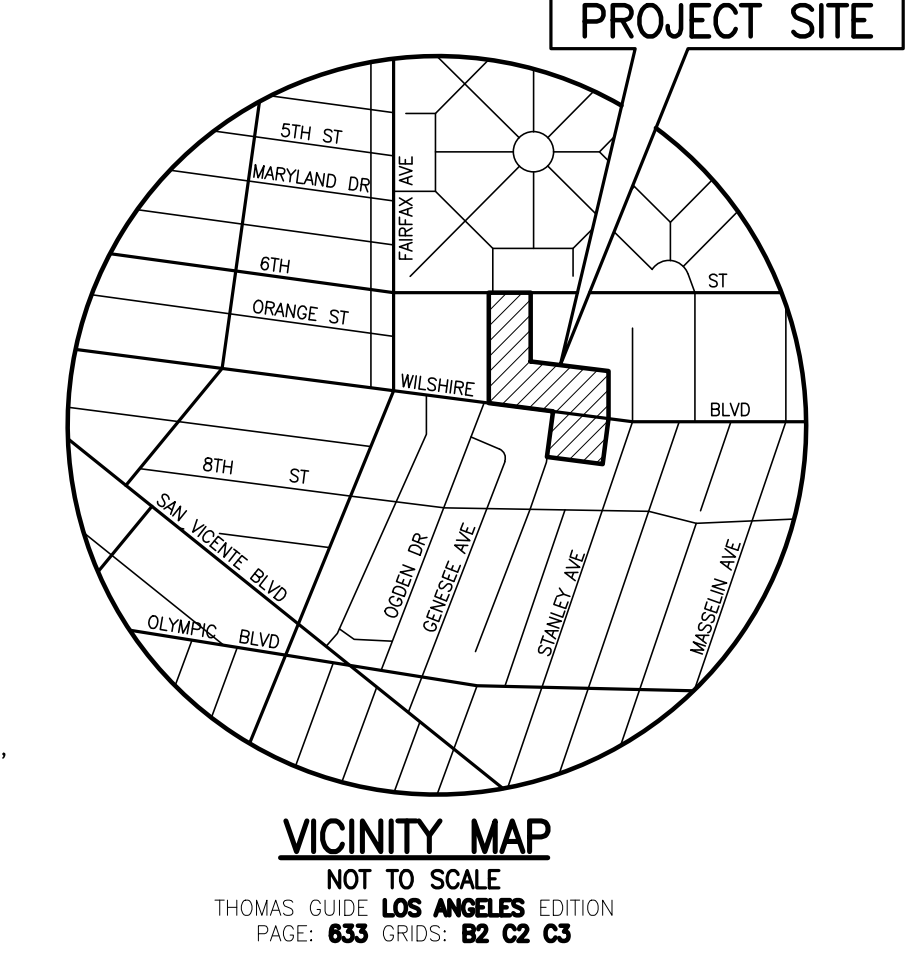


POST DEVELOPMENT PEAK FLOW HYDROLOGIC ANALYSIS

PROJECT SITE DISCHARGE POINT	AREA (AC.)	STORM FREQUENCY	RAINFALL DEPTH	SOIL TYPE	% IMPERVIOUS	Q (CFS)
#1 (SITE 1/ROOF 1 + UPSTREAM TRIBUTARY)	11.88	50-YEAR	5.80	13	57	25.08
#2 (SITE 2/ROOF 2+ NORTH WILSHIRE TRIBUTARY)	4.92	50-YEAR	5.80	13	98	12.17
#3 (SITE 3/ROOF 3)	2.23	50-YEAR	5.80	13	95	6.37
TOTAL Qpost=43.62 CFS						

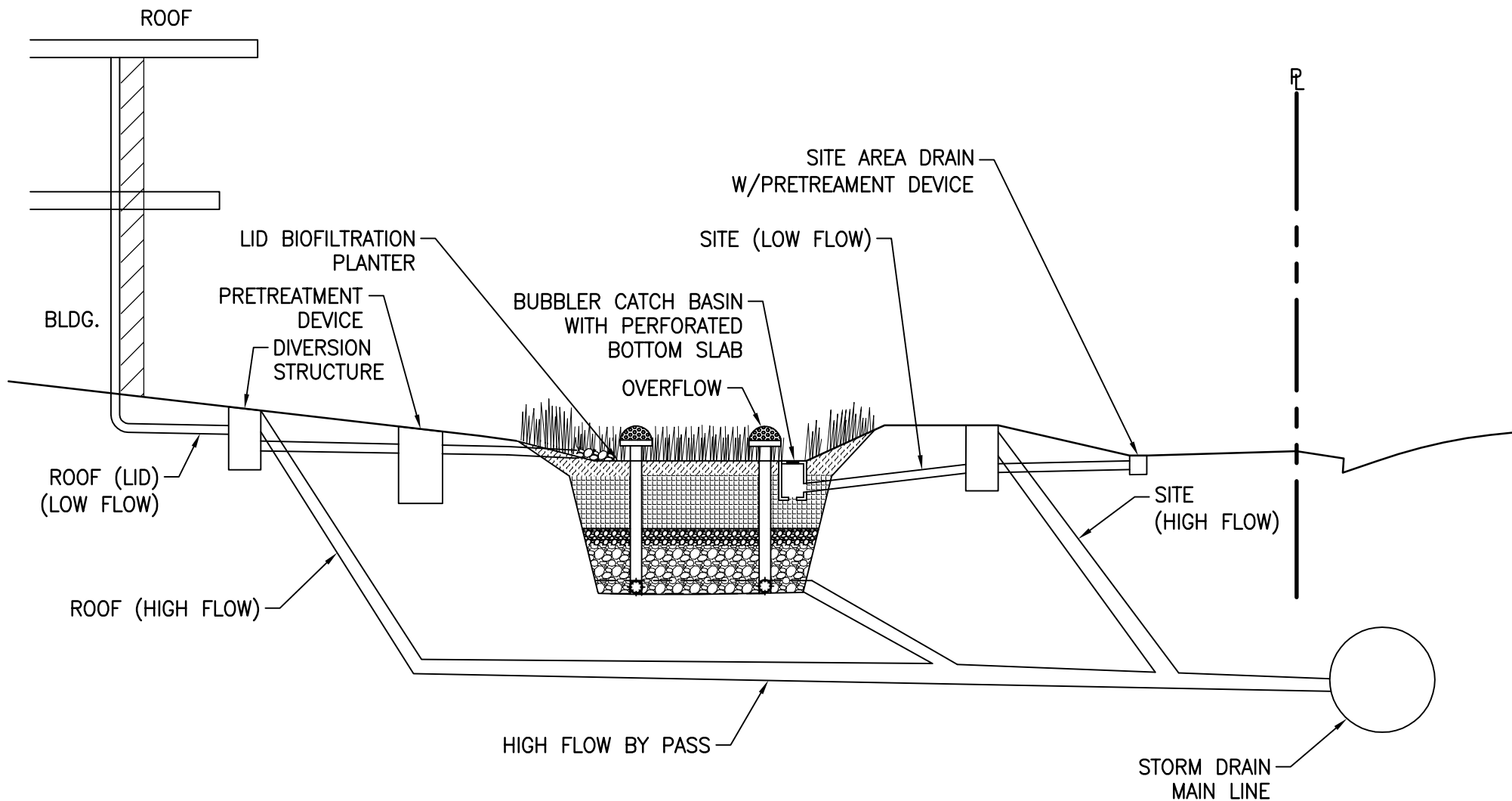
85th PERCENTILE TABLE

85TH PERCENTILE=1.1 IN.	DRAINAGE AREA (AC.)	IMPERVIOUS %	1.5 SWQDV (CU. FT.)	BIOFILTRATION PLANTER AREA REQ'D (SQ. FT.)
ROOF-1	1.41	100%		
SITE-1	2.31	56%		
BIOFILTRATION PLANTER 1	3.72	73%	15,114	1,846
ROOF-2	1.71	100%		
SITE-2	1.42	95%		
BIOFILTRATION PLANTER 2	3.13	97%	15,989	1,953
ROOF-3	1.03	100%		
SITE-3	1.20	90%		
BIOFILTRATION PLANTER 3	2.23	95%	11,392	1,392
PROJECT TOTAL	9.08	87%	42,495	5,191



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**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 2B: LID SCHEMATIC PROFILE DIAGRAM
FOR BMPS #1, 2, 3**



LID SCHEMATIC PROFILE DIAGRAM
N.T.S

**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3A: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

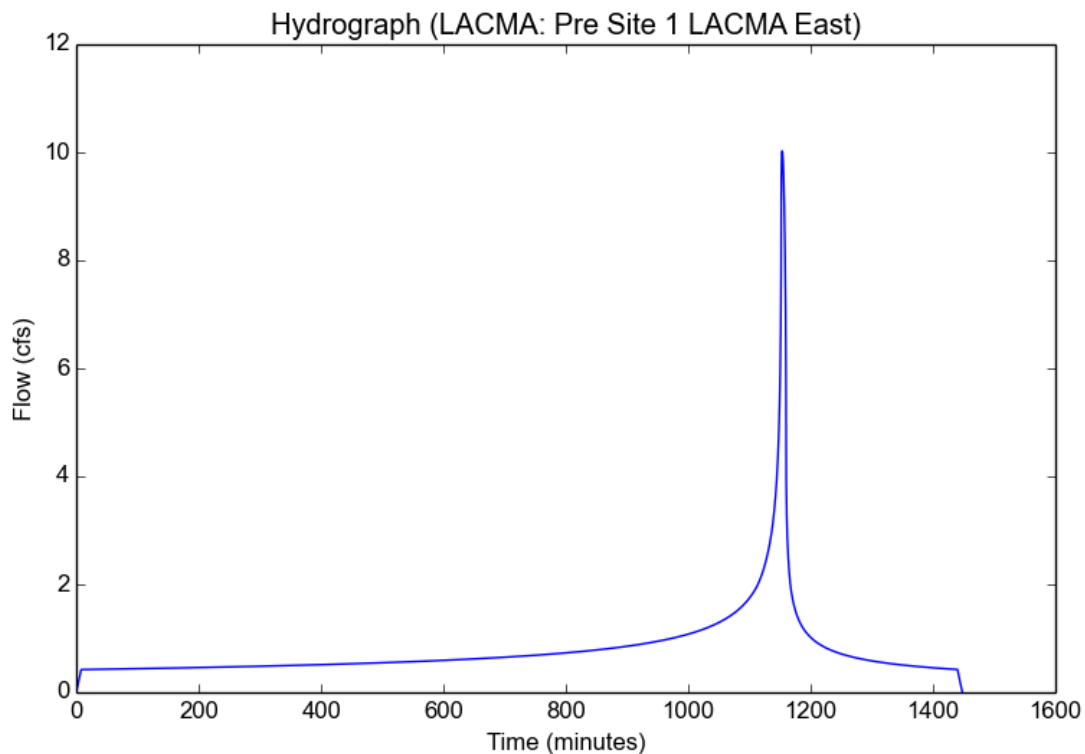
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre Site 1 LACMA East
Area (ac)	4.01
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.05
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.9
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.7746
Undeveloped Runoff Coefficient (Cu)	0.9106
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	10.0134
Burned Peak Flow Rate (cfs)	10.0134
24-Hr Clear Runoff Volume (ac-ft)	1.5919
24-Hr Clear Runoff Volume (cu-ft)	69344.935



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3B: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

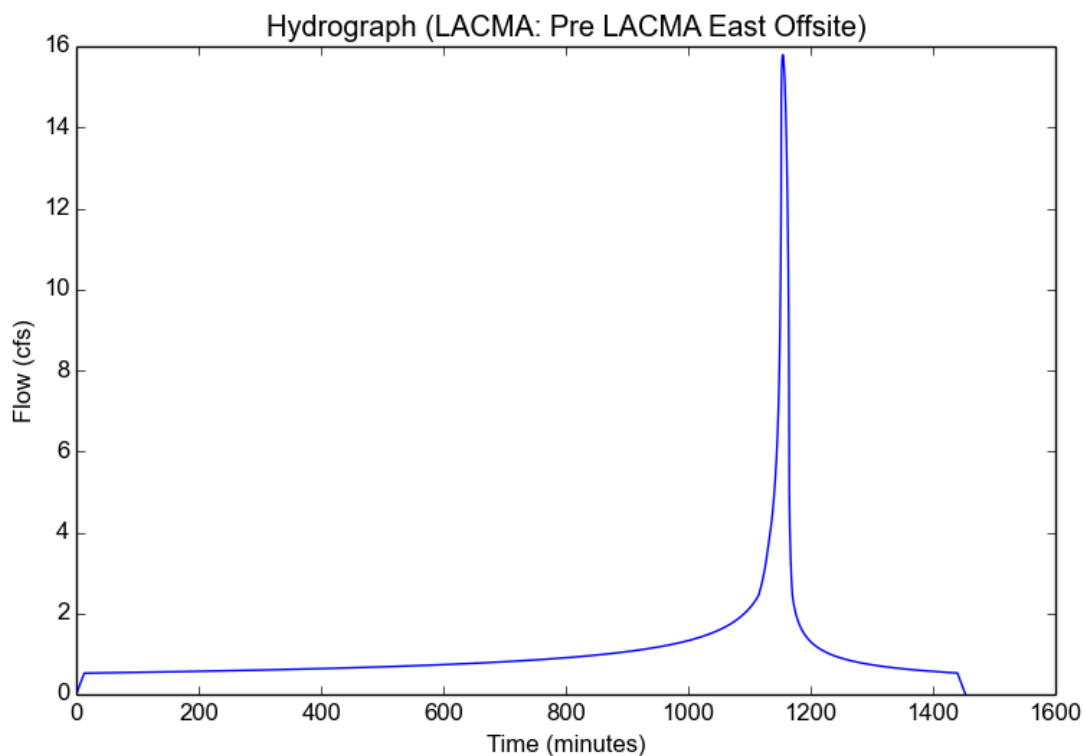
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre LACMA East Offsite
Area (ac)	8.16
Flow Path Length (ft)	2000.0
Flow Path Slope (vft/hft)	0.05
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.5
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.2085
Undeveloped Runoff Coefficient (Cu)	0.8526
Developed Runoff Coefficient (Cd)	0.8763
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	15.7923
Burned Peak Flow Rate (cfs)	15.7923
24-Hr Clear Runoff Volume (ac-ft)	2.1153
24-Hr Clear Runoff Volume (cu-ft)	92142.9754



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3C: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

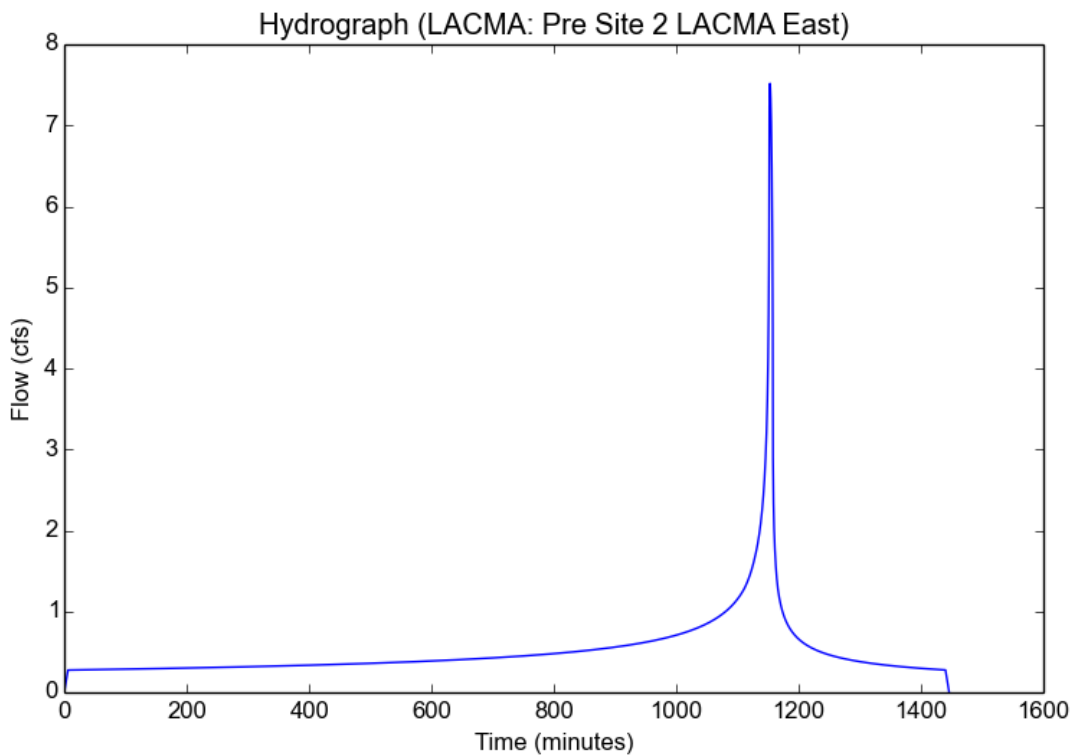
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre Site 2 LACMA East
Area (ac)	2.62
Flow Path Length (ft)	430.0
Flow Path Slope (vft/hft)	0.014
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.9
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.1763
Undeveloped Runoff Coefficient (Cu)	0.9342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	7.4896
Burned Peak Flow Rate (cfs)	7.4896
24-Hr Clear Runoff Volume (ac-ft)	1.0401
24-Hr Clear Runoff Volume (cu-ft)	45306.8996



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3D: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

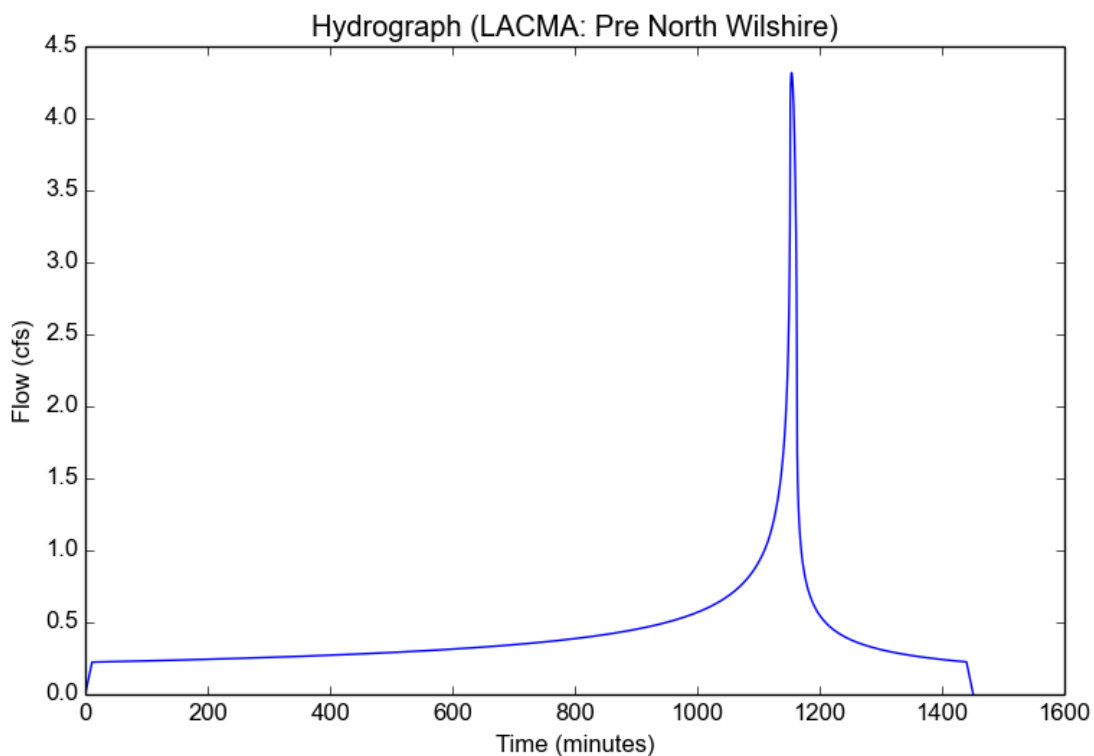
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre North Wilshire
Area (ac)	2.01
Flow Path Length (ft)	1250.0
Flow Path Slope (vft/hft)	0.025
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.96
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.3889
Undeveloped Runoff Coefficient (Cu)	0.8763
Developed Runoff Coefficient (Cd)	0.8991
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	4.3169
Burned Peak Flow Rate (cfs)	4.3169
24-Hr Clear Runoff Volume (ac-ft)	0.8395
24-Hr Clear Runoff Volume (cu-ft)	36566.4648



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3E: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

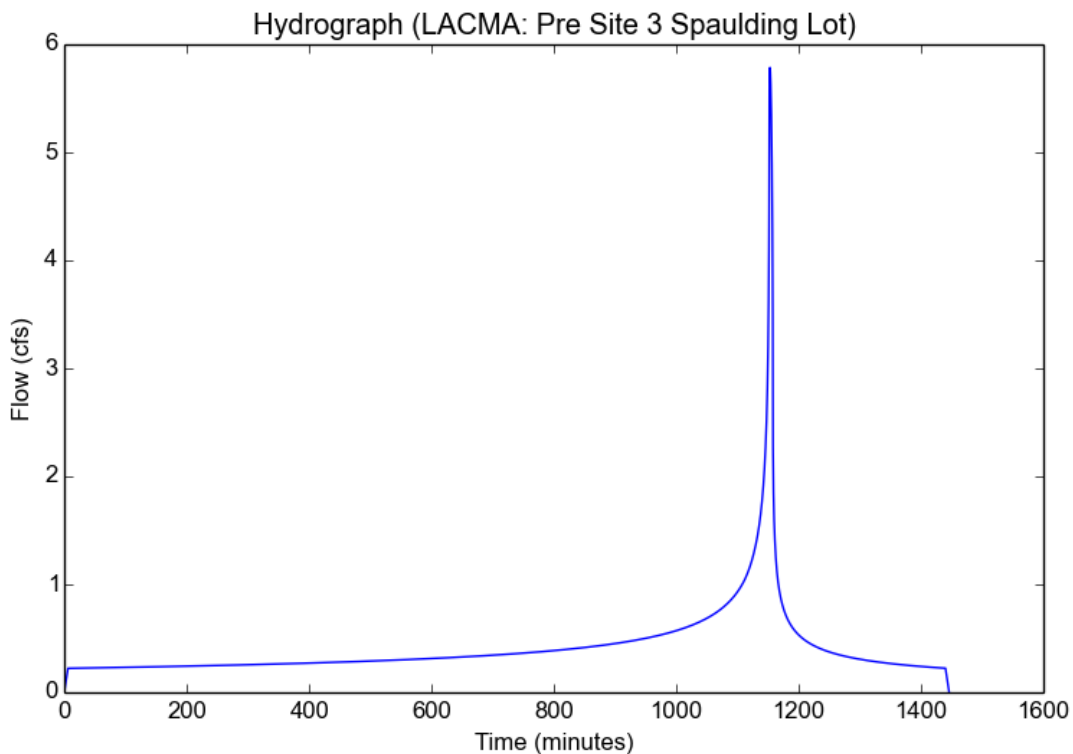
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/Spaulding pages.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre Site 3 Spaulding Lot
Area (ac)	2.02
Flow Path Length (ft)	450.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.1763
Undeveloped Runoff Coefficient (Cu)	0.9342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	5.7744
Burned Peak Flow Rate (cfs)	5.7744
24-Hr Clear Runoff Volume (ac-ft)	0.8367
24-Hr Clear Runoff Volume (cu-ft)	36445.5654



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3F: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

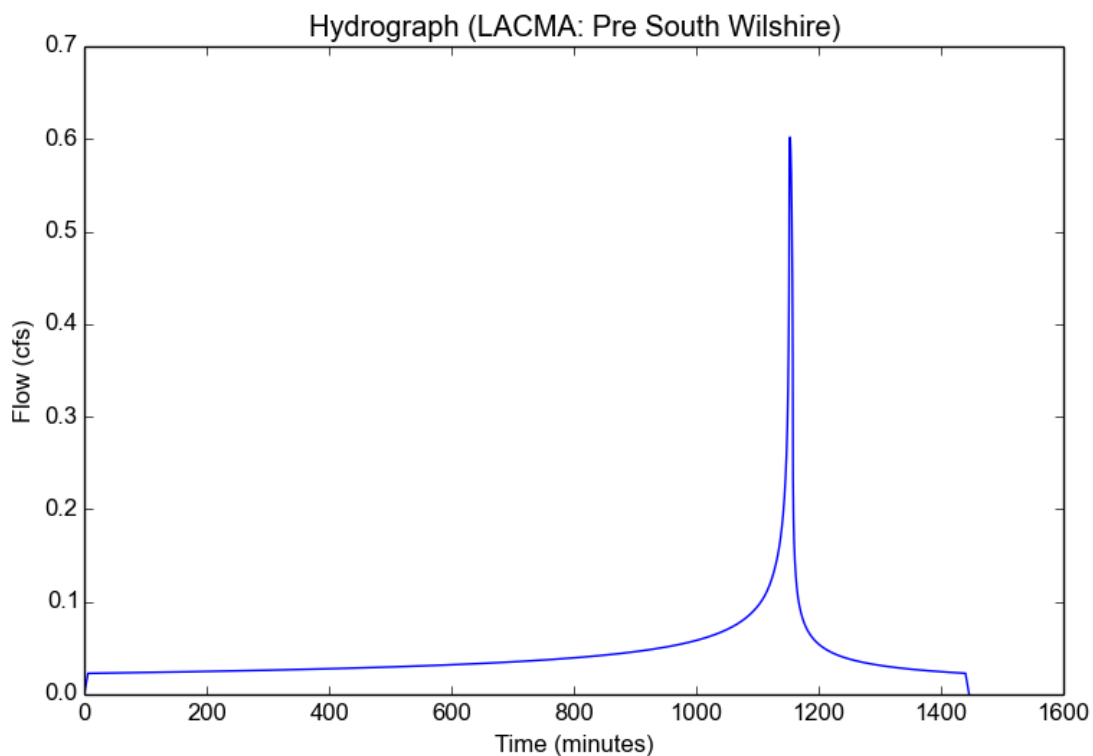
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/Spaulding pages.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre South Wilshire
Area (ac)	0.21
Flow Path Length (ft)	480.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.93
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.1763
Undeveloped Runoff Coefficient (Cu)	0.9342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	0.6003
Burned Peak Flow Rate (cfs)	0.6003
24-Hr Clear Runoff Volume (ac-ft)	0.0855
24-Hr Clear Runoff Volume (cu-ft)	3725.9249



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 3G: HYDROCALC HYDROLOGY RESULTS FOR EXISTING SITE**

Peak Flow Hydrologic Analysis

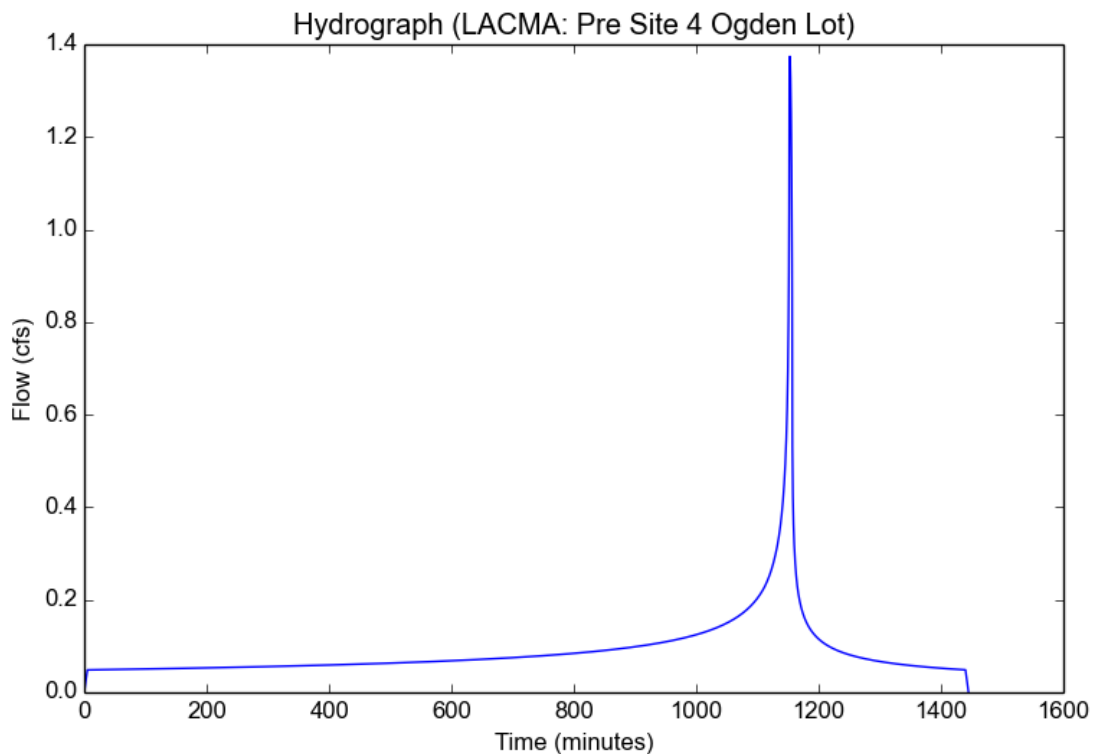
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Pre Site 4 Ogden Lot
Area (ac)	0.44
Flow Path Length (ft)	120.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.4604
Undeveloped Runoff Coefficient (Cu)	0.9462
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.3703
Burned Peak Flow Rate (cfs)	1.3703
24-Hr Clear Runoff Volume (ac-ft)	0.1822
24-Hr Clear Runoff Volume (cu-ft)	7938.5553



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4A: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

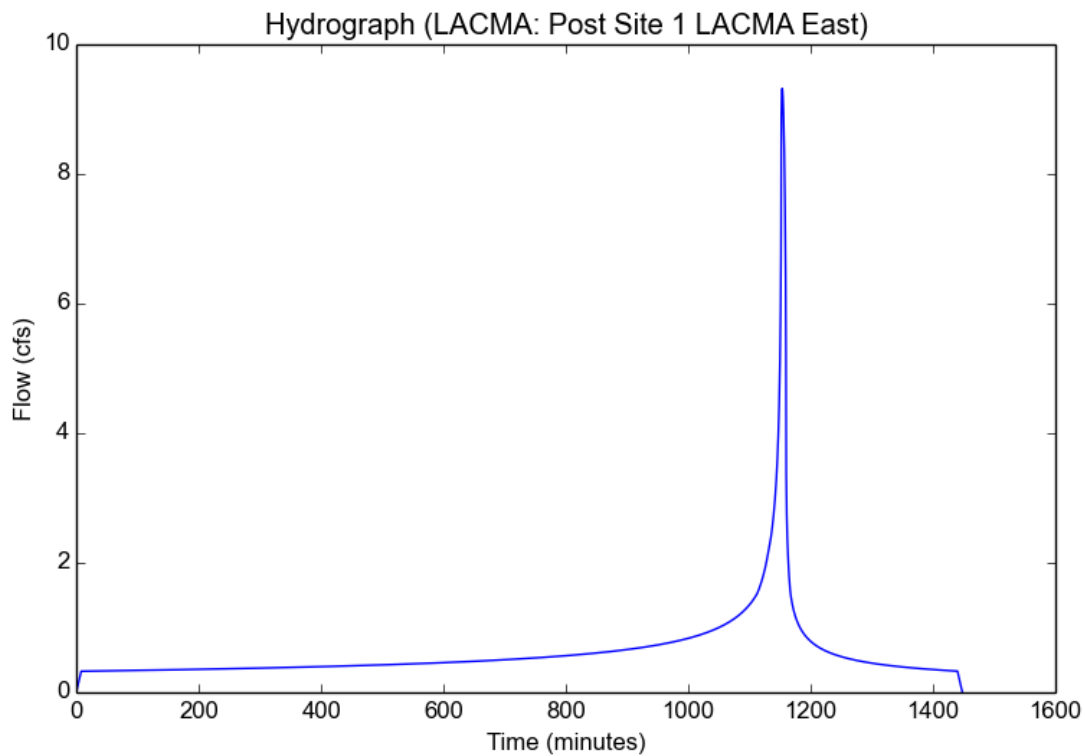
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 1 LACMA East
Area (ac)	3.72
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.05
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.73
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.7746
Undeveloped Runoff Coefficient (Cu)	0.9106
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	9.2892
Burned Peak Flow Rate (cfs)	9.2892
24-Hr Clear Runoff Volume (ac-ft)	1.2592
24-Hr Clear Runoff Volume (cu-ft)	54850.2009



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4B: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

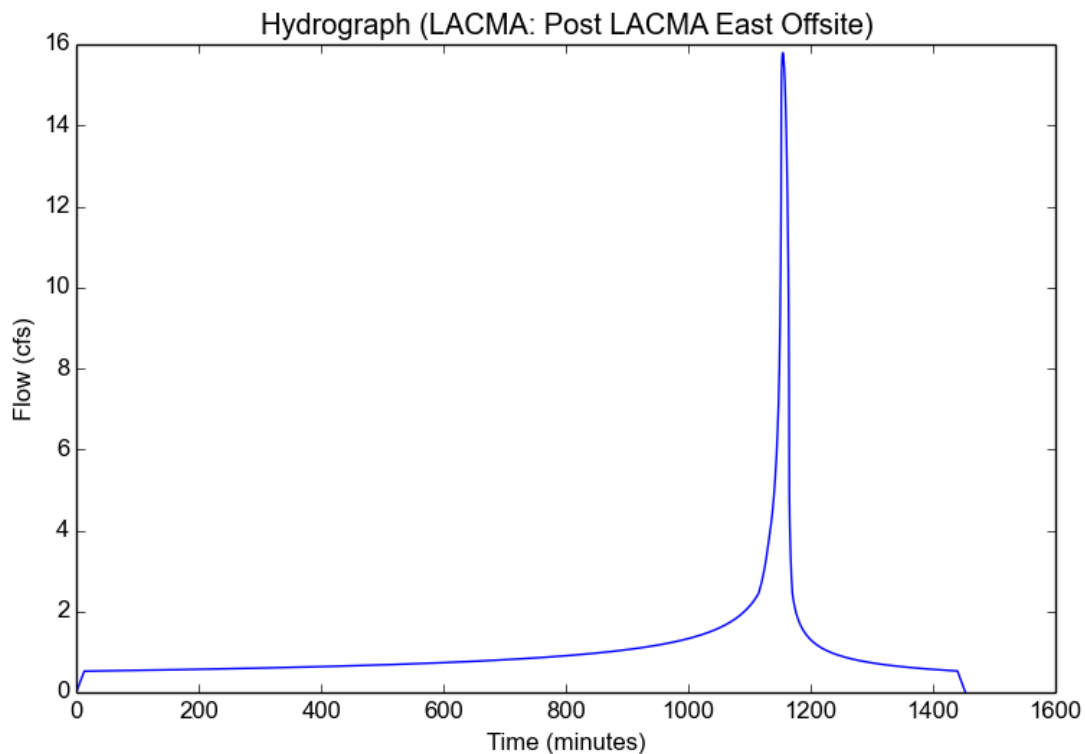
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post LACMA East Offsite
Area (ac)	8.16
Flow Path Length (ft)	2000.0
Flow Path Slope (vft/hft)	0.05
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.5
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.2085
Undeveloped Runoff Coefficient (Cu)	0.8526
Developed Runoff Coefficient (Cd)	0.8763
Time of Concentration (min)	13.0
Clear Peak Flow Rate (cfs)	15.7923
Burned Peak Flow Rate (cfs)	15.7923
24-Hr Clear Runoff Volume (ac-ft)	2.1153
24-Hr Clear Runoff Volume (cu-ft)	92142.9754



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4C: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

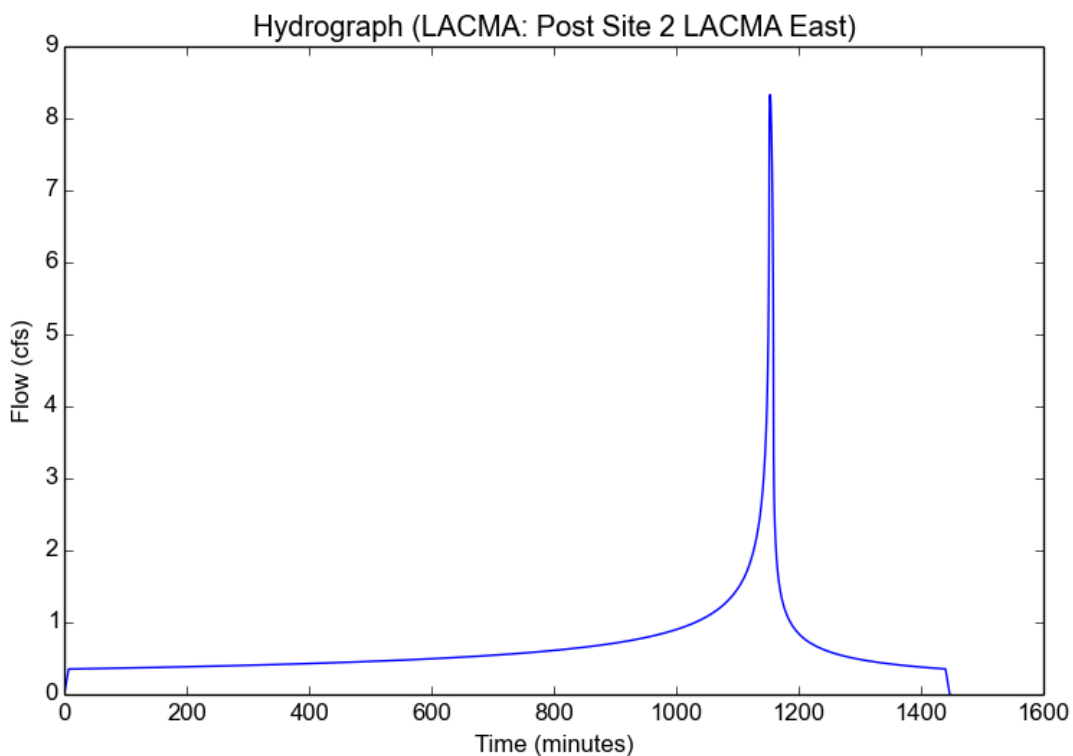
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 2 LACMA East
Area (ac)	3.13
Flow Path Length (ft)	550.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.97
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.9543
Undeveloped Runoff Coefficient (Cu)	0.9235
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	7.0
Clear Peak Flow Rate (cfs)	8.3222
Burned Peak Flow Rate (cfs)	8.3222
24-Hr Clear Runoff Volume (ac-ft)	1.318
24-Hr Clear Runoff Volume (cu-ft)	57411.3415



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4D: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

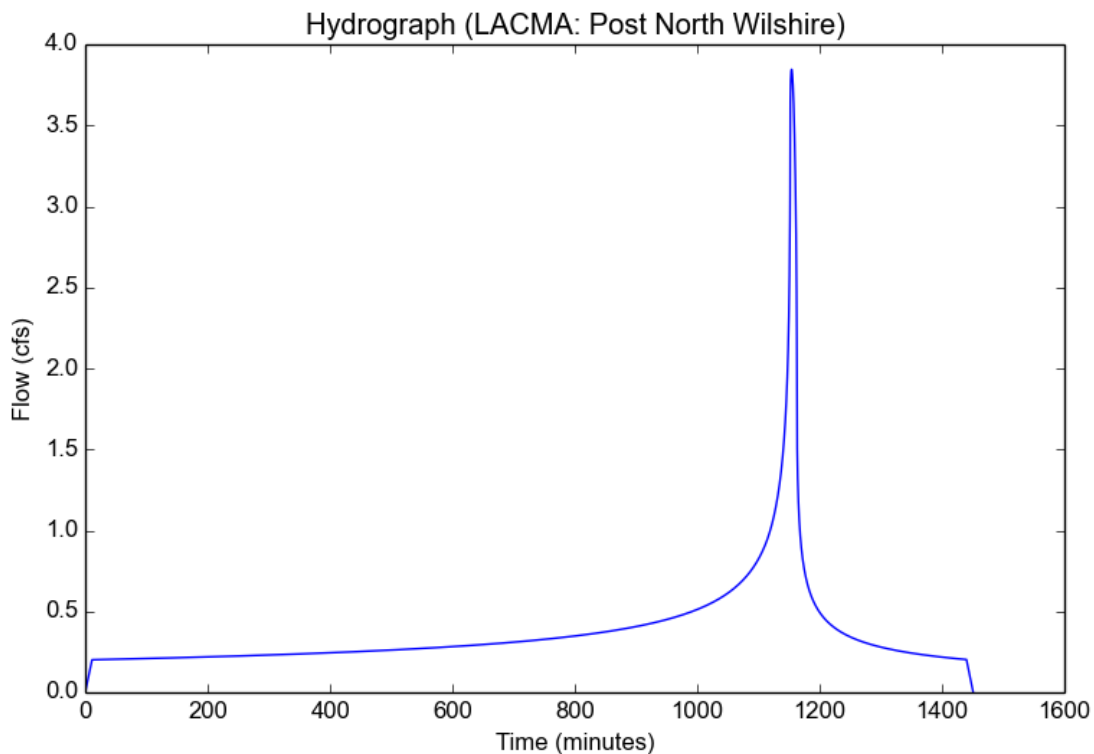
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post North Wilshire
Area (ac)	1.79
Flow Path Length (ft)	1250.0
Flow Path Slope (vft/hft)	0.025
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.97
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	2.3889
Undeveloped Runoff Coefficient (Cu)	0.8763
Developed Runoff Coefficient (Cd)	0.8993
Time of Concentration (min)	11.0
Clear Peak Flow Rate (cfs)	3.8454
Burned Peak Flow Rate (cfs)	3.8454
24-Hr Clear Runoff Volume (ac-ft)	0.7537
24-Hr Clear Runoff Volume (cu-ft)	32832.5567



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4E: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

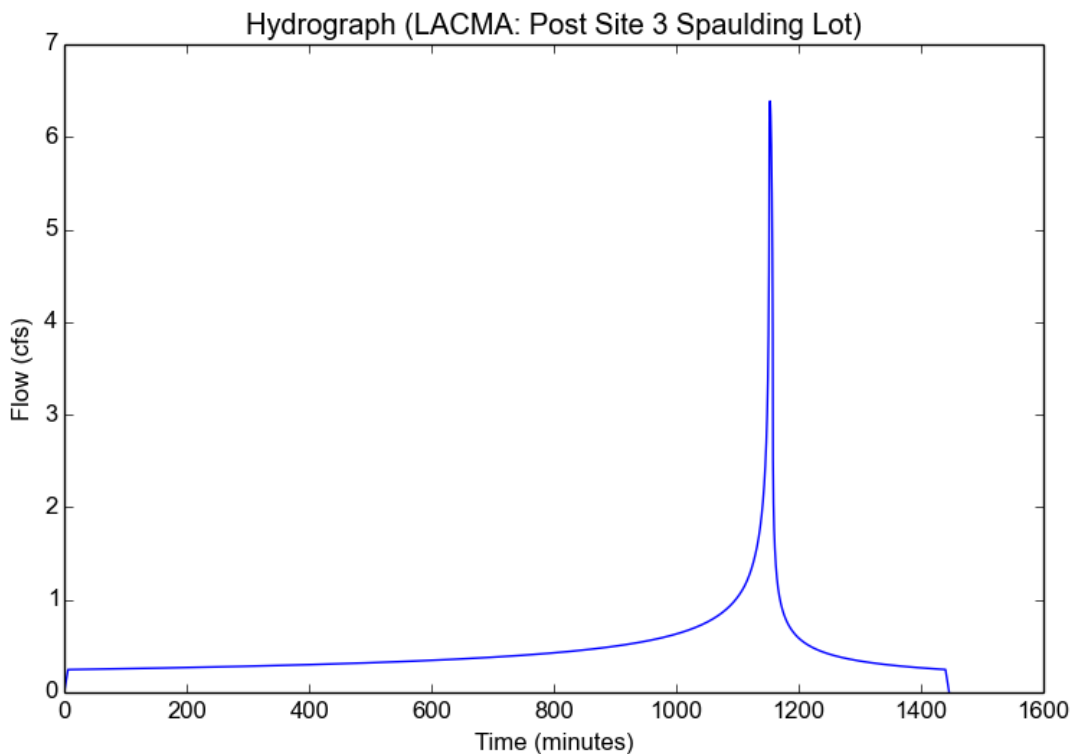
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 3 Spaulding Lot
Area (ac)	2.23
Flow Path Length (ft)	450.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.1763
Undeveloped Runoff Coefficient (Cu)	0.9342
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	6.3748
Burned Peak Flow Rate (cfs)	6.3748
24-Hr Clear Runoff Volume (ac-ft)	0.9237
24-Hr Clear Runoff Volume (cu-ft)	40234.4609



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 4F: HYDROCALC HYDROLOGY RESULTS FOR PROPOSED SITE**

Peak Flow Hydrologic Analysis

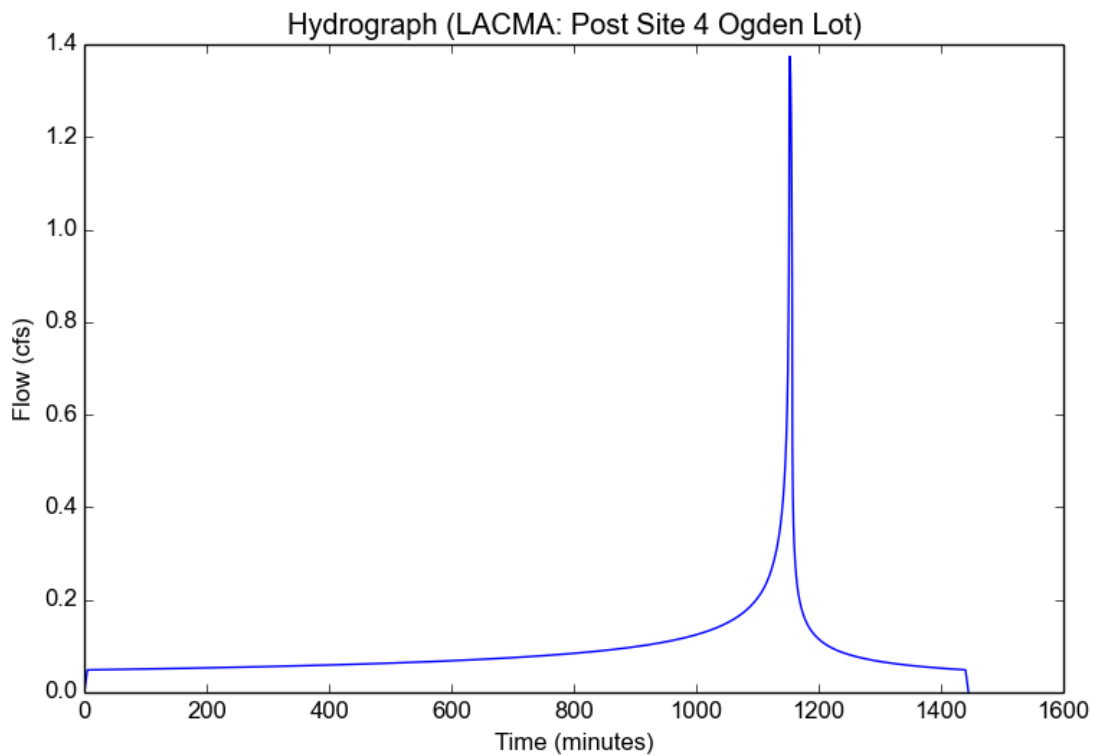
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 4 Ogden Lot
Area (ac)	0.44
Flow Path Length (ft)	120.0
Flow Path Slope (vft/hft)	0.02
50-yr Rainfall Depth (in)	5.8
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.8
Peak Intensity (in/hr)	3.4604
Undeveloped Runoff Coefficient (Cu)	0.9462
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.3703
Burned Peak Flow Rate (cfs)	1.3703
24-Hr Clear Runoff Volume (ac-ft)	0.1822
24-Hr Clear Runoff Volume (cu-ft)	7938.5553



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 5A: HYDROCALC LID RESULTS FOR PROPOSED SITE (SWQDv)**

Peak Flow Hydrologic Analysis

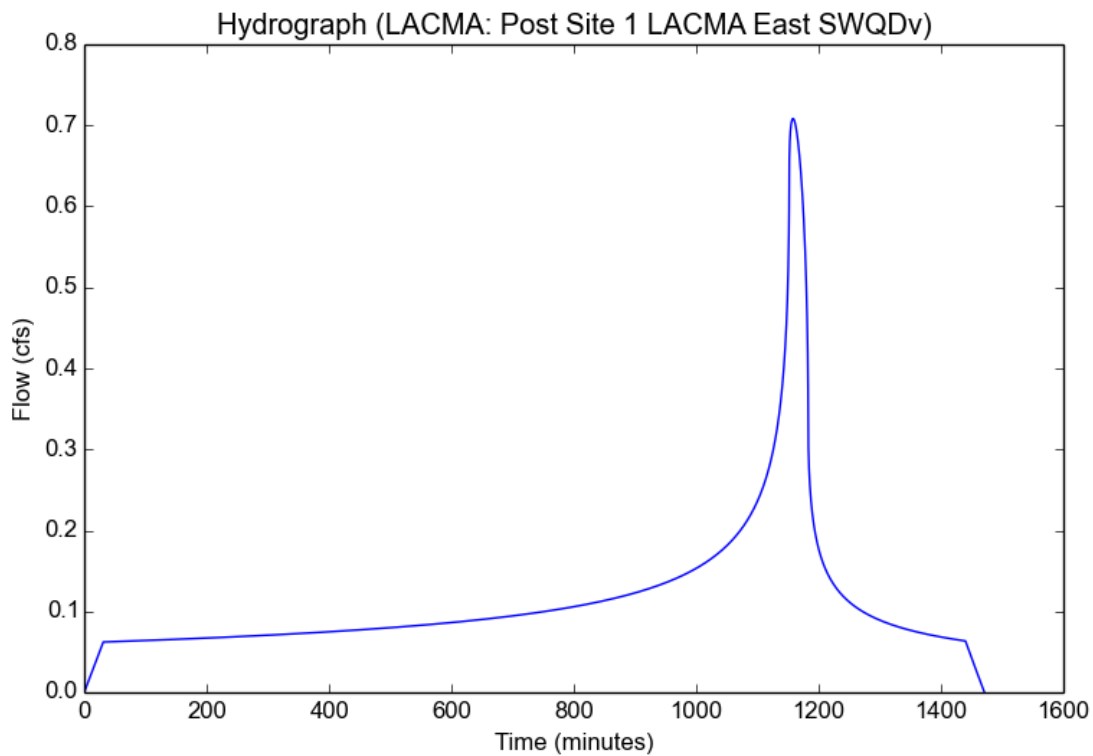
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 1 LACMA East SWQDv
Area (ac)	3.72
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.73
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.2784
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.684
Time of Concentration (min)	31.0
Clear Peak Flow Rate (cfs)	0.7084
Burned Peak Flow Rate (cfs)	0.7084
24-Hr Clear Runoff Volume (ac-ft)	0.2313
24-Hr Clear Runoff Volume (cu-ft)	10076.2644



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 5B: HYDROCALC LID RESULTS FOR PROPOSED SITE (SWQDv)**

Peak Flow Hydrologic Analysis

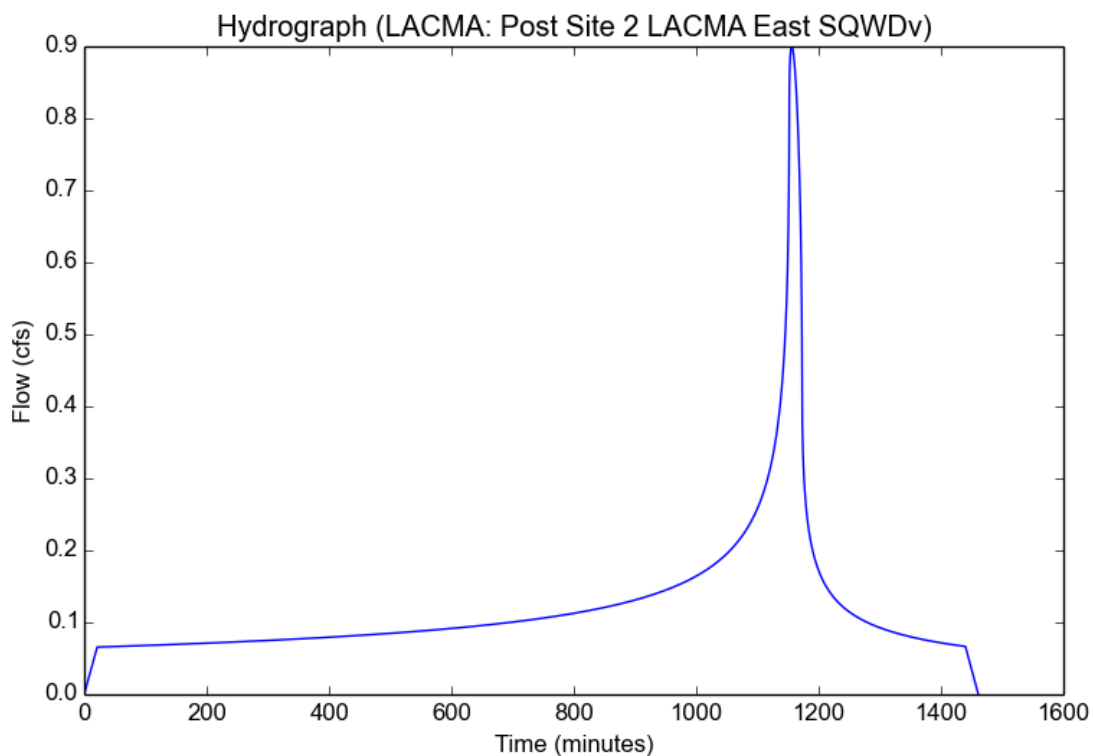
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 2 LACMA East SQWDv
Area (ac)	3.13
Flow Path Length (ft)	550.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.3343
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	0.8999
Burned Peak Flow Rate (cfs)	0.8999
24-Hr Clear Runoff Volume (ac-ft)	0.2447
24-Hr Clear Runoff Volume (cu-ft)	10659.5876



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 5C: HYDROCALC LID RESULTS FOR PROPOSED SITE (SWQDv)**

Peak Flow Hydrologic Analysis

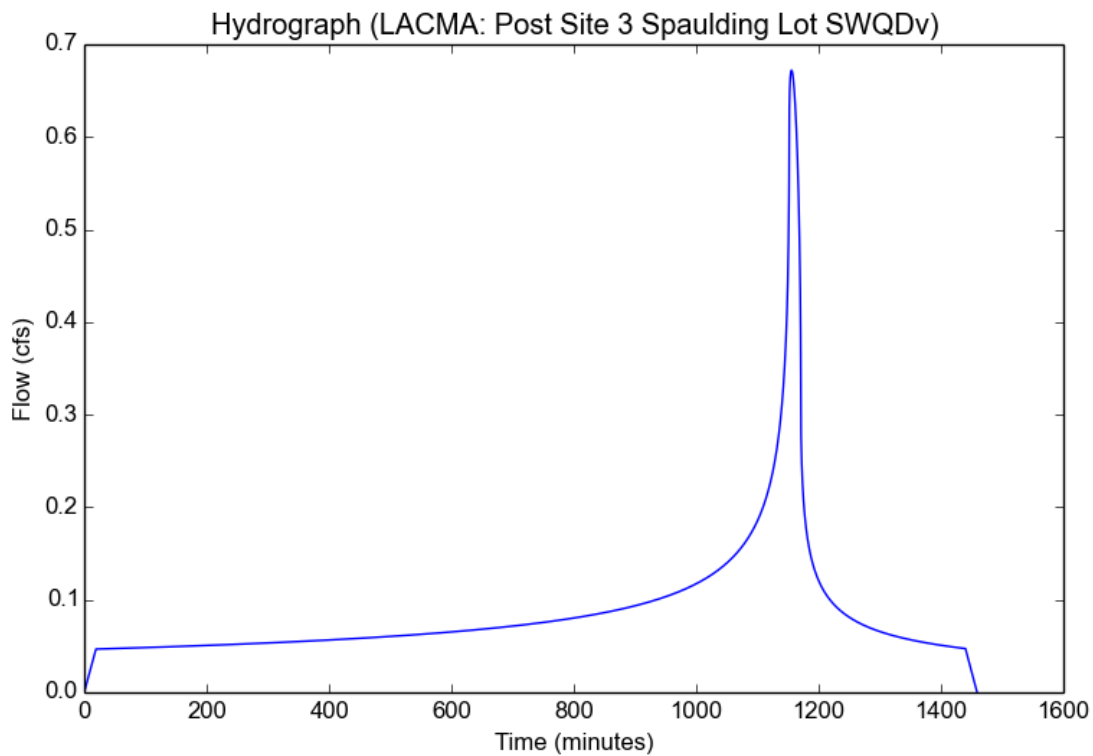
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 3 Spaulding Lot SWQDv
Area (ac)	2.23
Flow Path Length (ft)	450.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.3504
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.672
Burned Peak Flow Rate (cfs)	0.672
24-Hr Clear Runoff Volume (ac-ft)	0.1743
24-Hr Clear Runoff Volume (cu-ft)	7594.5227



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 5D: HYDROCALC LID RESULTS FOR PROPOSED SITE (SWQDv)**

Peak Flow Hydrologic Analysis

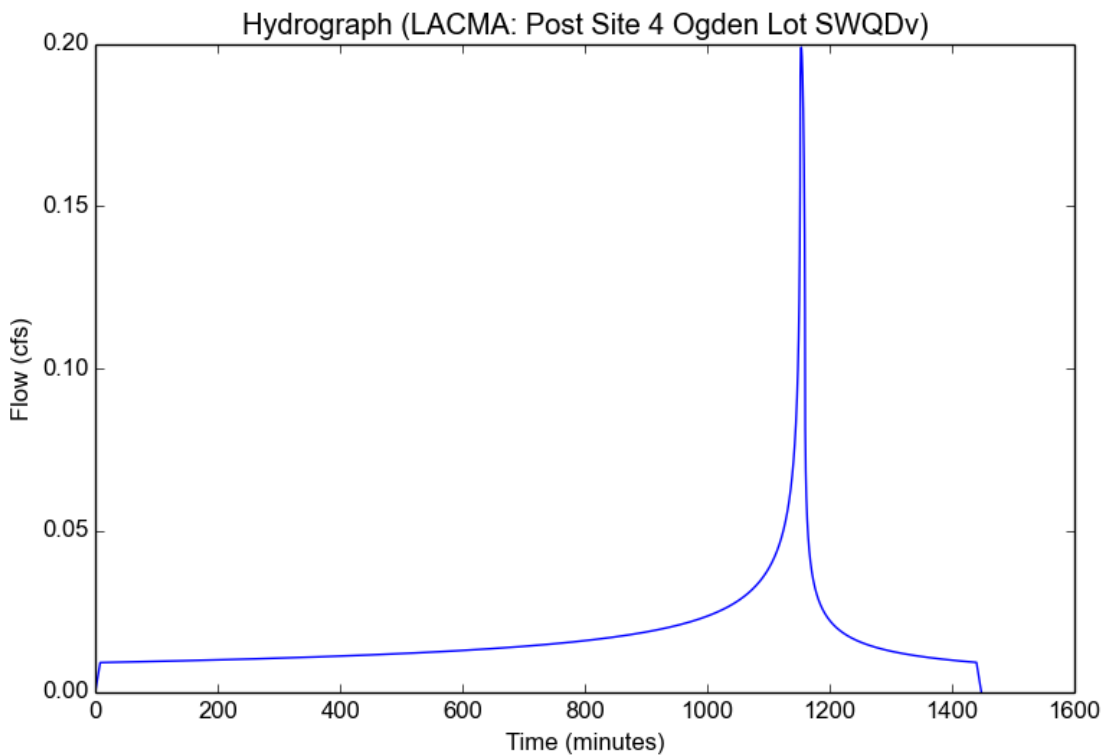
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 4 Ogden Lot SWQDv
Area (ac)	0.44
Flow Path Length (ft)	120.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.1
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.1
Peak Intensity (in/hr)	0.5262
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	8.0
Clear Peak Flow Rate (cfs)	0.1991
Burned Peak Flow Rate (cfs)	0.1991
24-Hr Clear Runoff Volume (ac-ft)	0.0344
24-Hr Clear Runoff Volume (cu-ft)	1498.4652



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 6A: HYDROCALC LID RESULTS FOR PROPOSED SITE (1.5 SWQDv)**

Peak Flow Hydrologic Analysis

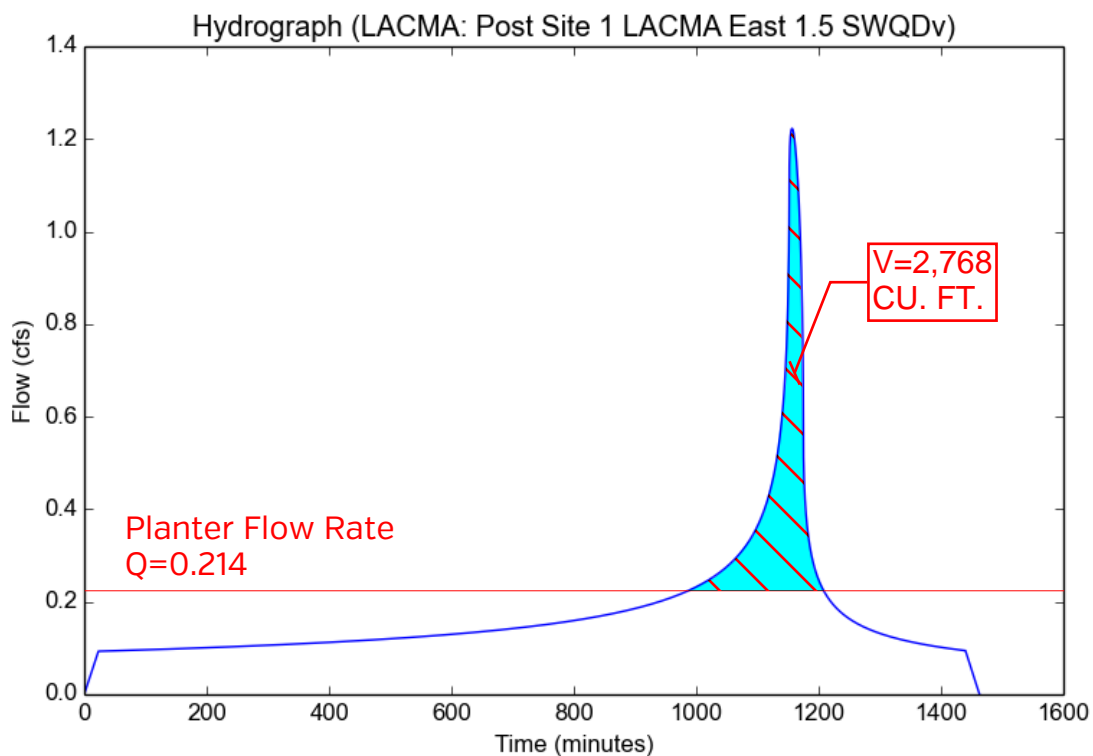
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 1 LACMA East 1.5 SWQDv
Area (ac)	3.72
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.05
85th Percentile Rainfall Depth (in)	1.65
Percent Impervious	0.73
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.65
Peak Intensity (in/hr)	0.4805
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.684
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	1.2226
Burned Peak Flow Rate (cfs)	1.2226
24-Hr Clear Runoff Volume (ac-ft)	0.347
24-Hr Clear Runoff Volume (cu-ft)	15114.3127



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 6B: HYDROCALC LID RESULTS FOR PROPOSED SITE (1.5 SWQDv)**

Peak Flow Hydrologic Analysis

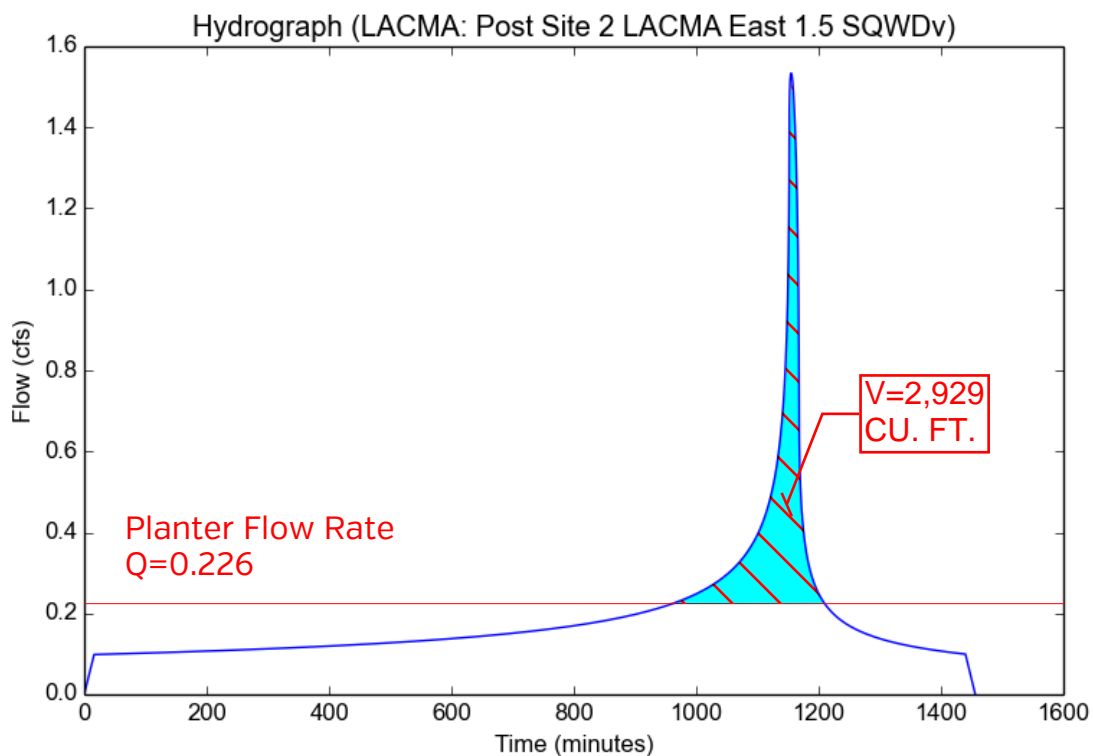
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 2 LACMA East 1.5 SQWDv
Area (ac)	3.13
Flow Path Length (ft)	550.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.65
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.65
Peak Intensity (in/hr)	0.5699
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	1.5339
Burned Peak Flow Rate (cfs)	1.5339
24-Hr Clear Runoff Volume (ac-ft)	0.3671
24-Hr Clear Runoff Volume (cu-ft)	15989.3437



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 6C: HYDROCALC LID RESULTS FOR PROPOSED SITE (1.5 SWQDv)**

Peak Flow Hydrologic Analysis

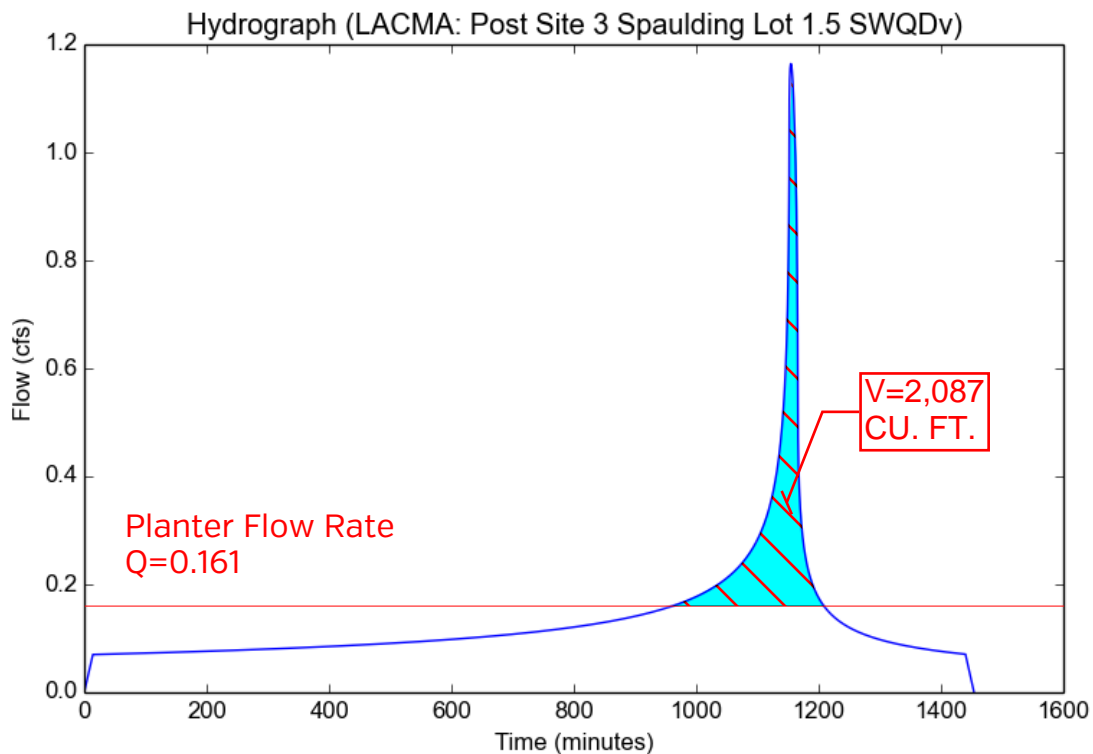
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 3 Spaulding Lot 1.5 SWQDv
Area (ac)	2.23
Flow Path Length (ft)	450.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.65
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.65
Peak Intensity (in/hr)	0.6068
Undeveloped Runoff Coefficient (Cu)	0.1098
Developed Runoff Coefficient (Cd)	0.8605
Time of Concentration (min)	14.0
Clear Peak Flow Rate (cfs)	1.1643
Burned Peak Flow Rate (cfs)	1.1643
24-Hr Clear Runoff Volume (ac-ft)	0.2615
24-Hr Clear Runoff Volume (cu-ft)	11391.8483



**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
FIGURE 6D: HYDROCALC LID RESULTS FOR PROPOSED SITE (1.5 SWQDv)**

Peak Flow Hydrologic Analysis

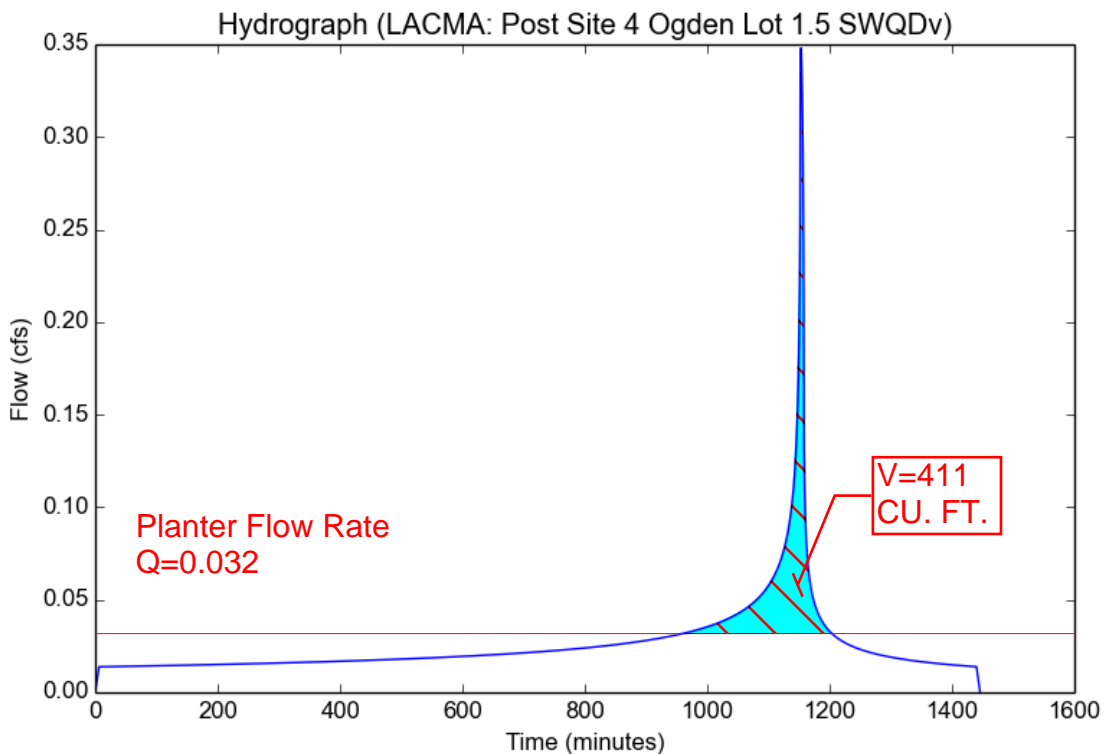
File location: P:/2014/114128 LACMA Phase III/ENGR/LID/HydroCalc Results/LACMA Report.pdf
Version: HydroCalc 1.0.2

Input Parameters

Project Name	LACMA
Subarea ID	Post Site 4 Ogden Lot 1.5 SWQDv
Area (ac)	0.44
Flow Path Length (ft)	120.0
Flow Path Slope (vft/hft)	0.02
85th Percentile Rainfall Depth (in)	1.65
Percent Impervious	0.95
Soil Type	13
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.65
Peak Intensity (in/hr)	0.9036
Undeveloped Runoff Coefficient (Cu)	0.4067
Developed Runoff Coefficient (Cd)	0.8753
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	0.348
Burned Peak Flow Rate (cfs)	0.348
24-Hr Clear Runoff Volume (ac-ft)	0.0516
24-Hr Clear Runoff Volume (cu-ft)	2249.347



HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD. FIGURE 7A: BIOFILTRATION PLANTER AREA CALCULATIONS

Planter Box Sizing

Note:

Red values to be <u>changed</u> by user.
Black values are <u>automatically</u> calculated.

Hydrograph:

Post Site 1 LACMA East 1.5 SWQDv			
[1]	85th Percentile Rainfall Depth (in)		1.10
[2]	Design Rainfall Depth (in)	[1] * 1.5	1.65
[3]	Clear Peak Flow Rate (cfs)	From Hydrocalc (Qpm)	1.22
[4]	24-Hr Clear Runoff Volume (cu-ft)	From Hydrocalc (=1.5 SWQDv)	15,114
[5]	$K_{sat,media}$ (in/hr)		5
[6]	FS		1
[7]	$K_{sat,design}$ (in/hr)	[5] * [6]	5
[8]	Proposed Planter Area (sf)		1,846
[9]	Proposed Planter Flow Rate (cfs)	[7]/12 in*[8]/60min*1/60sec	0.214
[10]	Proposed Total Storage Volume Required (cu-ft)	Use Hydrocalc CSV file to calculate area under hydrograph and above Planter Flow Rate	2,768
[11]	$d_{p,max}$ Max. Ponding Depth (ft)		1.5
[12]	Proposed d_p , Calculated Ponding Depth (ft)	Use Hydrocalc CSV file to calculate peak depth. Roughly = [10]/[8]	1.50
[13]	Drawdown Time (hr)	[12]*12 in/ft / [7]	3.60
[14]	A_{min} (sq. ft) (minimum area required)	Iterate [8] until [12] = [11]	1,846

*SEE FIGURE 6A FOR HYDROGRAPH

HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD. FIGURE 7B: BIOFILTRATION PLANTER AREA CALCULATIONS

Planter Box Sizing

Note:

Red values to be <u>changed</u> by user.
Black values are <u>automatically</u> calculated.

Hydrograph:

Post Site 2 LACMA East 1.5 SQWDv			
[1]	85th Percentile Rainfall Depth (in)		1.10
[2]	Design Rainfall Depth (in)	[1] * 1.5	1.65
[3]	Clear Peak Flow Rate (cfs)	From Hydrocalc (Qpm)	1.53
[4]	24-Hr Clear Runoff Volume (cu-ft)	From Hydrocalc (=1.5 SWQDv)	15,989
[5]	$K_{sat,media}$ (in/hr)		5
[6]	FS		1
[7]	$K_{sat,design}$ (in/hr)	[5] * [6]	5
[8]	Proposed Planter Area (sf)		1,953
[9]	Proposed Planter Flow Rate (cfs)	[7]/12 in*[8]/60min*1/60sec	0.226
[10]	Proposed Total Storage Volume Required (cu-ft)	Use Hydrocalc CSV file to calculate area under hydrograph and above Planter Flow Rate	2,929
[11]	$d_{p,max}$ Max. Ponding Depth (ft)		1.5
[12]	Proposed d_p , Calculated Ponding Depth (ft)	Use Hydrocalc CSV file to calculate peak depth. Roughly = [10]/[8]	1.50
[13]	Drawdown Time (hr)	[12]*12 in/ft / [7]	3.60
[14]	A_{min} (sq. ft) (minimum area required)	Iterate [8] until [12] = [11]	1,953

*SEE FIGURE 6B FOR HYDROGRAPH

HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD. FIGURE 7C: BIOFILTRATION PLANTER AREA CALCULATIONS

Planter Box Sizing

Note:

Red values to be <u>changed</u> by user.
Black values are <u>automatically</u> calculated.

Hydrograph:

Post Site 3 Spaulding Lot 1.5 SWQDv			
[1]	85th Percentile Rainfall Depth (in)		1.10
[2]	Design Rainfall Depth (in)	[1] * 1.5	1.65
[3]	Clear Peak Flow Rate (cfs)	From Hydrocalc (Qpm)	1.16
[4]	24-Hr Clear Runoff Volume (cu-ft)	From Hydrocalc (=1.5 SWQDv)	11,392
[5]	$K_{sat,media}$ (in/hr)		5
[6]	FS		1
[7]	$K_{sat,design}$ (in/hr)	[5] * [6]	5
[8]	Proposed Planter Area (sf)		1,392
[9]	Proposed Planter Flow Rate (cfs)	[7]/12 in*[8]/60min*1/60sec	0.161
[10]	Proposed Total Storage Volume Required (cu-ft)	Use Hydrocalc CSV file to calculate area under hydrograph and above Planter Flow Rate	2,087
[11]	$d_{p,max}$ Max. Ponding Depth (ft)		1.5
[12]	Proposed d_p , Calculated Ponding Depth (ft)	Use Hydrocalc CSV file to calculate peak depth. Roughly = [10]/[8]	1.50
[13]	Drawdown Time (hr)	[12]*12 in/ft / [7]	3.60
[14]	A_{min} (sq. ft) (minimum area required)	Iterate [8] until [12] = [11]	1,392

***SEE FIGURE 6C FOR HYDROGRAPH**

HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD. FIGURE 7D: BIOFILTRATION PLANTER AREA CALCULATIONS

Planter Box Sizing

Note:

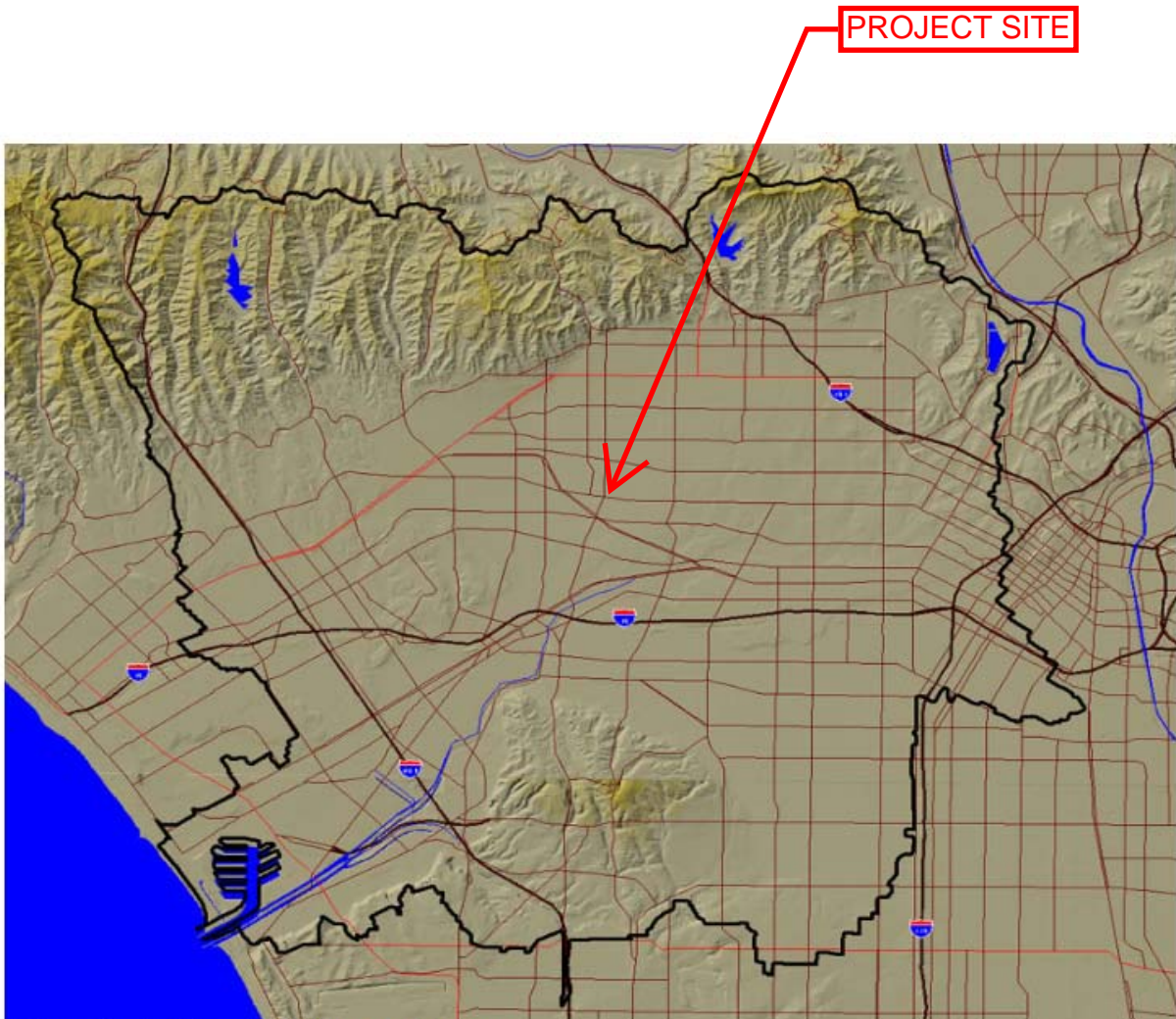
Red values to be <u>changed</u> by user.
Black values are <u>automatically</u> calculated.

Hydrograph:

Post Site 4 Ogden Lot 1.5 SWQDv			
[1]	85th Percentile Rainfall Depth (in)		1.10
[2]	Design Rainfall Depth (in)	[1] * 1.5	1.65
[3]	Clear Peak Flow Rate (cfs)	From Hydrocalc (Qpm)	0.35
[4]	24-Hr Clear Runoff Volume (cu-ft)	From Hydrocalc (=1.5 SWQDv)	2,249
[5]	$K_{sat,media}$ (in/hr)		5
[6]	FS		1
[7]	$K_{sat,design}$ (in/hr)	[5] * [6]	5
[8]	Proposed Planter Area (sf)		276
[9]	Proposed Planter Flow Rate (cfs)	[7]/12 in*[8]/60min*1/60sec	0.032
[10]	Proposed Total Storage Volume Required (cu-ft)	Use Hydrocalc CSV file to calculate area under hydrograph and above Planter Flow Rate	411
[11]	$d_{p,max}$ Max. Ponding Depth (ft)		1.5
[12]	Proposed d_p , Calculated Ponding Depth (ft)	Use Hydrocalc CSV file to calculate peak depth. Roughly = [10]/[8]	1.49
[13]	Drawdown Time (hr)	[12]*12 in/ft / [7]	3.58
[14]	A_{min} (sq. ft) (minimum area required)	Iterate [8] until [12] = [11]	276

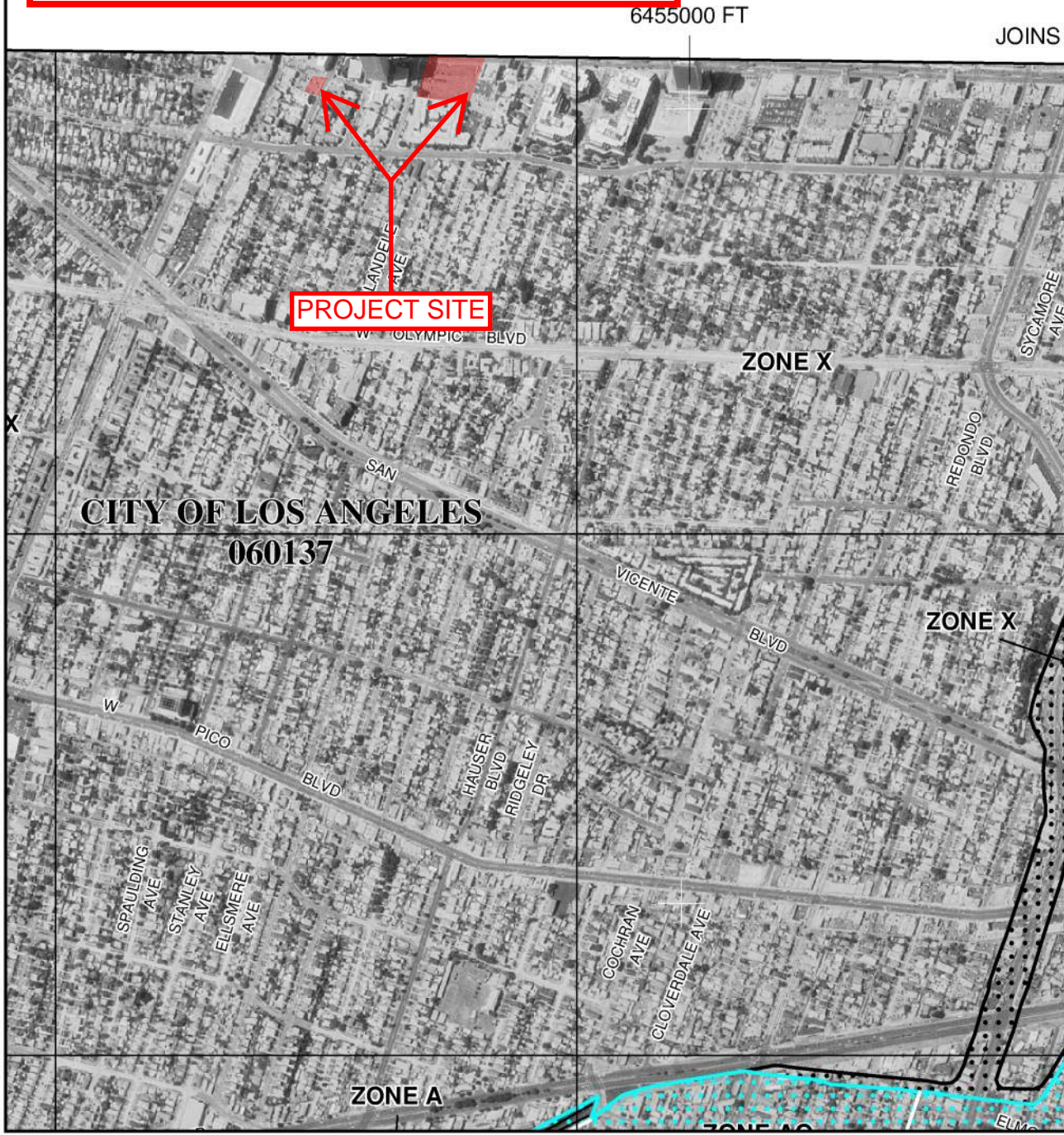
*SEE FIGURE 6D FOR HYDROGRAPH

FIGURE 9: WATERSHED MAP



Ballona Creek Watershed - Topographic Map

FIGURE 10B: FEMA Flood Plain Map Firmette 2



the Flood Insurance Study report for this jurisdiction.
 If insurance is available in this community, contact your insurance agent or the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 1000'



PANEL 1615F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 1615 OF 2350
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1615	F
BEVERLY HILLS, CITY OF	060655	1615	F
CULVER CITY, CITY OF	060114	1615	F
LOS ANGELES, CITY OF	060137	1615	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

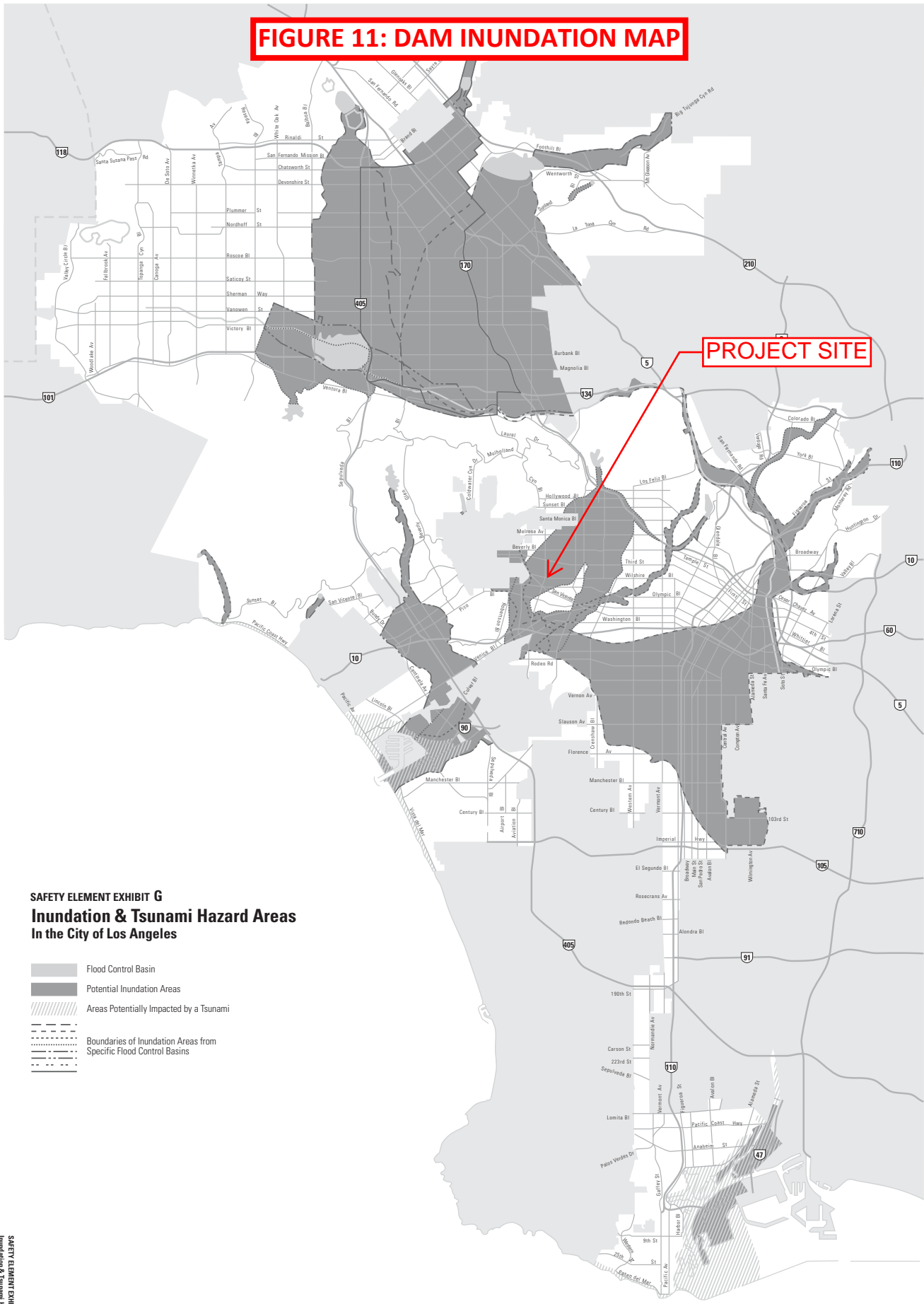


MAP NUMBER
06037C1615F
EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FIGURE 11: DAM INUNDATION MAP



**SAFETY ELEMENT EXHIBIT G
Inundation & Tsunami Hazard Areas
In the City of Los Angeles**

- Flood Control Basin
- Potential Inundation Areas
- Areas Potentially Impacted by a Tsunami
- Boundaries of Inundation Areas from Specific Flood Control Basins

SAFETY ELEMENT EXHIBIT G
Inundation & Tsunami Hazard Areas

Source: Environmental Impact Report, Framework Element, Los Angeles City General Plan, May 1995; Technical Appendix to the Safety Element of the Los Angeles County General Plan Hazard Reduction in Los Angeles County, Volume 2, Plate 6, "Flood and Inundation Hazards" January 1990; California Environmental Quality Act of 1970 (CEQA), Public Resources Code Section 21000 et. seq. with guidelines as amended, 1992; California Government Code Title 7 chapter 3, article 5 section 65302(g), as amended 1993.

Prepared by the General Plan Framework Section • City of Los Angeles Planning Department • Citywide Graphics • March, 1994 • Council File No. 89-2104



**FIGURE 12: CITY OF LA STORM
DRAIN CAPACITY CALCULATIONS**

City of LA SD per BD002007 Ph3 Sheet 5

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.04600	ft/ft
Normal Depth	1.50	ft
Diameter	1.50	ft

Results

Discharge	22.53	ft ³ /s
Flow Area	1.77	ft ²
Wetted Perimeter	4.71	ft
Hydraulic Radius	0.38	ft
Top Width	0.00	ft
Critical Depth	1.48	ft
Percent Full	100.0	%
Critical Slope	0.04187	ft/ft
Velocity	12.75	ft/s
Velocity Head	2.53	ft
Specific Energy	4.03	ft
Froude Number	0.00	
Maximum Discharge	24.23	ft ³ /s
Discharge Full	22.53	ft ³ /s
Slope Full	0.04600	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

City of LA SD per BD002007 Ph3 Sheet 5

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.48	ft
Channel Slope	0.04600	ft/ft
Critical Slope	0.04187	ft/ft

City of LA SD per P-22017 Sheet 3

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00600	ft/ft
Normal Depth	2.50	ft
Diameter	2.50	ft

Results

Discharge	31.77	ft ³ /s
Flow Area	4.91	ft ²
Wetted Perimeter	7.85	ft
Hydraulic Radius	0.63	ft
Top Width	0.00	ft
Critical Depth	1.92	ft
Percent Full	100.0	%
Critical Slope	0.00684	ft/ft
Velocity	6.47	ft/s
Velocity Head	0.65	ft
Specific Energy	3.15	ft
Froude Number	0.00	
Maximum Discharge	34.18	ft ³ /s
Discharge Full	31.77	ft ³ /s
Slope Full	0.00600	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

City of LA SD per P-22017 Sheet 3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	1.92	ft
Channel Slope	0.00600	ft/ft
Critical Slope	0.00684	ft/ft

FIGURE 13: City of LA Storm Drain Correspondence

From: Terry Phan [<mailto:terry.phan@lacity.org>]
Sent: Wednesday, August 09, 2017 8:15 AM
To: Kyle Trudeau
Subject: Re: City Allowance for Stormwater Discharge to Back of City Owned Catch Basin

Kyle,

It should be okay since the discharge flow is way less than capacity.

On Tue, Aug 8, 2017 at 9:18 AM, Kyle Trudeau <Kyle.Trudeau@kpff.com> wrote:

Hi Terry,

We spoke a few weeks back regarding whether the City has a process for Qallowable if we are connecting to the back of an existing catch basin.

In our case the existing Q flowing to the catch basin is 11.81 cfs and our site would increase the Q to approximately 12.17 cfs. The lateral from the catch basin to the main has a Qmax of 22.53, so we are well under the lateral's capacity.

In particular we are looking for confirmation that we are allowed to discharge the flow as discussed above.

Thank you,



Kyle Trudeau

O 213.418.0201 D 213.266.5250
700 S. Flower, Suite 2100

Los Angeles CA 90017

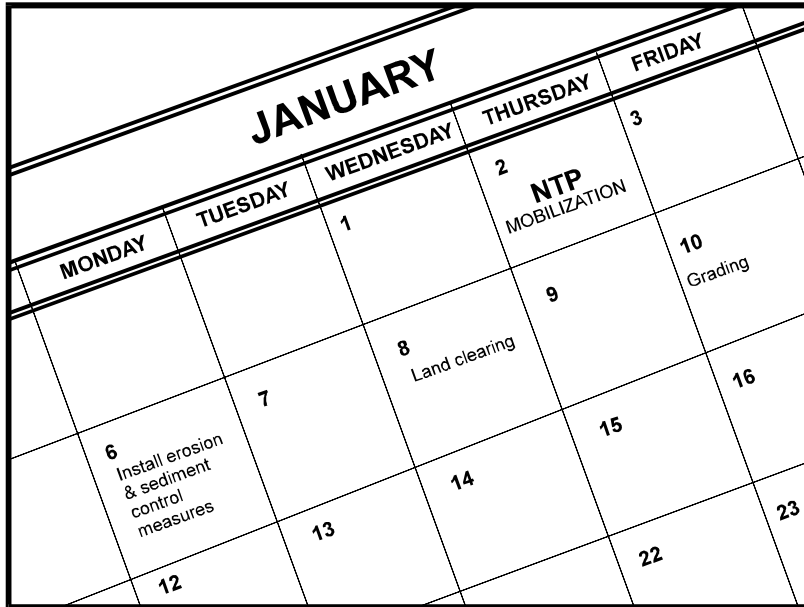
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Terry Phan, P.E.
Central District | B-Permit Engineer - Civil Engineering Associate
Bureau of Engineering | Department of Public Works
201 N. Figueroa St., Ste. 770
Los Angeles, CA 90012
T: 213-482-7466 | F: 213-482-7460



Scheduling

EC-1



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

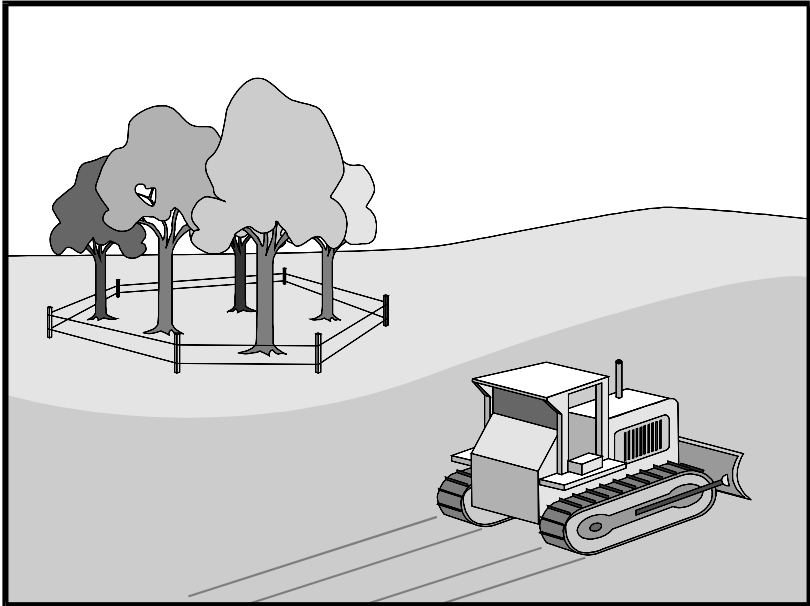
- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates



Preservation Of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

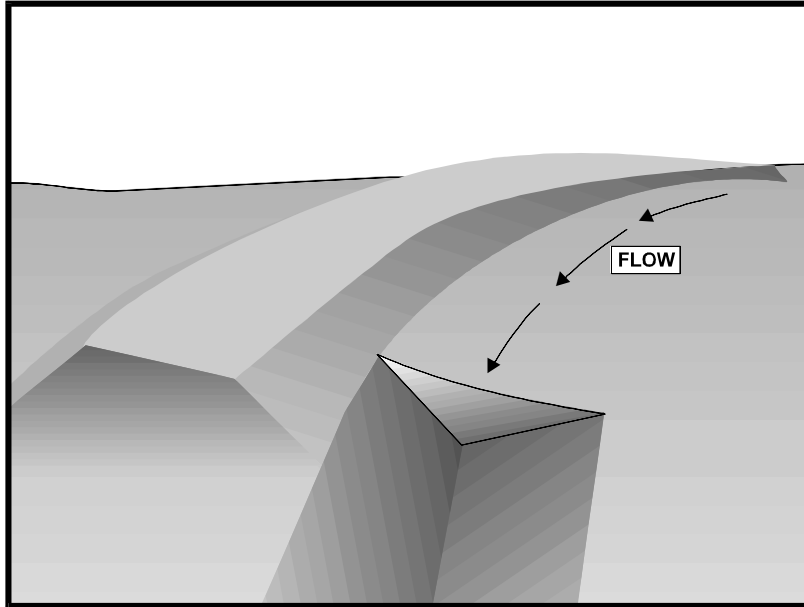
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
 - To convey surface runoff down sloping land
 - To intercept and divert runoff to avoid sheet flow over sloped surfaces
 - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
 - To intercept runoff from paved surfaces
 - Below steep grades where runoff begins to concentrate
 - Along roadways and facility improvements subject to flood drainage

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

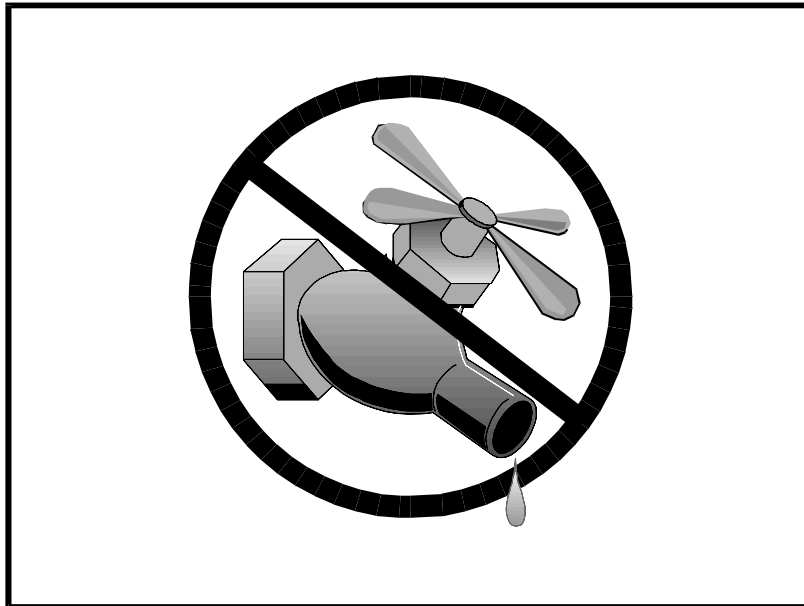
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Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

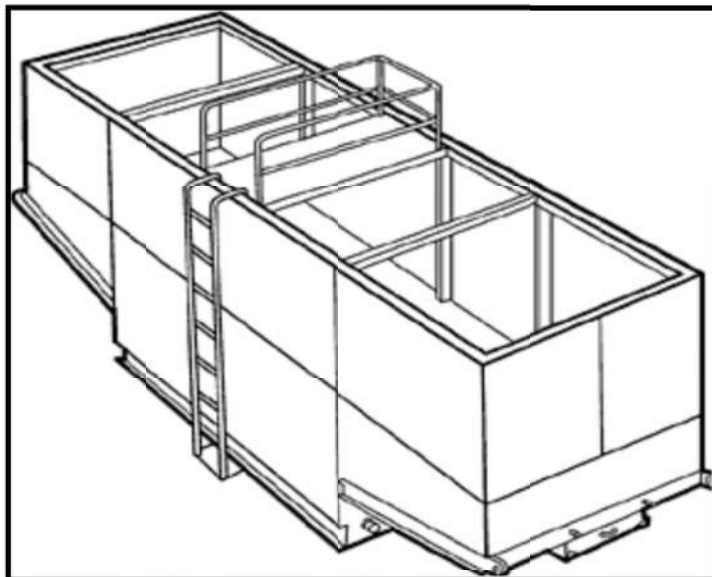
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedances of the General Permit requirements or Basin Plan standards.

The dewatering operations described in this fact sheet are not Active Treatment Systems (ATS) and do not include the use of chemical coagulations, chemical flocculation or electrocoagulation.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

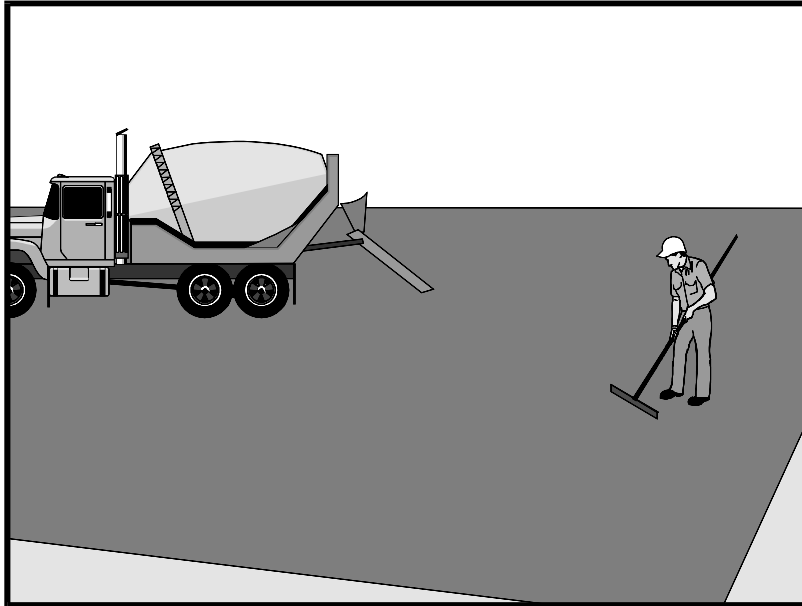
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

- SE-5: Fiber Roll
- SE-6: Gravel Bag Berm

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Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

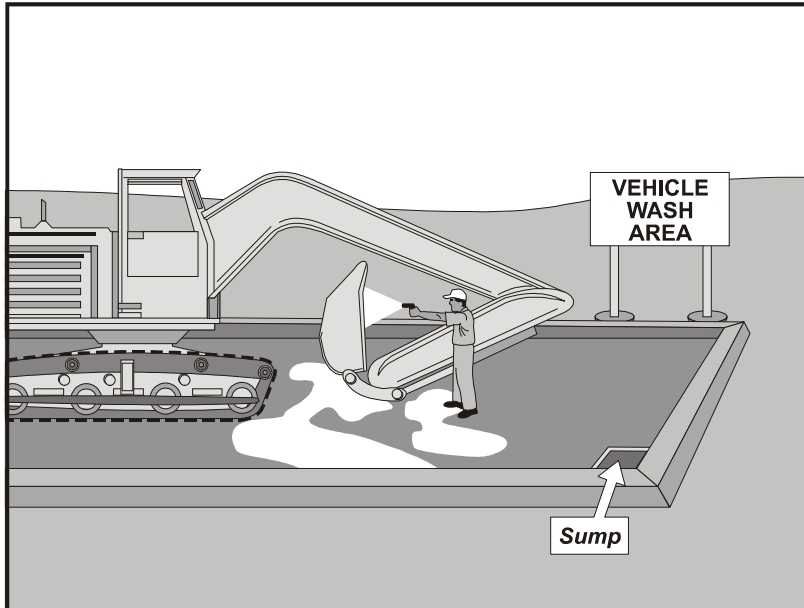
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

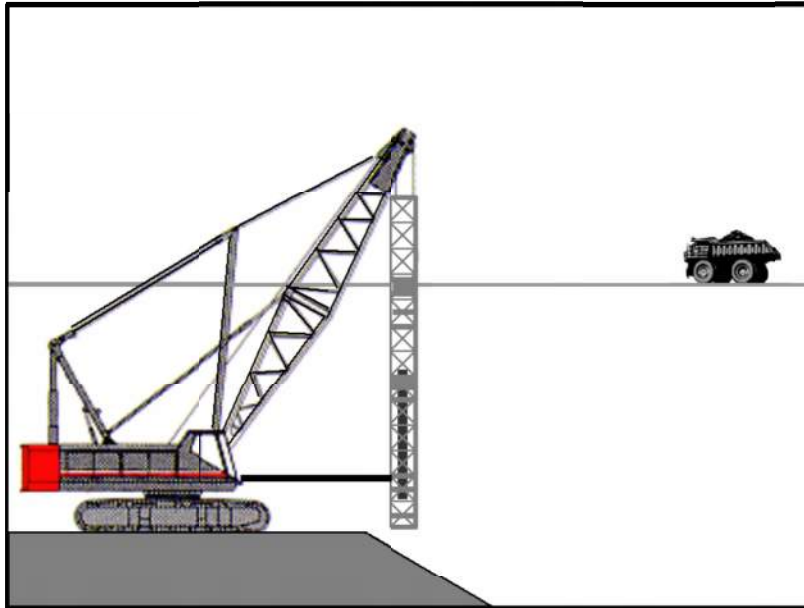
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Nutrients	<input checked="" type="checkbox"/>
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

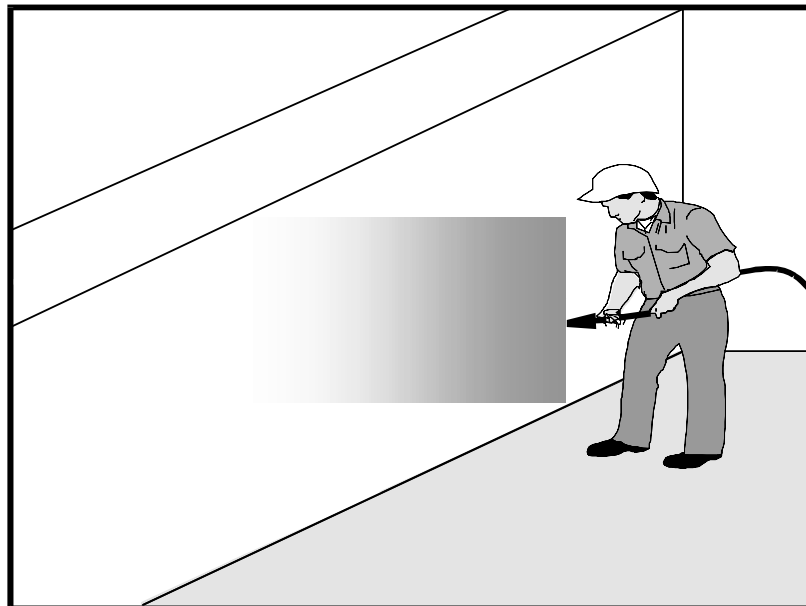
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

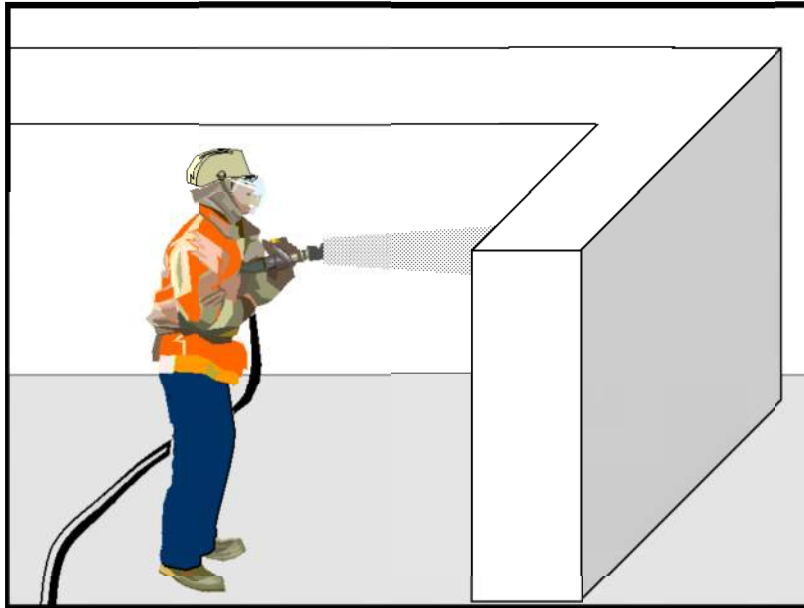
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Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

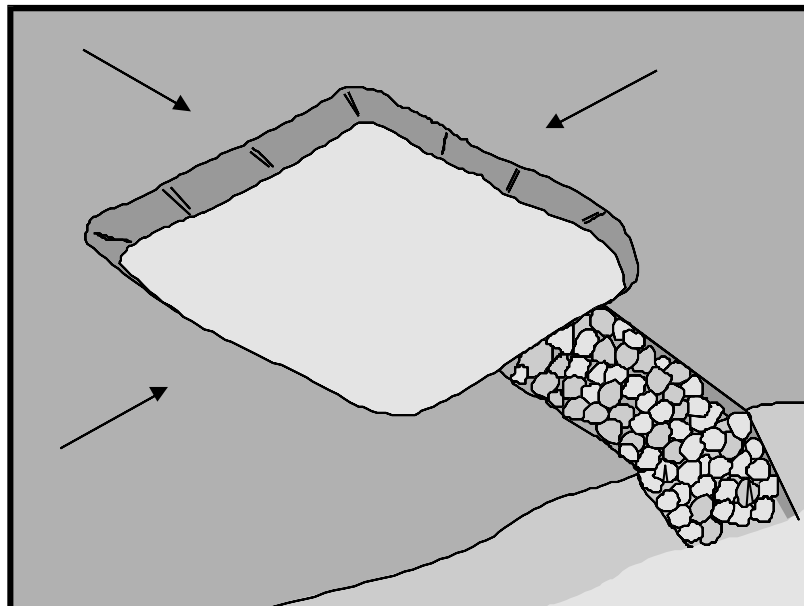
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Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged by gravity flow. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Trap design guidance provided in this fact sheet is not intended to guarantee compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment traps should be used in conjunction with a comprehensive system of BMPs.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

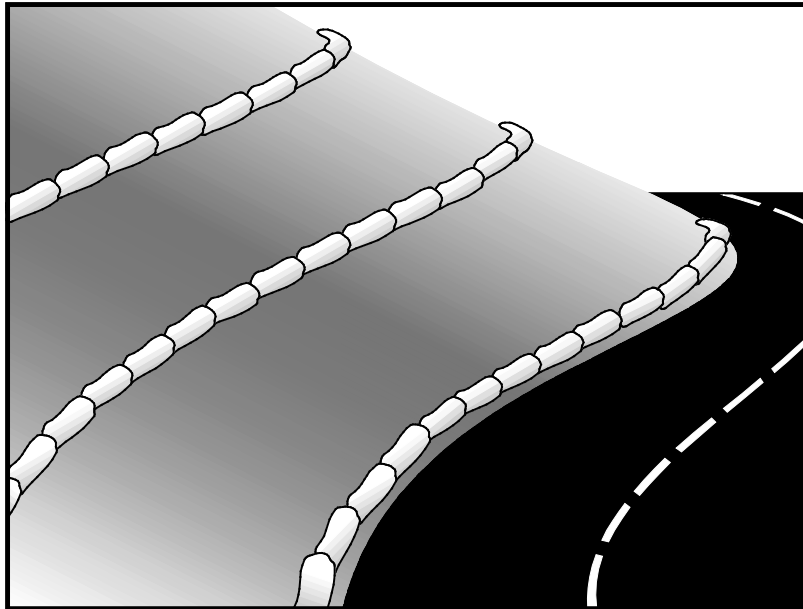
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

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Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-8 Sandbag Barrier
- SE-12 Temporary Silt Dike
- SE-14 Biofilter Bags

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Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

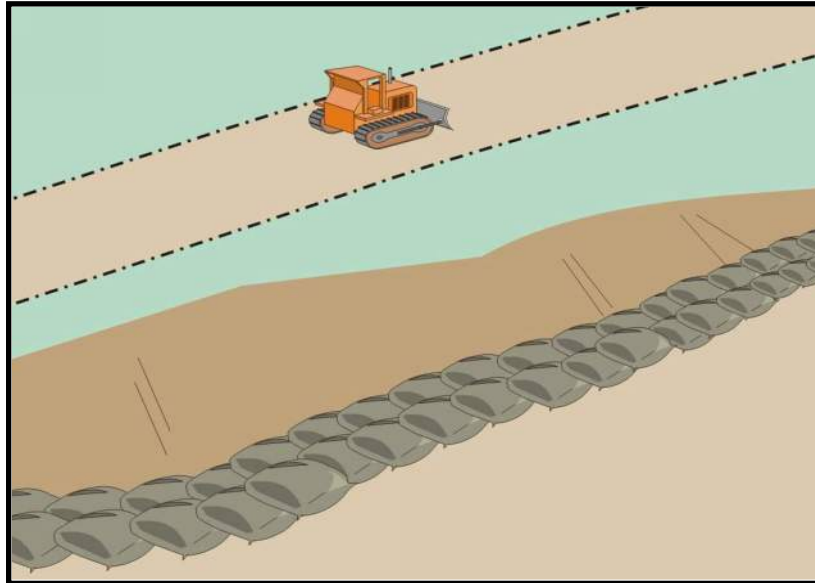
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Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes.
 - As sediment traps at culvert/pipe outlets.
 - Below other small cleared areas.
 - Along the perimeter of a site.
 - Down slope of exposed soil areas.
 - Around temporary stockpiles and spoil areas.
 - Parallel to a roadway to keep sediment off paved areas.
 - Along streams and channels.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

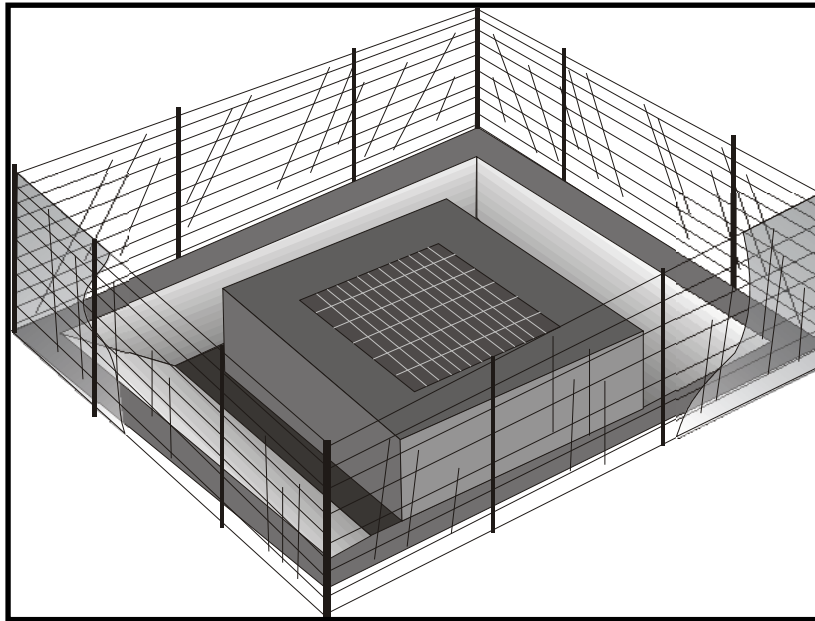
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

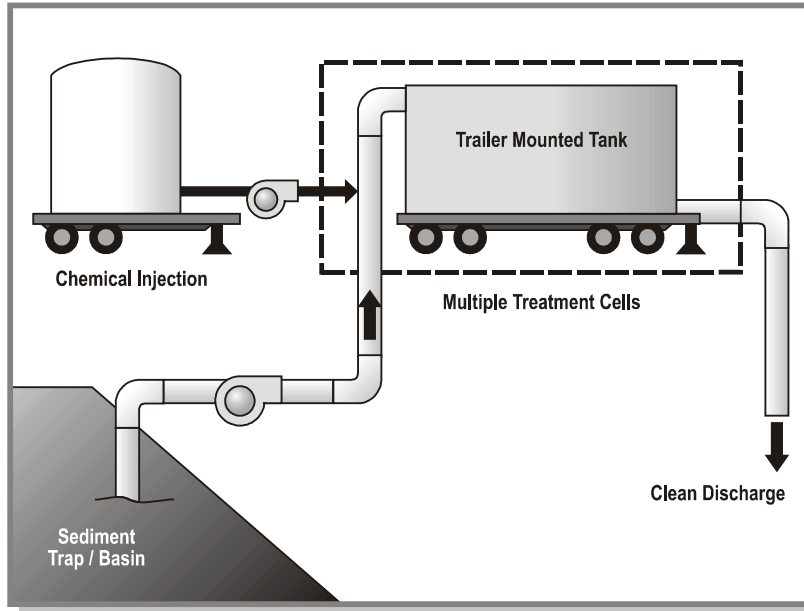
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-14 Biofilter Bags
- SE-13 Compost Socks and Berms

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Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Active Treatment Systems (ATS) reduce turbidity of construction site runoff by introducing chemicals to stormwater through direct dosing or an electrical current to enhance flocculation, coagulation, and settling of the suspended sediment. Coagulants and flocculants are used to enhance settling and removal of suspended sediments and generally include inorganic salts and polymers (USACE, 2001). The increased flocculation aids in sedimentation and ability to remove fine suspended sediments, thus reducing stormwater runoff turbidity and improving water quality.

Suitable Applications

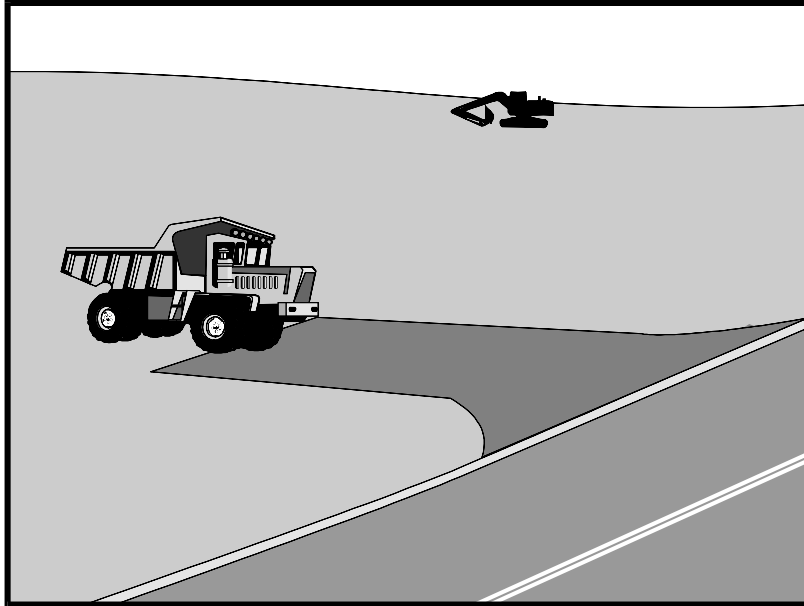
ATS can reliably provide exceptional reductions of turbidity and associated pollutants and should be considered where turbid discharges to sediment and turbidity sensitive waters cannot be avoided using traditional BMPs. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

Limitations

Dischargers choosing to utilize chemical treatment in an ATS must follow all guidelines of the Construction General Permit Attachment F – Active Treatment System Requirements. General limitations are as follows:



Stabilized Construction Entrance/Exit TC-1



Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

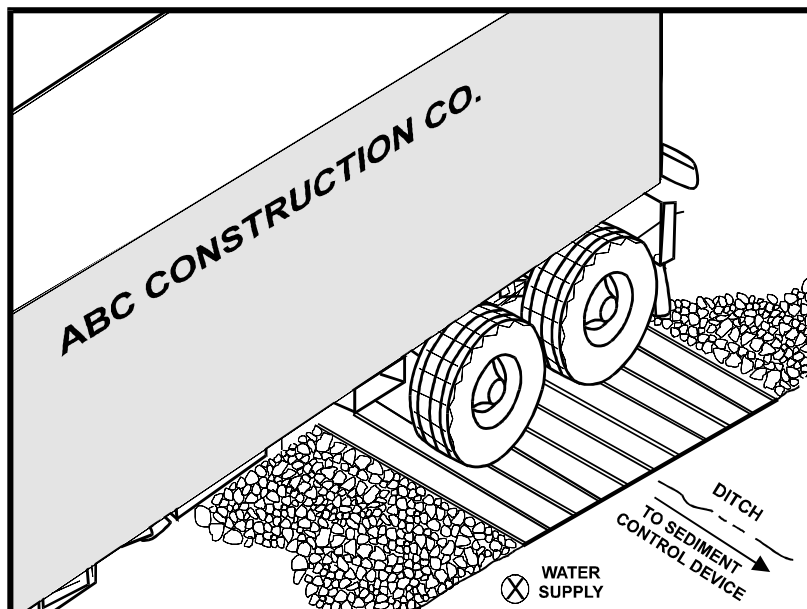
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

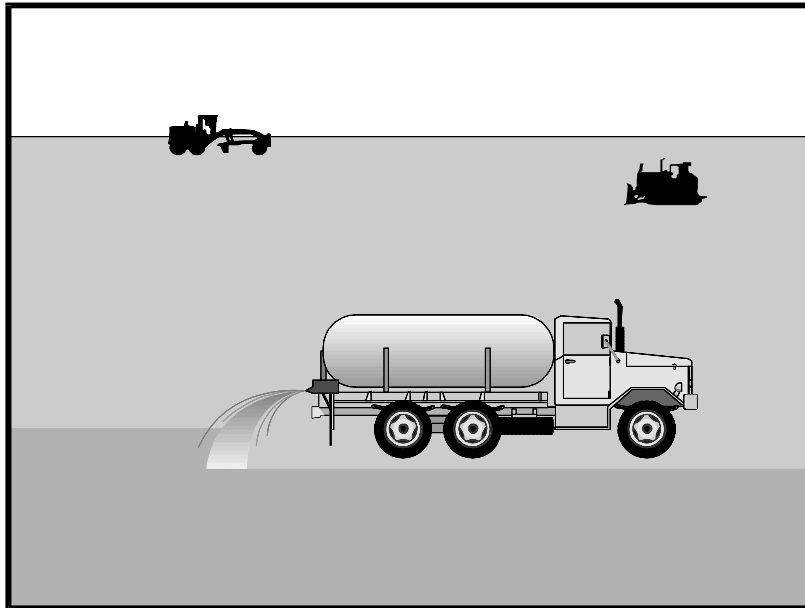
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

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Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California’s Mediterranean climate, with a short “wet” season and a typically long, hot “dry” season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

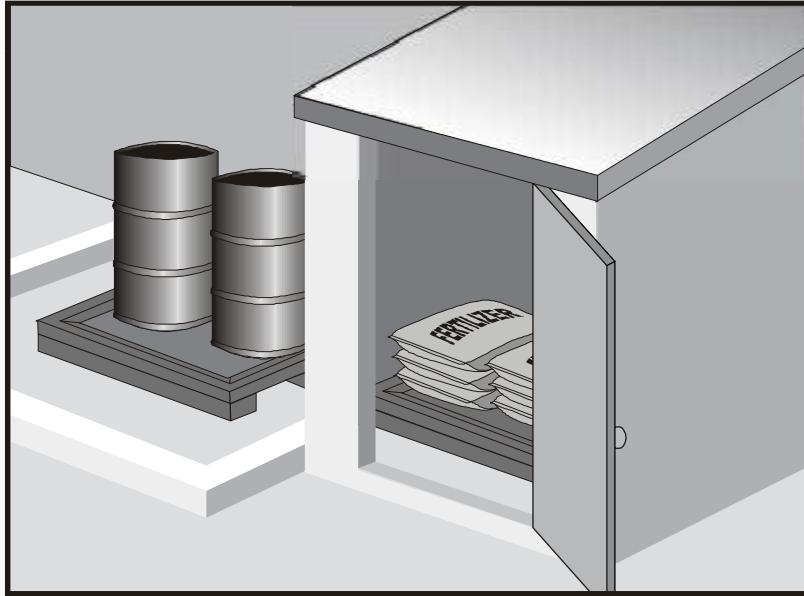
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Targeted Constituents

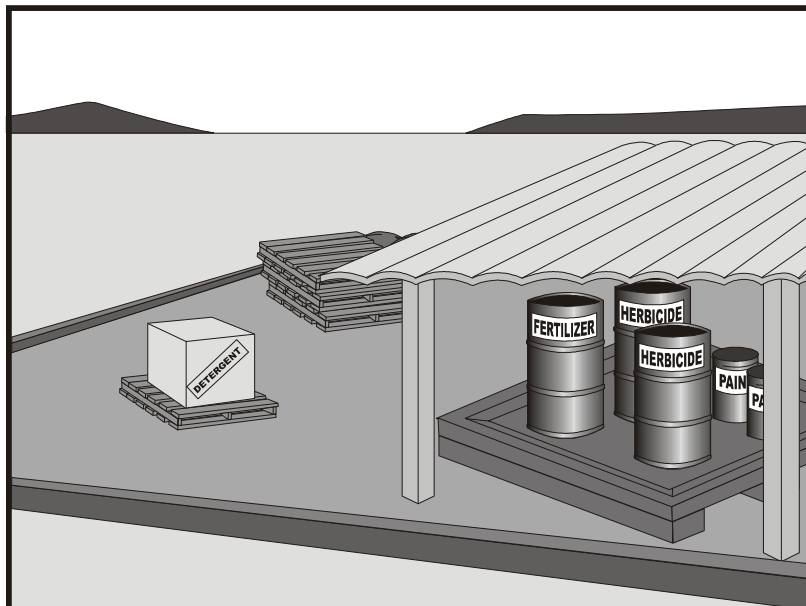
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Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

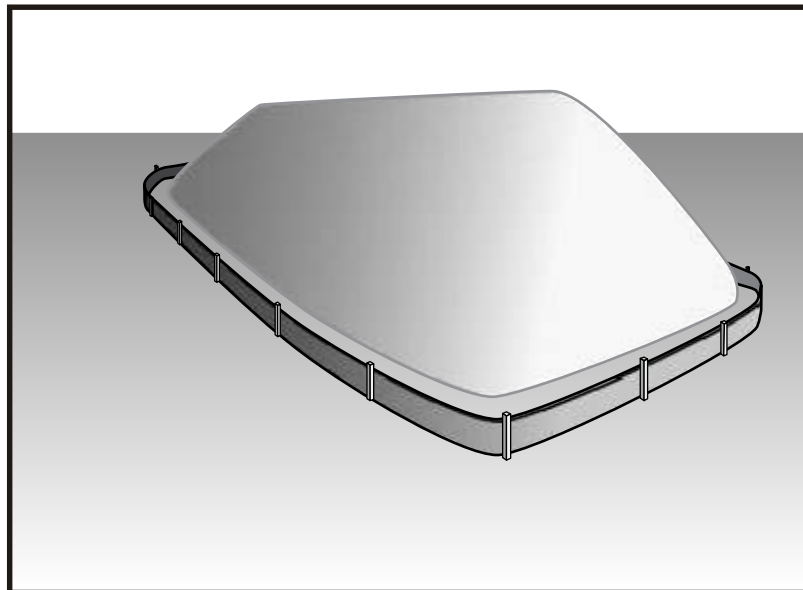
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Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

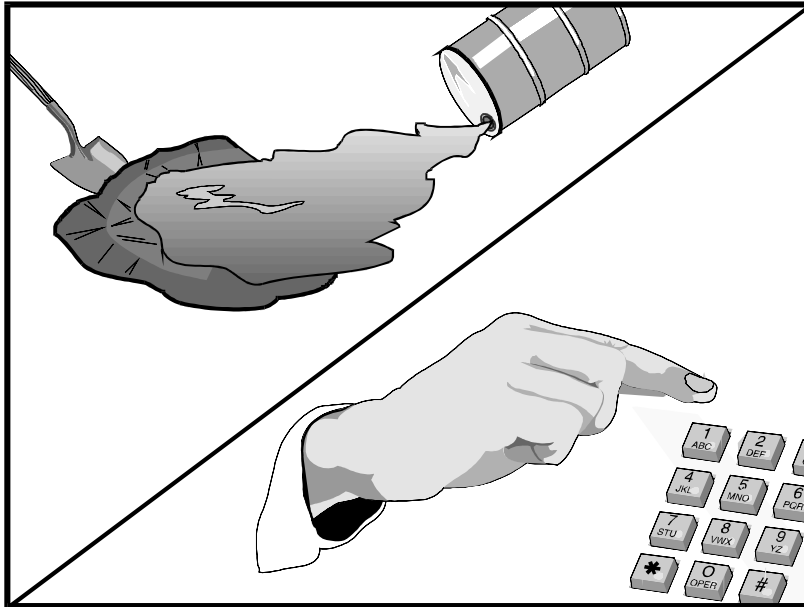
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Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

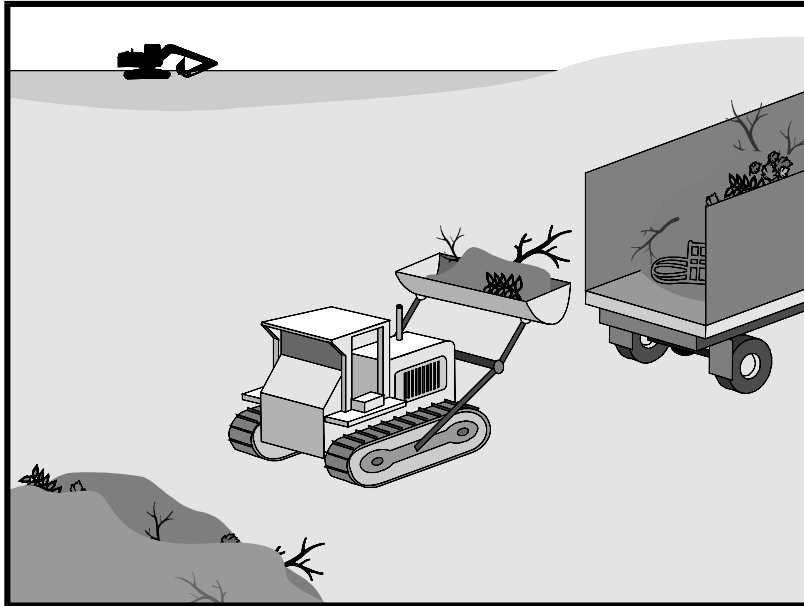
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Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

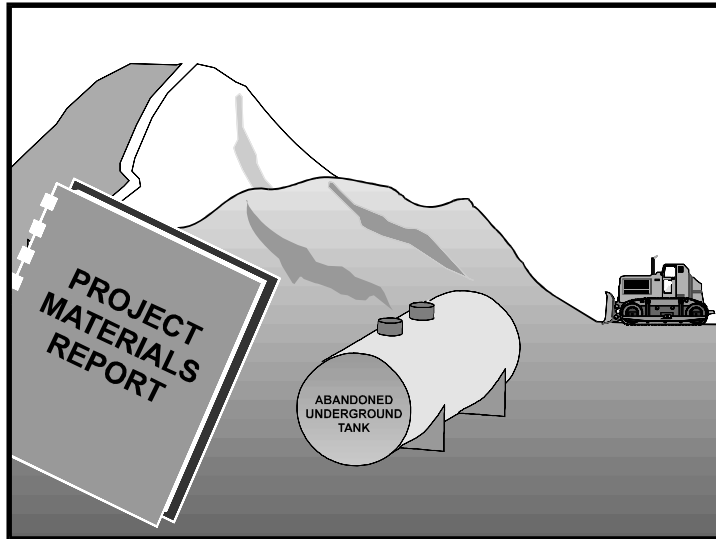
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Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

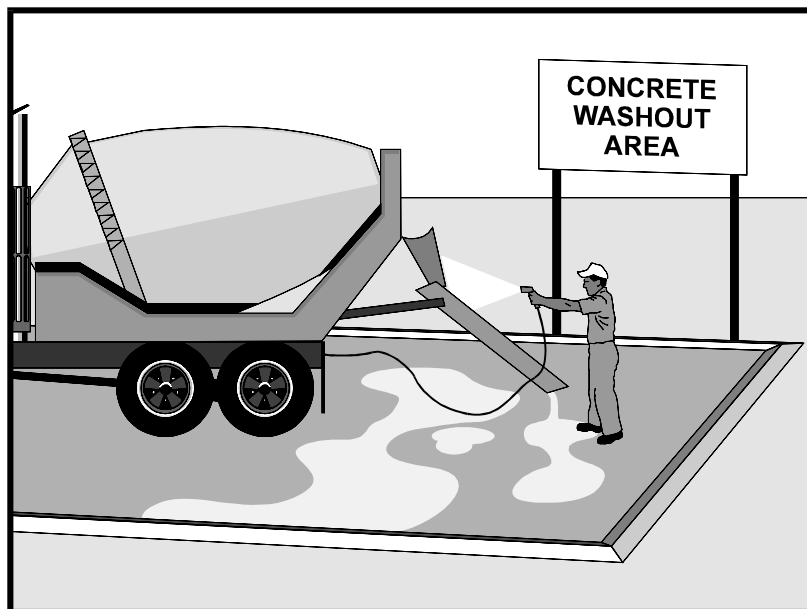
Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	

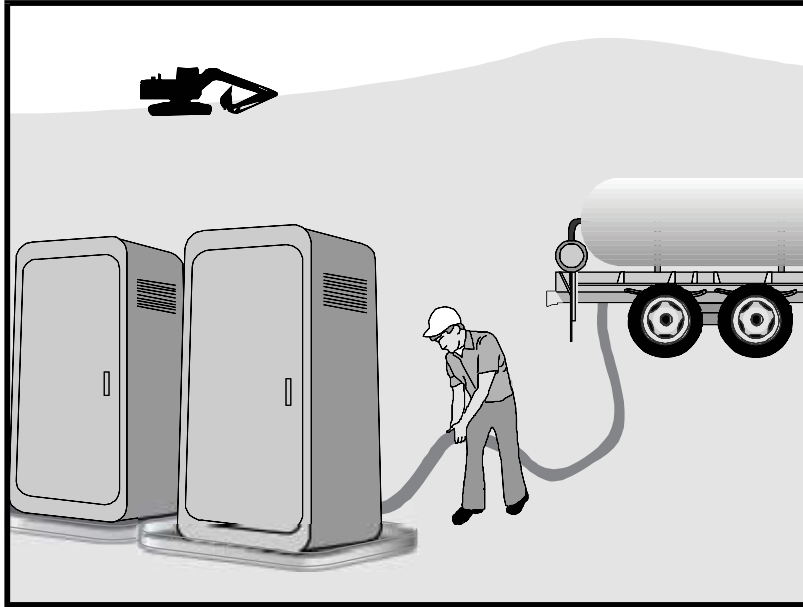
Potential Alternatives

None

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Sanitary/Septic Waste Management WM-9



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

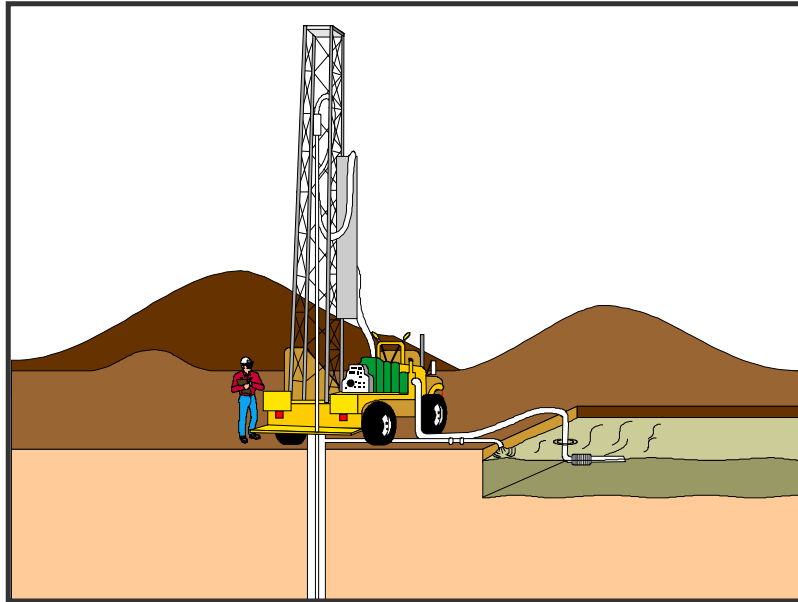
Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

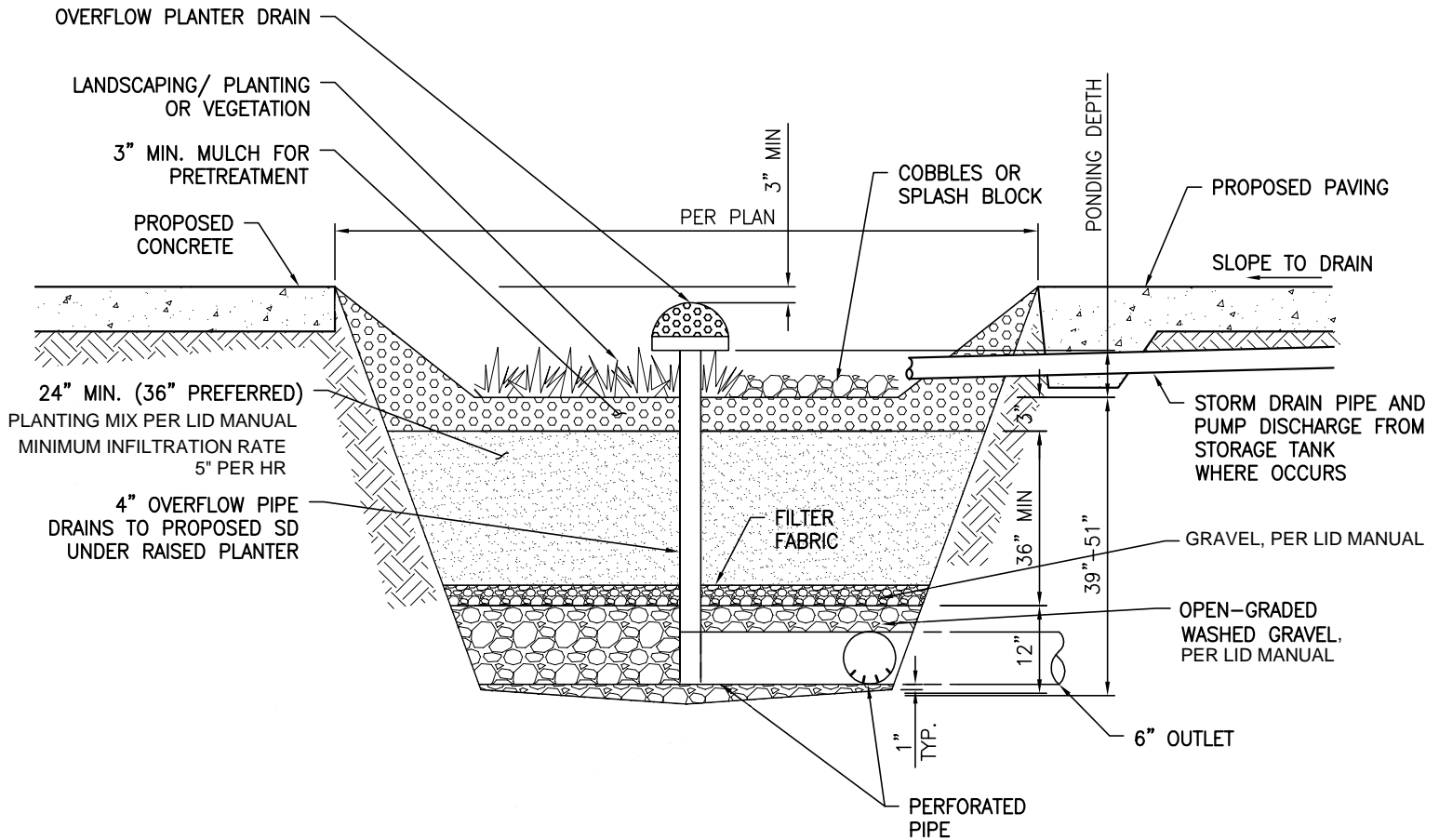
Potential Alternatives

None

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**HYDROLOGY STUDY/LID FOR 5905 WILSHIRE BLVD.
EXHIBIT 2: LID BMP DEVICES**



A TYPICAL SECTION – FLOW THROUGH PLANTER
NTS

EXHIBIT 2B: CDS UNIT

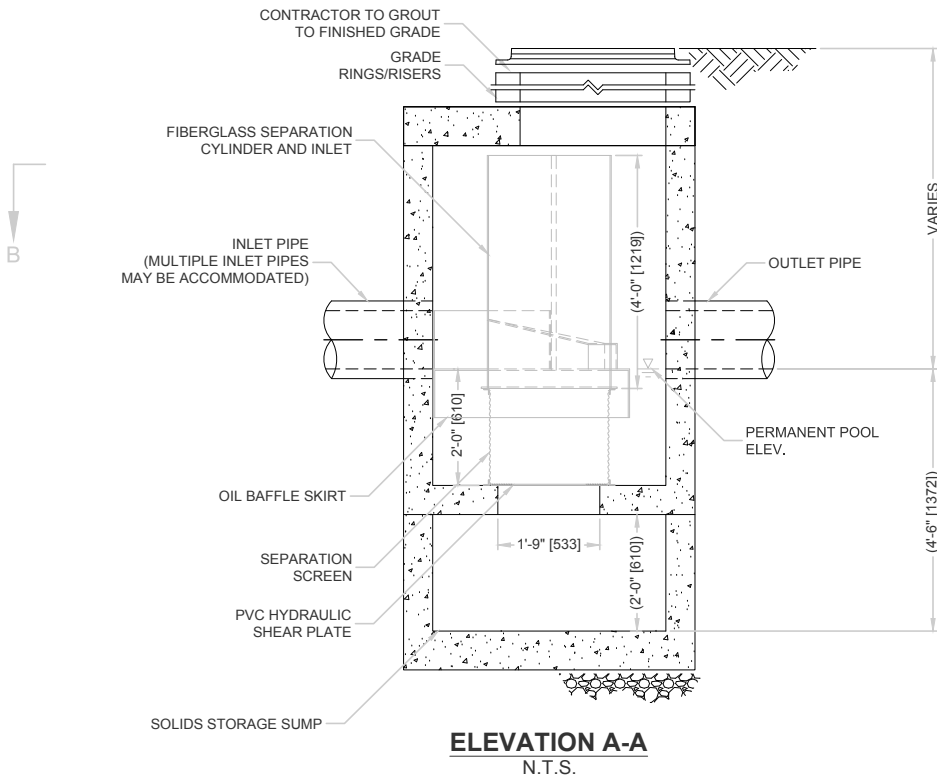
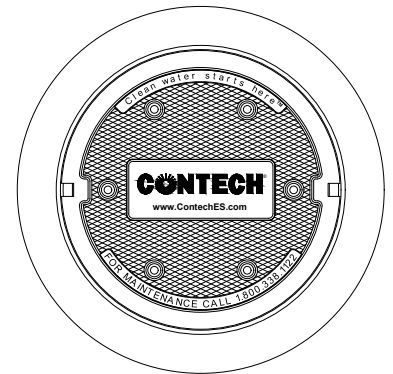
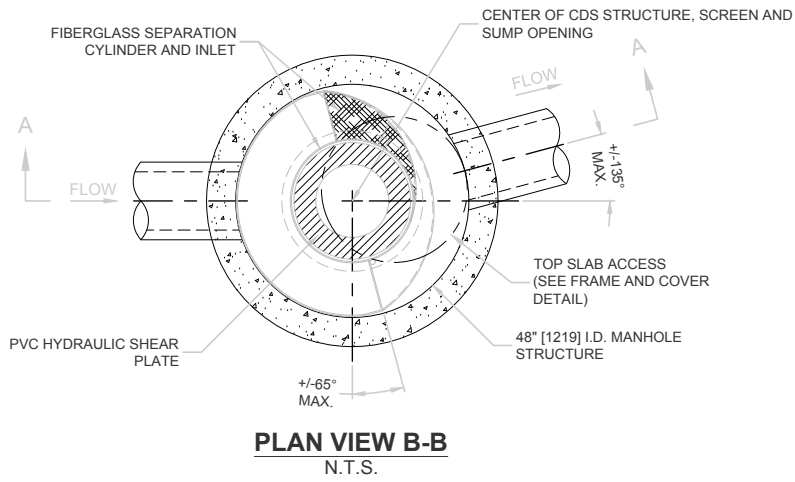
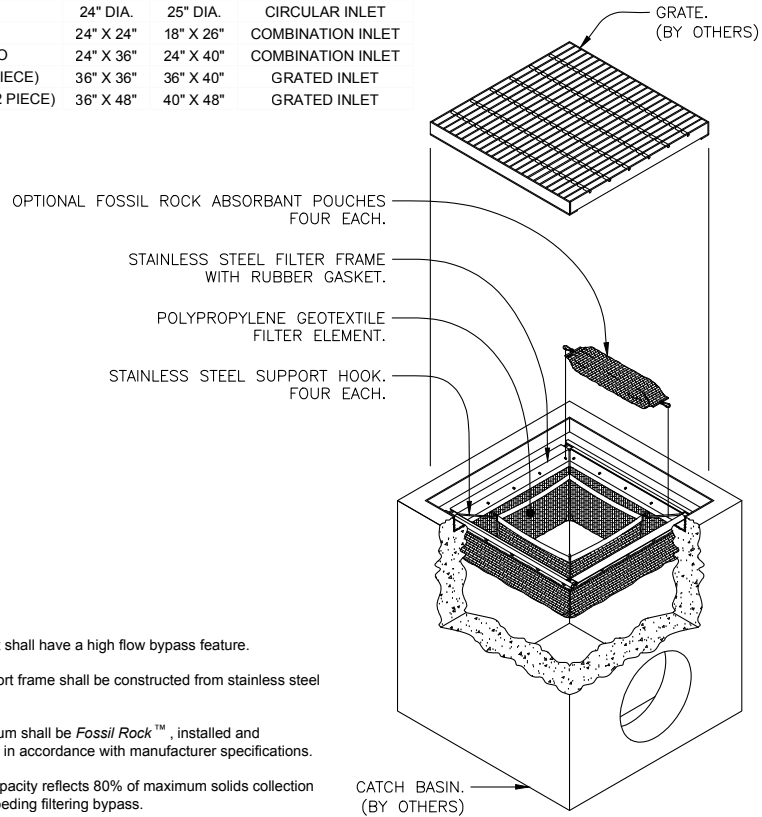


EXHIBIT 2C: CATCH BASIN INSERT FILTER

FG-0001

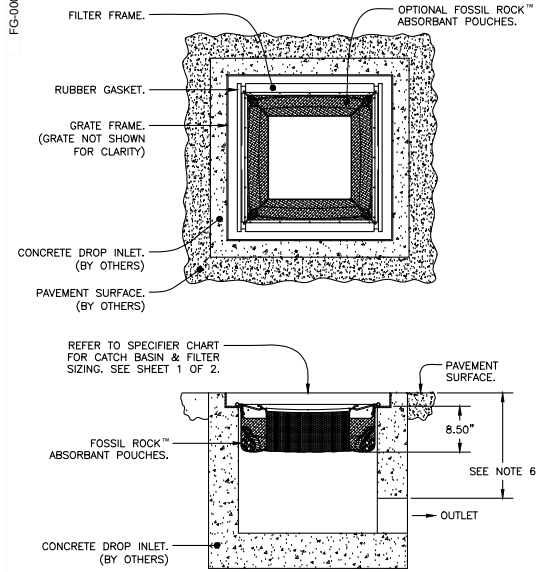
MODEL	INLET ID	GRATE OD	COMMENTS
FF-12D	12" X 12"	15" X 15"	GRATED INLET
FF-16D	16" X 16"	18" X 18"	GRATED INLET
FF-18D	18" X 18"	20" X 20"	GRATED INLET
FF-1836SD	18" X 36"	18" X 40"	GRATED INLET
FF-1836DGO	18" X 36"	18" X 40"	COMBINATION INLET
FF-24D	24" X 24"	26" X 26"	GRATED INLET
FF-2436D	24" X 36"	24" X 40"	GRATED INLET
FF-RF24D	24" DIA.	25" DIA.	CIRCULAR INLET
FF-24DGO	24" X 24"	18" X 26"	COMBINATION INLET
FF-2436DGO	24" X 36"	24" X 40"	COMBINATION INLET
FF-36D (2 PIECE)	36" X 36"	36" X 40"	GRATED INLET
FF-3648D (2 PIECE)	36" X 48"	40" X 48"	GRATED INLET



NOTES:

- Filter insert shall have a high flow bypass feature.
- Filter support frame shall be constructed from stainless steel Type 304.
- Filter medium shall be *Fossil Rock™*, installed and maintained in accordance with manufacturer specifications.
- Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.

FG-0001



SECTION VIEW



FloGard®
Catch Basin Insert Filter
Grated Inlet Style



Oldcastle®
Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | PH: 800.579.8819 | oldcastlestormwater.com
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DRAWING NO. FG-0001 REV. ECO ECO-0127 DATE JPR 5/18/15 JPR 12/18/06 SHEET 1 OF 2



FloGard®
Catch Basin Insert Filter
Grated Inlet Style



Oldcastle®
Stormwater Solutions
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | PH: 800.579.8819 | oldcastlestormwater.com
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DRAWING NO. FG-0001 REV. ECO ECO-0127 DATE JPR 5/18/15 JPR 12/18/06 SHEET 2 OF 2

Appendix I.2

Groundwater Report





LACMA PHASE III PROJECT

WATER RESOURCES TECHNICAL REPORT: GROUNDWATER

JUNE 23, 2017

PREPARED BY:

KPFF Consulting Engineers
700 South Flower Street, Suite 2100
Los Angeles, CA 90017
(213) 418-0201

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Appendix

Figure 1 - Groundwater Basin Map
Exhibit 1 – Typical SWPPP BMPs

1. INTRODUCTION

1.1. PROJECT DESCRIPTION

The Los Angeles County Museum of Art, partially located in Hancock Park in the Wilshire Community Plan Area of the City of Los Angeles and within the Miracle Mile, is the largest art museum in the western United States. Museum Associates, a private nonprofit public benefit corporation organized under California law and doing business as the Los Angeles County Museum of Art (LACMA), manages, operates and maintains the LACMA buildings under the authority of the County of Los Angeles. In partnership with the County of Los Angeles, Museum Associates proposes to construct the LACMA Building for the Permanent Collection (the Museum Building) within the eastern portion of the LACMA Campus (LACMA East) and adjacent properties.

The proposed 387,500 gross square-foot Museum Building would replace four buildings within LACMA East collectively comprising approximately 392,871 gross square feet. One of the four buildings to be removed includes the Bing Theater, which currently provides 600 seats. Overall, the Project would result in a decrease in the square footage of museum buildings by approximately 5,371 square feet and a reduction in the maximum theater size from 600 seats to 300 seats.

The Museum Building is proposed to consist of seven semi-transparent Pavilions supporting an elevated, continuous, transparent main gallery level extending over Wilshire Boulevard to the property on the southeast corner of Wilshire Boulevard and Spaulding Avenue (referred to as the Spaulding Lot). The design of the Museum Building would also enhance the outdoor experience by including new outdoor landscaped plazas, public programming and educational spaces, sculpture gardens, and native and drought tolerant vegetation that would be integrated with the Museum Building and the existing uses within Hancock Park. Approximately 148,000 square feet of covered outdoor space would also be provided. In addition, a new parking facility providing approximately 260 parking spaces would be developed southwest of the intersection of Ogden Drive and Wilshire Boulevard on three contiguous parcels owned by Museum Associates (referred to as the Ogden Lot). This new parking facility (referred to as the Ogden Parking Structure) would replace the surface parking area on the Spaulding Lot and would provide the same number of spaces currently located on the Spaulding Lot.

The Museum Building and the Ogden Parking Structure, together, comprise the Project. The Museum Building would be permitted by the Building and Safety Division of the LACDPW. The Ogden Parking Structure would be permitted by the City of Los Angeles Department of Building and Safety.

1.2. SCOPE OF WORK

This report provides a description of the existing groundwater level and groundwater quality at the Project Site. In addition, the Report includes an analysis of the Project's potential impacts related to groundwater level and groundwater quality.

2. GROUNDWATER

2.1. REGULATORY FRAMEWORK

Board Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties

As required by the California Water Code, the LARWQCB has adopted a plan entitled "Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties" (Basin Plan). Specifically, the Basin Plan designates beneficial uses for surface and groundwater, sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the State's antidegradation policy, and describes implementation programs to protect all waters in the Los Angeles Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent water quality policies and regulations. Those of other agencies are referenced in appropriate sections throughout the Basin Plan.

The Basin Plan is a resource for the Regional Board and others who use water and/or discharge wastewater in the Los Angeles Region. Other agencies and organizations involved in environmental permitting and resource management activities also use the Basin Plan. Finally, the Basin Plan provides valuable information to the public about local water quality issues.

Safe Drinking Water Act (SDWA)

The Federal Safe Drinking Act, established in 1974, sets drinking water standards throughout the country and is administered by the USEPA. The drinking water standards established in the SDWA, as set forth in the Code of Federal Regulations (CFR), are referred to as the National Primary Drinking Water Regulations (Primary Standards, Title 40, CFR Part 141) and the National Secondary Drinking Water Regulations (Second Standards, 40 CFR Part 143). California passed its own Safe Drinking Water Act in 1986 that authorizes the State's Department of Health Services (DHS) to protect the public from contaminants in drinking water by establishing maximum contaminants levels (MCLs), as set forth in the CCR, Title 22, Division 4, Chapter 15, that are at least as stringent as those developed by the USEPA, as required by the federal Safe Drinking Water Act.

California Water Plan

The California Water Plan (The Plan) provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The Plan, which is updated every five years, presents basic data and information on California's water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses. The Plan also identifies and evaluates existing and proposed statewide demand management and water supply augmentation programs and projects to address the State's water needs.

The goal for the California Water Plan Update is to meet Water Code requirements, receive broad support among those participating in California's water planning, and be a useful document for the public, water planners throughout the state, legislators and other decision-makers.

2.2. ENVIRONMENTAL SETTING

2.2.1. GROUNDWATER LEVEL

2.2.1.1. REGIONAL

Groundwater use for domestic water supply is a beneficial use of groundwater basins in Los Angeles County. The City of Los Angeles overlies the Los Angeles Coastal Plain Groundwater Basin. The Los Angeles Coastal Plain Basin is comprised of the Hollywood, Santa Monica, Central, and West Coast Subbasins. Groundwater flow in the Los Angeles Coastal Plain Groundwater Basin is generally south-southwesterly and may be restricted by natural geological features. Replenishment of groundwater basins occurs mainly by percolation of precipitation throughout the region via permeable surfaces, spreading grounds, and groundwater migration from adjacent basins, as well as injection wells designed to pump freshwater along specific seawater barriers to prevent the intrusion of salt water.

2.2.1.2. LOCAL

Within the Los Angeles Coastal Plain Groundwater Basin, the Project Site specifically overlies the Central Subbasin. The Project Site is located toward the western portion of the Basin. See Figure 1 for Groundwater Basin Map. The Central Basin is bounded on the north by a surface divide called the La Brea high, and on the northeast and east by emergent less permeable Tertiary rocks of the Elysian, Repetto, Merced and Puente Hills. The southeast boundary between the Central Basin and Orange County Groundwater Basin roughly follows Coyote Creek, which is a regional drainage province boundary. The

southwest boundary is formed by the Newport Inglewood fault system and the associated folded rocks of the Newport Inglewood uplift.¹

Groundwater in the Central Basin is naturally replenished from surface inflow through Whittier Narrows. Percolation in the Los Angeles Forebay Area is restricted due to urbanization of the area. Imported and recycled water is also used for artificial recharge at the Rio Hondo and San Gabriel River spreading grounds. There are problems with saltwater intrusions in locations where river systems have eroded through the Newport Inglewood uplift. The Central Basin “Allowed Pumping Allocation” (“APA”) was set at 217,367 acre-feet-per-year (AFY).²

Two LADWP facilities provide groundwater supplies in the Central Basin: the Manhattan Wells and the 99th Street Wells. The active Manhattan Wells were installed between 1928 and 1974, and have a production capacity of 16.9 cubic feet per second (cfs). Wells at the 99th Street location were installed between 1974 and 2002, and have a production capacity of 7.4 cfs.³

2.2.1.3. ON-SITE

The Project Site is currently existing buildings and hardscape (Main Campus) with approximately 98% impervious surface coverage and two paved parking lots (Spaulding Lot and Ogden Lot) with approximately 100% impervious surface coverage. Due to the primarily impervious condition of the Project Site, there is minimal recharge potential in the existing condition. The below discussion is based upon a review of relevant previous investigations and on-site explorations conducted as part of the *Preliminary Geotechnical Evaluation* for the Project Site by AECOM.

According to the Seismic Hazard Zone Report 026 for the Hollywood 7.5-Minute Quadrangle, the historically highest groundwater is on the order of 10 feet below existing grade. Groundwater data collected from previous geotechnical investigations by several consultants near the vicinity of the Project Site indicates groundwater level is variable between 1 to 14 feet bgs which corresponds to approximate elevations 152 to 171 feet MSL. The data also indicates the trend of groundwater flow is from east to west, which matches with historically highest groundwater contours. The Geotechnical Engineers

¹ California Department of Water Resources, California’s Groundwater Bulletin 118, “Coastal Plan of Los Angeles Groundwater Basin, Central Subbasin”, <http://www.water.ca.gov/groundwater/bulletin118/basindescriptions/4-11.04.pdf>., accessed August 9, 2016.

² Water Replenishment District of Southern California, Engineering Survey and Report, http://www.wrd.org/WRD_ESR_Final_Report_March_5_2015.pdf; accessed August 17, 2016.

³ LADWP, Sources of Supply “Groundwater”, https://www.ladwp.com/ladwp/faces/ladwp/aboutus/a-water/a-w-sourcesofsupply/a-w-sos-localgroundwater?_adf.ctrl-state=jzum6iski_4&_afLoop=1185517062045184; accessed July 11, 2016.

concluded that the shallow groundwater level was induced and impacted by adjacent La Brea tar pits which the surface level of water is observed to be at an elevation of approximately 175 feet above MSL. The existing ground surface within the Project limits varying from 165 to 180 feet above MSL.⁴

The variations in groundwater depths could be the result of seasonal fluctuations, rainfall, and well locations that are further away from the Project Site. To be conservative, the Geotechnical Engineer has recommended the design water level to be assumed at the finished grade elevation.⁵

Furthermore there are no groundwater production wells or public water supply wells within one mile of the Project Site.⁶

2.2.2. GROUNDWATER QUALITY

2.2.2.1. REGIONAL

As stated above, the City of Los Angeles overlies the Los Angeles Coastal Plain Groundwater Basin. This basin falls under the jurisdiction of the LARWQCB. According to LARWQCB's Basin Plan, water quality objectives applying to all ground waters of the Region include those concerning Bacteria, Chemical Constituents and Radioactivity, Mineral Quality, Nitrogen (Nitrate, Nitrite), and Taste and Odor.⁷

2.2.2.2. LOCAL

As stated above, the Project Site specifically overlies the Central Basin. Based upon LARWQCB's Basin Plan, constituents of concern listed for the Central Basin include Boron, Chloride, Sulfate, TDS, and Nitrate.⁷

⁴ Geotechnical report titled "Preliminary Geotechnical Evaluation: Los Angeles County Museum of Art, California", by AECOM.

⁵ *ibid.*

⁶ State Water Resources Control Board Groundwater Ambient Monitoring & Assessment GeoTracker , available at <http://geotracker.waterboards.ca.gov/gama/gamamap/public/default.asp?findaddress=True&city=LA> accessed July 11, 2016.

⁷ Los Angeles Regional Water Quality State Water Resources Control Board, *Basin Plan, Water Quality Objectives*, May 2013, http://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/electronics_documents/Final%20Chapter%203%20Text.pdf, accessed August 9, 2016.

2.2.2.3. ON-SITE

While it appears the Main Campus and Spaulding Lot portions of the Project Site currently do not have structural BMPs for the treatment of stormwater runoff from existing impervious surfaces such as building roof areas and pavements, it appears there are a range of non-structural BMPs and environmental water qualities that are currently utilized at the Project Site to minimize the impact of pollutant sources. These include general housekeeping practices such as regular trash collection, spill prevention and response activities where applicable; proper storage of hazardous materials and wastes; and substituting environmentally friendly products for environmentally hazardous products, such as soaps, solvents, and pesticides. In addition, stormwater runoff from the minimal existing pervious surfaces such as the landscaped areas and lawns is naturally treated to some extent by existing vegetation and the absorptive properties of the existing soils. Based on the existing operations within the Project Site, the on-site runoff likely contains the following pollutants of concern: sediment, nutrients, pesticides, metals, pathogens, and oil and grease.

Though it is possible for surface water borne contaminants to percolate into groundwater and affect groundwater quality, as the Project Site is primarily impervious in the existing condition, no appreciable infiltration of potential contaminants described above is expected to occur. Additionally, the good housekeeping practices described above and compliance with all existing hazardous waste regulations further reduce this potential. Therefore, groundwater quality is not impacted by existing activities at the Project Site.

Other types of risk such as underground storage tanks have a greater potential to impact groundwater. It appears no underground storage tanks are currently operated by the Project.⁸

Based upon AECOM's *Preliminary Geotechnical Report*, naturally occurring tar sands material with light to heavy hydrocarbon odor was encountered at depths between 10 feet bgs and the bottom of each subsurface geotechnical boring primarily within the San Pedro Formation and the underlying Fernando Formation bedrock. AECOM anticipates soils excavated within the top 10 feet (and above groundwater level) of the Project Site would contain lesser amount of natural oil or tar.⁴ Due to the natural presence of tar in the subsurface soils, petroleum impacted groundwater is expected beneath the Project Site.

⁸ Phase I ESA titled "Los Angeles county Museum of Art (LACMA), 5905 Wilshire Boulevard, Los Angeles, California 90036.", by AECOM, dated July 2016.

2.3. SIGNIFICANCE THRESHOLDS

2.3.1. GROUNDWATER LEVEL

With respect to groundwater level, the CEQA Guidelines inquire whether the Project would:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or lowering of the local groundwater table;

2.3.2. GROUNDWATER QUALITY

With respect to groundwater quality, the CEQA Guidelines inquire whether the Project would:

- Violate any water quality standard or waste discharge requirements; or
- Otherwise substantially degrade water quality.

2.4. METHODOLOGY

2.4.1. GROUNDWATER LEVEL

The State's CEQA Guidelines require a review of the Project, environmental setting, significance thresholds, and comparison with the screening criteria as stated above.

2.4.2. GROUNDWATER QUALITY

The State's CEQA Guidelines require a review of the Project, environmental setting, significance thresholds, and comparison with the screening criteria as stated above.

2.5. PROJECT IMPACT ANALYSIS

2.5.1. CONSTRUCTION

2.5.1.1. GROUNDWATER LEVEL

As stated above, construction activities for the Project would include excavating down on the order of 28.5 feet (approximately 140.5 above MSL) for subterranean parking, basement levels, building up the structure, and hardscape and landscape around the structure. Dewatering operations are expected during construction only and appropriate compliance and containment measures would be implemented to avoid impacts associated with potential groundwater discharges. Due to the operation of temporary dewatering systems, local groundwater hydrology in the immediate vicinity of the Site is minimally

affected. The purpose of dewatering operations is for the protection of both existing and proposed building structures. As the groundwater pumping is localized and limited in duration to during construction, regional impacts to groundwater flow and level are not considered to be significant. Therefore, the Project would result in less than significant impacts related to groundwater level and would not substantially deplete groundwater supplies in a manner that would result in a net deficit in aquifer volume or permanent lowering of the local groundwater table.

2.5.1.2. GROUNDWATER QUALITY

Regarding water quality specifically, practices that discharge non-stormwater, such as ground water releases from potential dewatering activities, must be removed from a work location to proceed with construction. Discharges from dewatering operations can contain high levels of fine sediments, which if not properly treated, could lead to exceedances of Construction General Permit requirements. As noted above, dewatering operations are expected and appropriate compliance and containment measures would be implemented to avoid impacts associated with potential groundwater discharges.

During on-site grading and building construction, hazardous materials, such as fuels, paints, solvents, and concrete additives, could be used and would therefore require proper management and, in some cases, disposal. The management of any resultant hazardous wastes could increase the opportunity for hazardous materials releases into groundwater. Compliance with all applicable federal, state, and local requirements concerning the handling, storage and disposal of hazardous waste, would reduce the potential for the construction of the Project to release contaminants into groundwater that could affect existing contaminants, expand the area or increase the level of groundwater contamination, or cause a violation of regulatory water quality standards at an existing production well. In addition, as there are no existing groundwater production wells or public water supply wells within one mile of the Project Site, construction activities would not be anticipated to affect existing wells. Therefore, the Project would not result in any substantial increase in groundwater contamination through hazardous materials releases, and impacts on groundwater quality would be less than significant.

Due to existing geologic conditions described above, naturally occurring tar sands may be encountered during excavation below the water table. As such, it is expected that the water encountered in the vicinity of the naturally occurring tar sands would be petroleum-impacted. For dewatering at the Project Site, the groundwater will have to be chemically analyzed in order to determine the appropriate treatment and/or disposal methods.⁹ The Project will implement BMPs in accordance with NPDES requirements including capture, filtration, and discharge of encountered groundwater.

⁹ Geotechnical report titled "Preliminary Geotechnical Evaluation", by AECOM.

However, the Project is not expected to permanently alter these existing subsurface conditions. Provided the adherence to the appropriate compliance and containment measures, the Project would result in less than significant impacts related to groundwater quality.

2.5.2. OPERATION

2.5.2.1. GROUNDWATER LEVEL

Regarding groundwater recharge, the entire Project Site is primarily impervious in the existing condition. There is minimal groundwater recharge potential on the Project Site in the existing condition. The Project will develop hardscape and structures that cover the majority of the project footprint with impervious surfaces. Though the Project will result in a net increase in pervious area, the pervious surfaces (such as landscaping) on the Project Site will drain into a controlled and managed drainage system that discharges into the storm drain system and not into the ground. Therefore, the Project's potential impact on groundwater recharge is less than significant.

The subterranean levels of the Project are to be designed such that they are able to withstand hydrostatic forces and incorporate comprehensive waterproofing systems in accordance with current industry standards and construction methods. As such, permanent dewatering operations are not expected and the groundwater level is expected to return to the existing level at the Project Site after construction is complete. Therefore, the Project's potential impact during operation on groundwater level is less than significant.

2.5.2.2. GROUNDWATER QUALITY

The Project does not include the installation or operation of water wells, or any extraction or recharge system that is in the vicinity of the coast, an area of known groundwater contamination or seawater intrusion, a municipal supply well or spreading ground facility. The Project does not include surface or subsurface application or introduction of potential contaminants or waste materials during construction or operation. The Project is not anticipated to result in releases or spills of contaminants that could reach a groundwater recharge area or spreading ground or otherwise reach groundwater through percolation. Therefore, the Project's potential impact on groundwater quality is less than significant.

Due to existing geologic conditions described above, naturally occurring tar sands may be encountered in the vicinity of the Project. As such, it is expected that the water encountered in the vicinity of the naturally occurring tar sands would be petroleum-impacted. However, the Project is not expected to alter these existing conditions. Provided adherence to the appropriate compliance and containment measures, the Project would result in less than significant impacts related to groundwater quality.

2.5.3. CUMULATIVE IMPACT ANALYSIS

2.5.3.1. GROUNDWATER LEVEL

Cumulative groundwater hydrology impacts could result from the overall utilization of groundwater basins located in proximity to the Project Site and other related projects around Los Angeles. In addition, interruptions to existing hydrology flow by dewatering operations of underground water would have the potential to affect groundwater levels. As mentioned above, the purpose of dewatering operations is for the protection of both existing and proposed building structures. The dewatering system expected for construction of the Project would be temporary, would not operate at all times, and would only be activated when the level of the water reaches the permitted level that initiates the dewatering operations. While short-term, periodic dewatering has the potential to have a minimal effect on groundwater hydrology locally at the Project Site, dewatering operations at such a temporary, localized level would not have the potential to affect regional groundwater hydrology.

Similar to the Project, other proposed projects within the groundwater basin will likely incorporate structural designs for subterranean levels that are able to withstand hydrostatic forces and incorporate comprehensive waterproofing systems in accordance with current industry standards and construction methods. If any related project requires permanent dewatering systems, such systems would be regulated by the SWRCB. Should excavation for other related projects extend beneath the groundwater level, temporary groundwater dewatering systems will be designed and implemented in accordance with SWRCB permit requirements. These dewatering operations would be limited to temporary and local impact to the groundwater level. Based on the above, cumulative impacts to groundwater hydrology would be less than significant.

2.5.3.2. GROUNDWATER QUALITY

Future growth in the Los Angeles Coastal Plain Central Subbasin would be subject to LARWQCB requirements relating to groundwater quality. In addition, since the Project Site is located in a highly urbanized area, future land use changes or development are not likely to cause substantial changes in regional groundwater quality. As noted above, the Project does not have an adverse impact on groundwater quality. Also, it is anticipated that the Project and other future development projects would also be subject to LARWQCB requirements and implementation of measures to comply with total maximum daily loads. Therefore, based on the fact that the Project does not have an adverse impact and through compliance with all applicable laws, rules and regulations, cumulative impacts to groundwater quality would be less than significant.

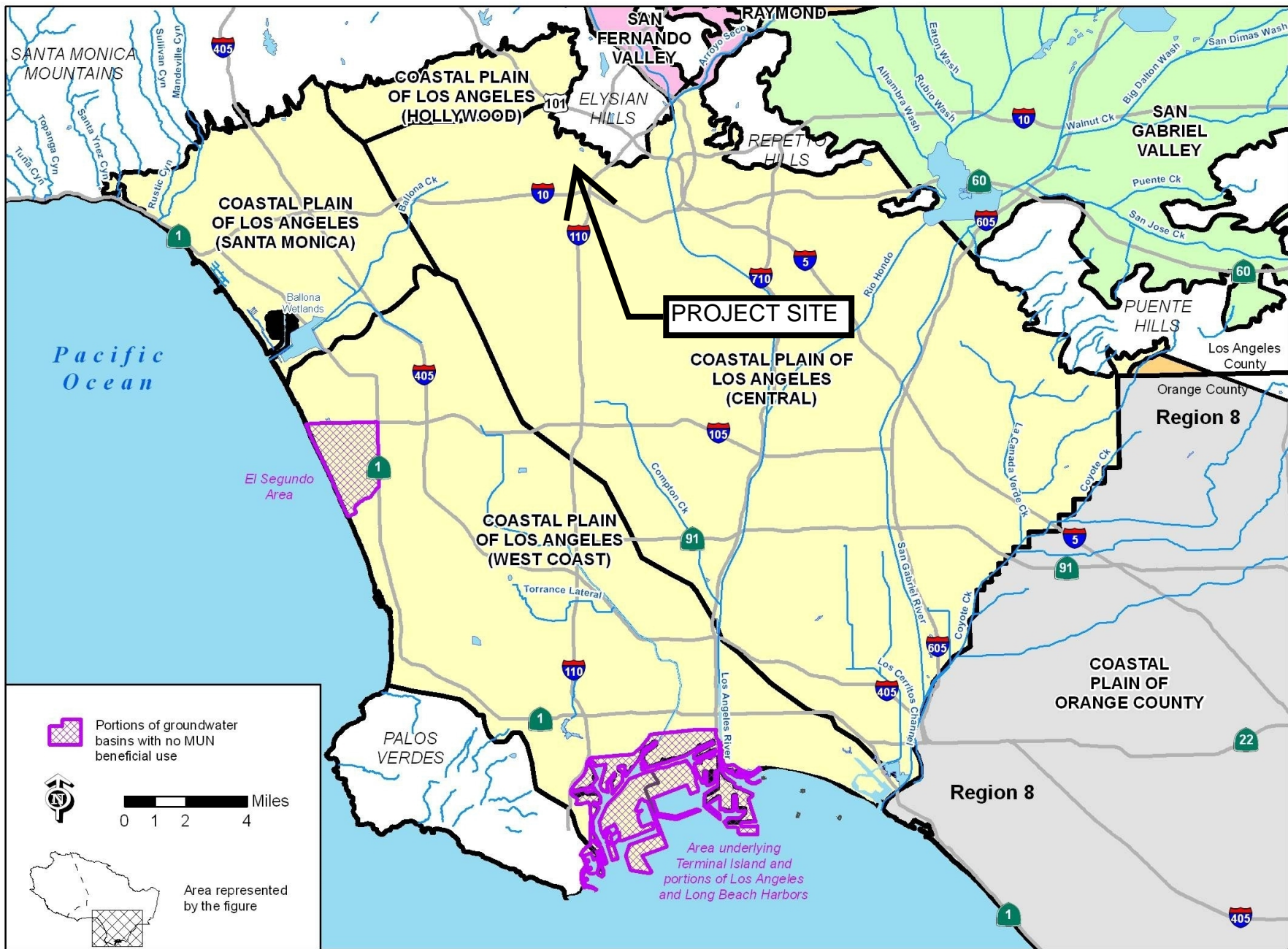
3. LEVEL OF SIGNIFICANCE

Based on the analysis contained in this report no significant impacts have been identified for groundwater level and groundwater quality for this Project.

APPENDIX

Groundwater Figures

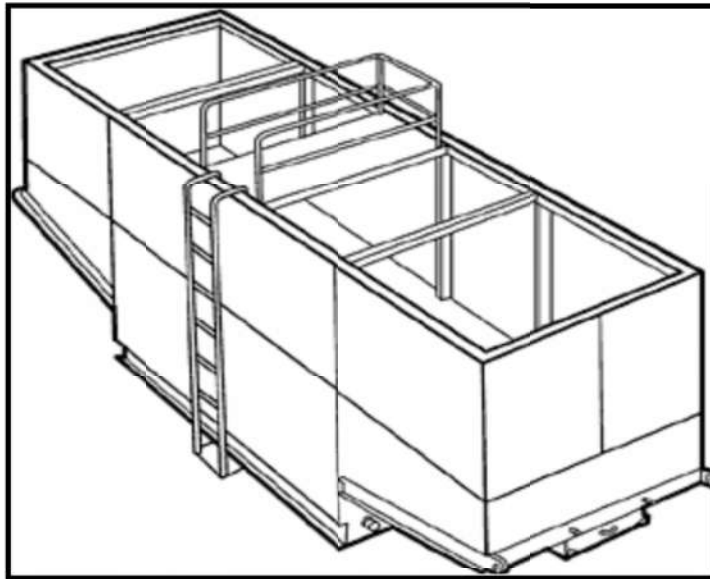
Figure 1: Groundwater Basin Map



Los Angeles Coastal Groundwater Basins.

Dewatering Operations

NS-2



Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project’s risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedances of the General Permit requirements or Basin Plan standards.

The dewatering operations described in this fact sheet are not Active Treatment Systems (ATS) and do not include the use of chemical coagulations, chemical flocculation or electrocoagulation.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category**
- Secondary Category**

Targeted Constituents

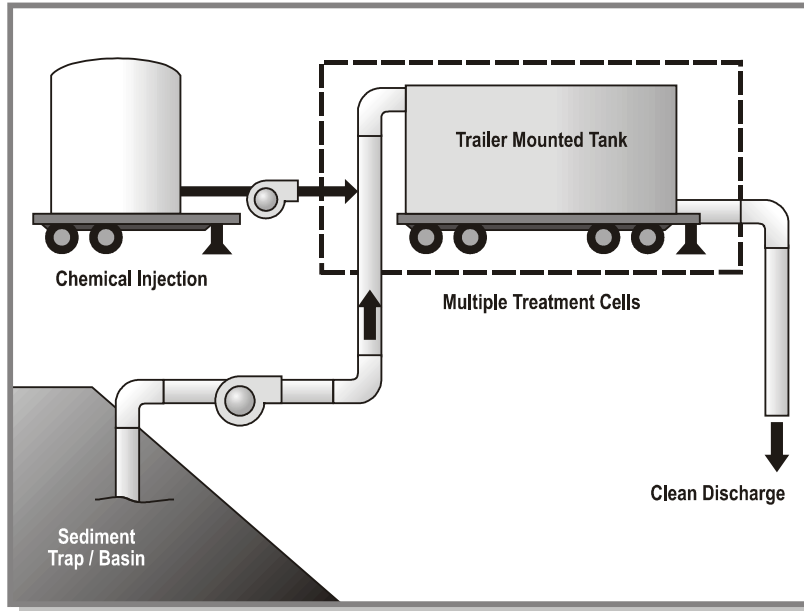
Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

- SE-5: Fiber Roll
- SE-6: Gravel Bag Berm

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Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Active Treatment Systems (ATS) reduce turbidity of construction site runoff by introducing chemicals to stormwater through direct dosing or an electrical current to enhance flocculation, coagulation, and settling of the suspended sediment. Coagulants and flocculants are used to enhance settling and removal of suspended sediments and generally include inorganic salts and polymers (USACE, 2001). The increased flocculation aids in sedimentation and ability to remove fine suspended sediments, thus reducing stormwater runoff turbidity and improving water quality.

Suitable Applications

ATS can reliably provide exceptional reductions of turbidity and associated pollutants and should be considered where turbid discharges to sediment and turbidity sensitive waters cannot be avoided using traditional BMPs. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

Limitations

Dischargers choosing to utilize chemical treatment in an ATS must follow all guidelines of the Construction General Permit Attachment F – Active Treatment System Requirements. General limitations are as follows:





Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

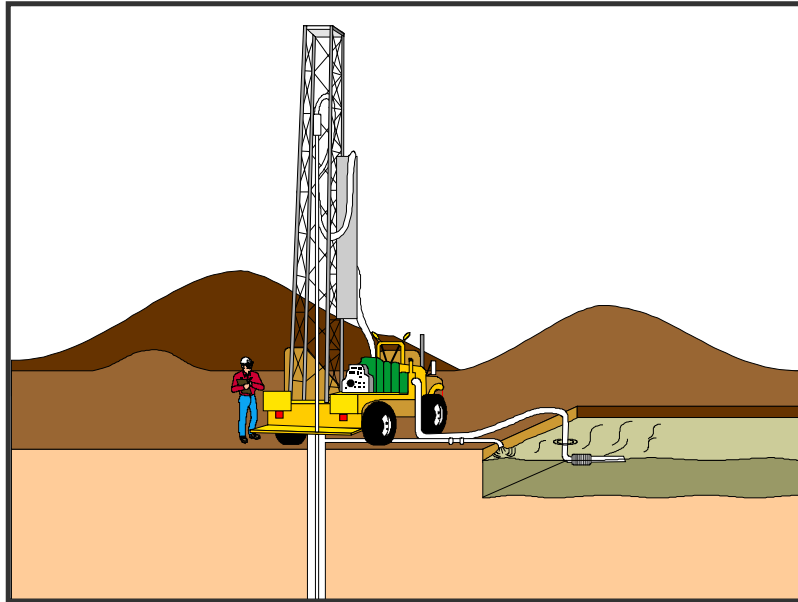
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Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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