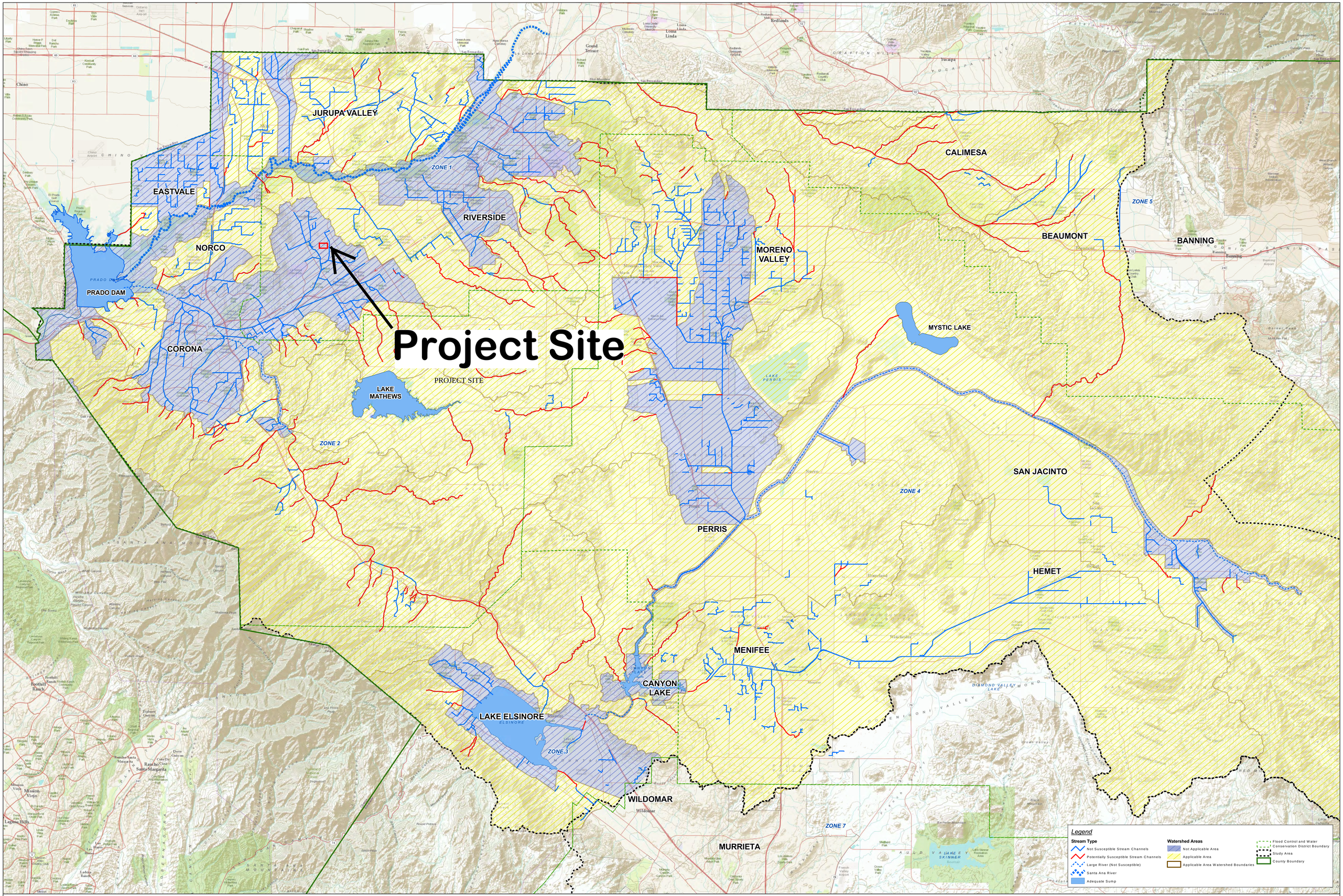
APPENDIX D: PART 2

Project WQMP

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2

NOAA Atlas 14, Volume 6, Version 2
Location name: Riverside, California, USA*
Latitude: 33.9204°, Longitude: -117.4801°
Elevation: 711.14 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.085 (0.071-0.103)	0.120 (0.100-0.145)	0.166 (0.138-0.202)	0.204 (0.169-0.250)	0.257 (0.205-0.326)	0.299 (0.233-0.387)	0.341 (0.259-0.454)	0.386 (0.285-0.529)	0.448 (0.317-0.641)	0.497 (0.339-0.737)
10-min	0.122 (0.102-0.147)	0.172 (0.143-0.208)	0.238 (0.198-0.289)	0.293 (0.242-0.358)	0.369 (0.294-0.467)	0.428 (0.334-0.555)	0.489 (0.372-0.651)	0.554 (0.408-0.758)	0.642 (0.454-0.919)	0.712 (0.485-1.06)
15-min	0.147 (0.123-0.178)	0.208 (0.173-0.251)	0.288 (0.240-0.349)	0.354 (0.292-0.433)	0.446 (0.355-0.565)	0.518 (0.403-0.671)	0.592 (0.450-0.787)	0.669 (0.494-0.917)	0.777 (0.549-1.11)	0.862 (0.587-1.28)
30-min	0.218 (0.182-0.263)	0.307 (0.256-0.371)	0.425 (0.354-0.516)	0.523 (0.431-0.640)	0.658 (0.524-0.834)	0.764 (0.596-0.991)	0.874 (0.664-1.16)	0.989 (0.729-1.35)	1.15 (0.810-1.64)	1.27 (0.867-1.89)
60-min	0.316 (0.264-0.382)	0.446 (0.372-0.539)	0.618 (0.514-0.750)	0.760 (0.627-0.930)	0.957 (0.762-1.21)	1.11 (0.866-1.44)	1.27 (0.965-1.69)	1.44 (1.06-1.97)	1.67 (1.18-2.38)	1.85 (1.26-2.74)
2-hr	0.465 (0.389-0.562)	0.624 (0.521-0.755)	0.836 (0.695-1.01)	1.01 (0.834-1.24)	1.25 (0.999-1.59)	1.45 (1.13-1.87)	1.64 (1.25-2.18)	1.85 (1.36-2.53)	2.13 (1.50-3.04)	2.35 (1.60-3.48)
3-hr	0.569 (0.476-0.688)	0.753 (0.628-0.911)	0.997 (0.830-1.21)	1.20 (0.990-1.47)	1.48 (1.18-1.88)	1.70 (1.33-2.21)	1.93 (1.46-2.56)	2.16 (1.60-2.96)	2.49 (1.76-3.56)	2.74 (1.87-4.07)
6-hr	0.790 (0.660-0.954)	1.03 (0.863-1.25)	1.36 (1.13-1.65)	1.63 (1.34-1.99)	2.00 (1.59-2.54)	2.29 (1.79-2.97)	2.59 (1.97-3.45)	2.91 (2.15-3.98)	3.34 (2.36-4.78)	3.68 (2.51-5.46)
12-hr	1.03 (0.857-1.24)	1.36 (1.14-1.65)	1.81 (1.51-2.20)	2.19 (1.80-2.68)	2.70 (2.15-3.42)	3.10 (2.42-4.02)	3.52 (2.67-4.68)	3.95 (2.91-5.41)	4.55 (3.21-6.50)	5.02 (3.42-7.44)
24-hr	1.35 (1.19-1.56)	1.84 (1.62-2.12)	2.48 (2.19-2.88)	3.02 (2.64-3.52)	3.75 (3.18-4.52)	4.33 (3.59-5.32)	4.92 (3.98-6.19)	5.53 (4.36-7.16)	6.38 (4.83-8.60)	7.04 (5.15-9.82)
2-day	1.67 (1.47-1.92)	2.30 (2.03-2.65)	3.13 (2.76-3.62)	3.82 (3.34-4.45)	4.76 (4.03-5.73)	5.49 (4.55-6.75)	6.24 (5.05-7.86)	7.01 (5.53-9.08)	8.08 (6.11-10.9)	8.91 (6.52-12.4)
3-day	1.80 (1.60-2.08)	2.51 (2.22-2.90)	3.44 (3.03-3.98)	4.21 (3.68-4.91)	5.26 (4.45-6.34)	6.07 (5.03-7.47)	6.90 (5.59-8.70)	7.77 (6.12-10.1)	8.95 (6.77-12.1)	9.87 (7.22-13.8)
4-day	1.95 (1.73-2.25)	2.73 (2.41-3.15)	3.77 (3.32-4.36)	4.62 (4.04-5.39)	5.78 (4.89-6.97)	6.68 (5.54-8.22)	7.61 (6.16-9.59)	8.57 (6.75-11.1)	9.88 (7.48-13.3)	10.9 (7.98-15.2)
7-day	2.24 (1.98-2.58)	3.15 (2.78-3.64)	4.37 (3.85-5.06)	5.38 (4.70-6.28)	6.78 (5.74-8.17)	7.87 (6.52-9.68)	8.98 (7.28-11.3)	10.1 (8.00-13.1)	11.8 (8.89-15.8)	13.0 (9.52-18.1)
10-day	2.40 (2.12-2.77)	3.39 (3.00-3.92)	4.73 (4.17-5.48)	5.85 (5.12-6.83)	7.41 (6.27-8.93)	8.63 (7.15-10.6)	9.89 (8.01-12.5)	11.2 (8.83-14.5)	13.0 (9.87-17.6)	14.5 (10.6-20.2)
20-day	2.87 (2.54-3.31)	4.08 (3.61-4.71)	5.75 (5.07-6.66)	7.17 (6.27-8.37)	9.18 (7.77-11.1)	10.8 (8.94-13.3)	12.5 (10.1-15.7)	14.3 (11.2-18.5)	16.8 (12.7-22.6)	18.8 (13.7-26.2)
30-day	3.39 (3.00-3.91)	4.81 (4.25-5.56)	6.81 (6.00-7.88)	8.51 (7.44-9.94)	11.0 (9.29-13.2)	13.0 (10.8-16.0)	15.1 (12.2-19.0)	17.3 (13.7-22.4)	20.5 (15.5-27.7)	23.1 (16.9-32.3)
45-day	4.01 (3.55-4.62)	5.65 (4.99-6.52)	7.97 (7.02-9.23)	9.99 (8.74-11.7)	13.0 (11.0-15.6)	15.4 (12.8-18.9)	18.0 (14.6-22.7)	20.8 (16.4-27.0)	24.9 (18.8-33.5)	28.2 (20.6-39.3)
60-day	4.62 (4.09-5.33)	6.43 (5.68-7.43)	9.04 (7.97-10.5)	11.3 (9.91-13.2)	14.7 (12.5-17.7)	17.5 (14.5-21.6)	20.6 (16.7-25.9)	23.9 (18.8-30.9)	28.7 (21.7-38.7)	32.7 (23.9-45.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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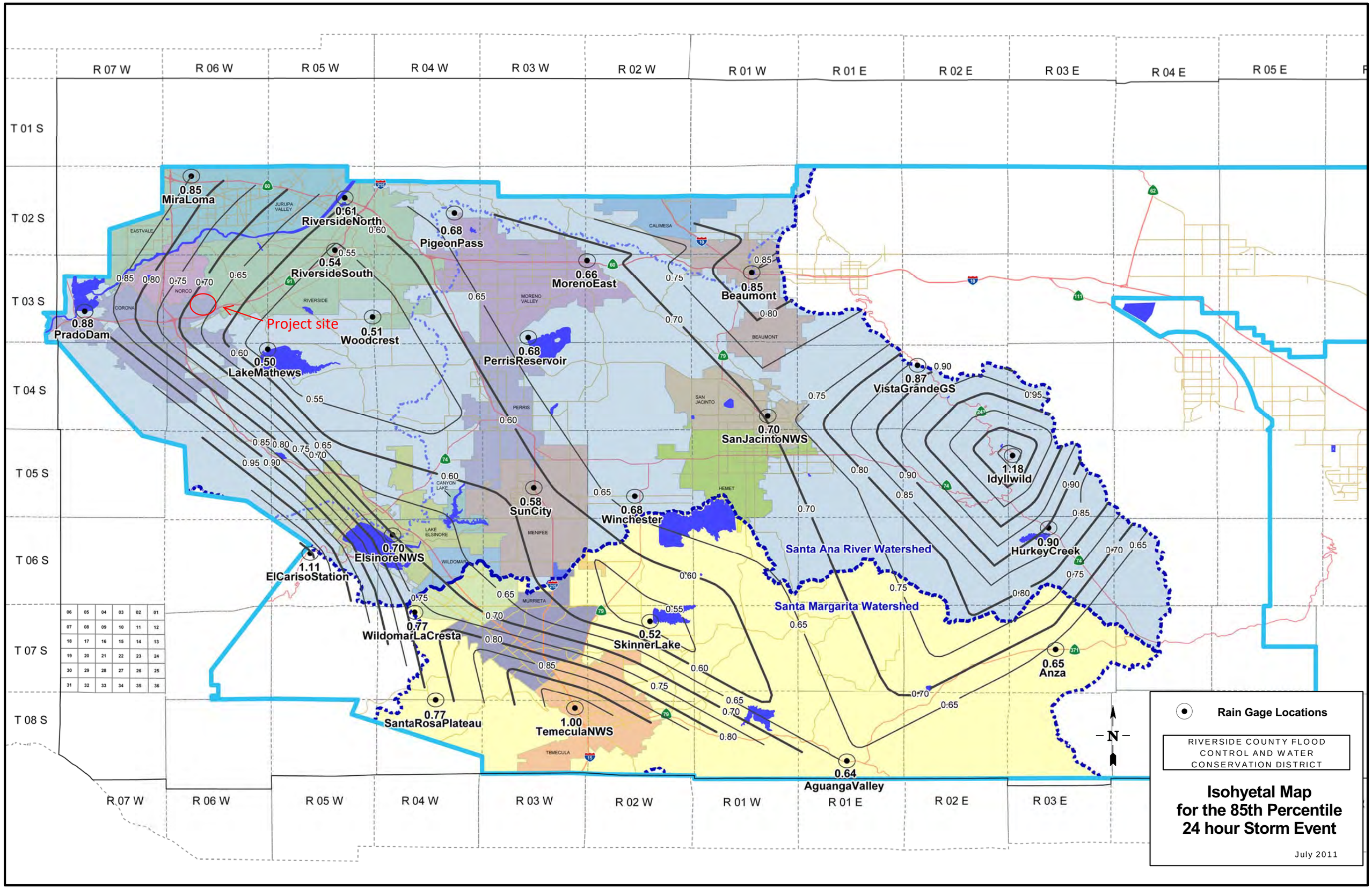
PF graphical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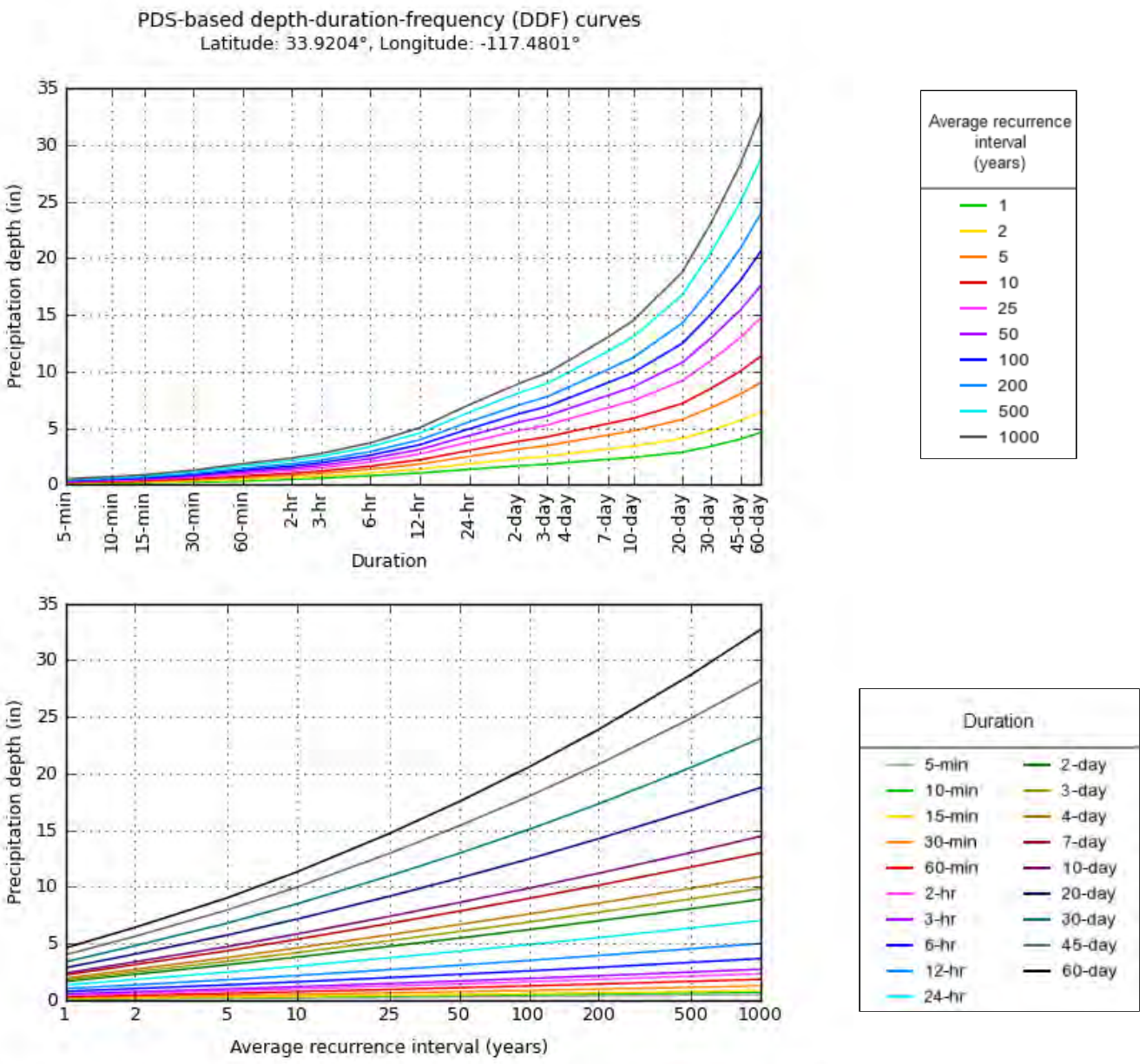
0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Project site
Santa Ana River Watershed
Santa Margarita Watershed
EASTVALE
JURUPA VALLEY
CORONA
NORCO
RIVERSIDE
MORENO VALLEY
CALIMESA
BEAUMONT
SAN JACINTO
PERRIS
HEMET
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MENIFEE
MURRIETA
TEMECULA
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011



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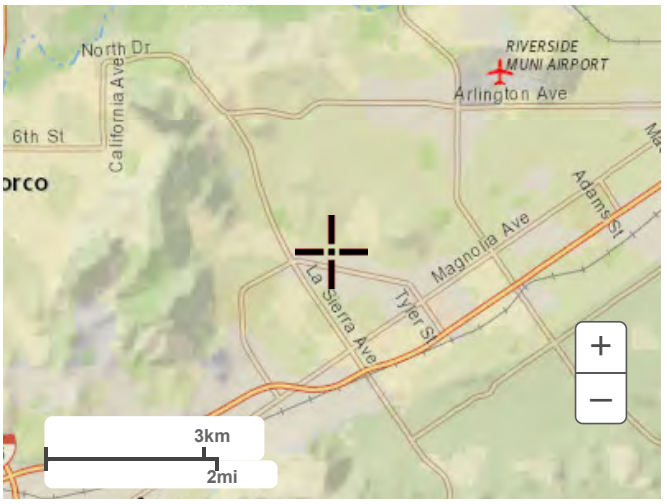
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **A.** On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☒ Maintain and periodically repaint or replace inlet markings. ☐ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☐ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☐ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☐ **B.** Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ **C.** Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☐ **D1.** Need for future indoor & structural pest control		☐ Note building design features that discourage entry of pests.	☐ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ **D2.** Landscape/ Outdoor Pesticide Use	☐ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining landscape areas, if any. ☒ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☐ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☐ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/ **Error! Hyperlink reference not valid.** ☒ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
❑ **F.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	❑ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
❑ **G.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **H.** Industrial processes.	❑ Show process area.	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**