SANTA ANA REGION HYDROMODIFICATION MANAGEMENT PLAN

January 18, 2017

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APPENDIX

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ACRONYMS and ABBREVIATIONS

2010 MS4 Permit Adequate Sump	Order R8-2010-0033	DISTRICT	Riverside County Flood Control and Water Conservation District
BMP	Best Management Practice	RWQCB	Regional Water Quality Control Board
CASQA	California Stormwater Quality Association	SARWQCB	Santa Ana RWQCB
CEM	Channel Evolution Model	SCCWRP	Southern California Coastal Water Research Project
CEQA	California Environmental Quality Act	SAR	Santa Ana Region
GIS	Geographical Information System	TMDL	Total Maximum Daily Load
HCOC	Hydrologic Conditions of Concern	TPG	Transportation Project Guidance
HMP	Hydromodification Management Plan	USACE	United States Army Corps of Engineers
HSPF	Hydrologic Simulation Program FORTRAN, distributed by USEPA	USEPA	United States Environmental Protection Agency
LID	Low Impact Development	USGS	United States Geological Survey
MEP	Maximum extent practicable	WAP	Watershed Action Plan
MS4	Municipal Separate Storm Sewer System	WQMP	Water Quality Management Plan
NOAA	National Oceanic and Atmospheric Administration	WLA	Waste Load Allocation
NRCS	Natural Resource Conservation Service		
Permittees	Cities of Beaumont, Calimesa, Canyon Lake, Corona, Eastvale, Hemet, Jurupa Valley, Lake Elsinore, Moreno Valley, Menifee Norco, Perris, Riverside, San Jacinto, County of Riverside and the District		

Note to the User:
The Santa Ana Region Hydromodification Management Plan (SAR HMP) uses the term "User" to refer to any public or private entities seeking the discretionary approval of new development or significant redevelop projects (Priority Development Projects [PDP]) by the Copermittee with jurisdiction over the project site. The SAR HMP employs the term "User" to identify the Registered Professional Civil Engineer responsible for submitting the Water Quality Management Plan (WQMP) that meets the Hydrologic Conditions of Concern (HCOC) Maximum Extent Practicable (MEP) standards set forth in the SAR HMP.

Simplified HMP Roadmap for User

The Santa Ana Region (SAR) Hydromodification Management Plan (HMP) was developed by the Permittees of the SAR in response to the Watershed Action Plan (WAP) Provision XII.B.5 of the 2010 SAR Municipal Separate Storm Sewer System (MS4) Permit (Order R8-2010-0033). The objective of the SAR HMP is to manage increases in runoff volumes and decreases in times of concentration that may result from New Development and Significant Redevelopment projects over one acre. The Permit contains specific requirements that strongly influence the hydromodification management methodology chosen in the development of the HMP, including the prioritization of actions based on drainage feature/susceptibility/risk assessments and opportunity for restoration.

The simplified HMP roadmap guides the user through the steps and the sections of the SAR HMP to:

(1) Identify whether the project is subject to Hydrologic Conditions of Concern (HCOC) requirements; and
(2) When required, meet the HCOC requirements.

A User, who must meet Low Impact Development (LID) and HCOC requirements simultaneously, may refer to the 2012 SAR Water Quality Management Plan (WQMP). The 2012 SAR WQMP will be updated after this HMP is approved.

How do I identify if a project is subject to the requirements of this HMP?

The User may refer to the **Figure 1**-HMP Decision Flowchart in **Section 2** to identify if the New Development or Significant Redevelopment project is subject to HCOC requirements.

A New Development and Significant Redevelopment project does not cause HCOC if <u>any one</u> of the following conditions is met:

- If the project is a New Development or Significant Redevelopment project that disturbs less than one acre; or
- If the project drains to a channel that conveys stormwater to engineered and stable channel sections identified by the Hydromodification Susceptibility Mapping efforts as defined in **Section 2.2.i**; or
- If the proposed project conveys stormwater directly to a Controlled Release Points, as defined in **Section 2.2.i**; or
- If the project is considered a Watershed Protection Project in the context of stormwater management. A Watershed Protection Project is not a New Development or Significant Redevelopment Project; see **Section 2.2.iii**; or
- If it has been determined that the Beneficial Uses in Prado Basin will benefit from the project, per conditions defined in **Section 2.2iv**; or
- If the project conveys stormwater into Natural Resistant Features or Stable Channels per the conditions defined in **Section 2.2.v**; or
- If additional analysis is provided that presents information that HCOC impacts are negligible or will be controlled. This may include utilizing existing infrastructure, available information or studies (see **Section 2.2.vi**); or
- If the project is routine roadway maintenance that maintain the original line and grade, hydraulic capacity, original purpose of the facility, or emergency roadway maintenance activities that are required to protect public health and safety (see **Section 2.2.vii**).

If the project is subject to HCOC requirements the User should implement, site design principles and hydrologic control measures, listed in **Section 3**, to achieve the HCOC standards to the maximum extent practicable (MEP). The User also has the option to implement alternative compliance. Alternative compliance options are mentioned in **Section 4**.

What are the HCOC MEP standards that applicable projects must meet?

Applicable projects shall demonstrate compliance with the HCOC MEP standards. Permit Provision XII.E.9 requires that the volume and the time of concentration of stormwater runoff for the post-development condition are not significantly different from pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant). Based on an agreement with the Santa Ana Regional Water Quality Control Board (SARWQCB), Users are effectively required to achieve the following:

- A post-development condition time of concentration of 95% <u>or more</u> of the pre-development condition time of concentration. The storage effects associated with LID BMPs will effectively increase the time of concentration in the post-development condition, thus minimize the increase of the peak runoff rate.
- A post-development condition runoff volume of 105% or less of the pre-development condition runoff volume.

If a project cannot meet the requirements mentioned above, it may be mitigated by using on- or off-site LID Principles and LID BMPs to address potential erosion or habitat impact and/or by mimicking the pre-development hydrograph with the post-development hydrograph for a 2-year, 24-hour return frequency storm. Generally, the HCOC is not significant if the post-development hydrograph is no more than 10 percent greater than the pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow.

How does the User meet the HCOC MEP standards?

The User has the option to meet the HCOC MEP standard using either a local approach (see **Section 3**) or a regional approach (see **Section 4**). The SAR HMP is integrated into **Section 3.6.1** of the WAP, which identifies local and regional options of the SAR HMP. Additionally, upon approval of the SAR HMP the SAR WQMP Guidance Document will be updated. The local approach consists of implementing onsite hydrologic control measures that mitigate the volumes and time of concentration or flow rate in the post-development condition to the HCOC MEP standard. The regional approach consists of implementing offsite mitigation controls that mitigate equivalent, if not higher, volumes and times of concentration within the same watershed or instream restoration projects that provide enhanced Beneficial Uses. Regional options and watershed improvements should be discussed and approved by the Permittee with jurisdiction over the project site before implementation. Alternatively, a User may contribute to an Urban Runoff Fund, if available.

The requirement for volumetric controls for HCOC should be determined by comparing 2-year, 24-hour volumes in the pre-development and post-development conditions. Volume computations shall be based on methods approved by the Permittees, including:

- The modified runoff curve number method (i.e., modified TR-55 method incorporating equivalent curve numbers), or
- The short-cut synthetic unit hydrograph method based on a 24-hour storm duration and a 15-minute unit time (see **Section 3.2**).

If the post-development condition runoff volume exceeds 105% of the pre-development condition runoff volume, the User shall design and implement onsite or offsite mitigation that infiltrates, evapotranspires, or harvests and reuses the exceeding volume. Design and implementation of such onsite or offsite mitigation shall be based on the Design Handbook for LID BMPs and the WQMP Guidance.

In addition, the User shall evaluate both LID and hydrologic control measures on the time of concentration for the post-development condition. If necessary, the User shall incorporate site design principles to ensure that the time of concentration in the post-development condition is 95% or higher than in the pre-development condition, thus minimizing the peak flow. Site design techniques include decreasing the slope, increasing the flow length, and/or directing flow over pervious areas (see **Section 3.3**).

In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow (see **Section 3.5**).

What are the alternative compliance options available to the User?

Applicable projects may consider alternative compliance to meet HCOC requirements. The User should refer to **Section 4.0** for additional information.

How does the User initiate compliance with the requirements of this HMP?

The User shall evaluate the hydrologic impacts with all available information and integrate hydrologic control measures into the project site design if necessary. The design specifics will be included in the preliminary WQMP, and reviewed by the Permittee.

1.0 Introduction & Regional Assessment of the Santa Ana Region

1.1 SAR HMP Context

Hydromodification refers to changes in the magnitude and frequency of stream flows and the associated sediment load due to unmitigated Urban Runoff or other changes in the watershed land use and hydrology. Other anthropogenic activities may include agriculture, forestry, mining, water withdrawal, climate change, and flow regulation by upstream reservoirs. Hydromodification may result in impacts on receiving channels, such as erosion, sedimentation, and potentially degradation of in-stream habitat. The degree to which a channel may erode or aggrade is a function of the increase or decrease in work (shear stress), the resistance of the channel bed and bank materials (critical shear stress), the change in sediment delivery, and the geomorphic condition (soil lithology) of the channel. Critical shear stress is the shear stress threshold above which motion of bed load sediment is initiated. Not all flows cause significant movement of bed load sediment—only those which generate shear stress in excess of the critical shear stress of the bank and bed sediments. Historic unmitigated urbanization increases the flow rate, amount and timing of runoff, and associated shear stress exerted on the bed sediments by stream flows, may reduce bed sediment delivered to the channel, and can trigger erosion in the form of incision (channel downcutting), widening (bank erosion), or both. Flow depths that generate shear below critical shear stress levels have no effect on the channel stability.

The notion of cumulative effective work, whereby the flow-frequency relationship of a channel is multiplied by sediment transport rate, is a mass-frequency relationship for erosion rates in a channel. Flows on the lower end of the relationship (e.g., 2-year flows) may transport less sediment, but occur more frequently than higher flows, thereby having a greater overall effect on the cumulative effective work, or the potential amount of erosion of bed and banks, within the channel. Conversely, higher magnitude events, while transporting more material, occur infrequently so cause less effective work. Leopold (1964) found that the maximum point on the effective work curve occurred around the 1-to 2-year frequency range. This maximum point is commonly referred to as the dominant flow.

Permit Provision XII.B.5 of the Permit requires that "Within two years of completion of the delineation in Permit Provision XII.B.4 above, develop a Hydromodification Management Plan (HMP) describing how the delineation will be used on per project, sub-watershed, and watershed basis to manage hydromodification caused by Urban Runoff. The HMP shall prioritize actions based on drainage feature/susceptibility/risk assessments and opportunities for restoration". Where receiving channels are already unstable, hydromodification management can be thought of as a method to avoid accelerating or exacerbating existing problems. Where receiving channels are in a state of dynamic equilibrium, hydromodification management may prevent the onset of accelerated erosion, sedimentation, or lateral bank migration.

The Permit contains requirements that strongly influence the methodology chosen in development of the HMP. The Permit requires the Permittees to develop an HMP that considers both sediment yield and balance on a watershed or subwatershed basis, and evaluates Hydromodification impacts for the channels deemed most susceptible to aggradation and degradation. The SAR HMP explores the impacts of historic modifications to the watershed, existing watershed protection infrastructure and proposes guidance for New Development and Significant Redevelopment projects on the Receiving Waters.

Permittees within the SAR include the Cities of Beaumont, Calimesa, Canyon Lake, Corona, Eastvale, Hemet, Jurupa Valley, Lake Elsinore, Moreno Valley, Menifee, Norco, Perris, Riverside, San Jacinto, as well as the County of Riverside and Riverside County Flood Control and Water Conservation District (District).

The SAR HMP will serve as the guidance document for addressing HCOC. The 2011 Design Handbook for LID BMPs and the 2012 SAR WQMP Guidance will be updated to incorporate the HMP. If a project has been granted approval of the preliminary WQMP before the implementation date as identified by the SARWQCB of the SAR HMP, compliance with HCOC, if any, will be grandfathered under the approved 2012 SAR WQMP Guidance.

1.2 Watershed History and Historical Hydromodification Impacts

Santa Ana River Watershed

The Santa Ana River Watershed is located in southern California, south and east of the city of Los Angeles. The Santa Ana River Watershed includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles County. The Santa Ana River Watershed is bound on the south by the Santa Margarita Watershed, on the east by the Whitewater Watershed and on the northwest by the San Gabriel River Watershed. The area of the Santa Ana River Watershed is approximately 2,650 square miles. The headwaters of the Santa Ana River are in the San Bernardino Mountains with its major tributary being the San Jacinto River, originating in the San Jacinto Mountains. The Santa Ana River traverses through Prado Dam before cutting through the Santa Ana Mountains and flowing to the Orange Coastal Plain. Eventually, the river discharges to the ocean in the city of Huntington Beach.

Santa Ana Region

The SAR is that portion of the Santa Ana River Watershed within Riverside County and is the area addressed by the HMP. The SAR extends approximately over more than 63 miles from east to west, and over more than 29 miles from north to south. The SAR lies between the Santa Ana Mountains and the San Bernardino Mountains; the topography of the SAR varies highly with altitudes ranging from 415 feet to 8,200 feet. The San Jacinto River is a tributary of the Santa Ana River within Riverside County. Runoff from the 768-square mile San Jacinto River Watershed is regulated by Railroad Canyon Dam and natural storage in Lake Elsinore. This Watershed contributes flow into the Santa Ana River only as a result of rare high intensity storm events that result in overflow from Lake Elsinore. The San Jacinto River flows through Canyon Lake, Lake Elsinore, and Temescal Creek to confluence with the Santa Ana River in the city of Corona.

Surface drainage system from the remainder of the SAR, which includes the cities of Jurupa Valley, Eastvale, and Riverside, drain through local systems to Reach 3 of the Santa Ana River.

Lakes, Water Reservoirs, and Basins

The SAR includes basins, two natural lakes and several man-made reservoirs, some of which may have modified hydrologic and sediment supply regimes of the natural channels within the SAR. The natural lakes are Lake Elsinore and Mystic Lake; the man-made reservoirs are Prado Dam, Lake Mathews, Canyon Lake, Diamond Valley Lake, Lake Hemet, and Lake Perris. These man-made reservoirs do not include the smaller regional watershed protection facilities that may warrant evaluation of their inherent contributions in mitigating potential HCOCs during project planning.

Basins

There are many retention, detention, debris and infiltration basins located within the SAR that may affect geomorphologic processes. Although they are structurally similar facilities, they serve different purposes. Basins may include an excavated area and an outlet structure to provide an impoundment. Retention basins are typically used to manage stormwater runoff to prevent flooding, downstream erosion, and improve water quality in an adjacent river, stream or lake. Detention basins are typically installed to protect against flooding and downstream erosion by storing or "detaining" runoff for a limited period. Debris basins are designed to prevent debris flows (rocks, boulders, sediment, etc.) from reaching channels where the material may compromise flow conveyance and result in flooding of agricultural or urban development. An infiltration basin is typically an impoundment designed to infiltrate runoff to recharge groundwater basins. Infiltration basins have been demonstrated to have high pollutant removal efficiency.

Natural Lakes

The natural lakes located within the SAR are Mystic Lake and Lake Elsinore. Mystic Lake is a 200-acre ephemeral lake in the San Jacinto Valley that lies within the outlet area of the San Jacinto River. Lake Elsinore is the largest natural freshwater lake in southern California. When high intensity storm events occur overflow from Lake Elsinore discharges into Temescal Wash.

Man-Made Reservoirs and Flood Control Improvements

Prado Lake is a flood control dam that was built in 1941 by the U.S. Army Corps of Engineers (USACE) downstream of the SAR to provide flood protection to the communities in Orange County. The 25,800 acre-feet dam is also operated to provide for water conservation. The USACE also constructed levees along the Santa Ana River to protect adjacent and downstream communities.

Bautista Basin is located at the headwaters of Bautista Creek southwest of the city of Hemet in the San Jacinto River Watershed. Bautista Basin was constructed by the USACE to regulate flow and control sedimentation. Outflow from the basin is conveyed to Bautista Channel and on to the San Jacinto River. Downstream communities are protected by levees constructed along Bautista Creek (earthen levee faced with ungrouted stone revetment) and the San Jacinto River (Segments 1a and 1b of earthen levee faced with grouted stone revetment) by the USACE and local entities.

Lake Hemet was formed in 1895 following the completion of the 135-feet high arched masonry structure. Lake Hemet is located at 4,340 feet above sea level in the San Jacinto Mountains and has a storage capacity of 14,000 acre-feet. Lake Hemet captures runoff from the upper reaches of the San Jacinto River and is operated based on water supply and recreational activities purposes, not flood control. The presence of Lake Hemet has partially reduced the supply of coarse-grained sediments that originate from the upper reaches to the middle segment of San Jacinto River.

Lake Mathews is a 182,000 acre-feet reservoir that commenced to supply water in 1941. Lake Mathews receives water supply from the State Water Project and the Colorado Aqueduct and captures the natural stormwater flows from Cajalco Creek. A series of water quality wetlands and basins, as well as sediment basins are located on Cajalco Creek. Lake Mathews and the water quality wetlands and basins are operated by the Metropolitan Water District solely on the considerations of water supply, not for flood control purposes. Releases from Lake Mathews would only occur if the water elevation was to reach the spillway crest.

Canyon Lake, also referenced as Railroad Canyon Reservoir, was constructed in 1928 and has a total capacity of 11,600 acre-feet. Canyon Lake receives runoff from the 749-square mile San Jacinto River Watershed. Canyon Lake creates a sump for bed material that has been transported along the San Jacinto

River. The Elsinore Valley Municipal Water District operates the lake based on water supply considerations and maintains a minimum lake elevation of 1,372 feet for the benefits of residents of the Lake Elsinore/Canyon Lake area. In addition, the Canyon Lake Property Owners Association leases surface rights for water recreation and regulates residential development around the edge of the lake.

Diamond Valley Lake is a man-made water supply reservoir located near Hemet and is one of the largest reservoirs in Southern California. Diamond Valley Lake is bordered by the Domenigoni Mountains and the Rawson Mountains on its northern and southern shores, respectively. The valley between the two mountains ranges historically drained to Warm Springs Creek (Santa Margarita Region) for its western portion and the San Jacinto River (Santa Ana Region) for its eastern portion. The Metropolitan Water District began construction of the project in 1995 and first started filling the lake by way of the Colorado River Aqueduct in 1999. Diamond Valley Lake was created by construction of three earth fill dams, two located on either side of the valley and one on the north rim (Saddle Dam), which has slightly affected hydrologic and sediment regimes within the SAR. The construction of Saddle Dam has slightly affected the contribution of flows and coarse-grained sediments to Salt Creek; no major development has occurred where slopes are facing north of the Domenigoni Mountains. Diamond Valley Lake provides storage for 800,000 acre-feet of water and is not a flood control facility.

Lake Perris is another man-made water supply reservoir that was completed in 1973 in the mountain-rimmed valley between the cities of Moreno Valley and Perris. Lake Perris is supplied from imported State Water Project water and the storage capacity of the reservoir is 131,400 acre-feet and is not a flood control facility.

The storage capacity of the lakes and water reservoirs provide a reduction of peak flow rates and durations during storm events. The potential increases in flood flows resulting from upstream development are offset, if not fully absorbed, by the storage effect of the reservoirs (Phillip Williams & Associates, 2004). However, the presence of these lakes and reservoirs in the SAR affects the geomorphologic equilibrium by:

- Decreasing the amount of runoff released after frequent storm events. The Permittees do not, however, have jurisdiction over the management of the lakes and reservoirs.
- For basins located downstream of upper and steeper reaches, altering the supply of coarse-grained sediment fluxes from high yield areas to the downstream channels. The presence of coarse-grained sediments is essential in maintaining the natural highly dynamic geomorphic processes in the SAR.

Urbanization in the SAR

The land uses in the SAR are primarily undeveloped with only approximately 30% in residential, commercial, and industrial. Historically, the SAR has seen significant agricultural development and remains a strong component of the County's economy[1] (2020 General Plan, Riverside County). In 2008, agriculture accounted for 10% of the land uses within the SAR. As of September 2013, the SAR is home to approximately 1.6 million individuals[2], and current projections indicate an increase of the population by 70% at the horizon of 2035[3]. Projections for housing demand are proportional to the projected increase in population, and urbanization has, over the past few decades, been rising rapidly to meet the demand. Over the last approximately 18 years, Permittees have mitigated increases in runoff from New Development during the planning process and have minimized downstream impacts.

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[1] County of Riverside General Plan, Vision Statement for Year 2020. Website: http://planning.rctlma.org/ZoningInformation/GeneralPlan.aspx

[2] State of California, Dept. of Finance, E-1 Population Estimates, and RCIT's Riverside County Progress Report

[3] 2010 Projections of Population. Riverside County Center for Demographic Research.

Floodplain Management

Runoff from urbanization is managed by the District in collaboration with the Co-Permittees. The District reviewed technical literature including the "Effects of Increased Urbanization from the 1970's to the 1990's on storm-runoff characteristics in Perris Valley, CA" and the "Engineering Workshop on Peak reduction for Drainage and Flood Control Projects" when developing the criteria for managing increased runoff. A number of technical issues were explored in some detail, including a review of the models used to evaluate development-related increases in runoff, and a review of the effectiveness of the various detention/retention schemes commonly proposed as management measures. The Permittees require users to demonstrate that the project's associated runoff volume and peak discharge will not significantly increase for selected storm return frequencies in developing project-specific WQMPs.

The Permittees participate in the National Flood Insurance Program, which provides subsidized flood insurance to participating communities. The Permittees successively implement and enforce a floodplain management ordinance to regulate development in mapped flood hazard areas. Consistent with the requirements of the National Flood Insurance Program, the District has adopted the 100-year return frequency storm event as the minimum standard for the protection of all habitable structures. Flood protection facilities, including storm drains and detention and retention facilities within the SAR, are designed to provide this level of protection. In addition, onsite drainage facilities are required to convey the 10-year storm while habitable structures are protected from the 100-year flood by the inclusion of factors of safety and freeboard. Construction permits are issued only for projects meeting or exceeding these requirements.

The Permittees collectively maintain MS4 facilities to ensure that adequate level of protection is provided for their communities. Projects may be considered by the District to reduce historical flooding hazards in specific communities in order to minimize threats to life, property and the environment. Improvement projects may also include the rehabilitation or restoration of channel segments that have been impacted by Hydromodification.

Future Infrastructure & Project Prioritization

The Permittees are responsible for the maintenance of the MS4 within the SAR. District was established by the Legislature to ensure that the major drainage infrastructure is properly functioning to convey the design discharge and protect the communities of Riverside County. The District, as part of its annual budget process, holds public budget hearings for the purpose of receiving flood control project requests. The process is described, as follows:

- Public hearings are held in a centrally located public place in each of the District's seven tax zones. Each zone has three Flood Control Commissioners who are zone residents. These Commissioners are appointed by the Board of Supervisors.
- Any individual, or representative of any business, organization, or government entity, may make a request for a flood control project by appearing at the budget hearing for the appropriate zone, or by submitting a written request to the District. Support for currently budgeted projects may also be offered. Written project requests include the location and nature of the problem and the degree of damage (i.e., are residences or businesses actually flooded, etc.).
- After the public hearing, District staff prepares cost estimates of all newly requested projects, as well as ongoing projects, and then prioritizes them on the basis of public need, necessity and available funds. A draft budget is then prepared by District staff and is presented to the Commissioners at a second public meeting (Work Session). At the Work Session, the Commissioners review the draft budget with District staff and make adjustments, as they deem

appropriate before making a recommendation for approval. The Work Session is a public meeting and there is opportunity for public comment.

- In June, a final draft proposed budget, approved by the Zone Commissioners, is forwarded to the District's Board of Supervisors for final approval.

1.3 SAR HMP Organization

The HMP is organized into four sections, supported with technical appendices.

- Section 2: Identification of SAR HMP requirements for New Development and Significant Redevelopment projects not subject to HCOC requirements.
- Section 3: Identification of standards to be achieved to the MEP and the applicable tools and measures to meet these standards.
- Section 4: Discussion of the alternative compliance options that are available to users unable to implement onsite volumetric mitigation for hydromodification.
- Technical Appendices: Literature review of the state of hydromodification science and incorporation of the findings of HMP studies performed to classify stream segments per susceptibility category, and qualify the potential to supply bed load sediments to Receiving Waters per sub-watersheds.

2.0 Santa Ana Region HMP Requirements for New Development and Significant Redevelopment Projects

This section identifies where in the SAR and under what circumstances do the HCOC MEP standards apply for New Development and Significant Redevelopment projects. The HMP identifies the coverage areas that are not subject to HCOC requirements based on Permit Provisions, existing infrastructure, the state of the hydromodification science, specific HMP studies performed within the SAR, the practicality of implementation of hydromodification controls and consistency with the SAR WQMP, environmental benefits of the implementation of controls, and approved hydromodification exemptions for other jurisdictions in California.

2.1 HMP Applicability Requirements

2.1.i HMP Decision Flowchart

Users may refer to the HMP Decision Flowchart, **Figure 1**, to determine if hydromodification management controls are required per the requirements of this HMP. When required, the HMP Decision Flowchart will direct the user to the adequate sections of this HMP describing the hydromodification management controls to be implemented based on the project type and size.

It should be noted that all projects are subject to the Permit's LID, design capture volume (DCV) and water quality treatment requirements even if hydromodification control measures for both volumetric mitigation and time of concentration mitigation are not required.

As noted in Figure 1, New Development and Significant Redevelopment project does not cause a Hydrologic Conditions of Concern (HCOC) if any one of the following conditions is met:

- If the project is a New Development or Significant Redevelopment project that disturbs less than one acre; or
- If the project drains to a channel that conveys stormwater to engineered and stable channel sections identified by the Hydromodification Susceptibility Mapping efforts as defined in **Section 2.2.i**;or
- If the proposed project conveys stormwater directly to a Controlled Release Point, as defined in **Section 2.2.i**; or
- If the project is considered a Watershed Protection Project in the context of stormwater management. A Watershed Protection Project is not a New Development or Significant Redevelopment Project (see **Section 2.2.iii**); or
- If it has been determined that the Beneficial Uses in Prado Basin will benefit from the project, per conditions defined in **Section 2.2iv**; or
- If the project conveys stormwater into Natural Resistant features and Stable Channels per the conditions defined in **Section 2.2.v**; or
- If additional analysis is provided that presents information that HCOC impacts are negligible or will be controlled. This may include utilizing existing infrastructure, available information or studies (see **Section 2.2.vi**); or
- If the project is routine roadway maintenance that maintains the original line and grade, hydraulic capacity, original purpose of the facility, or emergency roadway maintenance activities that are required to protect public health and safety (see **Section 2.2vii)**.

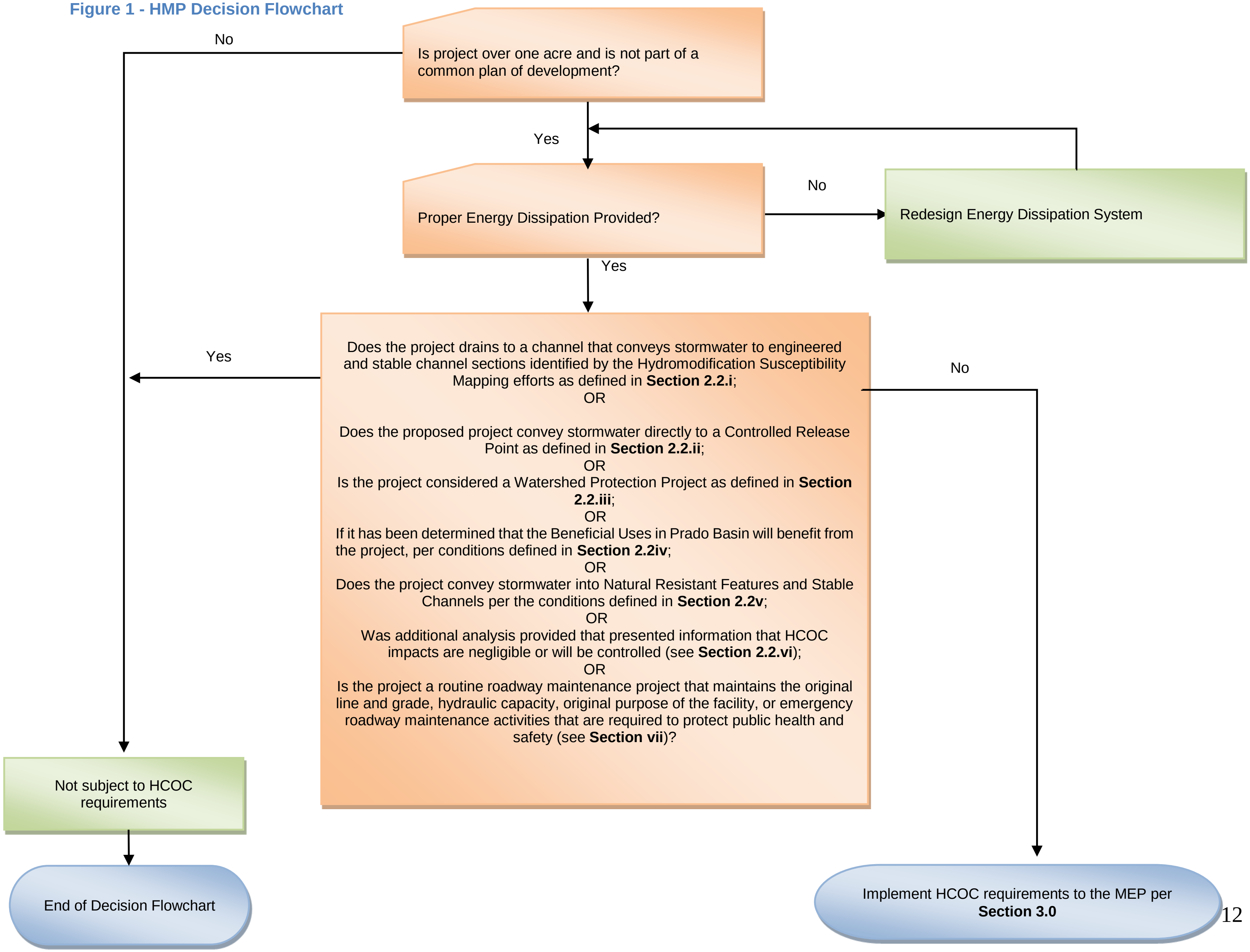
2.1.ii Requirement for Proper Energy Dissipation System(s)

As identified in the HMP Decision Flowchart in **Figure 1**, properly designed energy dissipation systems, set forth by the *1982 Los Angeles Flood Control District Hydraulic Design Manual* or other approved alternatives (Caltrans, Army Corps, Green Book), are required for all development project outfalls to unlined channels. The user should design the energy dissipation system based on an engineered acceptable method to reduce impacts from concentrated outfalls. For reference purposes, the 1982 Los Angeles County Flood Control District Hydraulic Design Manual identifies that (page B-12):

"When a storm drain outlets into a natural channel, an outlet structure shall be provided, which prevents erosion and property damage. Velocity of the flow at the outlet should agree as closely as possible with the existing channel velocity. Fencing and a protection barrier shall be provided…

… When the discharge velocity is high, or supercritical, the designer shall, in addition, consider bank protection in the vicinity of the outlet and an energy dissipation structure."

Figure 1 - HMP Decision Flowchart



2.2 Projects Not Subject to HCOC Requirements

Projects may not be subject to HCOC requirements based on specific channel or watershed conditions. These conditions are detailed in this section.

2.2.i Hydromodification Susceptibility Mapping

This includes areas that convey stormwater into engineered and regularly maintained facilities or natural resistant feature, as identified per the SAR Hydromodification Susceptibility Report and Mapping (see Appendix A), are not subject to HCOC requirements.

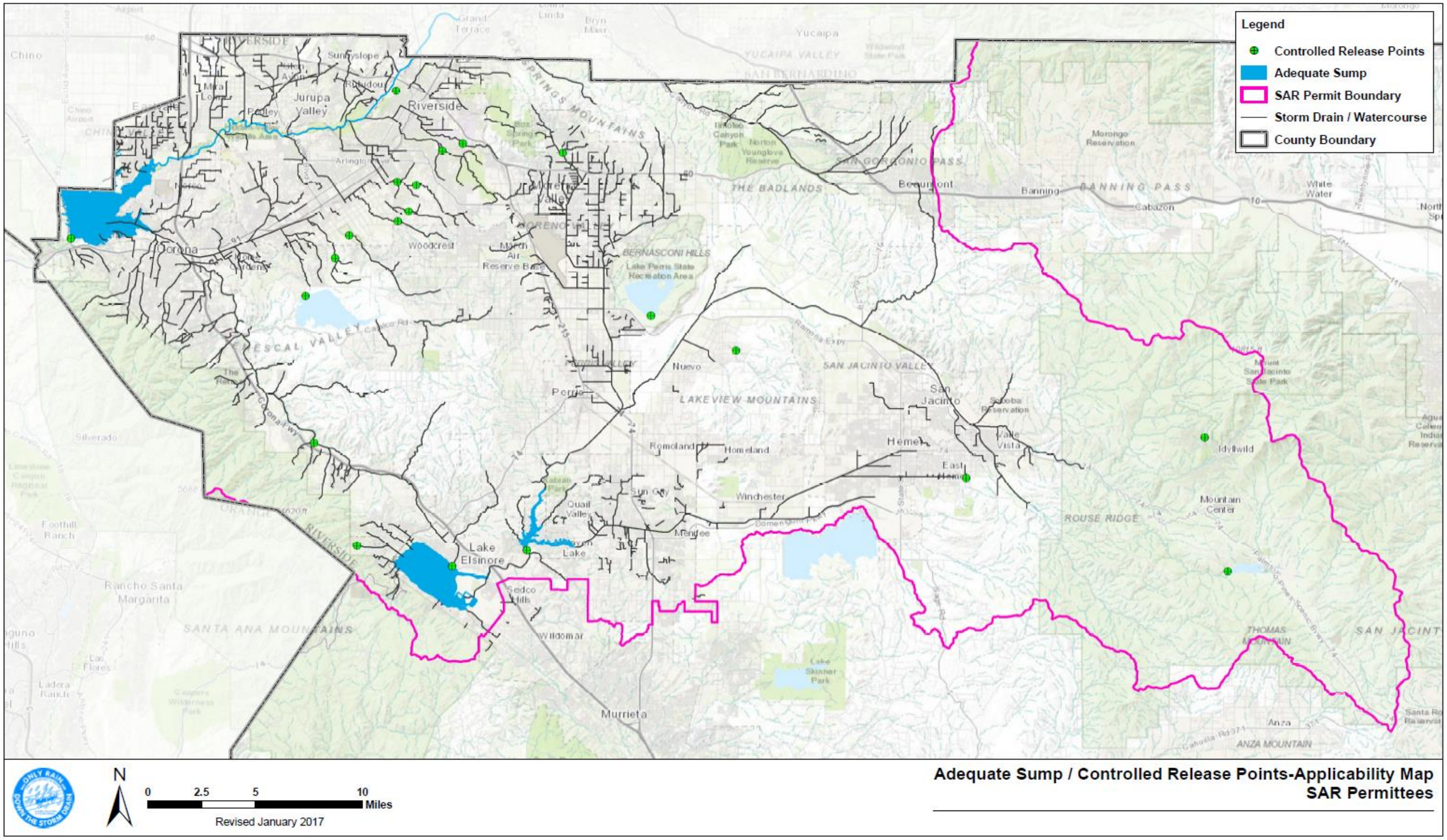
To confirm the exemption, User must determine if the project conveys stormwater into a continuous engineered and regularly maintained facility to an Adequate Sump or a natural resistant feature.

2.2.ii Controlled Release Point

This includes areas that convey stormwater to a Controlled Release Point. See **Figure 2** for Controlled Release Point locations. For exact location of a CRP please see the Stormwater and Water Conservation Tracking Tool (Geodatabase).

To confirm the exemption, User must determine if the project conveys stormwater into a continuous engineered and regularly maintained facility or a natural resistant feature to a CRP.

Figure 2 - Controlled Release Locations



2.2.iii Watershed Protection Projects

Watershed Protection Projects, in the context of stormwater management, are constructed to prevent economic, social, and environmental damage to the SAR, including Receiving Waters, by providing the following:

- Water quality protection by the proper management of stormwater and floodplains
- Flood risk reduction to adjacent land uses, stored matter, and stockpiled material
- Elimination of the comingling of stormwater and hazardous materials
- Erosion mitigation
- Restoration of rivers and ecosystems
- Groundwater recharge
- Creation of new open space and wetlands
- Programs for water conservation, stormwater capture and management
- Retrofit projects constructed to improve water quality

Watershed Protection Projects provide an important environmental benefit toward protecting Beneficial Uses by preventing stormwater from mobilizing Pollutant loads and/or managing Pollutant sources into Receiving Waters from adjacent urban land uses.

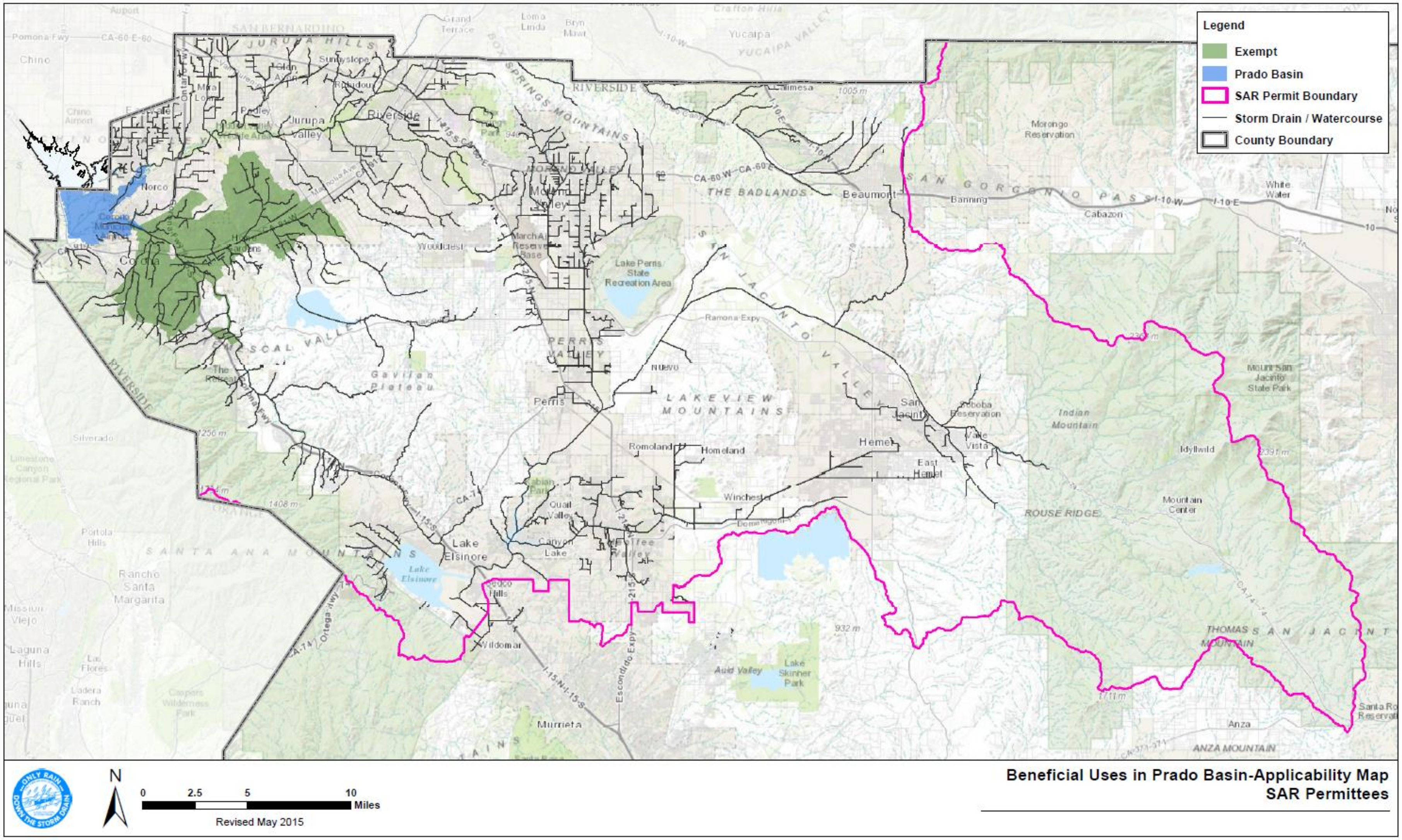
Any potential impacts upon the environment from Watershed Protection Projects are mitigated through required compliance with CEQA, the USACE 404 Permits, RWQCB Section 401 Water Quality Certification and California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreements. Furthermore, Watershed Protection Projects are not considered New Development or Significant Redevelopment projects as they do not involve any post-construction human use or activity, and have no associated Pollutants of Concern. Consequently, Watershed Protection Projects would not require the preparation of a Project-Specific WQMP. However, "Other Development Projects" are required to incorporate appropriate LID Principles (Site Design), Source Control, and other BMPs which may or may not include Treatment Control BMPs. Co-Permittee staff will require Project-Specific WQMPs for these Other Development Projects not considered under priority development categories, if deemed necessary to ensure that the potential for significant adverse water quality impacts to storm water are mitigated.

2.2.iv Beneficial Uses in Prado Basin

The Orange County Water District owns 2,150 acres behind Prado Dam in Riverside County. Upstream of the Prado Dam lies a large strand of forested, riparian habitat. This productive and rare ecosystem supports rich plant and animal life that includes many different species.

It has been determined that the Beneficial Uses in Prado Basin will benefit from stormwater runoff that may have otherwise been retained onsite due to hydromodification mitigation requirements. Therefore, the Co-permittees may exempt the areas draining to Temescal Wash between the Prado Basin and the U/S confluence with Bedford Canyon Wash Reach from implementing hydromodification mitigation requirements. See Figure 3 for areas that are exempt from HCOC requirements.

Figure 3 - Areas draining to Temescal Wash between the Prado Basin and the U/S confluence with Bedford Canyon Wash



2.2.v Natural Resistant Features and Stable Channels

Users have the option to consult with an expert and perform a stream stability analysis for natural resistant features and stable channels downstream of New Development or Significant Redevelopment Projects. The stream stability analysis should analyze the susceptibility of the channel to hydromodification based on hydraulic and geomorphic considerations. The user may identify, if applicable, that the channels are currently stable. The analysis shall include:

- As-builts, maintenance records, and design specifications that demonstrate the channel has the capacity to convey the 2-year ultimate discharge; or
- A degradation/aggradation evaluation (scour analysis) for a single 2-year storm using approved hydraulic methods that demonstrate the stability of the channel under the 2-year event.

New Development or Significant Redevelopment Projects discharging into stable channels are not subject to HCOC requirement. The results of the stream stability analysis should be documented and attached to the project preliminary WQMP for approval by the Permittee.

2.2.vi Existing Infrastructure Information

The susceptibility maps were based on current available data and a desktop analysis, therefore a more detailed analysis may be necessary. Infrastructure continues to be constructed and may become available. The User may perform an evaluation to demonstrate to the Permittee that HCOC impacts will be negligible or will be mitigated by existing infrastructure. The evaluation should be based on existing data and existing infrastructure. The analysis should include:

- As-builts, maintenance records, and design specifications that demonstrate the capacity of downstream channels to convey the 2-year ultimate discharge; or
- A degradation/aggradation evaluation (scour analysis) for a single 2-year storm using approved hydraulic methods that demonstrate the stability of the channel under the 2-year event.

To confirm the exemption, User must determine if the project conveys stormwater into a continuous engineered and regularly maintained facility to an Adequate Sump or a natural resistant feature.

2.2.vii Transportation Projects

This includes routine roadway maintenance projects that maintain the original line and grade, hydraulic capacity, original purpose of the facility, or emergency roadway maintenance activities that are required to protect public health and safety.

Permittee roadway projects are linear New Development or Significant Redevelopment projects to be completed within a limited right-of-way. Permit Provision XII.F. required the Permittees to develop a *Low Impact Development: Guidance and Standards for Transportation Projects*, which was approved by the Executive Officer on October 22, 2012 and was required to meet the performance standards for site design/LID BMPs, Source Control and Treatment Control BMPS as well as HCOC criteria. In addition, the guidance document addressed streets, roads or highways used for transportation of automobiles, trucks, and motorcycles and exclude routine road maintenance activities where the surface footprint is not increased. The guidance document included principles contained in the USEPA guidance, "Managing Wet Weather with Green Infrastructure: Green Streets" and included the following:

- Guidance for new road projects;
- Guidance specifically for projects with existing roads;
- Sizing criteria that trigger project coverage (i.e. impervious area);

- Green infrastructure approaches that are taken to the MEP; and
- A BMP and design feasibility analysis on a project specific basis.

The *Low Impact Development: Guidance and Standards for Transportation Projects* document does not apply to the following projects, and thus does not apply to performance standards for site design/LID BMPs, Source Control and Treatment Control BMPs as well as HCOC criteria:

- Transportation Projects that received CEQA approval prior to October 22, 2012
- Emergency Projects, as defined in the Guidance, Section 2;
- Maintenance Projects, as defined in the Guidance, Section 2;
- Dirt or gravel roads;
- Transportation Projects that are part of a private new development or significant redevelopment project and required to prepare a Water Quality Management Plan (WQMP); and
- Transportation Projects subject to other MS4 Permit requirements, e.g., California Transportation Department (Caltrans) oversight projects, cooperative projects with an adjoining County or an agency outside the jurisdiction covered by the Santa Ana Region MS4 Permit.

3.0 Santa Ana Region HCOC Maximum Extent Practicable Standards

The objective of this section is to identify the specific HCOC standards that New Development and Significant Redevelopment projects have to fulfill to the MEP in the SAR. Only New Development and Significant Redevelopment projects that are subject to HCOC requirements per **Section 2** should address the HCOC MEP standards.

3.1 HCOC MEP Standards

The HCOC MEP standards are designed to manage increases in runoff volume and reductions in runoff time of concentration from New Development and Significant Redevelopment projects.

Projects do not cause a HCOC if the volume and the time of concentration of stormwater runoff for the post-development condition are not significantly different from pre-development condition for a 2-year return frequency storm. A non-significant difference is equivalent to:

- A post-development condition time of concentration of 95% or more of the pre-development condition time of concentration;
- A post-development condition runoff volume of 105% or less of the pre-development condition runoff volume.

If a project cannot meet the requirements mentioned above, it may be mitigated by using on- or off-site LID Principles and LID BMPs to address potential erosion or habitat impact and/or by mimicking the pre-development hydrograph with the post-development hydrograph for a 2-year, 24-hour return frequency storm. Generally, the HCOC is not significant if the post-development hydrograph is no more than 10 percent greater than the pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow.

The HCOC MEP standard is also applicable to those New Development and Significant Redevelopment projects seeking compliance through offsite mitigation projects or regional mitigation approaches that are consistent with the strategy of the WAP. Refer to **Section 4** for alternative compliance mitigation projects.

3.2 Volumetric Matching Approach

Users are encouraged to use hydrologic control measures available to meet the HCOC MEP standard identified in **Section 3.1**. The intent of the HMP is not to specify the types of hydrologic control measures that can be used but rather identify the criteria that must be met, allowing flexibility for Users to meet the HCOC MEP standard. The 2011 Design Handbook for LID BMPs provides information on BMP design to meet the combined Treatment Control and LID requirements. The handbook will be updated to specify the type of BMPs that can be used to meet HCOC standards after this HMP is approved. The LID BMP handbook can be found at http://rcflood.org/NPDES/LIDBMP.aspx

The requirement for onsite hydrologic controls should be determined by comparing 2-year, 24-hour volumes in the pre-development and post-development conditions. The post-development condition runoff volume should be 105% or less of the pre-development condition runoff volume.

The delineation of drainage management areas should comply with the guidance set forth in the SAR WQMP.

The User should compute 2-year volumes based on District approved methods, including:

- The modified runoff curve number method (i.e., modified TR-55 method incorporating equivalent curve numbers). This method is based on modified curve numbers (**Equation 1**) and the modified equation for initial abstraction (**Equation 2**).

Equation 1 - Modified Curve Number

$$CN_{0.05} = \frac{100}{1.879 \cdot \left[\frac{100}{CN_{0.20}} - 1\right]^{1.15} + 1}$$

Equation 2 - Modified Initial Abstraction

$$I_a = 0.05 \cdot S$$

The determination of this method is detailed in Runoff Curve Number Method: Examination of the initial Abstraction Ratio (http://ponce.sdsu.edu/hawkins_initial_abstraction.pdf).

- The short-cut synthetic unit hydrograph method based on 24-hour storm duration and a 15-minute unit time. The User should perform the volume computations based on the guidance and assumptions provided in Section E of the District Hydrology Manual.

If the post-development condition runoff volume exceeds 105% of the pre-development condition runoff volume, the User should design and implement onsite or offsite mitigation BMPs that infiltrate, evapotranspirate, or harvest and reuse the exceeding volume. Referring to Section 2.1.4 of the SAR WQMP Guidance Document, the Permittees have adopted a Development Planning and Permitting Process that includes an Initial Environmental Study and CEQA checklist. These initial environmental studies will identify mitigation effects that are specific to the conditions associated with the project and downstream reaches and habitats. Design and implementation of such onsite or offsite mitigation BMPs should be based on the District Design Handbook for LID BMPs and the WQMP Guidance.

3.3 Mitigating the Post-Development Time of Concentration

Permit Provision XII.E.9 identifies that, in addition to mimicking pre- and post-development volumes for a 2-year return frequency storm, projects are also required to mitigate the post-development condition time of concentration so that it is not significantly different from the pre-development condition (a difference of 5% or less is considered insignificant). Mitigating the time of concentration will effectively minimize the increase of the peak runoff rate.

Due to the storage effects that occur when matching the runoff volume of the post-development condition with the pre-development condition through Site Design and Treatment Control BMPs, the resulting time of concentration for the post-development condition will be, in most cases, greater than the time of concentration of the pre-development condition.

A project must effectively demonstrate that the post-development condition time of concentration is 95% or more of the pre-development condition time of concentration.

The Permit defines the time of concentration as the time after the beginning of rainfall when all portions of the drainage basin, or drainage management area, are contributing simultaneously to flow at the outlet. Page D-1 of the District Hydrology Manual (1978) complements the definition to state that the time of concentration corresponds to the time required to reach the maximum or equilibrium runoff rate.

The hydraulic theory identifies three major factors that affect both time of concentration and travel time, including:

Surface roughness
An increase in the surface roughness will retard flow, thus increasing the time of concentration. Areas of dense vegetation typically present higher roughness coefficients than smoother surfaces such as impermeable pavements (NJSBMP, 2004). Roughness coefficients will vary based on the land cover, the season, and the degree of maintenance. As identified in the SAR WQMP, existing native vegetation should be preserved or native plants should be used to restore disturbed areas (District, 2012).

Slope
Ground slope and the slope of onsite drainage systems play a significant role in computing the time of concentration. Onsite grading will typically reduce the slope of overland flow, when directed through storm drains, street gutters, and diversions. However, channel straightening will tend to increase the slope of stormwater conveyance systems.

Flow length
In small non-urban watersheds, much of the travel time results from overland flow in upstream areas (USDA, 1986). Site development is typically associated with a reduction in overland flow and an optimization of the hydraulic efficiency of onsite stormwater conveyance systems, thus, increasing flow velocity and decreasing the time of concentration.

Projects should follow the site design principles defined in Section 3.2 of the SAR WQMP. If necessary, users may increase the time of concentration by maximizing the roughness coefficient and the length of the flow path for the most remote area in the drainage area. After the transition to shallow concentrated flow, the user may investigate the effects of decreasing the slope, increasing the flow length, and/or directing flow over pervious areas on the time of concentration. Increasing the time of concentration may be accomplished through the described mitigation principles, Treatment Control and LID BMPs.

3.3.i Treatment Control BMPs

Permit Provision XII.E.2. identifies that Priority Development Projects are required to infiltrate, harvest and use, evapotranspirate, or bio-treat the 85th percentile storm event. If deemed feasible, this may be accomplished through the implementation of onsite Treatment Control BMPs. Onsite Treatment Control BMPs may also be designed for volumetric considerations, as described in **Section 3.2**. Treatment Control BMPs typically introduce a hydraulic residence time or travel time for the runoff to flow from the inlet to the outlet of the BMP. This residence time should be taken into account in the computation of the time of concentration for the post-development condition.

3.3.ii Site Design

The design principles that are available to the User may also consist of using Site Design BMPs to mitigate the time of concentration, including:

- Maintaining predevelopment flow path length by dispersing and redirecting flows, generally, through open swales and natural drainage patterns;
- Increasing surface roughness (rougher pavements, dense vegetation);
- Detaining flows (open swales, bioretention systems);
- Minimizing compaction and changes to existing vegetation;
- Flattening grades in impacted areas;
- Disconnecting impervious areas (e.g., eliminating curb/gutter and redirecting downspouts);

- Connecting pervious and vegetated areas (native vegetation and tree planting); and
- Swales and open channels should be designed based on the local drainage manual while considering: (1) optimizing the surface roughness to reduce flow velocity and maximizing the use of pervious soils; (2) maximizing the width of the channels to reduce the flow velocity; (3) maximizing channel lengths and potentially introduce meandering; and (4) minimizing the channel gradient.

3.3.iii Computation of Time of Concentration

The computation of the total travel time from the hydraulically most remote point in the drainage area to the outlet at the downstream point may consist of quantifying the different phases of flow, including sheet flow, shallow concentrated flow, and open channel flow. The User may compute the time of concentrations for the 2-year return frequency storm event for both the pre-development condition and the post-development condition, separately. Computations should solely be performed using District-approved methods mentioned in the Hydrology Manual Found here: http://rcflood.org/downloads/Manuals/Hydrology%20Manual.pdf. The User may use another equivalent method, only if approved by the Permittee.

3.4 Identification of Existing Conditions for New Developments

Compliance with the Permit requirement should be based on the results obtained from the computational methods identified in **Section 3.1**. As part of developing a New Development or Significant Redevelopment project, a User should identify and document, using professional knowledge, pre-development (existing) conditions in terms of geology, topography, soils, and vegetation. Significant Redevelopment projects should identify the existing conditions (imperviousness, drainage management areas, topography, soils, vegetation).

Several publicly-available information sources may help the User characterize pre-development conditions for New Development, including:

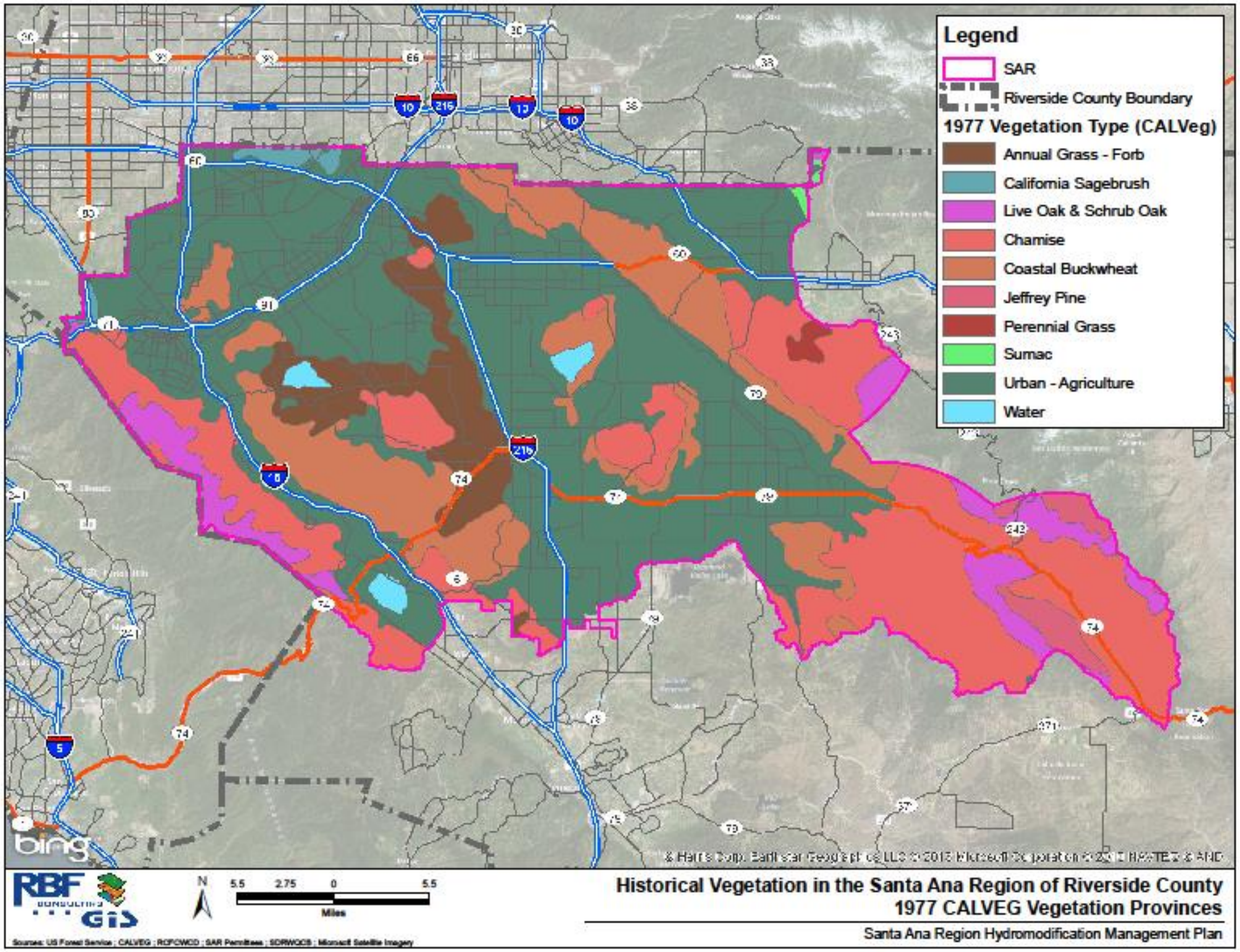
- The Riverside County Stormwater Geodatabase, entitled Stormwater & Water Conservation Tracking Tool (SWCT[2]) that is available to all users within the County of Riverside (see http://rivco.permitrack.com/). The User may identify information regarding local topology, stormwater infrastructure, groundwater, the local habitat and species.
- Soil database (#678, #679, and #680) from the Natural Resources Conservation Service (NRCS). Among the parameters of interest, the database identifies the type, the original range of observed topographic slopes, the soil erosion factor K, and, if available, plant community information for the native or pre-development soil. The database is accessible through the Web Soil Survey page (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).
- Vegetation and eco-regional GIS information listed by the U.S. Forest Services. The USEPA Ecoregion database information locates the SAR in the Southern California Mountains and Valleys Ecoregion and references the climate of humid and temperate Mediterranean type. The USEPA Ecoregion database identifies also the vegetation province of the SAR within the California Coastal Range Open Woodland-Shrub-Coniferous Forest-Meadow province. A historical CALVEG GIS vegetation layer is available for the year 1977 (USFS, 2000). The historical vegetation layer reveals a majority of evergreen chaparral shrub and scrub oak within the watershed. For those areas located within the Urban Land and Agriculture vegetation area, the user may select the shrub vegetation for pre-development, naturally occurring, conditions. Figure 4 delineates the distribution of historical vegetation types in the SAR. GIS-based layers are available on the USFS website (http://www.fs.usda.gov/detail/r5/landmanagement/gis/).

- Other historical USGS topographic maps and aerials of the SAR are publicly available from the USGS website.

3.5 Flow Rate Mitigation

Permit Provision XII.E.9.d identifies that if a project cannot meet the requirements mentioned above and the exemptions mentioned in **Section 2**, it may be mitigated by using on- or off-site LID Principles and LID BMPs to address potential erosion or habitat impact and/or by mimicking the pre-development hydrograph with the post-development hydrograph for a 2-year, 24-hour return frequency storm. Generally, the HCOC is not significant if the post-development hydrograph is no more than 10 percent greater than the pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and used, discharge from the site must be limited to a flow rate no greater than 110 percent of the pre-development 2-year, 24-hour peak flow.

Figure 4 - Historical Vegetation and Eco-Regions in the Santa Ana Region



4.0 Alternative Compliance for Hydromodification

The Watershed Action Plan (WAP) was developed by the Permittees of the SAR to identify a comprehensive strategy that addresses watershed scale water quality impacts of urbanization in the Permit Area associated with Urban Total Maximum Daily Load (TMDL), Waste Load Allocations (WLAs), stream system vulnerability to Hydromodification from Urban Runoff, cumulative impacts of development on vulnerable streams, preservation of Beneficial Uses of streams in the SAR, and protection of water resources, including groundwater recharge areas. The WAP also helps improve integration of water quality, stream protection, stormwater management, water conservation and re-use, and flood management through an integrated watershed management approach.

Consistent with the integrated approach set forth in the WAP, this HMP allows the user to investigate regional mitigation approaches. Alternative compliance may be achieved through either: 1) Offsite post-development runoff volumes and time of concentrations, 2) In-stream restoration within the project's Receiving Water, 3) Protecting Beneficial Uses, 4) Urban Runoff Fund, or 5) Water Quality Credits

Some New Development or Significant Redevelopment projects will implement or be a part of a regional approach to mitigating HCOC.

The goal of Regional Mitigation is to protect Beneficial Uses. The regional mitigation project must be capable of one of the following MEP standards:

- Matching or reducing the equivalent volume, as well as ensuring that the time of concentration has not significantly decreased, from the project development; or
- Protects or restores the channel stability

4.1 Offsite Post-Development Runoff Volumes and Time of Concentration

The User must investigate potential locations for implementation of an offsite mitigation project within the same drainage system as the project. The offsite mitigation project must mitigate the incremental impact from the post-development runoff volumes and time of concentrations for the project site. Sizing of offsite mitigation controls may be accomplished using the computational methods described in **Section 3.1**. The User will evaluate and identify potential sites in the same channel system. If no potential offsite mitigation project sites are identified in the same channel system as the project, the User can propose an offsite mitigation project in the same hydrologic unit. If an adequate site is identified in the same channel system or hydrologic unit, the User will include the following in the preliminary WQMP:

- the offsite mitigation project addresses the incremental impact from the post-development runoff volumes and times of concentration for the project site
- conceptual plans for the offsite mitigation project for review and approval
- the pre and post-project runoff volumes and times of concentration

4.2 In-stream restoration within the project's Receiving Water

The User investigates the potential for implementation of an in-stream restoration for the Receiving Water of the project. The in-stream restoration project must be located in the Receiving Water of the project. Restoration projects are projects that protect or restore channel stability. The User will include conceptual plans to the Permittee with jurisdiction over the project, in the preliminary WQMP, for review. Permittees will establish individual processes consistent with their approval procedures to evaluate the HMP Regional Compliance. The User must also coordinate with the appropriate regulatory agencies (e.g., Regional Board, California Department of Fish and Wildlife, U.S. Army Corps of Engineers) for review and approval of the restoration project.

4.3 Protect Beneficial Uses

The User will coordinate with the appropriate Permittee on implementing a watershed project that is consistent with the goals of the WAP. Potential watershed projects within the SAR include projects that enhance water conservation and/or groundwater recharge, and protect the Beneficial Uses as identified in the Basin Plan.

If this option is sought by the User, the User should identify the Beneficial Uses as defined in both the Basin Plan and the WAP that will be enhanced by the watershed project. The User should: (1) quantify the protection toward Beneficial Uses provided by the watershed project; and (2) demonstrate that HCOC impacts caused by the New Development or Significant Redevelopment project, if any, are negligible when compared to the benefits provided by the watershed project. Only the Permittee with jurisdiction over the project should make the determination on whether the offsite watershed project is a viable option for protecting the Beneficial Uses in the SAR. All waivers, along with waiver justification documentation, must be submitted to the Executive Officer for approval in writing within 30 days prior to Permittee approval.

4.4 Urban Runoff Fund

(Note: Section 4.4 is available only if an Urban Runoff Fund has been developed and is available to the user.)

The Permittees have the option to develop an Urban Runoff Fund. The Urban Runoff Fund will aim at developing regional HMP mitigation projects where users can buy HMP mitigation credits. The development and operation of an Urban Runoff Fund will include the identification of potential regional HMP mitigation projects; the planning, design, permitting, construction, and maintenance of regional HMP mitigation projects; the development of a fee structure for users participating in the mitigation bank; and managing the HMP Urban Runoff Fund. Regional HMP mitigation projects can also serve as projects for a LID waiver program if site conditions allow for implementation of LID-type projects.

If in-stream restoration projects are considered, options for stream protection will be identified in collaboration with the appropriate Permittee.

4.5 Water Quality Credits

This option is consistent with Permit Provision XII.G.4 that allows Permittees to establish, where feasible and practicable, a water quality credit system for alternatives to infiltration, harvesting and use, evapotranspiration, and other LID and HCOC requirements.

For certain types of New Development and Significant Redevelopment projects, LID BMPs may be more difficult to incorporate due to the nature of the development, but the development practices may provide other environmental benefits to communities. Projects potentially eligible for consideration for Water Quality Credits include:

- Significant Redevelopment projects that reduce the overall impervious area.
- Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, Pollutants or contaminants, and which have the potential to contribute to adverse ground or surface water quality if not redeveloped (http://www.epa.gov/brownfields/overview/glossary.htm).
- Higher density developments which include two distinct categories (credits can only be taken for one category):
    - Those with more than seven units per acre of development (lower credit allowance).
    - Vertical density developments, for example, those with a Floor to Area Ratio of 2, or those having more than 18 units per acre (greater credit allowance).
- Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g., reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).
- Transit-oriented developments (within ½ mile of transit), such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within ½ mile of a mass transit center (e.g., bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned.
- Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.
- Regional treatment systems with a capacity to treat flows from all upstream developments.
- Offsite mitigation or dedicated mitigation areas within the same watershed.
- Developments in highly urbanized areas such as a city center area.
- Developments in historic Districts or historic preservation areas.
- Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria for mixed use development, would not be able to take credit for both categories.
- In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas, as defined by the local jurisdiction.

This provision does not exempt the User from first conducting the investigations to determine if it is feasible to fulfill the full requirements for volumetric mitigation requirements through a combination of treatment control and LID BMPs.

To determine the amount of Water Quality Credit a New Development or Significant Redevelopment project would qualify for, the first step is to calculate the difference for the 2-year storm frequency between 105% of the volume associated with the existing development and the volume generated in the post-development conditions. The increase in volumes would need to be satisfied in the absence of any credits. Any credits would then be taken as a reduction to this remaining volume. For all categories of projects noted above, the remaining volume to be treated or mitigated would be reduced in accordance with portions of the increase in volumes as shown in **Table 1**.

Table 1 - Water Quality Credits Applied to LID BMPs

Project Category	**Water Quality Credit (% Delta Volume)**
Significant Redevelopment Projects that reduce the overall impervious footprint of the project site	Percentage of site imperviousness reduced
Historic District, historic preservation area, or similar areas	10%
Brownfield redevelopment	25%
Higher density development, 7 units/acre or more	5%
Higher density development, vertical density	20%

If more than one category applies to a particular project, the Water Quality Credit percentages would be additive. Applicable performance criteria depend on the number of Water Quality Credits claimed by the proposed project. Water Quality Credits can be additive up to a 50% reduction (50% reduction maximum) from a proposed project's obligation for sizing LID BMPs, contributing to an urban runoff/mitigation fund, or offsite mitigation projects. The volume credit would be calculated as the increased volume, as defined above, multiplied by the sum of the percentages claimed above.

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APPENDIX A–

Glossary

Glossary

2010 SAR MS4 Permit	Order No. R8-2010-0033, an NPDES Permit issued by the Santa Ana Regional Water Quality Control Board.
Beneficial Use	The uses of water necessary for the survival or well-being of man, plants and wildlife. These uses of water serve to promote the tangible and intangible economic, social and environmental goals. "Beneficial Uses" of the waters of the State that may be protected include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing Beneficial Uses are uses that were attained in the surface or ground water on or after November 28, 1975; and potential Beneficial Uses are uses that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)].
Best Management Practice (BMP)	Any procedure or device designed to minimize the quantity of Pollutants that enter the MS4 or to control stormwater flow. See Chapter Two of WQMP Guidance Document.
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Controlled Release Point	A controlled release point (CRP) is a detention or debris basin that provides regional flood protection for the downstream watershed areas and mitigates flows for the hydrologic conditions of concern such that any new development or significant redevelopment upstream of the basins will not cause a significant change in the flow conditions downstream of the basin. For this study, we have defined a CRP as providing attenuation for storm events down to the 2-year return frequency storm identified in the MS4 permit.

Conventional Treatment BMPs	A type of stormwater BMP that provides treatment of stormwater runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the 2010 SAR MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Development Project	Any project that proposes construction, rehabilitation, redevelopment, or reconstruction of any public or private residential industrial, or commercial facility, or any other projects designed for post-construction human activity or occupation.
Final Project-Specific WQMP	A fully completed version of the Water Quality Management Plan that must be submitted and approved prior to recordation of the final parcel map or issuance of a building permit. See also Preliminary Project-Specific WQMP.
Hydrologic Condition of Concern (HCOC)	An HCOC exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
Hydromodification	The change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport.
Low Impact Development (LID)	LID includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the Pollution of Waters of the United states through Stormwater management and land development strategies that emphasize conservation and the use of onsite natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. LID BMPs include retention practices that do not allow Runoff, such as infiltration, rain water harvesting and reuse, and evapotranspiration. LID BMPs also include flow-through practices such as biofiltration that may have some discharge of Stormwater following Pollutant reduction.

LID BMPs	A type of stormwater BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of stormwater runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. See discussion in Chapter 2 of the WQMP Guidance Document.
Maximum Extent Practicable (MEP)	Standard, established by the 1987 amendments to the Clean Water Act, for the reduction of Pollutant discharges from MS4s.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) as defined in 40 CFR 122.26(b)(8).
Pollutant of Concern	Pollutants expected to be present on the project site. In developing this list, consideration should be given to the chemicals and potential Pollutants available for storm water to pick-up or transport to Receiving Waters and legacy Pollutants at the project site. Pollutants of Concern for New Development and Significant Redevelopment projects are those Pollutants identified above for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Preliminary Project-Specific WQMP	A Preliminary Project-Specific WQMP is commonly required to be submitted with an application for entitlements and development approvals and must be approved by the Co-Permittee before any approvals or entitlements will be granted.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and Stormwater BMPs to control post-construction Pollutants and stormwater runoff for the life of the project, and to maintain Stormwater BMPs for the life of the project. Co-Permittees may require a preliminary Project-Specific WQMP submittal to be followed by a final Project-Specific WQMP.
Receiving Water	Any water body that is identified in the Santa Ana Basin Plan (and associated amendments), which is available at their website for download.

Redevelopment Project	Any project that meets the criteria described in Section 1 of the WQMP Guidance Document. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair.
Regional Water Quality Control Board (Regional Board)	Regional Boards are responsible for implementing Pollution control provisions of the CWA and California Water Code within their jurisdiction. There are nine Regional Boards in California. Portions of Riverside County are within the jurisdiction of three Regional Boards: the Santa Ana Region, the San Diego Region, and the Colorado River Basin Region. The Regional Boards issue MS4 Permits to the Cities and County of Riverside.
Santa Ana Region	The portion of Riverside County covered by Order R8-2010-0033, an NPDES MS4 Permit issued by the Santa Ana Regional Board.
Total Maximum Daily Load (TMDL)	A TMDL is the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.

Urban Runoff	Urban Runoff includes those discharges from residential, commercial, industrial, and construction areas within the Permit Area and excludes discharges from Open Space, feedlots, dairies, farms and agricultural fields. Urban Runoff discharges consist of storm water and non-storm water surface runoff from drainage sub-areas with various, often mixed, land uses within all of the hydrologic drainage areas that discharge into the Waters of the U.S. In addition to Urban Runoff, the MS4s regulated by this Order receive flows from Open Space, agricultural activities, agricultural fields state and federal properties and other non-urban land uses not under the control of the Permittees. The quality of the discharges from the MS4s varies considerably and is affected by, among other things, past and present land use activities, basin hydrology, geography and geology, season, the frequency and duration of storm events, and the presence of past or present illegal and allowed disposal practices and Illicit Connections. The Permittees lack legal jurisdiction over storm water discharges into their respective MS4 facilities from agricultural activities, California and federal facilities, utilities and special Districts, Native American tribal lands, wastewater management agencies and other point and non-point source discharges otherwise permitted by or under the jurisdiction of the Regional Board. The Regional Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. Similarly, certain activities that generate Pollutants present in Urban Runoff are beyond the ability of the Permittees to eliminate. Examples of these include operation of internal combustion engines, atmospheric deposition, brake pad wear, tire wear, residues from lawful application of pesticides, nutrient runoff from agricultural activities, leaching of naturally occurring minerals from local geography. Urban Runoff does not include background Pollutant loads or naturally occurring flows.
Watershed Protection Project	Watershed Protection Projects provide an important environmental benefit toward protecting Beneficial Uses by preventing stormwater from mobilizing Pollutant loads and/or managing Pollutant sources into Receiving Waters from adjacent urban land uses.
Waste Load Allocation (WLA)	Maximum quantity of Pollutants a discharger of waste is allowed to release into a particular waterway, as set by a regulatory authority. Discharge limits usually are required for each specific water quality criterion being, or expected to be, violated. Distribution or assignment of TMDL Pollutant loads to entities or sources for existing and future Point Sources.