WATER QUALITY TECHNICAL REPORT
AND
HYDROMODIFICATION MANAGEMENT PLAN
FOR
UNIVERSITY AND INNOVATION DISTRICT (UID)

(CONCEPTUAL)

Job Number 16693-A

September 17, 2015

RICK ENGINEERING COMPANY
ENGINEERING COMPANY
RICK ENGINEERING CO

RICK
ENGINEERING COMPANY

WATER QUALITY TECHNICAL REPORT
AND
HYDROMODIFICATION MANAGEMENT PLAN
FOR
UNIVERSITY AND INNOVATION DISTRICT (UID)

(CONCEPTUAL)

Job Number 16693-A

Brendan Hastie
R.C.E. #65809
Exp. 09/17

Prepared For:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard, Suite 200
La Mesa, California 91942
(619) 462-1515

Prepared By:

Rick Engineering Company
Water Resources Division
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

September 17, 2015

June 20, 2016

Mr. Tom Adler
City of Chula Vista
276 Fourth Avenue
Chula Vista, California 91910

SUBJECT: UNIVERSITY AND INNOVATION DISTRICT (UID) – CONCEPTUAL "PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT PLAN (PDP SWQMP)" (a.k.a. CONCEPTUAL WATER QUALITY TECHNICAL REPORT AND HYDROMODIFICATION MANAGEMENT PLAN)
(RICK ENGINEERING COMPANY JOB NUMBER 16693-A)

Dear Mr. Adler:

Pursuant to our discussion on March 3, 2016, this cover letter was prepared to supplement the following technical reports that were previously prepared:

- "Water Quality Technical Report for University and Innovation District (UID) (Conceptual)," dated September 17, 2015, prepared by Rick Engineering Company (herein referred to as the "WQTR")
- "Drainage Study for University and Innovation District (UID) (Conceptual)," dated September 17, 2015, prepared by Rick Engineering Company (herein referred to as the "Drainage Study")

The above referenced Conceptual WQTR (dated September 17, 2015) was previously prepared to address all the City of Chula Vista's outstanding review comments prior to the 2016 City of Chula Vista BMP Design Manual; therefore, the WQTR did not reflect the "format" of a Priority Development Project Storm Water Quality Management Plan (PDP SWQMP); however, it incorporated the anticipated design requirements based on the "2013 MS4" Permit (Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100).

In the above referenced WQTR, a total of five (5) "bioretention basins" (with subdrains and impermeable liners) were proposed that will serve as the primary stormwater management features for the project. These "bioretention basins" were designed to meet the intent of the "biofiltration BMP" design requirements in the 2013 MS4 Permit requirements (i.e. – pollutant control performance standard). The 2013 MS4 Permit requires Priority Development Projects (PDPs) to "retain" the design capture volume based on the 24-hour 85th percentile rainfall storm event (via Harvest and Use BMPs and/or Infiltration BMPs). If retention is determined to be technically infeasible, then the 2013 MS4 Permit allows the use of "Biofiltration BMPs" (with subdrain and impermeable liners). The retention design typically requires 36-hour drawdown time to be ready for "back-to-back storm". The project anticipates to use more drought-tolerant based plantings and the irrigation demand may not be sufficient to meet the drawdown time requirements. Secondly, based

on our current understanding of the site and a draft geotechnical investigation referenced in the WQTR, the majority of the project consists of Hydrologic Soil Type 'D" and infiltration is not anticipated to be feasible. Therefore, it is anticipated that the project will comply with the 2013 MS4 Permit requirements using "Biofiltration BMPs" (The "Biofiltration BMPs" would be equivalent to the "bioretention basins" with subdrains and impermeable liners). Minor adjustments may be necessary during future stages of design to reflect the requirements in the 2016 City of Chula Vista BMP Design Manual; however, the general BMP design approach/concept should not have to change significantly. Therefore, the five (5) "bioretention basins" (or "biofiltration BMPs") will continue to serve as the primary stormwater management features for the project.

In regards to hydromodification management plan (HMP) requirements (specific to flow control), major changes that took place in the 2013 MS4 Permit, as compared to the previous 2007 MS4 Permit, are that the "pre-project" condition is now based on the "pre-development" condition and the HMP exemption guidelines became more stringent. For the UID project, runoff from Phases I, II, and III of the project will be conveyed in a network of the proposed storm drain systems to proposed storm water management features for pollutant control and discharge directly to Otay River. Based on the approved San Diego Bay Watershed Management Area Water Quality Improvement Plan (WQIP), dated February 2016, a portion of Otay River is HMP exempt from the "Outfall to San Diego Bay" (downstream limit) to "Interstate 805" (upstream limit). The UID project will be situated upstream of the "Interstate 805"; however, it is our understanding that an additional HMP exemption study was prepared by an engineering consultant (reviewed by the City of San Diego) and submitted independently to the San Diego Regional Water Quality Control Board. The study recommends that hydromodification management exemption be reinstated for projects discharging runoff directly to the portion of Otay River from "Interstate 805" to "Lower Otay Reservoir Dam". Based on our conversation with the City of Chula Vista on March 3, 2016, it is anticipated that the above referenced HMP exemption study will be approved by the San Diego Regional Water Quality Control Board in the near future. Therefore, Phase I, II, and III of the project should continue to be exempt from the HMP requirements. If this exemption is not in place prior to final engineering for this project, the on-site BMPs will need to be upsized and/or additional BMPs will need to be implemented at that time.

In a similar fashion, runoff from Phase IV of the project will be conveyed in a network of storm drain systems towards the proposed storm water management features for pollutant control and discharges to Lower Otay Reservoir via a stabilized storm water conveyance system. Therefore, the Phase IV of the project should also continue to be exempt from the HMP requirements.

Lastly, in addition to the HMP flow control requirements, the project must consider the HMP sediment control pursuant to the 2013 MS4 Permit requirements. Based on the potential critical course sediment yield area (PCCSYA) map located in the San Diego Bay Watershed Management Area WQIP, it appears that a small portion of the project is identified as PCCSYA. However, this area is identified as "potential" only and it may require an additional analysis to determine if this area is considered truly critical to the downstream river/channel. The additional analysis can be performed during the future design stage (i.e. – preliminary engineering) to further assess the project's PCCSYA; however, this area is very small since the project is generally avoiding the steeper slopes surrounding the project area.

In conclusion, the WQTR, dated September 17, 2015, has incorporated adequate BMP design concepts in anticipation of the "2013 MS4" Permit (Order No. R9-2013-0001, as amended by Order Nos. R9-2015-0001 and R9-2015-0100). In the future, during preliminary engineering the WQTR will be replaced with a PDP SWQMP, specifically detailing the project permanent stormwater BMPs in accordance with the 2016 BMP Design Manual.

Please feel free to contact Nobu Murakami or myself if you have any questions and/or concerns at (619) 291-0707.

Sincerely,

RICK ENGINEERING COMPANY

Brendan C. Hastie
R.C.E. #65809, Exp. 09/17
Associate

BH:NM:vs:/files/text/16693-A.001

cc: Mr. Aaron Brownwood – HELIX Environmental Planning, Inc.
Ms. Karen Van Ert – Rick Engineering Company
Mr. John Goddard – Rick Engineering Company
Mr. Nobu Murakami – Rick Engineering Company

TABLE OF CONTENTS

1.0 Introduction 1
1.1 Project Description 1
1.2 Drainage Characteristics 2
1.3 Storm Water Regulations 2
2.0 Identification of Pollutants and Conditions of Concern 5
2.1 Identify Pollutants and Conditions of Concern 5
2.2 Identify Conditions of Concern 10
3.0 Geotechnical/Soils Summary 11
4.0 Permanent Storm Water BMPs 12
4.1 Low Impact Development (LID) and Site Design BMPs 12
4.2 Source Control BMPs 14
4.3 Treatment Control BMPs 16
4.4 Hydromodification Control BMPs 21
5.0 Storm Water BMP Maintenance 22
5.1 Typical Maintenance Procedures for Storm Water BMPs 22
5.2 Inspection and Maintenance Frequency 24
5.3 Qualifications of Maintenance Personnel 25
5.4 Record Keeping Requirements 25
6.0 Summary 26

Figures:

Figure 1: Vicinity Map 4

Tables:

Table 2-1: Anticipated and Potential Pollutants Generated by Land Use Type 7
Table 4-1: Relative Effectiveness and Ranking of Treatment Control BMPs 17
Table 5-1: Summary of Inspection and Maintenance Frequency (Minimum) 25

Appendices:

Appendix A: Permanent Storm Water BMPs Applicability Checklist – Form 5500
Appendix B: Hydrologic Unit Map and 2010 CWA Section 303(d) List of Water Quality Limited Segments
Appendix C: Water Quality Treatment Calculations and Typical Details
Appendix D: BMP Supporting Materials
Appendix E: City of Chula Vista Development Storm Water Manual Source Control and LID BMP Checklists
Appendix F: Storm Water Management Facilities Maintenance Agreement
Appendix G: Lower Otay Reservoir Requirements

Map Pockets:

Map Pocket 1: Water Quality Technical Report Exhibit for University and Innovation District (UID)

1.0 INTRODUCTION

1.1 Project Description

This conceptual water quality technical report (WQTR) summarizes permanent storm water BMP requirements for the University and Innovation District (UID) project (herein referred to as "the project") in support of conceptual grading study. The project will be constructed in four (4) Phases: Phase I, Phase II, Phase III, and Phase IV. Phases I, II, and III of the project is bounded by Hunte Parkway and Otay Ranch Village 11 to the north, Otay Ranch Village 9 (ORV 9) to the west, Otay Ranch Village 10 (ORV 10) and Otay River to the south, and Salt Creek to the east. Phase IV of the project is bounded by the United States Olympic Training Center to the north, Wueste Road and Lower Otay Reservoir (Lake) to the east and Salt Creek to the west. See Figure 1 for project location and map. The project is a mixed use development and proposes construction of educational facilities, commercial buildings, recreational facilities, office, and associated streets, parking lots and infrastructure.

More specifically, the proposed project would implement campus development planned for the site in the Otay Ranch and Eastlake III General Development Plans (GDPs), as amended. Approximately 353.8 acres of the project site is contained within Planning Area 10 of Otay Ranch GDP, while approximately 30 acres occur on the Lake Property portion of the Eastlake III GDP. The proposed maximum development area for the UID is 10,066,200 square feet that would support a total of 34,000 people including a mix of students, faculty, staff, residents, and office/retail workers. The university land uses are assumed to include up to 20,000 full-time students and 6,000 university faculty and staff. Innovation uses would include a mix of office, laboratory, and retail uses to support up to 8,000 jobs. Residents on the site are anticipated to include up to 5,400 students and 2,000 employees. A total of 13,500 parking spaces would be provided at full build-out to support the proposed UID SPA Plan development.

Based on the "Permanent Storm Water BMPs Applicability Checklist" (Form 5500) provided in the City of Chula Vista's guidance manual titled, "Development Storm Water Manual for Development & Redevelopment Projects," dated January 2011 (herein referred to as the "Development Storm Water Manual"), the project is a Priority Development Project (PDP). The following PDP categories apply to the project: "Commercial developments greater than one acre," "Restaurants," "All hillside development greater than 5,000 square feet," "Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff", "Streets, roads, highways, and freeways," and "Development Projects that result in the disturbance of one acre or more of land."

1.2 Drainage Characteristics

The project consists of ten (10) major drainage basins: Basins 100, 200, 300, 400, 500, 600, 700, 1000, 1100, and 1200. For locations of these drainage basins, refer to Map Pockets 1 and 2 of the Conceptual Drainage Study for this project. In the pre-project condition, runoff from Phase I and Phase II of the project (i.e. – Basins 100 and 200) sheet-flows in a southerly direction towards Otay River. Runoff from Phase III of the project (i.e. – Basins 300, 400, 500, 600, and 700) sheet-flows in a southeasterly direction towards Salt Creek, which flows in a southerly direction and confluences with Otay River. Runoff from Phase IV of the project (i.e. – Basins 1000, 1100, and 1200) sheet-flows in an easterly directions towards three (3) existing culvert crossings beneath Wueste Road and outlets into Lower Otay Reservoir.

In the post-project condition, the general drainage characteristics will remain similar as compared to the pre-project condition. Runoff from Phase I and Phase II will be conveyed in the southerly direction via a network of the on-site proposed storm drain systems, which will connect to the proposed storm drain system as part of the future ORV 10 development and directly discharge into Otay River. Runoff from Phase III will be conveyed in a southwesterly direction via a network of on-site proposed storm drain systems and a proposed storm drain system through an off-site easement that will outlet into a proposed storm water management feature (i.e. – bioretention basin) located northwest of the confluence of Salt Creek and Otay River and discharge directly into Otay River. Runoff from Phase IV will be conveyed in an easterly direction via a network of on-site proposed storm drain systems towards the proposed storm water management features (i.e. – bioretention basins) for Basins 1100 and 1200 (except Basin 1000 will be a self-treating area) and outlet into Lower Otay Reservoir via three (3) proposed culvert crossings in the future that will replace the three (3) existing culvert crossings beneath Wueste Road.

1.3 Storm Water Regulations

The project is subject to the National Pollutant Discharge Elimination System (NPDES) requirements. The NPDES requirements are contained in Section 402(p) of the Federal Clean Water Act, which established a framework for regulating storm water discharges from municipal, industrial, and construction activities. These requirements are implemented through permits issued by the State Water Resources Control Board (SWRCB), the San Diego Regional Water Quality Control Board (herein referred to as the "SDRWQCB"), and/or the governing municipality (City of Chula Vista).

For the purposes of the municipal storm water requirements, the project will follow the guidelines set forth in the following document:

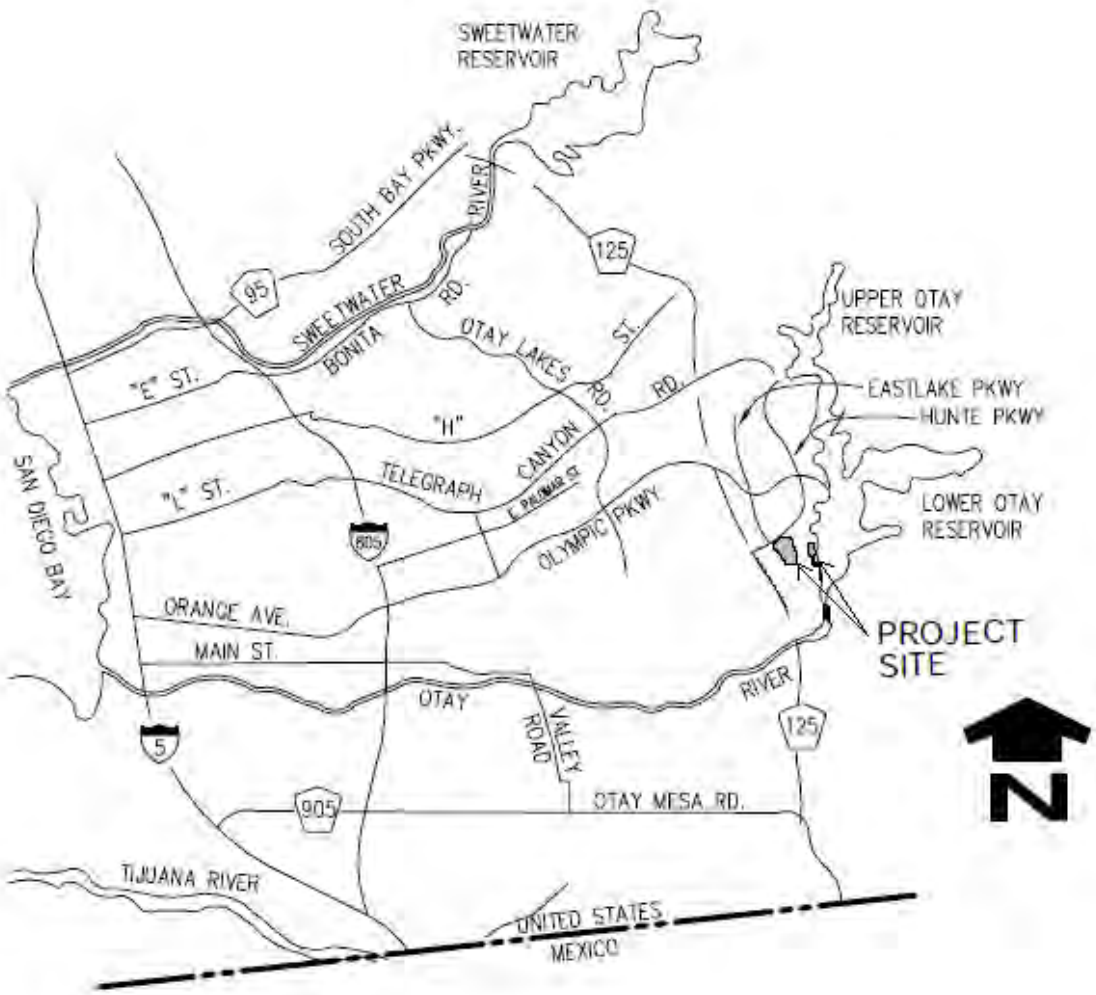
- The City of Chula Vista's guidance manual titled, "Development Storm Water Manual for Development and Redevelopment Projects," dated January 2011.

Section 3 of the Development Storm Water Manual provides guidance for new development and redevelopment projects to achieve compliance with the City of Chula Vista's Standard Urban Storm Water Mitigation Plan (SUSMP) requirements. The SUSMP requirements are based on the Municipal Storm Water Permit adopted by the SDRWQCB, dated January 24, 2007, Order No. R9-2007-0001 and the Chula Vista Municipal Code Chapter 14.20.

The following sections of this conceptual WQTR describe the pollutants and conditions of concern for the project (Section 2.0), the hydrologic soil characteristics (Section 3.0), the proposed BMPs for the project (Section 4.0), and the operation and maintenance requirements for the proposed BMPs (Section 5.0).

Note: Following the authoring of this report, the 2013 MS4 Permit for the San Diego Region went into effect for permanent stormwater BMP requirements, as of February 16, 2016. Therefore, future water quality related design and reports will follow the 2016 City of Chula Vista BMP Design Manual, including the template for Priority Development Project Storm Water Quality Management Plans (PDP SWQMPs). A supplemental cover letter has been prepared describing the changes that occurred from the 2007 MS4 Permit to the 2013 MS4 Permit, including how the UID project will comply accordingly.

Figure 1: Vicinity Map



Vicinity Map
Not to Scale

2.0 IDENTIFICATION OF POLLUTANTS AND CONDITIONS OF CONCERN

Section 3.6.1 and 3.6.2 of the City of Chula Vista's Development Storm Water Manual outlines the procedure for the selection of storm water BMPs. The procedure begins with identification of pollutants and conditions of concern, which is discussed below.

2.1 Identify Pollutants and Conditions of Concern

Section 3.6.1 of the City of Chula Vista's Development Storm Water Manual defines nine general categories of water pollutants. These definitions have been reproduced below:

1. **Sediments** – Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.
2. **Nutrients** – Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.
3. **Metals** – Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary sources of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.
4. **Organic Compounds** – Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

5. **Trash & Debris** – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.
6. **Oxygen-Demanding Substances** – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.
7. **Oil and Grease** – Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.
8. **Bacteria and Viruses** – Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.
9. **Pesticides** – Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

2.1.1 Identify Pollutants from the Project Area

Table 3.1 of the Development Storm Water Manual, *Anticipated and Potential Pollutants Generated by Land Use Type*, identifies general pollutant categories that are either anticipated or potential pollutants for general project categories. The following general project categories listed in Table 3.1 apply to the project: "Commercial Development > One Acre", "Restaurants," "Hillside Development > 5,000 ft^2," "Parking Lots," and "Streets, Highways & Freeways." Table 3.1 of the Development Storm Water Manual is renamed as Table 2-1 and reproduced on the following page, with the Priority Project Categories applicable to the project highlighted.

Table 2-1: Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
Priority Project Categories	**Sediments**	**Nutrients**	**Heavy Metals**	**Organic Compounds**	**Trash & Debris**	**Oxygen Demanding Substances**	**Oil & Grease**	**Bacteria & Viruses**	**Pesticides**
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development > One Acre	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Heavy Industry	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development > 5,000 ft^2	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

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

Source: City of Chula Vista "Development Storm Water Manual," dated January 2011.

Based on the highlighted rows, the "anticipated" and "potential" pollutants generated from the project include: sediments, nutrients, heavy metals, organic compounds, trash & debris, oxygen demanding substances, oil & grease, bacteria & viruses, and pesticides.

2.1.2 Identify Pollutants of Concern

To identify primary pollutants of concern in receiving waters, each priority project shall, at a minimum, do the following: (1) for each of the proposed project's discharge points, identify the receiving water(s) that each discharge point proposes to discharge to, including hydrologic unit basin number(s), as identified in the most recent version of the Water Quality Control Plan for the San Diego Basin, prepared by the SDRWQCB; (2) identify any receiving waters, into which the developed area would discharge to, listed on the most recent list of Clean Water Act Section 303(d) impaired water bodies and list any and all pollutants for which the receiving waters are impaired; and (3) compare the list of pollutants for which the receiving waters are impaired with the pollutants anticipated to be generated by the project (as discussed in the previous section). Any pollutants identified, as being associated with the site, which are also causing impairment of receiving waters shall be considered primary pollutants of concern. For projects where no primary pollutants of concern exist, those pollutants identified as discussed in the previous section shall be considered secondary pollutants of concern.

1. Water Quality Control Plan for the San Diego Basin (9) [San Diego Basin Plan]

According to the San Diego Basin Plan dated September 8, 1994 and amendments, Phases I, II, and III of the project are located in the following hydrologic basin planning areas: Otay Valley Hydrologic Area within the Otay Hydrologic Unit. The corresponding number designation is 910.20 (Region '9', Hydrologic Unit '10', Hydrologic Area '2'). Phase IV of the project is located in the Savage Hydrologic Area within the Otay Hydrologic Unit. The corresponding number designation is 910.31 (Region '9', Hydrologic Unit '10', Hydrologic Area '3', Hydrologic Subarea '1'). For location of hydrologic basin refer to a map provided in Appendix B of this report.

The San Diego Basin Plan also designates beneficial uses of inland surface waters and ground waters for each Hydrologic Unit Basin. Based on the *Water Quality Control Plan for the San Diego Basin* (dated September 8, 1994 and amendments), the following section discusses the beneficial uses of coastal waters and ground waters, which are designated for Otay River.

Inland Surface Waters

The following are designated as existing beneficial uses of inland surface waters for Otay River.

- **AGR** - Agricultural Supply - AGR waters are used of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- **REC2** – Non-contact Water Recreation – REC2 waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

- **WARM -** Warm Fresh Water Habitat - WARM waters includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
- **WILD** – Wildlife Habitat – WILD waters include uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife, or wildlife water and food sources.
- **RARE** – Rare, Threatened, or Endangered Species – RARE waters include uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

The following are designated as potential beneficial uses of coastal waters for Otay River.

- **IND** – Industrial Service Supply – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
- **REC1** – Contact Water Recreation – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.

Ground Waters

The following are designated as existing beneficial uses of ground waters in the Otay Valley Hydrologic area (910.20).

- **MUN** – Municipal and Domestic Supply – MUN waters are used for community, military, or individual water supply. These uses may include, but are not limited to, drinking water supply.
- **AGR -** Agricultural Supply - AGR waters are used of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- **IND** – Industrial Service Supply – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

2. 2010 Clean Water Act Section 303(d) List of Water Quality Limited Segments [303(d) List]

Phase I and II of the project discharge directly to Otay River, Phase III discharges to Salt Creek, which is a tributary of Otay River, and Phase IV drains to Lower Otay Reservoir. Otay River conveys flows in a westerly direction to the San Diego Bay which ultimately discharges into the Pacific Ocean. Based on the 2010 Clean Water Act Section 303(d) list of Water Quality Limited Segments, Otay River is not listed as impaired; however, San Diego Bay is listed as impaired for PCBs, and Lower Otay Reservoir is listed as impaired for nutrients, metals, pH (high), and color. For the project-specific 303(d) list, refer to a table provided in Appendix B of this report.

3. Primary Pollutants of Concern

The Development Storm Water Manual defines the primary pollutants of concern as any anticipated project pollutants associated with the site that are also causing impairment of the project's receiving waters. A portion of the project (Phase IV) is tributary to Lower Otay Reservoir and the project as a whole is tributary to Otay River and ultimately to San Diego Bay / Pacific Ocean. San Diego Bay is listed as impaired for PCBs, and Lower Otay Reservoir is impaired for nutrients and metals based on the 2010 303(d) List. Therefore, the primary pollutants of concern are pesticides, nutrients, and metals. The project's secondary pollutants of concern will include the additional pollutants of concern that were listed in Section 2.1.1: sediments, organic compounds, trash & debris, oxygen demanding substances, oil & grease, and bacteria & viruses.

2.2 Identify Conditions of Concern

Conditions of concern for the project are related to any relevant hydrologic and environmental factors that are to be protected specific to the project area's watershed. A change to a priority project site's hydrologic regime would be considered a condition of concern if the change would impact downstream channels and habitat integrity. Common impacts to the hydrologic regime resulting from development typically include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Pursuant to the Development Storm Water Manual, all Priority Development Projects shall address these potential impacts to downstream channels and habitat with a hydromodification management strategy as outlined in the SUSMP, unless the project and downstream receiving waters meet the requirements for an exemption from HMP criteria.

Runoff from Phases I, II, and III of the project will be conveyed in a network of the proposed storm drain systems to proposed storm water management features for water quality treatment and will discharge directly to Otay River. In a similar fashion, runoff from Phase IV of the project will be conveyed in a network of storm drain systems towards the proposed storm water management features for water quality treatment and will discharge to Lower Otay Reservoir via a stabilized storm water conveyance system. Since Phases I, II, and III of the project will be directly discharging into an exempt receiving water as defined in the Final HMP (i.e. – Otay River), and Phase IV of the project will be discharging into Lower Otay Reservoir via stabilized conveyance systems, HMP should not be required pursuant to the Development Storm Water Manual, dated January 2011 and the Final Hydromodification Management Plan, dated March 2011. Therefore, there are no conditions of concern related to erosion and habitat integrity resulting from a change to the hydrologic regime for the project site.

3.0 GEOTECHNICAL/SOILS SUMMARY

Section 4.5 of the Development Storm Water Manual requires a geotechnical/soils investigation of new development and redevelopment projects in the City of Chula Vista and a summary of the findings to be reproduced in the Water Quality Technical Report. The following italicized text is taken directly from the Development Storm Water Manual and identifies specific items that should be addressed following geotechnical investigations and input:

- *Soil erosion potential before and after grading, and recommendations for minimizing erosion.*
- *Potential for infiltration permanent BMPs in view of soil permeability, depth to water table, and other geotechnical consideration.*
- *Recommendations to enable the project to use LID Site Design BMPs, infiltration Treatment Control BMPs, or Hydromodification Control BMPs. Such recommendations may include deepening foundations, the use of impervious layers near foundation, installing under-drains, etc.*
- *Potential for temporary or permanent groundwater extraction, and if coverage under the NPDES Permit No CAG919001, R9-2007-0034, or any other re-issuances of those permits, or any other regulatory permit for discharges of groundwater to the Receiving Waters is required.*

A draft geotechnical investigation has been prepared for this project and it is titled, "Preliminary Geotechnical Evaluation University Park and Innovation District EIR Chula Vista, California HELIX Project No. CCV-08," dated September 18, 2014, prepared by Ninyo & Moore. The water quality design for the project will follow the recommendations from the above referenced geotechnical report (or any revisions thereafter). According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx), the majority of the project consists of Hydrologic Soil Type 'D'. Additionally, based on the findings in the above referenced draft geotechnical report; it is anticipated that infiltration will not be feasible. The proposed best management practices (BMPs) for the project are discussed in Section 4.0.

4.0 PERMANENT STORM WATER BMPs

Section 3.6.2 of the Development Storm Water Manual addresses the identification and implementation of all applicable storm water BMPs for the project. According to Section 3.6.2, all Priority Development Projects shall implement storm water BMPs in the following progression:

- Low Impact Development Site Design BMPs
- Source Control BMPs
- Treatment Control BMPs
- Hydromodification Control BMPs

4.1 Low Impact Development (LID) Site Design BMPs

The term "site design BMP" refers to any project design feature that reduces the creation or severity of potential pollutant sources, reduces the alteration of the project site's natural flow regime, or maintains or reduces pre-development erosion and protects stream habitat. This can be achieved by using LID techniques to promote infiltration.

The following discussion identifies the LID Site Design BMPs from Section 3.6.2.a of the Development Storm Water Manual that are proposed for the project. Italicized text is taken directly from the Development Storm Water Manual, and reproduced for this report. Portions of the italicized text are condensed from the Development Storm Water Manual. Immediately following and written in regular text, will be the response as it applies to the project. The low impact development site design BMP checklist, referred to as Table 3.3 in the Development Storm Water Manual is located in Appendix E. For other BMP supporting material refer to Appendix D of this report.

It is important to note that individual site plans will not be defined until future stages of the design development process; therefore, specifics on the location of LID measures cannot be provided at this time. However, the project will implement site-specific LID measures when each individual site plan is identified, as discussed further below.

Design Concept LID-1: Minimize Project's Impervious Footprint & Conserve Natural Areas

1. *Minimize and disconnect impervious surfaces.*
2. *Conserve natural areas, soils, and vegetation where feasible.*
3. *Construct walkways, trails, patios, overflow parking lots and alleys and other low-traffic areas with permeable surfaces, such as pervious concrete, permeable asphalt, unit pavers, and granular materials.*
4. *Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.*
5. *Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.*

6. *Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.*
7. *Use natural drainage systems to the maximum extent practicable.*
8. *Other site design options, which are comparable, and equally effective.*
9. *Minimize soil compaction.*

The project is undeveloped in the pre-project condition. The development footprint for the project is part of larger planning process that dedicated large open space areas to be preserved as part of the MSCP, including much of the Salt Creek corridor and the Otay River corridor. This contributes significantly to the conservation of more environmentally sensitive natural areas. In the post-project condition, proposed recreation fields and landscaped areas will assist in minimizing the amount of impervious surfaces, and impervious surfaces will be directed towards landscaping where feasible. The project will include trees throughout the project development to maximize canopy interception, and soil compaction of the downstream bioretention basins will be minimized to allow for incidental infiltration below the bioretention facilities.

Design Concept LID-2: Minimize Directly Connected Impervious Areas (DCIAs)

1. *Where landscaping is proposed, drain rooftops into adjacent landscaping prior to discharging to the storm drain.*
2. *Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.*
3. *Other design characteristics, which are comparable and equally effective.*

Where feasible, runoff from rooftops and other impervious surfaces will be directed to landscaped areas to the maximum extent practicable to help reduce the "effective" percent imperviousness for the project.

Design Concept LID-3: Protect Slopes and Channels

1. *Minimize disturbances to natural drainages.*
2. *Convey runoff safely from the tops of slopes.*
3. *Vegetate slopes with native or drought tolerant vegetation.*
4. *Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.*
5. *Stabilize permanent channel crossings.*
6. *Install energy dissipaters to minimize impacts to receiving waters.*
7. *Employ other design principles, which are comparable and equally effective.*

The site will not disturb the larger natural drainage systems to the east, southeast (Salt Creek), and south (Otay River). The site will be stabilized and landscaped in accordance with the City's Landscape Manual. Runoff will be conveyed safely away from the top of slopes via swales and/or area drains. Energy dissipaters area proposed at all storm drain outlet/outfall locations, and splash pads and/or landscape rocks will be provided for roof drain outlets and concentrated outlets into landscaped areas to help minimize potential erosion.

4.2 Source Control BMPs

The term "source control BMP" refers to land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimizes the contact between pollutants and urban runoff. The following discussion identifies the source control BMPs from Section 3.6.2.b of the Development Storm Water Manual that are proposed for the project. Italicized text is taken directly from the Development Storm Water Manual, and reproduced for this report. Portions of the italicized text are condensed from the Development Storm Water Manual. Immediately following and written in regular text, will be the response as it applies to the project. The source control BMP checklist, referred to as Table 3.4 in the Development Storm Water Manual, is located in Appendix E.

Design Concept SC-1: Provide Storm Drain System Stenciling and Signage

1. *Provide stenciling or labeling of all storm drain inlets and catch basins within the project area with prohibitive language (such as: "No Dumping – I Live Downstream") and/or graphical icons to discourage illegal dumping.*
2. *Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.*
3. *Maintain legibility of stencils and signs.*

Storm drain inlets and catch basins within the project will be stenciled or labeled with prohibitive language (such as: "No Dumping – I Live Downstream") and/or graphical icons to discourage illegal dumping. Legibility of the labels will be maintained. Illegal dumping signs will be posted where appropriate.

Design Concept SC-2: Design Outdoor Material Storage Areas to Reduce Pollution Introduction

1. *Hazardous materials with the potential to contaminate urban runoff shall either be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm drainage system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.*
2. *Storage areas shall be paved and sufficiently impervious to contain leaks and spills.*
3. *Storage areas shall have a roof or awning to minimize direct precipitation within the secondary containment area.*

Outdoor material storage areas are not anticipated for this project.

Design Concept SC-3: Design Trash Storage Areas to Reduce Pollution Introduction

All trash container areas shall meet the following requirements:

1. *Paved with an impervious surface, designed not to allow run-on from adjoining areas, screened or walled to prevent off-site transport of trash; and*
2. *Covered with a roof or awning to minimize direct precipitation.*
3. *Designed in accordance with Chula Vista Municipal Code Section 19.58.340.*

All trash storage areas and they will be designed to meet the above requirements.

Design Concept SC-4: Use Efficient Irrigation Systems & Landscape Design

1. *Employ rain shutoff devices to prevent irrigation after precipitation.*
2. *Design irrigation systems to each landscape area's specific water requirements.*
3. *Use flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.*
4. *Employ other comparable, equally effective methods to reduce irrigation water runoff.*

The irrigation system and landscape design for the project will meet the above requirements.

Design Concept SC-5: Incorporate Requirements Applicable to Individual Priority Project Categories

Projects shall adhere to each of the individual priority project category requirements that apply to the project, see *a.* through *k.* (pages 3-25 to 3-28) of the Development Storm Water Manual. The individual priority project categories that apply to the proposed project are: *b. Residential Driveways & Guest Parking*, *h. Parking Areas*, and *k. Hillside Landscaping.* Italicized text is taken directly from the Development Storm Water Manual, and reproduced for this report. Immediately following and written in regular text, will be the response as it applies to the project.

b. Residential Driveways & Guest Parking
Driveways and private residential parking areas shall use at least one of the following features:

1. Design driveways:
a. With shared access;
b. Flared (single lane at street);
c. Paved only under tires; or,
d. To drain into landscaping
2. Pave uncovered parking on private residential lots with a permeable surface, or design parking to drain into landscaping.
3. Other features which are comparable and equally effective, as determined by the City Engineer.

The residential driveways and guest parking will be designed pursuant to the design guidelines shown above.

h. Parking Areas

To minimize the offsite transport of pollutants from parking areas, the following design concepts shall be considered, and incorporated and implemented where determined applicable and feasible by the City of Chula Vista:

1. *Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.*
2. *Overflow parking (parking stalls provided in excess of the City of Chula Vista's minimum parking requirements) should be constructed with permeable paving.*
3. *Other design concepts, which are comparable and equally effective, as determined by the City Engineer.*

Where feasible, the parking areas will be designed pursuant to the design guidelines shown above.

i. Roadways

Priority roadway projects shall select Treatment Control BMPs following the treatment control selection procedure identified in Section 3.6.2.c.

Where feasible, roadways will be designed pursuant to the design guidelines shown above.

k. Hillside Landscaping

Hillside areas, as defined in this Manual, that are disturbed by project development shall be landscaped with deep-routed, drought tolerant plant species selected for erosion control, satisfactory to the City of Chula Vista.

Hillside landscaping will be design pursuant to guidelines shown above.

4.3 Treatment Control BMPs

"Treatment Control (Structural) BMP" means any engineered system designed and constructed to remove pollutants from urban runoff. Pollutant removal is achieved by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process. Pursuant to the Development Storm Water Manual, Priority Development Projects shall be designed to remove Pollutants of Concern through the implementation of treatment control BMPs with high or medium pollutant removal efficiency for the project's most significant pollutant category.

Table 4-1 below has been replicated from Table 3.5 of the Development Storm Water Manual. The table has been evaluated to determine appropriate treatment control BMPs for the project. The table is renamed as Table 4-1 for the purposes of this report.

Table 4-1: Relative Effectiveness and Ranking of Treatment Control BMPs

Pollutants of Concern	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Wetlands	Infiltration Facilities or Practices (LID)	Media Filters	High-rate biofilters	High-rate media filters	Hydro-dynamic Devices	Vegetated Swales
Coarse Sediment and Trash	High	High	High	High	High	High	High	High	High
Pollutants that tend to associate with fine particles during treatment	High	High	High	High	High	Medium	Medium	Low	Medium
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low	Low
Overall Ranking 1 (High) 5 (Low)	**2**	**3**	**2**	**1**	**3**	**4**	**4**	**5**	**4**

The following discussion identifies the storm water BMPs that will be utilized for the project. Italicized text is taken directly from the Development Storm Water Manual, and reproduced for this report. Portions of the italicized text are condensed from the Development Storm Water Manual. Immediately following and written in regular text, will be the response as it applies to the project.

Design Standard TC-1: Treatment Control BMP Selection

All Treatment Control BMPs for Priority Development Projects shall, at a minimum:

1. *Have high or medium pollutant removal efficiency for the project's most significant category of pollutants of concern. BMPs shall be selected in priority order from higher to lower rankings as determined from Table 3.5. Where lower ranking BMPs are selected, infeasibility of higher-ranking BMPs shall be demonstrated to the satisfaction of the City.*
2. *Target removal of Pollutants of Concern from urban runoff.*
3. *Treatment Control BMPs with low removal efficiencies may only be approved to augment more effective treatment facilities or under exceptional circumstances to where more effective facilities have been determined to be infeasible by the City.*

The following treatment control BMP is appropriate for the project:

- **Bioretention Basin** has been selected for use for the project. Bioretention basins filter storm water through plant roots and a biologically active soil mix before infiltrating into the native soil, if soil conditions permit. If soil conditions are not conducive to infiltration, then a sub-drain will be incorporated to convey flows into the storm drain system. Typically, an appropriate plant palette is specified by the landscape architect. Bioretention basins do not include concrete.

  A total of five (5) bioretention basins are proposed that will serve as TC-BMPs for the overall UID project. This includes two (2) bioretention basins to be constructed as part of the adjacent ORV 10 project that will treat Phase I and II, one (1) large bioretention basin that will treat Phase III, and two (2) smaller bioretention basins that will treat runoff from Phase IV. The bioretention basins will treat for sediments, trash, metals, bacteria, oil and grease, and organics at high efficiency. The bioretention basins will treat for nutrients at medium removal efficiency. A bioretention basin provides a higher level of treatment for several pollutants of concern in comparison to alternative treatment control BMP's. The site mostly consists of Type D soil, which precludes use of infiltration based BMPs, which has an overall ranking #1. The bioretention basin has an overall ranking #2.

Design Standard TC-2: Numeric Sizing

Depending on the type of Treatment Control BMPs selected for the project, either volume-based or flow-based numeric sizing methods shall be used as follows:

1. *Volume-based Treatment Control BMPs shall be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the County of San Diego's 85th Percentile Precipitation Isopluvial Map.*
2. *Flow-based Treatment Control BMPs shall be designed to mitigate (infiltrate, filter, or treat) either: a) the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour for each hour of a storm event; or b) the maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity (for each hour of a storm event), as determined from the local historical rainfall record, multiplied by a factor of two. For flow-based facilities, the Municipal Permit specifies the rational method be used to determine flow.*

At this time, the proposed bioretention basins, including the bioretention basins proposed as part of the future ORV 10 development, are anticipated to treat runoff from all Phases of the project. The three (3) proposed bioretention basins have been sized using the volume-based approach pursuant to the numeric sizing criteria established within Section 3.6.2.c of the City of Chula Vista Storm Water Standards. The treatment volume is determined as the maximum volume of runoff produced from the 24-hour, 85th percentile storm event. The rational method equation was used to determine the treatment volumes, based on the following equation:

- Rational method equation: $V = R_F PA$
- 'V' is the treatment volume in acre-feet,
- 'R_F' is the weighted runoff factor for the drainage area,
- 'P' is the 85th percentile precipitation in inches [24-hour, 85th percentile storm event per volume based numeric sizing criteria], converted to feet and
- 'A' is the drainage management area in acres

Note: Bioretention basins can be sized using either the volume-based approach or flow-based approach.

The 24-hour, 85th percentile storm event precipitations for the project ranges from 0.56 inches to 0.58 inches, according to the County of San Diego 85th Percentile Isopluvial Maps, dated August 7, 2003. The water quality treatment calculations are included in Appendix C of this report. Typical details of the proposed treatment control BMPs are also included in Appendix C, following the water quality treatment calculations.

Design Standard TC-3: Treatment Control BMP location

> *Treatment Control BMPs shall be located close to the pollutant sources to minimize costs and maximize pollutant removal prior to runoff entering receiving waters. Such BMPs may be located on- or offsite, used singly or in combination, or shared by multiple new developments, pursuant to the following requirements:*
>
> *a. All Treatment Control BMPs shall be located so as to infiltrate, filter, and/or treat the required runoff volume or flow prior to its discharge to any receiving water body supporting beneficial uses.*
> *b. Multiple post-construction Treatment Control BMPs for a single Priority Development Project shall collectively be designed to comply with the design standards.*
> *c. Treatment BMPs shall be located within project boundaries, where feasible.*

The bioretention basins were selected as a treatment control BMPs for the project. There will be a total of five (5) bioretention basins to treat the runoff from the project. Runoff from Phases I and II of the project (i.e. – Drainage Basins 100 and 200) is proposed to be treated via two (2) proposed bioretention basins that will be constructed as part of the future ORV 10 development. Runoff from Phase III of the project (i.e. – Basins 300, 400, 500, 600 and 700) will be treated via one (1) proposed bioretention basin to be located northwest of the Salt Creek and Otay River confluence. Runoff from Phase IV (i.e. – Basins 1100 and 1200) will be treated via two (2)

proposed bioretention basins. Basin 1000 is considered as a self-treating area. The proposed treatment control BMPs will comply with the City of Chula Vista Development Storm Water Manual. For locations of the proposed treatment control BMPs, refer to a map titled, "Water Quality Technical Report Exhibit for University Park and Research Center," located in Map Pocket 1 of this report.

Design Standard TC-4: Shared or Interim Treatment Control BMPs

> *The City may approve shared or Interim Treatment Control BMPs subject to the following standards:*
>
> 1. *Shared storm water BMPs shall be operational prior to the use of any dependent development or phase of development.*
> 2. *Interim storm water BMPs that provide equivalent or greater treatment than is required by these design standards may be implemented by a dependent development until each shared BMP is operational.*

Runoff from Phases I and II of the project will be treated by the proposed storm water management features that will be constructed as part of the future ORV 10 development. It is anticipated that the storm water management features will be operational prior to the development of Phases I and II. In the event that the Otay Ranch Village 10 project's bioretention basins are not complete by the completion of this project, a similar bioretention basin approach would be implemented within the project footprint during the initial phases, if necessary.

Design Standard TC-5: Restrictions on Use of Infiltration BMPs

> *Three factors significantly influence the potential for urban runoff to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in urban runoff, (iii) and soluble fraction of a pollutant. The risk of contamination of groundwater may be reduced by pretreatment of urban runoff. A discussion of limitations and guidance for infiltration practices is contained in, Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).*

Infiltration BMPs are not proposed for the project; therefore, this design standard should not apply.

City of San Diego Requirements for Lower Otay Reservoir

The Lower Otay Reservoir is a drinking water reservoir owned and operated by the City of San Diego Water Department. To protect reservoirs, the City of San Diego Water Department prepared a document titled, "Source Water Protection Guidelines for New Developments," dated January 2004, to guide future activities within the San Diego County watersheds which drain into drinking water reservoirs.

The aforementioned document provides a simple BMP selection process to ensure that priority source water protection guidelines are met. The guidelines are voluntary, but are consistent with state and local storm water permit requirements, as well as local planning protocols.

These requirements have been satisfied by collecting and treating to the Maximum Extent Practicable (MEP), the 85th percentile runoff (portion of runoff where the majority of pollutants accumulate) from the proposed project improvements. The project site, as shown on Figure 1 - Reservoir Watershed Index Map and Figure 1D, is within the Otay Watershed boundaries. By completing the Project Evaluation Worksheet contained in the above mentioned City of San Diego guidelines document, this project is determined to be a Tier 2 Project. As such, site design BMPs, source control BMPs, and treatment control BMPs are all considered for Phase IV of the project. Preliminary design of these BMPs can be found in Appendices C and E.

The Treatment Best Management Practices Technologies Matrix, as provided in the Source Water Protection Guidelines for New Developments in the San Diego Water Department Source Water Watershed is included in Appendix G. This table presents a summary of BMP performance in removing pollutants of concern for source water and urban runoff as well as some typical removal percentages for various BMPs.

The BMPs selected for Phase IV of the project site were selected to ensure a high level of treatment for stormwater runoff in order to protect Lower Otay Reservoir. There are a total of two (2) bioretention basins proposed within the Phase IV portion of the project, designed to treat storm water runoff before it enters the Lower Otay Reservoir. The location of the bioretention basins can be found in Map Pocket 1, Sheet 2 of 2.

4.4 Hydromodification Control BMPs

As discussed in Sections 1.0 and 2.0 of this report, runoff from Phases I, II, and III of the project will be conveyed in a network of the proposed storm drain systems to proposed storm water management features for water quality treatment and discharge directly to Otay River. In a similar fashion, runoff from Phase IV of the project will be conveyed in a next work of storm drain systems towards the proposed storm water management features for water quality treatment and discharges to Lower Otay Reservoir via a stabilized storm water conveyance system. In addition, since Phases I, II, and III of the project will be directly discharging into a hydromodification management plan (HMP) exempt portion of Otay River and Phase IV of the project will be discharging into Lower Otay Reservoir via stabilized conveyance systems, the HMP should not be required pursuant to the Development Storm Water Manual, dated January 2011 and the Final Hydromodification Management Plan, dated March 2011, prepared for the County of San Diego.

5.0 STORM WATER BMP MAINTENANCE

Pursuant to Section 3.7 of the Development Storm Water Manual, the City of Chula Vista will not consider storm water BMPs "effective," unless a mechanism is in place that will ensure ongoing long-term maintenance of all structural BMPs. This mechanism may be provided by the City or by the project proponent.

Typically, the project proponent will enter into a maintenance agreement obliging the project proponent to inspect, maintain, repair and replace the storm water BMPs as necessary. At this time, it is anticipated that the City of Chula Vista will maintain the proposed BMPs for this project; therefore, this section may not be applicable. However, this section is included as a reference in case a separate entity is identified prior to project completion. Pursuant to Section 3.7 of the Development Storm Water Manual, an Inspection, Operation, and Maintenance Plan (IOMP) will be prepared prior to issuance of a development permit to describe the designated responsible party to manage the BMPs, training requirements, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities, copies of resource agency permits (if applicable), record keeping requirements, and any other necessary activities. Designated responsible parties will be responsible for ensuring compliance of all maintenance activities outlined in the IOMP.

5.1 Typical Maintenance Procedures for Storm Water BMPs

Bioretention Basin

During inspection, the inspector shall check for the maintenance indicators given below:

- Accumulation of sediment, litter and/or debris at the inlets/outlets
- Standing water in the storage and draining layer indicating clogging in the underdrains
- Dislodged energy dissipaters or erosion

Routine maintenance of the Bioretention Basins shall include removal and proper disposal of accumulated materials (e.g., sediment, litter). After installation inspection should occur once a month for 4-6 months. After this time period inspection should occur annually, particularly after there has been heavy rain or storms.

If inspection indicates that the underdrains for the Bioretention Basins are clogged, the additional non-routine maintenance will be required to backwash and clear the underdrains. The party responsible to ensure implementation and funding of maintenance of permanent BMPs shall contract for additional cleaning and disposal services as necessary if non-routine cleaning and disposal is required.

Landscaped Areas

Inspection and maintenance of the vegetated areas may be performed by the landscape maintenance contractor.

During inspection, the inspector shall check for the maintenance indicators given below:

- Erosion in the form of rills or gullies
- Ponding water
- Bare areas or less than 70% vegetation cover
- Animal burrows, holes, or mounds
- Trash

Routine maintenance of vegetated areas shall include mowing and trimming vegetation, and removal and proper disposal of trash.

If erosion, ponding water, bare areas, poor vegetation establishment, or disturbance by animals are identified during the inspection, additional (non-routine) maintenance will be required to correct the problem. For ponding water or erosion, see also inspection and maintenance measures for irrigation systems. In the event that any non-routine maintenance issues are persistently encountered such as poor vegetation establishment, erosion in the form of rills or gullies, or ponding water, the party responsible to ensure that maintenance is performed in perpetuity shall consult a licensed landscape architect or engineer as applicable.

As applicable, IPM procedures must be incorporated in any corrective measures that are implemented in response to damage by pests. This may include using physical barriers to keep pests out of landscaping; physical pest elimination techniques, such as, weeding, squashing, trapping, washing, or pruning out pests; relying on natural enemies to eat pests; or proper use of pesticides as a last line of defense. More information can be obtained at the UC Davis website (http://www.ipm.ucdavis.edu/WATER/U/index.html).

Concrete Stamping

Inspection and maintenance of the concrete stamping may be performed by the building/facilities maintenance contractor or other employees of the project owner, as applicable. In addition, there may be storm drain maintenance contractors who will perform this service for a fee.

During inspection, the inspector(s) shall check for the maintenance indicators given below:

- Faded, vandalized, or otherwise unreadable concrete stamping

There are no routine maintenance activities for the concrete stamping. If inspection indicates the concrete stamping is intact, no action is required.

If inspection indicates the concrete stamping is not legible, the concrete stamping shall be repaired or replaced as applicable.

Irrigation Systems

Note: If the "landscaped area" above is determined to be non-applicable, this section may be removed in the next submittal.

Inspection and maintenance of the irrigation system may be performed by the landscape maintenance contractor.

During inspection, the inspector shall check for the maintenance indicators given below:

- Eroded areas due to concentrated flow
- Ponding water
- Refer to proprietary product information for the irrigation system for other maintenance indicators, as applicable

Refer to proprietary product information for the irrigation system for routine maintenance activities for the irrigation system, as applicable. If none of the maintenance indicators listed above is identified during inspection of the irrigation system, no other action is required.

If any of the maintenance indicators listed above are identified during the inspection, additional (non-routine) maintenance will be required to restore the irrigation system to an operable condition. If inspection indicates breaks or leaks in the irrigation lines or individual sprinkler heads, the affected portion of the irrigation system shall be repaired. If inspection indicates eroded areas due to concentrated flow from the irrigation system, the eroded areas shall be repaired and the irrigation system shall be adjusted or repaired as applicable to prevent further erosion. If inspection indicates ponding water resulting from the irrigation system, the irrigation system operator shall identify the cause of the ponded water and adjust or repair the irrigation system as applicable to prevent ponding water. Refer to proprietary product information for the irrigation system for other non-routine maintenance activities as applicable.

5.2 Inspection and Maintenance Frequency

Typically, maintenance requirements are site and product specific, and will depend on the particular land use activities and the amount of gross pollutants and sediment generated within the drainage areas. If it is determined during the regularly scheduled inspection and routine maintenance that the BMPs require more frequent maintenance to remove accumulated sediment, trash or debris, it may be necessary to increase the frequency of inspection and routine maintenance.

The Table below lists the storm water facilities to be inspected and maintained and the minimum frequency of inspection and maintenance activities.

Table 5-1. Summary of Inspection and Maintenance Frequency (Minimum)

BMP / IMP	Inspection Frequency	Maintenance Frequency
Bioretention Basins	Annual, and after major storm events	Routine maintenance to remove accumulated materials at the inlets and outlets: annually, on or before September 30th. As-needed maintenance based on maintenance indicators in Section 5.1
Landscaped Areas	Monthly	Routine mowing and trimming and trash removal: monthly Non-routine maintenance as-needed based on maintenance indicators in this section
Concrete Stamping	Annual	As-needed based on maintenance indicators in this section
Irrigation Systems	Monthly	As-needed based on maintenance indicators in this section

5.3 Qualifications of Maintenance Personnel

The LID and treatment control BMPs are features that are integrated into site layout, landscaping and drainage design. The typical maintenance activities for landscaped areas can generally be accomplished by typical landscape maintenance personnel. The contracting of additional services may be necessary if non-routine cleaning, disposal or repair is required for any of the project's storm water facilities.

If evidence of illegal dumping of hazardous materials is identified in a storm water facility, the illegally dumped materials shall be cleaned up and disposed of properly. Specialized clean up and disposal of illegally dumped hazardous materials may be outside of the owner expertise. In this event, the owner shall contract for additional cleaning and disposal services as necessary if non-routine cleaning and disposal is required.

5.4 Record Keeping Requirements

If a separate entity is identified prior to project completion, the project owner is responsible to ensure implementation and funding of maintenance of permanent BMPs and shall maintain records documenting the inspection and maintenance activities. Parties responsible for the operation and maintenance shall retain records for at least 5 years. It is anticipated that the project owner will contract for additional cleaning and disposal services as necessary if non-routine cleaning and disposal is required.

The maintenance of the facilities should be performed by a qualified Service Provider. The owner of the project will be responsible to select a Service Provider qualified to maintain these BMP facilities.

6.0 SUMMARY

This water quality technical report (WQTR) summarizes permanent storm water management requirements and proposed design features to meet these requirements for the University and Innovation District (UID) project. The project is a mixed development and proposes construction of office, educational facilities, commercial buildings and associated streets, parking lots and infrastructures.

The project is considered a priority project based on Section 3 of the Development Storm Water Manual because the following PDP categories apply to the project: "Commercial developments greater than one acre," "Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff", "Restaurants," "All hillside development greater than 5,000 square feet," "Streets, roads, highways, and freeways," and "All other pollutant generating Development Projects that result in the disturbance of one or more of land."

For the purposes of storm water quality management, the proposed project will follow the guidelines set forth in the following document:

- City of Chula Vista Development Storm Water Manual, dated January 2011

The project must address the water quality and hydromodification management plan (HMP) requirements. With regards to pollutants of concern, there are no direct discharges into receiving waters for the project that are currently listed as impaired based on the 2010 303(d) List, however, San Diego Bay is impaired for PCBs and Lower Otay Reservoir is listed as impaired for nutrients and metals, pH (high), and color. In accordance with the Final HMP for San Diego Region, dated March 2011 and the City of Chula Vista Storm Water Manual, dated January 2011, the project should be exempt from the HMP requirements since runoff from Phases I, II, and III will directly discharge into a HMP exempt portion of the Otay River and runoff from Phase IV will be conveyed via a stabilized conveyance system to Lower Otay Reservoir.

In general, a combination of LID site design, source control, and treatment control BMPs will be proposed throughout the project. The project will include three (3) proposed bioretention basins as treatment control BMPs to treat runoff from Phase III and Phase IV of the project. Two (2) additional bioretention basins proposed as part of the future ORV 10development will be utilized to treat Phases I and II of the project.

An Operation and Maintenance Plan (O&M Plan) will be prepared to describe the designated responsible parties to manage the proposed BMPs and the training requirements, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities, record keeping requirements, and any other necessary activities. For this project, it is anticipated that the City of Chula Vista is will maintain the proposed BMPs. If a separate entity is identified prior to project completion, the project owner is the responsible party for funding and maintenance of the BMPs implemented on-site.

APPENDIX A

Permanent Storm Water BMPs Applicability Checklist – Form 5500

CITY OF CHULA VISTA	**DEVELOPMENT SERVICES DEPARTMENT** 276 Fourth Avenue, Chula Vista, CA 91910 Phone: (619) 691-5021 Fax: (619) 691-5171	**PERMANENT STORM WATER BMPs APPLICABILITY CHECKLIST**
	FORM 5500	

Complete the following checklist to determine the project's permanent Best Management Practices requirements. This form must be completed and submitted with the permit application.

If one or more questions in the checklist are answered "Yes", the project is a Priority Development Project subject to the Standard Urban Storm Water Mitigation Plan (SUSMP) requirements in Section 3 of this Manual. If all answers are "No", please complete Form 5501 to select applicable Standard Permanent BMPs for your proposed project.

Project category descriptions in the following checklist are abbreviated for clarity. Please refer to the definitions in the NPDES Municipal Permit, Order No. R9-2007-0001, or Sections 3.1 and 9 of this Manual for expanded definitions of "Priority Development Projects" and "Redevelopment."

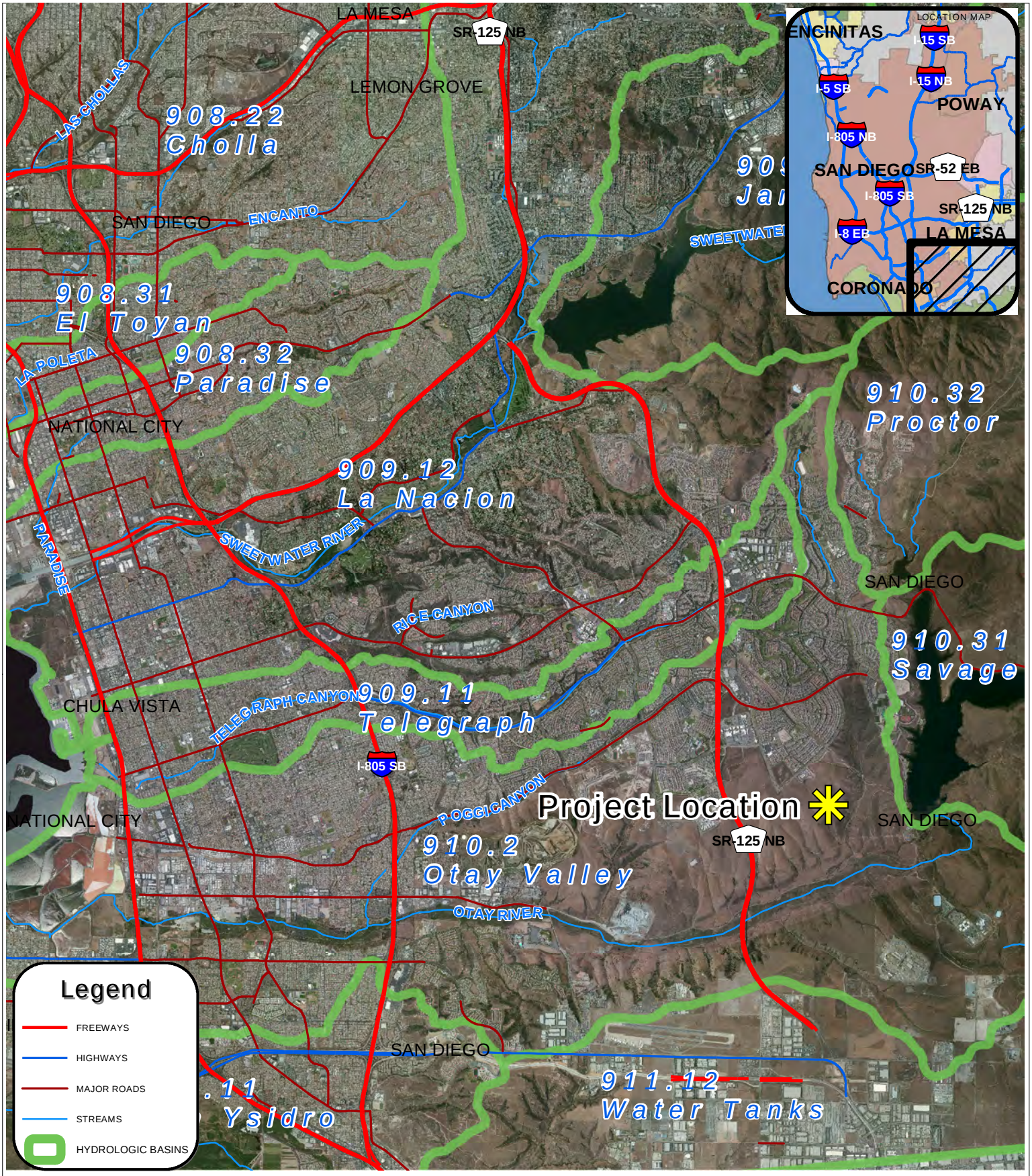
Does the project meet the definition of one or more of the Priority Development Project Categories below?

	Priority Development Project Categories	Yes	No
1	Housing subdivisions of 10 or more dwelling units.		✓
2	Commercial developments greater than one acre	✓	
3	Developments of heavy industry greater than one acre		✓
4	Automotive repair shops		✓
5	Restaurants	✓	
6	All Hillside development greater than 5,000 square feet	✓	
7	Development within or adjacent to Environmentally Sensitive Areas	✓	
8	Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff	✓	
9	Streets, roads, highways, and freeways	✓	
10	Retail Gasoline Outlets		✓
11	Development Projects that result in the disturbance of one acre or more of land	✓	
12	Redevelopment projects that create, add, or replace at least 5,000 square feet of impervious surfaces on an already developed site that falls under the project categories or locations listed above		✓

Limited Exclusion: Trenching and resurfacing work associated with utility projects are not considered Priority Development Projects unless the project results in new impervious surfaces. Parking lots, buildings, and other structures associated with utility projects are Priority Development Projects if one or more of the criteria is met.

APPENDIX B

Hydrologic Unit Map
and
2010 CWA Section 303(d) List of Water Quality Limited Segments



RICK ENGINEERING COMPANY

PREPARED BY GIS SERVICES DIVISION

1 inch = 8,000 feet

0 4,000 8,000 16,000 Feet

EXHIBIT DATE: 9/17/2015 REC JN: 16693

J:\16693_UPRC\GIS\16693_HydrologicUnitBaseMap.mxd

HYDROLOGIC UNIT FOR UNIVERSITY AND INNOVATION DISTRICT (UID)

THIS PROJECT LOCATED WITHIN THE CITY OF CHULA VISTA

2010 California 303(d) List of Water Quality Limited Segments*

Water quality limited segments requiring a TMDL(5A), being addressed by TMDL(5B), and/or being addressed by an action other than TMDL(5C).

REGION	REGION NAME	WATER BODY NAME	WBID	WATER BODY TYPE	WBTYPE CODE	INTEGRATED REPORT CATEGORY	USGS CATALOGING UNIT*	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT	POLLUTANT	POLLUTANT CATEGORY	FINAL LISTING DECISION	TMDL REQUIREMENT STATUS**	EXPECTED TMDL COMPLETION DATE***
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	Ammonia	Nutrients	List on 303(d) list (TMDL required list)	5A	2019
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	Color	Nuisance	Do Not Delist from 303(d) list (TMDL required list)	5A	2019
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	Iron	Metals/Metalloids	List on 303(d) list (TMDL required list)	5A	2019
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	Manganese	Metals/Metalloids	List on 303(d) list (TMDL required list)	5A	2019
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	Nitrogen	Nutrients	List on 303(d) list (TMDL required list)	5A	2021
9	Regional Board 9 - San Diego Region	Otay Reservoir, Lower	CAL910310001999111715 5943	Lake & Reservoir	L	5	18070304	91031000	1050	Acres	pH (high)	Miscellaneous	List on 303(d) list (TMDL required list)	5A	2019
9	Regional Board 9 - San Diego Region	San Diego Bay	CAB910100001999021013 2422	Bay & Harbor	B	5	18070304	91010000	10783	Acres	PCBs (Polychlorinated biphenyls)	Other Organics	List on 303(d) list (TMDL required list)	5A	2019

APPENDIX C

Water Quality Treatment Calculations
and
Typical Details

UID
J-16693-A
September 17, 2015

Water Quality Treatment Calculations for the Proposed LID-based Treatment Control BMPs (Bioretention Basins)

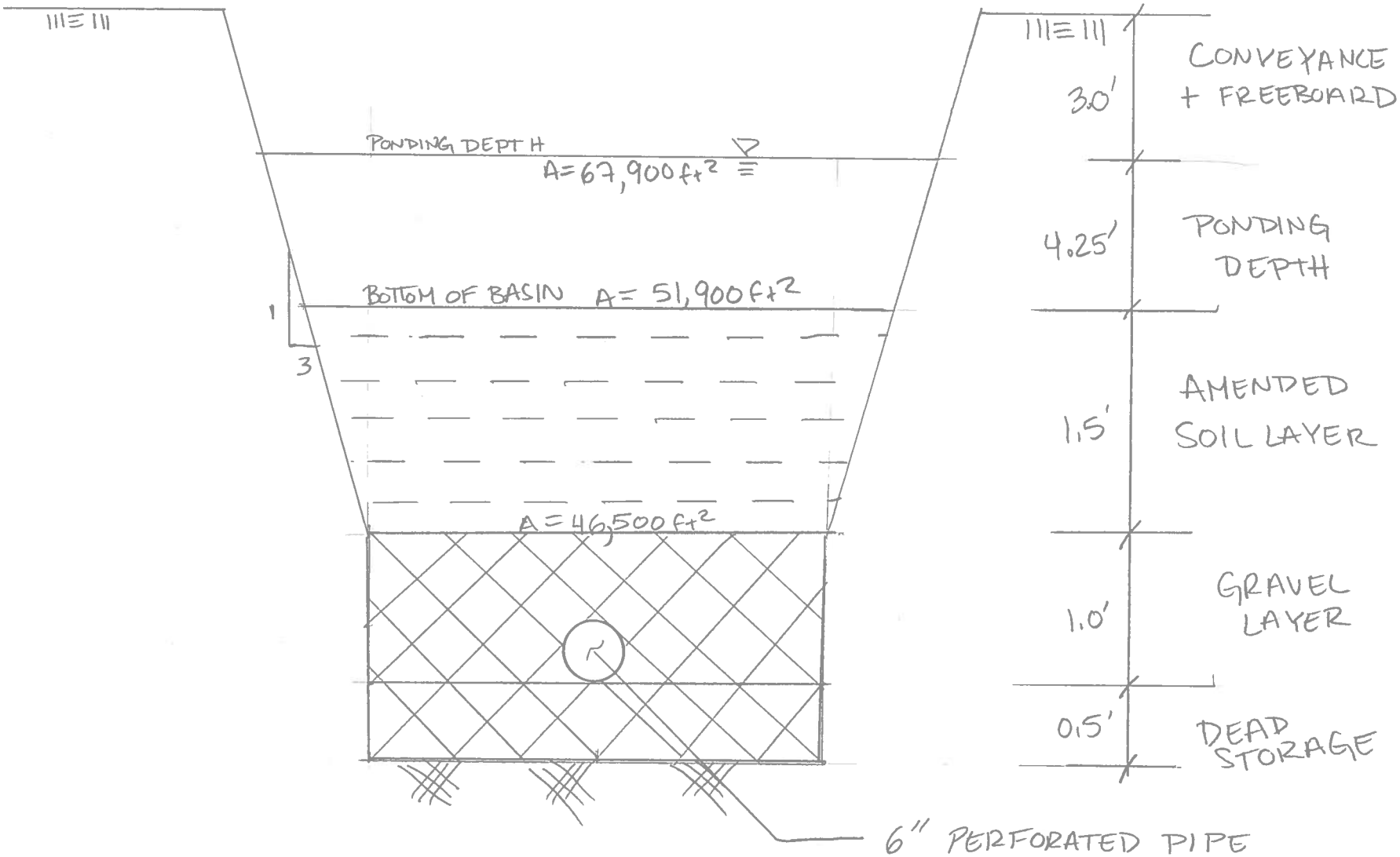
Bioretention Basin - Sized as volume-based BMPs using the 24-hour, 85th Percentile Precipitation											Bioretention Basin Property - Verify if the Provided Volume is Adequate						
Drainage Management Area (DMA)		**Area (ac)**	**Area (ft^2)**	**Impervious Percentage (weighed) [1]**	**Post-Project Surface Type**		**DMA Runoff Factor**	**DMA Area x Runoff Factor**	**85th Percentile [2] (in)**	**Minimum WQ Volume (ft^3)**	**Ponding Depth Layer (ft)**	**Bioretention (Amended) Soil Layer (ft)**	**Gravel Layer [3] (ft)**	**Total Effective Depth, d_E (ft)**	**Bioretention Side Slopes (z:1)**	**Conveyance + Freeboard (ft)**	**Approximate Provided Volume [4] (ft^3)**
100	Phase I	71.3	3,105,828	0.90	Impervious	2,795,245	1.0	2,795,245	0.56	131,894	Runoff from Basin 100 (Phase I) and adjacent street (Discovery Falls Drive) will be conveyed via proposed storm drain system through the future Otay Ranch Village 10 and treated in a proposed bioretention basin prior to directly discharging into Otay River. For details regarding the proposed bioretention basin, please refer to a separate Water Quality Technical Report prepared for Otay Ranch Village 10, prepared by Hunsaker & Associates.						
					Pervious	310,583	0.1	31,058									
	Adjacent Street	4.0	174,240	0.95	Impervious	165,528	1.0	165,528	0.56	7,765							
					Pervious	8,712	0.1	871									
200	Phase II	70.0	3,049,200	0.90	Impervious	2,744,280	1.0	2,744,280	0.56	129,489	Runoff from Basin 200 (Phase II) and adjacent streets (Discovery Falls Drive and University Drive) will be conveyed via proposed storm drain system through the future Otay Ranch Village 10 and treated in a proposed bioretention basin prior to directly discharging into Otay River. For details regarding the proposed bioretention basin, please refer to a separate Water Quality Technical Report prepared for Otay Ranch Village 10, prepared by Hunsaker & Associates.						
					Pervious	304,920	0.1	30,492									
	Adjacent Streets	15.0	653,400	0.95	Impervious	620,730	1.0	620,730	0.56	29,120							
					Pervious	32,670	0.1	3,267									
300, 400, 500, 600 & 700	Phase III	153.6	6,690,816	0.90	Impervious	6,021,734	1.0	6,021,734	0.56	286,667	4.25	1.5	1.0	5.25	3	3.0	302,700
					Pervious	669,082	0.1	66,908									
1100	Phase IV	7.7	335,412	0.27	Impervious	90,561	1.0	90,561	0.58	5,561	1.00	1.5	0.67	1.87	3	1.5	6,760
					Pervious	244,851	0.1	24,485									
1200	Phase IV	7.1	309,276	0.35	Impervious	108,247	1.0	108,247	0.58	6,204	1.00	1.5	0.67	1.87	3	1.5	6,760
					Pervious	201,029	0.1	20,103									

Notes:
1. This is the overall impervious percentage within the Drainage Management Area (DMA). In general, 90% impervious and 95% impervious were assumed for lots and streets, respectively. 0% impervious was assumed for landscaped (pervious) areas/slopes.
2. Pursuant to the San Diego County 85th Percentile Isopluvial Map, the 24-hour, 85th percentile precipitation ranges from approximately 0.56 inches to 0.58 inches for the project.
3. For storage calculations, the depth is measured from the top of the gravel to the flowline of the subdrain pipe (i.e. - ranges from 4" to 8"). Additional gravel below the subdrain pipe is considered "dead storage" and not considered for storage.
4. See attached Bioretention Basin Sketch for approximate bioretention footprint and geometry.

UID PHASE III
J-16693-A
9/17/15

BASINS 300, 400, 500, 600 & 700

TYPICAL LARGE BIORETENTION SKETCH

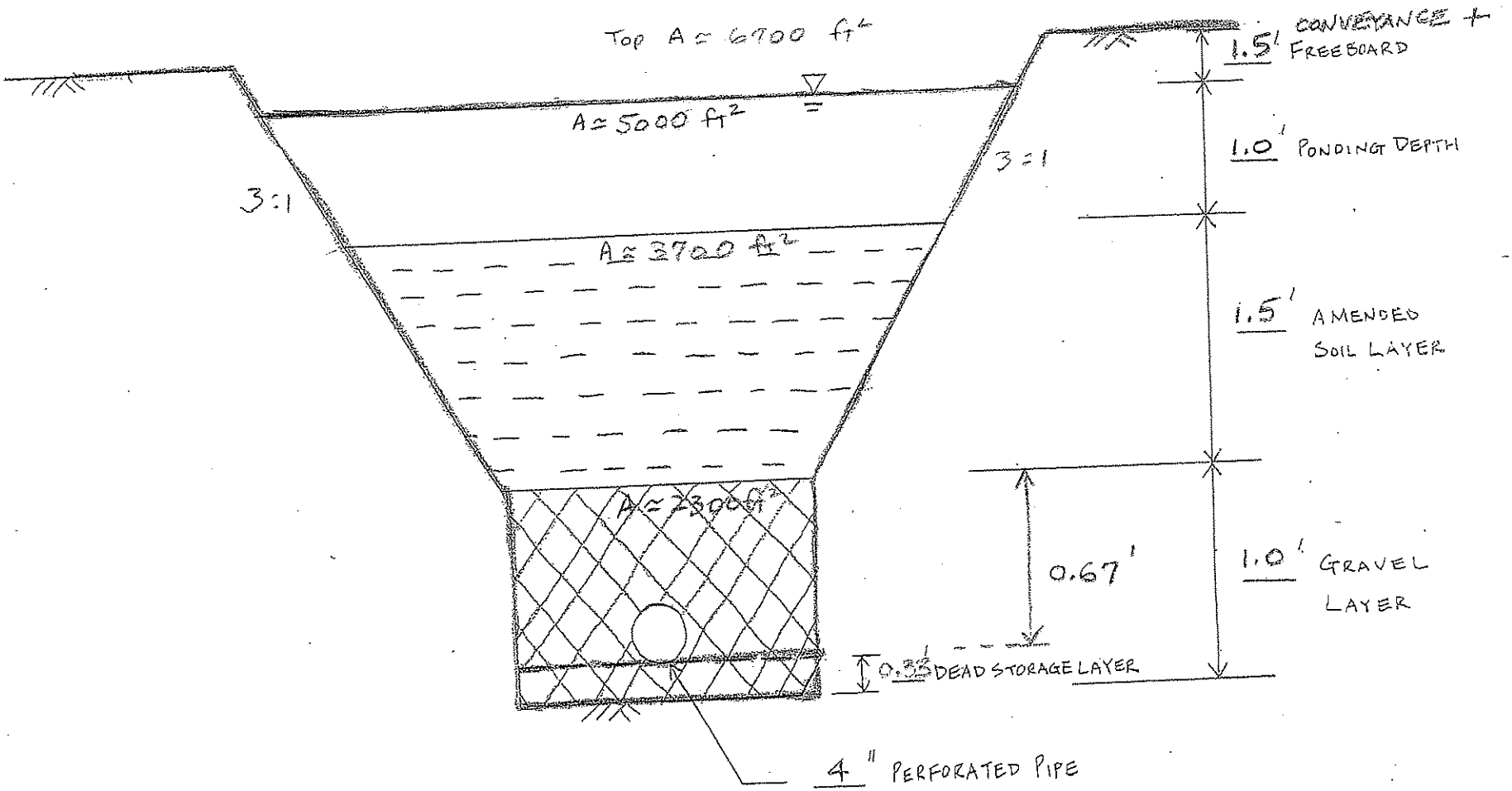


NOT TO SCALE

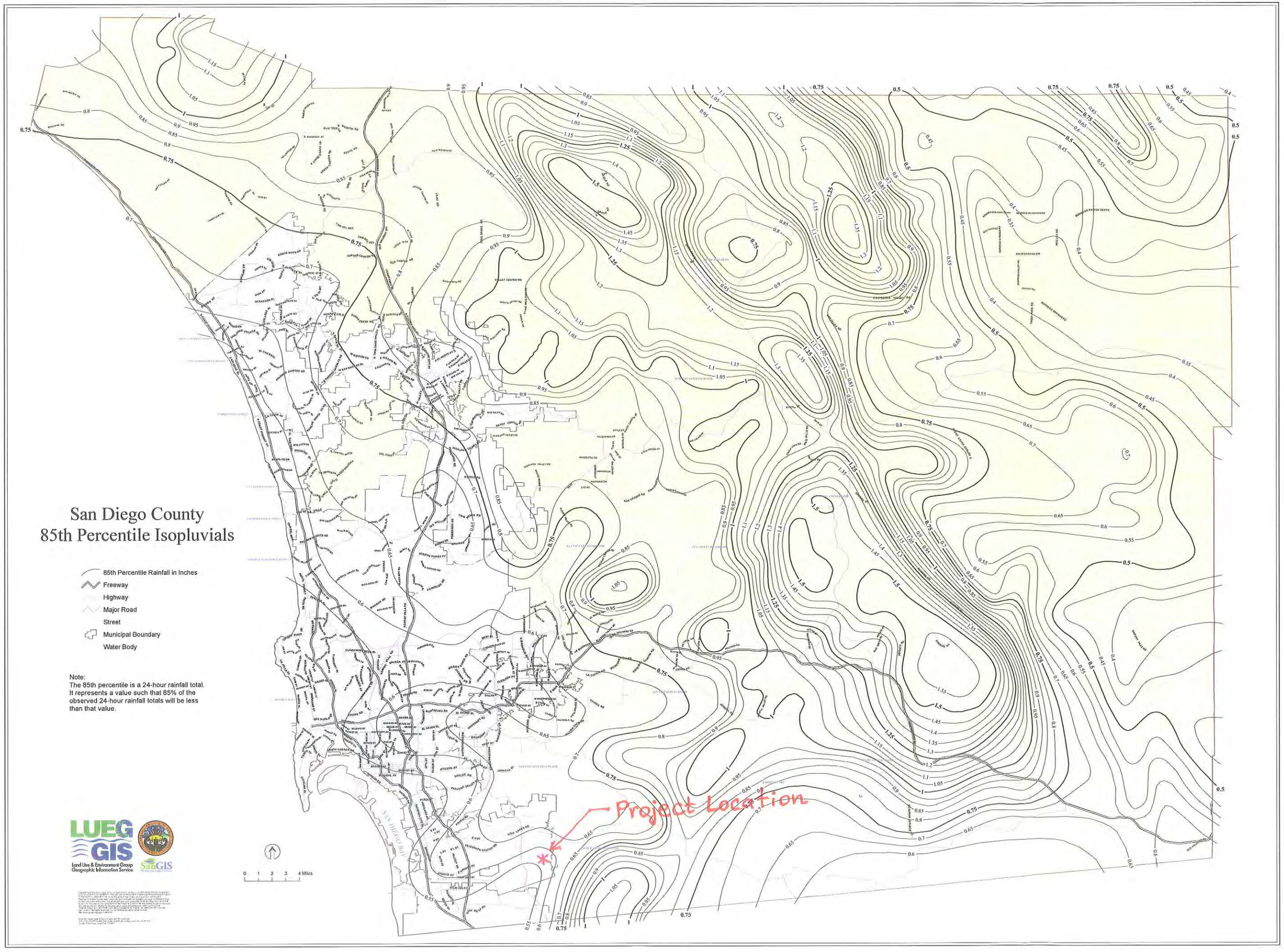
UPRC PHASE V
J-16693-A
11/22/13

Basin 1100
& Basin 1200

TYPICAL SMALL BIORETENTION BASIN SKETCH



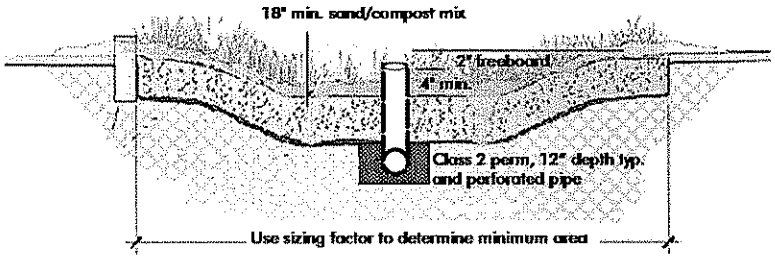
NOT TO SCALE


San Diego County
85th Percentile Isopluvials
85th Percentile Rainfall in Inches
Freeway
Highway
Major Road
Street
Municipal Boundary
Water Body
Note:
The 85th percentile is a 24-hour rainfall total.
It represents a value such that 85% of the observed 24-hour rainfall totals will be less than that value.
0 1 2 3 4 Miles
Project Location
LUEG GIS
Land Use & Environment Group
Geographic Information Service
SanGIS

APPENDIX D

BMP Supporting Materials

Bioretention Facilities



Bioretention facility configured for treatment-only requirements. Bioretention facilities can rectangular, linear, or nearly any shape.

Bioretention detains runoff in a surface reservoir, filters it through plant roots and a biologically active soil mix, and then infiltrates it into the ground. Where native soils are less permeable, an underdrain conveys treated runoff to storm drain or surface drainage.

Bioretention facilities can be configured in nearly any shape. When configured as linear **swales**, they can convey high flows while percolating and treating lower flows.

Bioretention facilities can be configured as in-ground or above-ground planter boxes, with the bottom open to allow infiltration to native soils underneath. If infiltration cannot be allowed, use the sizing factors and criteria for the Flow-Through Planter.

▶ CRITERIA

For development projects subject only to runoff treatment requirements, the following criteria apply:

Parameter	Criterion
Soil mix depth	18 inches minimum
Soil mix minimum percolation rate	5 inches per hour minimum sustained (10 inches per hour initial rate recommended)
Soil mix surface area	0.04 times tributary impervious area (or equivalent)

Best Uses

- Commercial areas
- Residential subdivisions
- Industrial developments
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

Advantages

- Can be any shape
- Low maintenance
- Can be landscaped

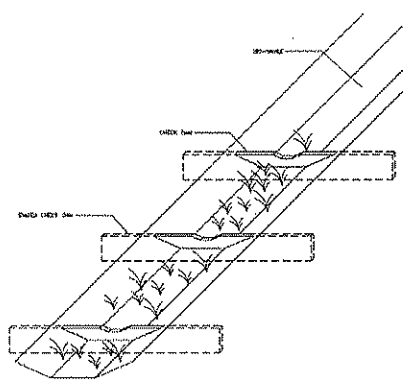
Limitations

- Require 4% of tributary impervious square footage
- Typically requires 3-4 feet of head
- Irrigation typically required

Parameter	Criterion
Surface reservoir depth	6 inches minimum; may be sloped to 4 inches where adjoining walkways.
Underdrain	Required in Group "C" and "D" soils. Perforated pipe embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point.

► DETAILS

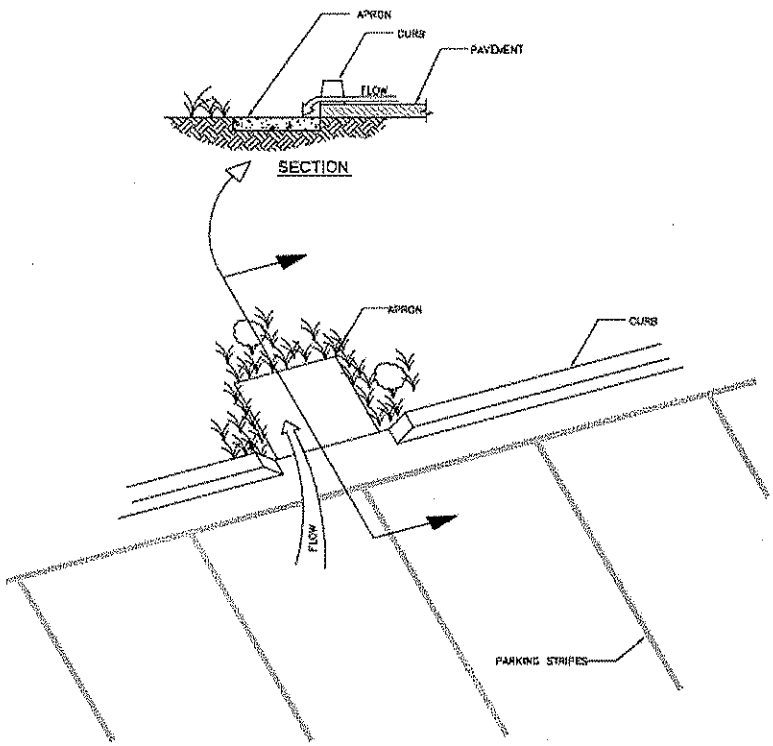
Plan. On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil mix.



Use check dams for linear bioretention facilities (swales) on a slope.

In a linear swale, check dams should be placed so that the lip of each dam is at least as high as the toe of the next upstream dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders.

Inlets. Paved areas draining to the facility should be graded, and inlets should be placed, so that runoff remains as sheet flow or as dispersed as possible. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 4"-6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.



Recommended design details for bioretention facility inlets (see text).

Where runoff is collected in pipes or gutters and conveyed to the facility, protect the landscaping from high-velocity flows with energy-dissipating rocks. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.

Upturned pipe outlets can be used to dissipate energy when runoff is piped from roofs and upgradient paved areas.

Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life. Typically, on-site soils will not be suitable due to clay content.

Storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is recommended. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock gravel layers. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

Underdrains. No underdrain is required where native soils beneath the facility are Hydrologic Soil Group A or B. For treatment-only facilities where native soils are Group C or D, a perforated pipe must be bedded in the gravel layer and must terminate at a storm drain or other approved discharge point.

Outlets. In treatment-only facilities, outlets must be set high enough to ensure the surface reservoir fills and the entire surface area of soil mix is flooded before the outlet elevation is reached. In swales, this can be achieved with appropriately placed check dams.

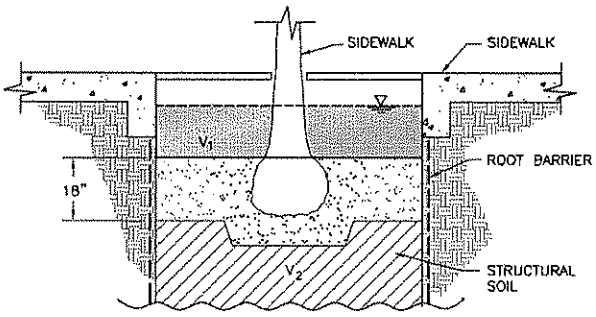
The outlet should be designed to exclude floating mulch and debris.

Vaults, utility boxes and light standards. It is best to locate utilities outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose. If utility structures are to be placed within the facility, the locations should be anticipated and adjustments made to ensure the minimum bioretention surface area and volumes are achieved. Leaving the final locations to each individual utility can produce a haphazard, unaesthetic appearance and make the bioretention facility more difficult to maintain.

Emergency overflow. The site grading plan should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

Trees. Bioretention areas can accommodate small or large trees. There is no need to subtract the area taken up by roots from the effective area of the facility. Extensive tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.

The bioretention facility can be integrated with a tree pit of the required depth and filled with structural soil. If a root barrier is used, it can be located to allow tree roots to spread throughout the bioretention facility while protecting adjacent pavement. Locations and planting elevations should be selected to avoid blocking the facility's inlets and outlets.



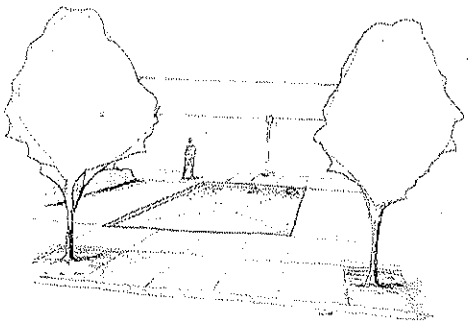
Bioretention facility configured as a tree well.
The root barrier is optional.

► APPLICATIONS

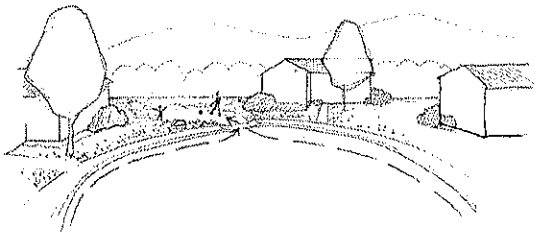
Multi-purpose landscaped areas. Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support turf or a plant palette suitable to the location and a well-drained soil.

Example landscape treatments:

- Lawn with sloped transition to adjacent landscaping.
- Swale in setback area
- Swale in parking median
- Lawn with hardscaped edge treatment
- Decorative garden with formal or informal plantings
- Traffic island with low-maintenance landscaping
- Raised planter with seating
- Bioretention on a terraced slope



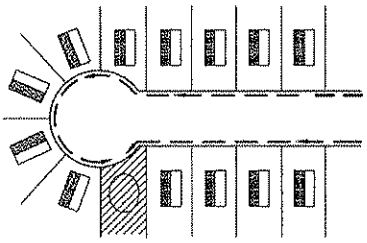
Bioretention facility configured as a recessed decorative lawn with hardscaped edge.



Bioretention facility configured and planted as a lawn/ play area.

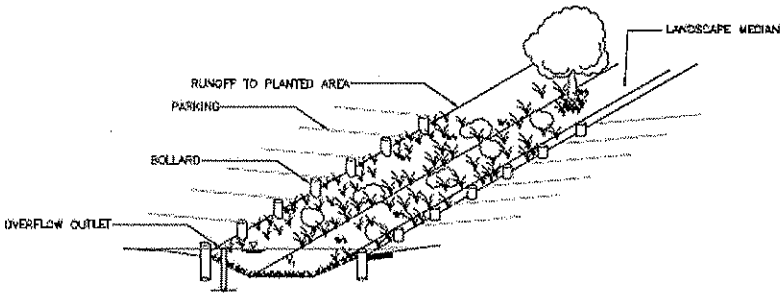
Residential subdivisions. Some subdivisions are designed to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 6 lots, depending on subdivision layout and topography.

If allowed by the local jurisdiction, bioretention areas can be placed on a separate, dedicated parcel with joint ownership.



Bioretention facility receiving drainage from individual lots and the street in a residential subdivision.

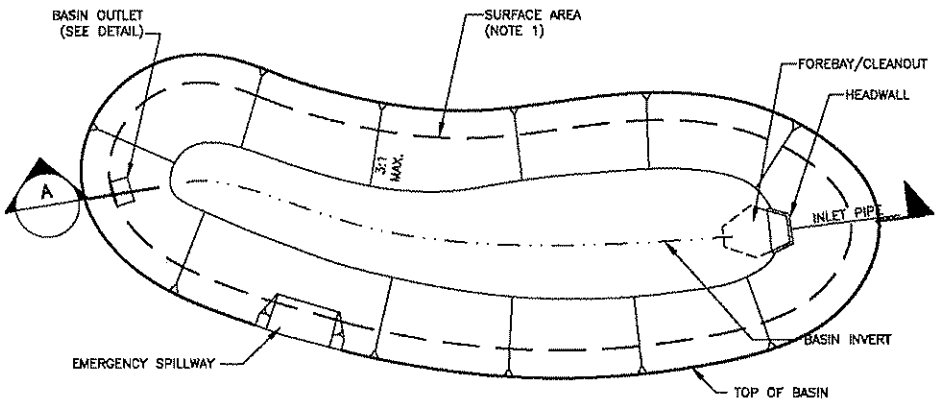
Sloped sites. Bioretention facilities must be constructed as a basin, or series of basins, with the circumference of each basin set level. It may be necessary to add curbs or low retaining walls.



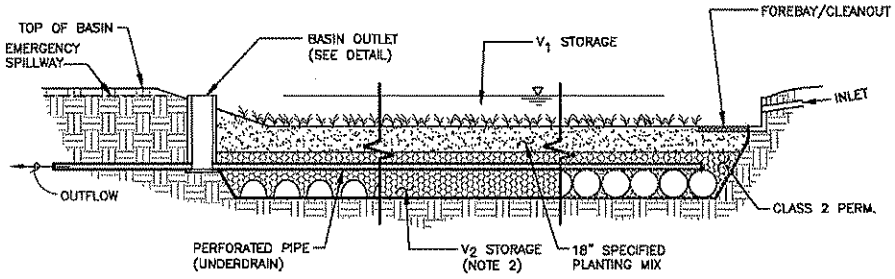
Bioretention facility configured as a parking median.
Note use of bollards in place of curbs, eliminating the need for curb cuts.

Design Checklist for Bioretention

- ☐ Volume or depth of surface reservoir meets or exceeds minimum.
- ☐ 18" depth "loamy sand" soil mix with minimum long-term percolation rate of 5"/hour.
- ☐ Area of soil mix meets or exceeds minimum.
- ☐ Perforated pipe underdrain bedded in "Class 2 perm" with connection and sufficient head to storm drain or discharge point (except in "A" or "B" soils).
- ☐ No filter fabric.
- ☐ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 6 inches and a watertight cap.
- ☐ Location and footprint of facility are shown on site plan and landscaping plan.
- ☐ Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. If facility is designed as a swale, check dams are set so the lip of each dam is at least as high as the toe of the next upstream dam.
- ☐ Inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.
- ☐ Overflow connected to a downstream storm drain or approved discharge point.
- ☐ Emergency spillage will be safely conveyed overland.
- ☐ Plantings are suitable to the climate and a well-drained soil.
- ☐ Irrigation system with connection to water supply.
- ☐ Vaults, utility boxes, and light standards are located outside the minimum soil mix surface area.
- ☐ When excavating, avoid smearing of the soils on bottom and side slopes. Minimize compaction of native soils and "rip" soils if clayey and/or compacted. Protect the area from construction site runoff.



PLAN VIEW
NOT TO SCALE



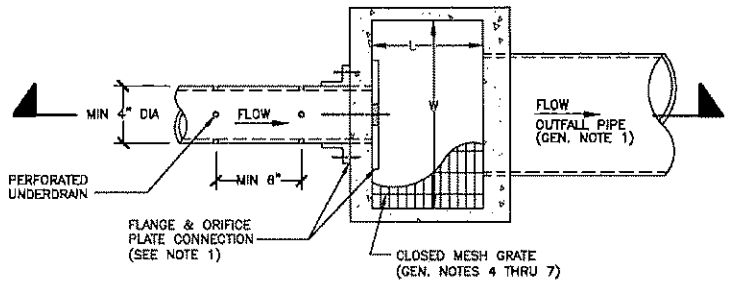
A SECTION
NOT TO SCALE

NOTE

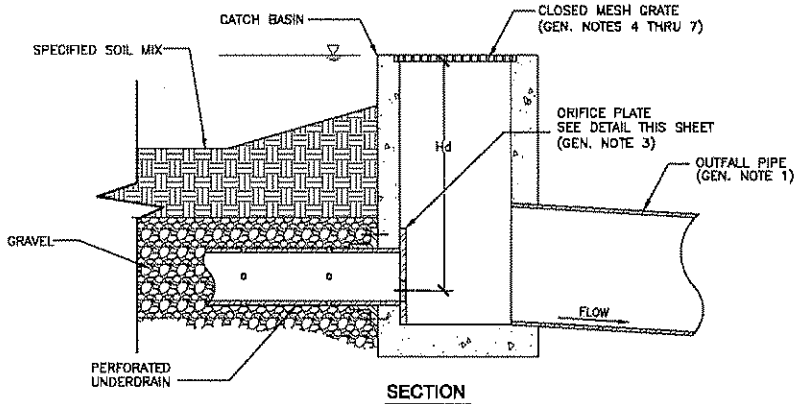
1. SURFACE AREA LIMIT DETERMINED BY EXTENT OF SPECIFIED PLANTING MIX, WHICH IS GOVERNED BY THE OUTLET SPILL ELEVATION. FOR REQUIRED SURFACE AREA REFER TO THE FACTORS AND EQUATIONS IN THE STORMWATER C.3 GUIDEBOOK.
2. V_2 STORAGE ACCOMPLISHED WITH INFILTRATION ARCHES, PERFORATED PIPES, CLASS 2 PERM OR OTHER AT THE DESIGNERS DISCRETION.

P:\Projects\San Diego County\133504 - SDCo Hydromod Management Plan\CAD\ES\DCCCP_Infiltration Basin.dwg 8-04-08 07:16:03 PM mellen

Bioretention Facility

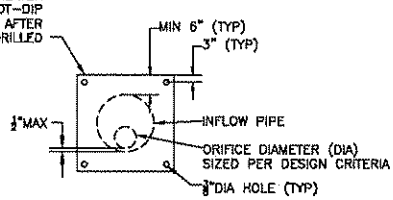


PLAN
N.T.S.



SECTION
N.T.S.

ORIFICE PLATE: MIN SQUARE DIMENSIONS 1.0 FT GREATER THAN PIPE DIA. HOT-DIP GALVANIZED PLATE AFTER HOLES HAVE BEEN DRILLED



FLOW CONTROL ORIFICE PLATE

NOTE

1. ORIFICE PLATE & FLANGE CONNECTION TO CONCRETE SHALL BE FITTED WITH 30 DUROMETER NEOPRENE RING.

Bioretention Facility Outlet Detail - A

APPENDIX E

City of Chula Vista Development Storm Water Manual

Source Control

and

LID BMP Checklists

Table 3.4 Source Control BMP Checklist

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words "No Dumping. Drains to Bay" or similar.	Maintain and periodically repaint or replace inlet markings. Provide storm water pollution prevention information to new property 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 dump anything into storm drains or store or deposit materials so as to create a potential discharge to storm drains."
Interior floor drains and elevator shaft sump pumps	Interior floor drains and elevator shaft sump pumps shall be plumbed to sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.
Interior parking garages	Parking garage floor drains shall be plumbed to the sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.
Need for future indoor & structural pest control	Implement building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners, lessees, and operators.
Landscape/ Outdoor Pesticide Use	Implement 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 storm water pollution. Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape.	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Provide IPM information to new owners, lessees and operators.

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
	To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	
Pools, spas, ponds, decorative fountains, and other water features		See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance, " in the CASAQ Stormwater Quality Handbooks at www.cabmphandbooks.com
Food service	Provide designated indoor cleaning areas, sized to ensure that the largest items can be accommodated. Floor drains in cleaning areas shall be connected to a grease interceptor before discharging to the sanitary sewer. Floor drains in cleaning areas shall not be connected to storm drains. Floor mats, containers, equipment, and other similar items shall be cleaned only in these areas.	Maintain designated cleaning areas in a clean condition at all times. Provide spill kits where detergents and other cleaning products are stored.
Refuse areas	Provide adequate number of waterproof trash containers. Containers should be equipped with lids that can be closed when not in use. Locate containers indoors or in enclosures with solid roof. Chula Vista Municipal Code requires trash enclosures to have solid roofs (with the exception of single family homes). Pave and grade trash enclosure areas to prevent run-on and provide berms where necessary to prevent runoff from the area. Post signs on or near dumpsters with the words "Do not dump hazardous materials here" or similar. Do not provide drains in trash enclosure areas.	Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Inspect and pick up litter daily and clean up spills immediately. Trash enclosures shall be cleaned only by sweeping or power washing. Power washing waste shall be collected. Do not allow power washing waste water to enter storm drain systems. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at http://www.cabmphandbooks.com/

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
Industrial processes.	If industrial processes are to be located on site, all process activities shall be performed indoors. No processes shall 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
Outdoor storage of equipment or materials.	Storage areas shall include structural features that prevent pollutants from entering storm drains. Where appropriate, comply with the requirements of local Hazardous Materials Programs for: • Hazardous Waste Generation • Hazardous Materials Release Response and Inventory • California Accidental Release Prevention (CalARP) • Aboveground Storage Tank • Uniform Fire Code Article 80 Section 103(b) & (c) 1991 • Underground Storage Tank Grade and berm outdoor storage areas to prevent run-on or run-off from area. Areas for outdoor storage of non-hazardous liquids shall be covered by a roof and contained by secondary containment such as berms, dikes, liners, or vaults. Storage of hazardous materials and wastes shall be in compliance with federal, state, and local laws, ordinances, and regulations.	See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at: www.cabmphandbooks.com
Vehicle and Equipment Cleaning	If a car wash area is not provided, take measures to discourage on-site car washing. 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. Multi-dwelling complexes are encouraged to have a paved, bermed, and covered carwash area. Such areas	Implement the following (if applicable): Wash water from vehicle and equipment washing operations shall not be discharged to the storm drain system. Car dealerships and similar may rinse cars with water only. No discharge shall be allowed into storm drain systems. See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
	shall drain to landscaping or the sanitary sewer system. Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or run-off from the area. Commercial carwash 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.	www.cabmphandbooks.com
Vehicle/Equipment Repair and Maintenance	All vehicle or equipment repair shall be conducted indoors. Any outdoor vehicle or equipment repair is subject to prior approval by the City of Chula Vista and the implementation of adequate BMPs to prevent run-on and run-off of storm water. Floor drains in repair areas shall not be connected to storm drainage systems. Connection of floor drains in repair areas to the sanitary sewer system requires prior approval by the City of Chula Vista Wastewater Engineering Section. No tanks, containers, or sinks connected to the sanitary sewer system shall be used for cleaning or rinsing vehicle or equipment parts unless permitted by the City of Chula Vista Wastewater Engineering Section.	No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinse water from parts cleaning into storm drains. No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.
Fuel Dispensing Areas	Fueling areas shall have impermeable floors (i.e., Portland Cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of storm water to the maximum extent practicable. Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. Alternatively, the fueling area must be covered and the cover's minimum	The fueling area shall be dry swept routinely as needed. See the Business Guide Sheet, "Automotive Service-Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
	dimensions must be equal to or greater than the area within the grade break or fuel dispensing area. The canopy (or cover) shall not drain onto the fueling area.	
Loading Docks	Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading areas. Water from loading dock areas should be drained or pumped to landscape areas where feasible. Direct connections to storm drains from depressed loading docks are prohibited. Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.	Move loaded and unloaded items indoors as soon as possible. See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer or landscaping.	See the note in Fact Sheet SC-41, "Building and Grounds Maintenance" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Miscellaneous Drain or Wash Water - Boiler drain lines - Condensate drain lines - Rooftop equipment - Drainage sumps - Roofing, gutters, and trim.	Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
Plazas, sidewalks, and parking lots.		Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris.

Pollutant Source	Permanent Source Control BMPs	Operational Source Control BMPs
		Debris from pressure washing shall be collected to prevent entry into the storm drain system. Wash-water containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer, if permitted by the City of Chula Vista Wastewater Engineering Section. It shall not be discharged to a storm drain system.

c. Treatment Control BMPs

Minimizing a development's detrimental effects on water quality can be most effectively achieved through the use of a combination of Low Impact Development Site Design, Source Control, Treatment Control, and Hydromodification Control BMPs. Where projects have been designed to minimize, to the maximum extent practicable, the introduction of anticipated Pollutants of Concern that may result in significant impacts to the receiving waters through the implementation of Low Impact Development Site Design and Source Control BMPs, the development would still have the potential for Pollutants of Concern to enter the storm drainage system. Therefore, priority projects shall be designed to remove Pollutants of Concern from the storm drainage system to the Maximum Extent Practicable through the incorporation and implementation of Treatment Control BMPs.

In meeting the requirements in this section, Priority Development Projects shall implement a single or combination of storm water BMPs that will remove anticipated Pollutants of Concern, as identified by the procedure in Section 3.6.1, in site runoff to the Maximum Extent Practicable. Treatment Control BMPs with a high or medium pollutant removal efficiency for the project's most significant category of pollutant shall be selected. The City of Chula Vista may approve Treatment Control BMPs with a low removal efficiency ranking only under exceptional circumstances and after the project proponent has conducted a feasibility analysis which exhibits that implementation of Treatment Control BMPs with a high or medium removal efficiency ranking are infeasible.

The following types of facilities have been determined to be appropriate for treatment of runoff potentially containing most pollutants of concern. These types of facilities can generally be used for storm water treatment for all land uses, except where site-specific constraints make them infeasible as approved by the City.

- Infiltration facilities or practices, including dry wells, infiltration trenches, infiltration basins, and other facilities that infiltrate runoff to native soils (sized to detain and infiltrate a volume equivalent to the 85th percentile 24-hour event.)

Table 3.3 Low Impact Development Site Design BMP Checklist

No.	Low Impact Development BMP
1	Conserve natural areas, including existing trees, other vegetaion, and soils.
2	Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.
3	Minimize the impervious footprint of the project.
4	Minimize soil compaction in planned green space (landscaped areas, lawns, etc.) and re-till soils when compacted by grading/construction equipment
5	Minimize disturbances to natural drainages (e.g., natural swales, topographic depressions, etc.)
6	Incorporate landscaped buffer areas between sidewalks and streets
7	Design residential streets for the minimum required pavement widths
8	Minimize the number of residential street cul-de-sacs and incorporate landscaped areas within cul-de-sac centers with curb-cuts to reduce their impervious cover
9	Use open space development that incorporates smaller lot sizes.
10	Increase building density while decreasing the building footprint.
11	Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together
12	Reduce overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.
13	Increase rainfall infiltration
14	Use permeable materials for private sidewalks, driveways, praking lots, and interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.)
15	Use curb-cuts to direct pavement runoff into swales, landscaping, and natural areas prior to entering the MS4
16	Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the storm drainage system
17	Pitch driveways and parking areas toward yards and vegetated areas prior to draining into the MS4
18	Conserve and utilize natural soils and/or use amended soils to encourage light infiltration/percolation
19	Maximize rainfall interception
20	Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs
21	Use cisterns/rain barrels to conserve and re-use rain water
22	Drain rooftops into adjacent landscaping prior to discharging to the storm drain
23	Drain roads, sidewalks, and impervious trails into adjacent landscaping
24	Protect slopes and channels
25	Use natural drainage systems to the maximum extent practicable
26	Plant native or drought tolerant vegetation on slopes
27	Design energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels

APPENDIX F

Storm Water Management Facilities Maintenance Agreement

THE STORM WATER MANAGEMENT FACILITIES MAINTENANCE AGREEMENT WILL BE PROVIDED UPON FINAL DESIGN OF THE PROJECT

APPENDIX G

Lower Otay Reservoir Requirements

RUNOFF CALCULATIONS

Unlike the SUSMP, the Source Water Protection Guidelines do not specifically require calculation of runoff volume. However, the design and application of BMPs to implement the Guidelines will require you to calculate runoff volumes in order to size BMPs appropriately. As a general rule, you should estimate pre-development and post-development runoff volumes. Ensuring that pre-development and post-development volumes are equal minimizes the water quality impacts of the project. Calculation of post-development runoff is also necessary for sizing any treatment BMPs required for the project. Appendix B to these Guidelines includes a summary of runoff coefficients and a discussion of runoff estimate methodologies.

HOW TO USE THE GUIDELINES

The Source Water Protection Guidelines are designed to be simple and easy to use. An overview of the Guidelines process is summarized on Figure 2 below. The process works as follows:

1. Review the Reservoir Watershed Index Map (Figure 1) to identify whether your project is located within a drinking water reservoir watershed.

2. If your project is located within a drinking water reservoir watershed, identify your project footprint on the applicable watershed map. See Figures 1(a)-1(d) (attached as hard copy and included on CD accompanying these Guidelines).

3. Complete the Project Evaluation Worksheet to identify what tier of protection (Tier 1, 2, or 3) is applicable for your project.

4. Work through Decision Guides A and B to select appropriate site design and source control BMPs for your project.

5. If your project falls into Tier 2 or Tier 3, work through Decision Guide C to identify alternative treatment BMP technologies. Use the Treatment BMP Technologies Matrix to compare the pollutant removal effectiveness and other factors for the various alternatives.

6. If your project falls into Tier 3, also consider Decision Guide D to identify potential treatment train and/or regional BMP systems.

7. Include the completed Source Water Protection Guidelines package with selected BMPs in your project's first formal submittal to the planning department.

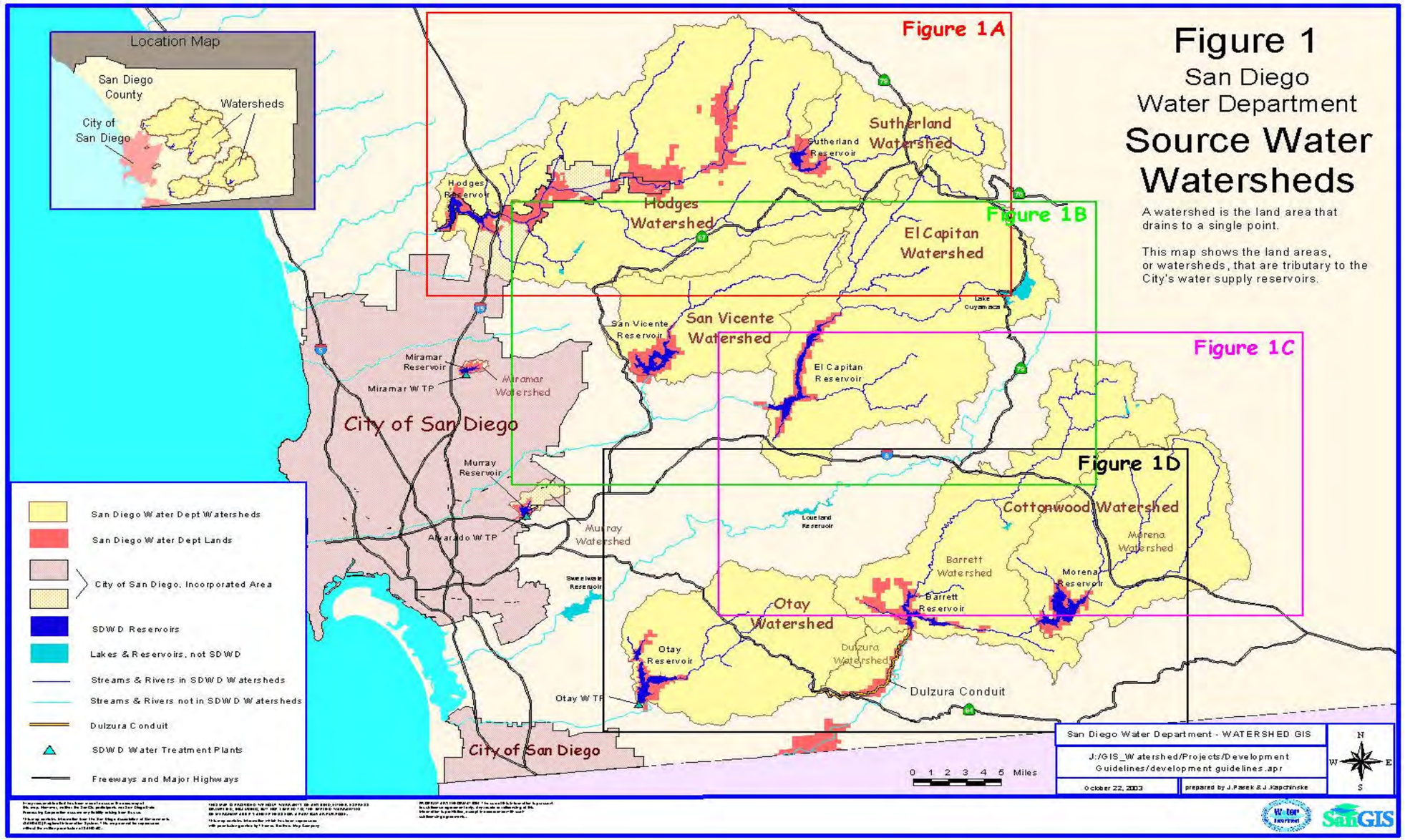


Figure 1 – Reservoir Watershed Index Map

NOTE:

Please call the City of San Diego Public Information Office at (619) 527-7413 if you have questions or need assistance determining whether your project is within one of the drinking water reservoir watersheds. Have your Assessors Parcel Number available. The San Diego Water Department thanks you for considering these Guidelines and your efforts to preserve the quality of our regional drinking water sources.

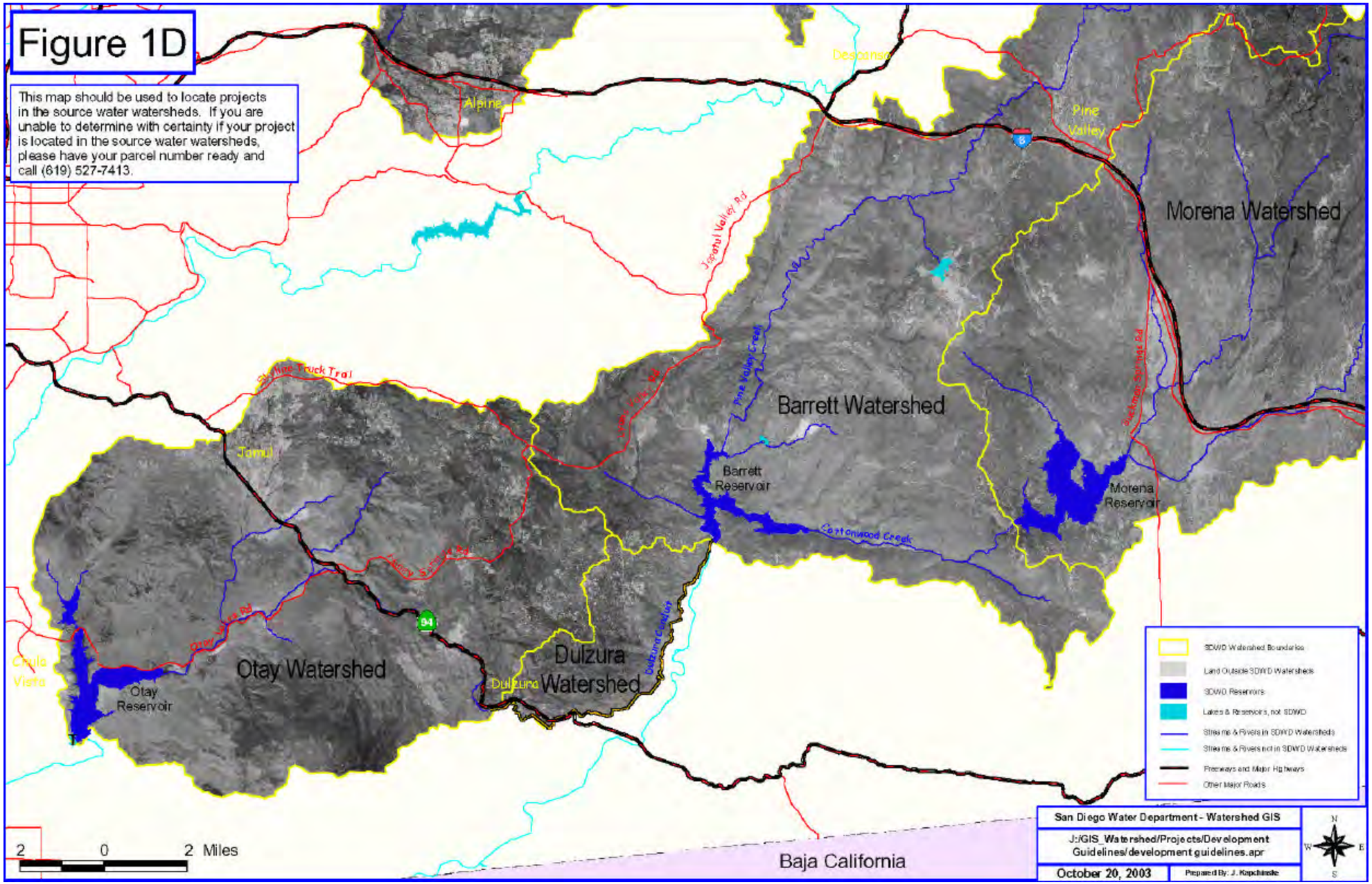


Figure 1D
This map should be used to locate projects in the source water watersheds. If you are unable to determine with certainty if your project is located in the source water watersheds, please have your parcel number ready and call (619) 527-7413.
Alpine
Descanso
Pine Valley
Morena Watershed
Barrett Watershed
Barrett Reservoir
Morena Reservoir
Cottonwood Creek
Jamul
Otay Watershed
Otay Reservoir
Chula Vista
Dulzura
Dulzura Watershed
Baja California
2 0 2 Miles
SDWD Watershed Boundaries
Land Outside SDWD Watersheds
SDWD Reservoirs
Lakes & Reservoirs, not SDWD
Streams & Rivers in SDWD Watersheds
Streams & Rivers not in SDWD Watersheds
Freeways and Major Highways
Other Major Roads
San Diego Water Department - Watershed GIS
J:/GIS_Watershed/Projects/Development Guidelines/development guidelines.apr
October 20, 2003
Prepared By: J. Kapchinske

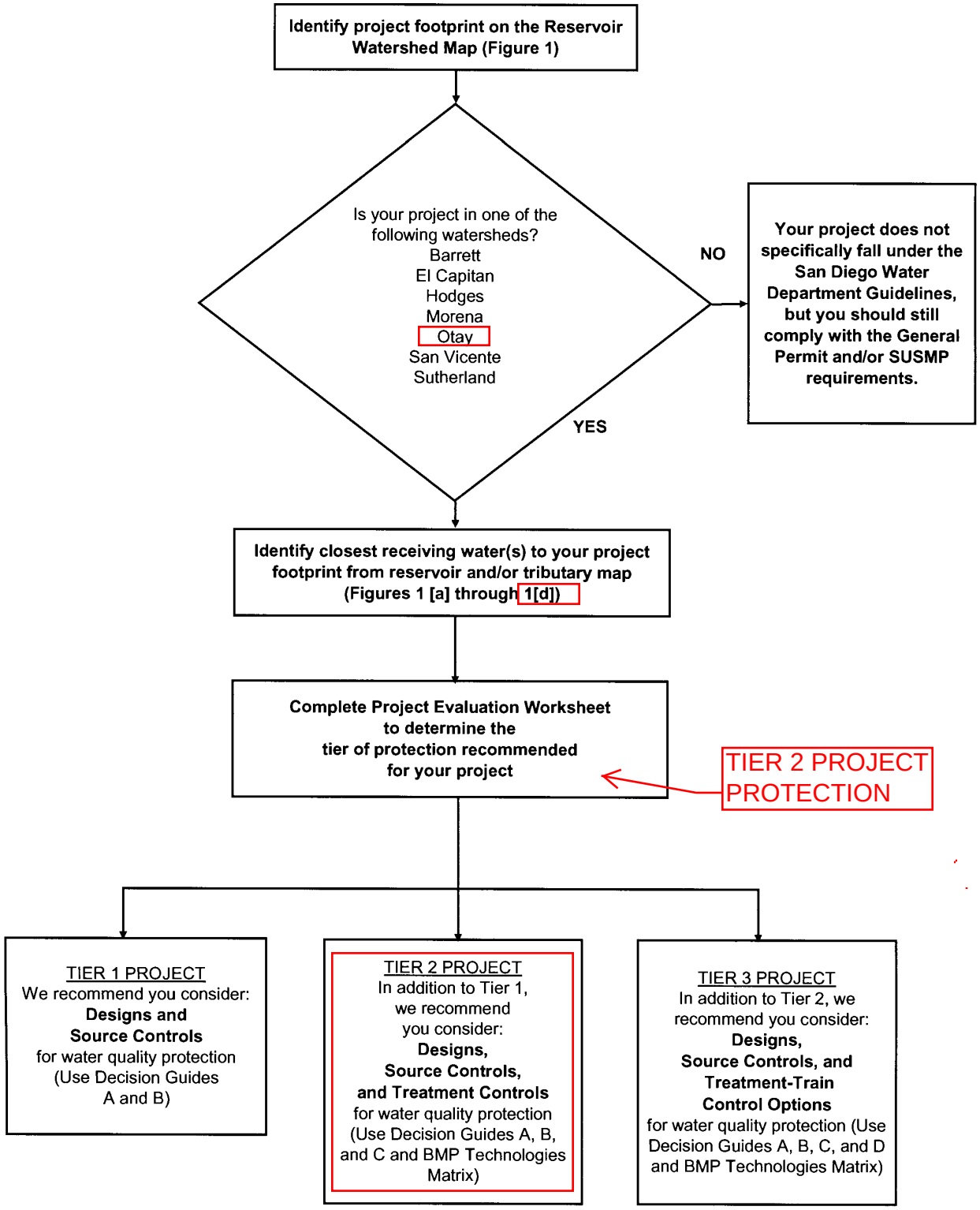


Figure 2 - Overall Process for Use of Source Water Protection Guidelines

USING THE TREATMENT BMP TECHNOLOGIES MATRIX

This table presents a summary of BMP performance in removing the constituents of concern for San Diego source water protection. The first four columns (highlighted in yellow) present removal efficiencies for the source water pollutants of concern (i.e., nitrogen, phosphorus, TDS, and TOC). Additionally, a fifth column (total suspended solids, or TSS) is shaded in a lighter shade of yellow, since removal of TSS may also result in a decrease in phosphorus and TOC.

The table was developed by compiling the results of many recent published studies on BMP pollutant removal effectiveness. The majority of the studies looked at efficiencies as a percent reduction in constituent concentrations of effluent exiting the BMP, as compared to influent entering the BMP. This type of analysis yields an approximate assessment of performance; however, BMP efficiency studies are not uniform and precise, and results may vary considerably depending on local site conditions. In addition, recent research indicates that a simple percent reduction analysis may not be the best measure of BMP effectiveness. For example, CalTrans, 2002 found that sand filters function such that they will reduce the concentration of total suspended solids to a constant level (7.5 mg/L), regardless of the influent concentration of TSS. Thus, efficiency is a function of influent concentration rather than true removal efficiency. Where available, information is provided on the pollutant removal efficiencies for other constituents present in typical urban runoff.

The Treatment BMP Technologies Matrix is organized according to the following treatment categories:

Filtration: Gravity flow-through systems that filter runoff to remove solids and other pollutants from the water. These systems typically require about 4 to 6 feet of elevation difference (between inflow and outflow) to be successful.

Biofiltration: Vegetated systems that use grass, plants, shrubs, and/or trees to slow water velocity (promote sediment settling), absorb moisture, promote percolation into the soil, and uptake pollutants. These are most useful on relatively flat terrain with well-drained soils.

Infiltration: Systems that promote the percolation of surface runoff into the ground. Infiltration best management practices to capture urban runoff and reuse it as a resource for augmenting local groundwater supplies are recommended, wherever possible. These can be natural or fabricated systems that incorporate sand, gravel, rock, and various forms of vegetation. Well-drained soils and a low groundwater table are required. Consider pre-treatment as needed to limit adverse impacts on groundwater quality. Note the limitations where infiltration can be applied, as outlined in the San Diego County storm water permit and the Model SUSMP and summarized below.

- Not allowed in areas where seasonal high groundwater mark is within 10 feet or less from base of infiltration treatment BMP.
- Not allowed within 100 feet horizontally from any water supply wells.
- No dry-weather flows allowed (they must be diverted).
- Not allowed in areas to take drainage from industrial or light industrial areas.
- Pretreatment required for any urban runoff from commercial developments.
- Pollution prevention and source control BMPs are required to protect groundwater quality.
- Soil with appropriate physical and chemical characteristics.

Settling: Systems that capture runoff in large volumes to promote the settling or fall out of sediments.

- Detention systems hold back water temporarily. Water is released at slow, controlled rates to promote settling of solids, to reduce the volume of water discharged during storms, and to minimize downstream erosion.
- Retention systems store the captured runoff indefinitely. All solids and other pollutants associated with the captured water are retained in the unit or system. Water is lost over time through percolation and evaporation. These systems may require more maintenance than detention systems because more water is retained and not released. Vector control may also be an issue.

Appendices A through D to these Guidelines provides more information about the treatment BMPs included in the Treatment BMP Technologies Matrix. For each BMP, the following information is succinctly summarized in approximately one-half page:

- Name and brief description of the BMP
- Photo and/or schematic drawing
- Internet links to more detailed sources of information about the BMP

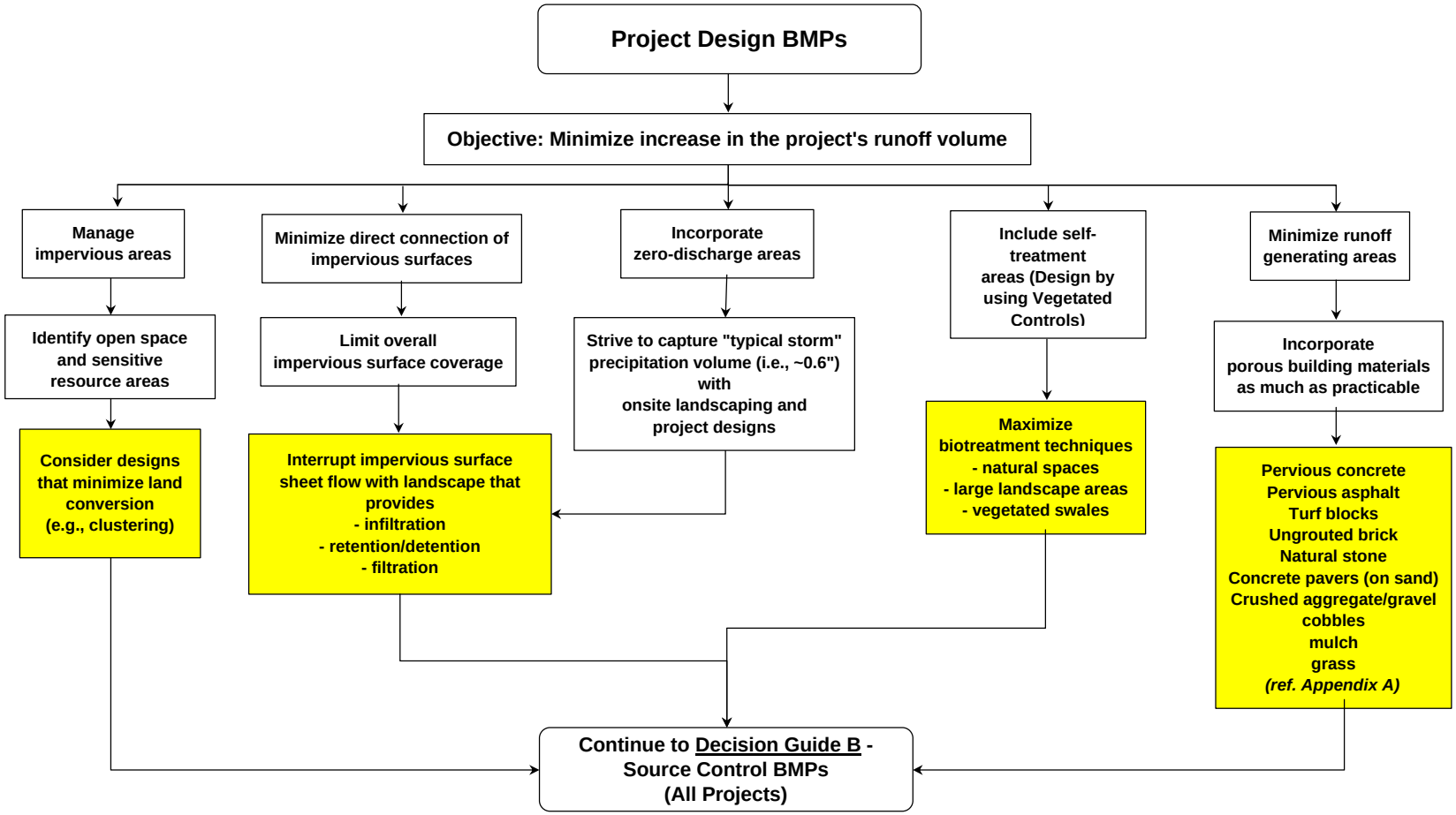
In addition, important information regarding BMP maintenance requirements is provided in Appendix E.

Project Evaluation Worksheet **NOTE: WORK THROUGH ENTIRE WORKSHEET**				
STEP	**CRITERIA**	**YES ✓**	**NO ✓**	**GUIDANCE DIRECTION**
1.	Is your project in one of the following drinking water watersheds: ▪ Barrett Lake, **or** ▪ El Capitan Reservoir, **or** ▪ Lake Hodges, **or** ▪ Morena Reservoir, **or** ▪ Otay Reservoir, **or** ▪ San Vicente Reservoir, **or** ▪ Sutherland Reservoir.	✓		If yes, go to Step 2. If no, the project is not subject to the City of San Diego Water Department Watershed Protection Guidelines; however, we recommend you go to Step 7 to check if SUSMP requirements pertain to you.
2.	Will your project provide substantial additional sources of polluted runoff? (Per CEQA* checklist Item VIII(e), if you checked boxes indicating "potentially significant impact" or "less than significant with mitigation incorporation" as a result of additional sources of polluted runoff).		✓	If yes, go to Step 4. If no, go to Step 3.
3.	Will your project otherwise substantially degrade water quality? (Per CEQA* checklist Item VIII(f), if you checked boxes indicating "potentially significant impact" or "less than significant with mitigation incorporation").		✓	If yes, go to Step 4. If no, go to Step 5.
4.				**PROJECT IS TIER 3.** Use Decision Guides A, B, C, and D and the Treatment BMP Technologies Matrix **AND** go to Step 9.

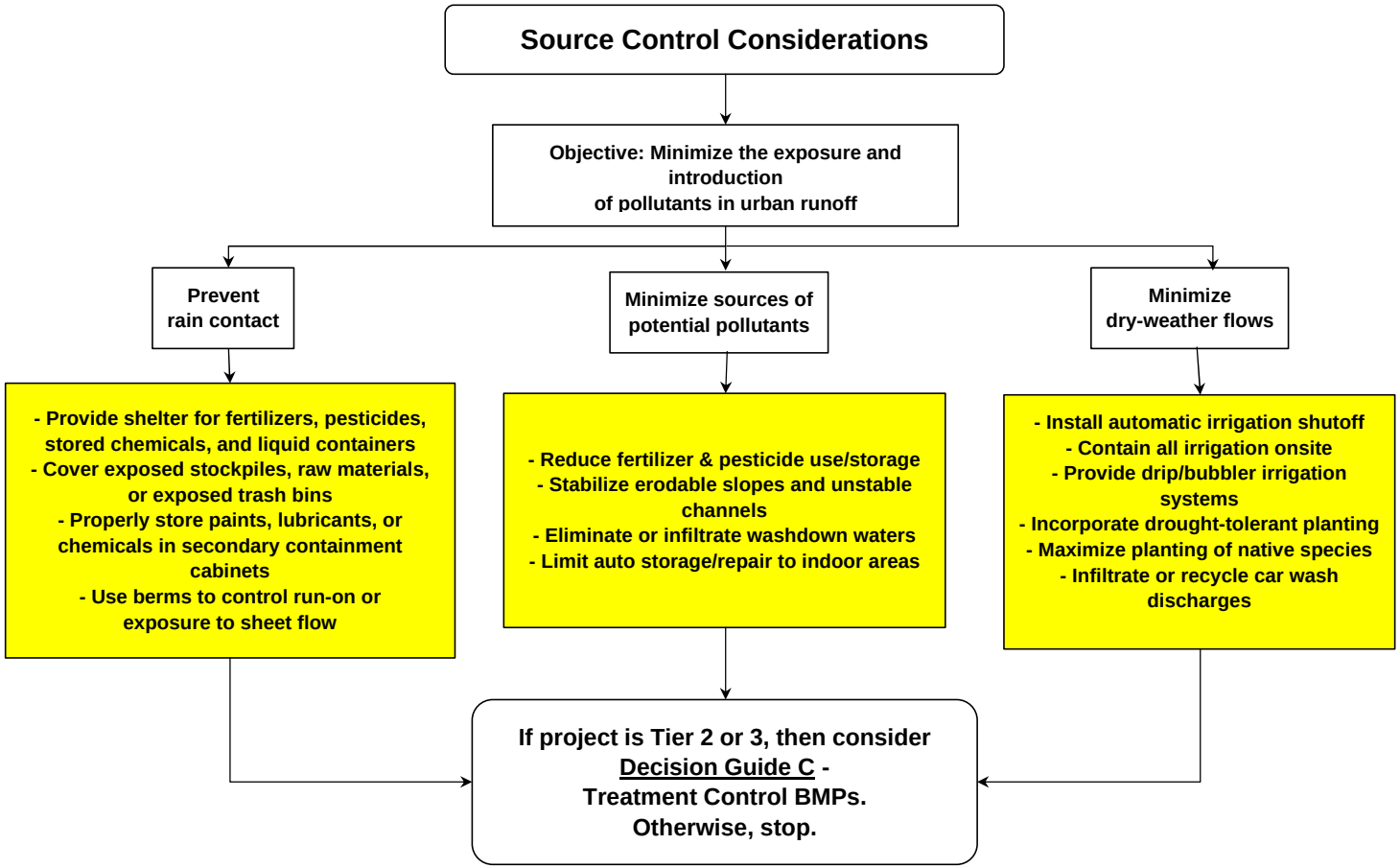
*If the project is in a jurisdiction where there are CEQA thresholds, use them. If not, please reference the 'Significance Determination Guidelines' for CEQA used by the City of San Diego, Development Services Department, Land Development Review Division, and Environmental Analysis Section.

Project Evaluation Worksheet **NOTE: WORK THROUGH ENTIRE WORKSHEET**				
STEP	**CRITERIA**	**YES ✓**	**NO ✓**	**GUIDANCE DIRECTION**
5.	Is your project: ▪ A residential project involving more than 10 units, **or** ▪ A commercial development involving more than 100,000 square feet of developed area, **or** ▪ An automotive repair shop, **or** ▪ A restaurant, **or** ▪ A hillside development greater than 5,000 square feet, **or** ▪ In the vicinity of an environmentally sensitive area (ESA), **or** ▪ Involving a parking lot greater than 5,000 square feet or more than 15 spaces, **or** ▪ Involving road or travel surfaces with a surface area of 5,000 square feet or more?	✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓	If yes, please check SUSMP requirements from the local municipality and we recommend you go to Step 7. If no, go to Step 6.
6.	Is runoff from your finished project likely to contain significant nutrients (nitrogen or phosphorous), or total organic carbon, or salts (total dissolved solids) or sediment that may impact reservoir water quality?	✓		If yes, go to Step 7. If no, go to Step 8.
7.				**PROJECT IS TIER 2.** Use Decision Guides A, B, and C and the Treatment BMP Technologies Matrix. Compliance with applicable SUSMP requirements and other pertinent design standards is recommended. Go to Step 9.
8.				**PROJECT IS TIER 1.** Use Decision Guides A and B and go to Step 9.
9.	Attach this form and a list of selected BMPs to your project's first formal submittal to the Planning Department.			

Decision Guide A: Project Design BMPs
[Applicable to ALL Projects - Tier 1, Tier 2, and Tier 3]



Decision Guide B: Source Control BMPs
[Applicable to ALL Projects - Tier 1, Tier 2 and Tier 3]



Decision Guide C: Treatment Control BMPs
[Applicable to Tier 2 and Tier 3 Projects]

Condition	BMPs to Consider	BMPs to Avoid
Does your site have high groundwater or poorly draining soils?	Extended detention basins* Retention basins* Wetland systems	Porous pavement Infiltration trench Infiltration basin Dry wells
Is your drainage area larger than 10 acres?	Treatment trains Extended detention basins Retention basins Bioretention Grass channels	Bioretention Biofiltration devices Infiltration trench Infiltration basin Dry well Vortex separators
Is your drainage area smaller than 2 acres?	Bioretention Swales Gravel-based wetland Grass channels Surface sand filters Vortex separators	Wetlands Dry ponds
Is the impervious area less than 10% of the total project area?	Surface or perimeter sand filters Detention systems Bioretention Grass channels	N/A
Is the impervous area greater than 10% of the total project area?	Sand filters Dry wells Swales Filter strips Bioretention Infiltration Basin Trench Porous pavement	N/A
Is the vertical change across your project 4 feet or more?	Extended detention systems Sand filters Dry wells Bioretention Swales	N/A
Hydraulic head less than 1 to 3 feet?	Filter strips	Sand filters Media filters Gravel-based wetlands Grass channels Dry wells Infiltration systems
Sensitive groundwater area?	Bioretention	Infiltration trench Infiltration basin Porous pavement Subsurface storage Grassed swales Wetlands
Area sensitive to visual impact?	Bioretention Filter strips Subsurface retention Vortex separators	N/A
None of the above?	Filter strips Buffers Grass channels	N/A

If Project is Tier 2, Consider the Treatment BMP Technologies Matrix to Compare Alternative BMP Options

If Project is Tier 3, Consider the Treatment BMP Technologies Matrix and Decision Guide D

Note: Colors refer to categories of BMPs listed in the Treatment BMP Technologies Matrix.

N/A = Not Applicable

* - System should be designed to minimize infiltration

TREATMENT BEST MANAGEMENT PRACTICES TECHNOLOGIES MATRIX*

	BMPs	Pollutants of Concern for Source Water** – Percent Removal				Pollutants of Concern for Urban Runoff – Percent Removal							Community and Environmental Factors					
		Total Nitrogen	Total Phosphorous	Total Dissolved Solids	Total Organic Carbon	Total Suspended Solids	Total Copper	Total Lead	Total Zinc	Oil and Grease	Bacteria	Trash / Sediment	Aesthetics	Habitat	Relative Cost	Maintenance	Safety	Water Conservation
DETENTION / SETTLING	Wet Vault / Tank	NA	30% [k]	NA	NA	NA	NA	NA	NA	NA	NA	Sediment 60% [g]	○	○	◐	V, L	◐	◐
	Underground Detention	NA	20 to 40% [l]	NA	NA	60 to 80% [l]	NA	40 to 70% [l]	NA	NA	NA	NA	○	○	○	V, L	●	●
	Dry Detention	NA	75% [k]	NA	NA	NA	NA	NA	NA	NA	NA	Sediment 90% [k]	○	○	●	V, L	●	●
	Dry Extended Basin / Dry Extended Detention Pond	25% [c] Nitrate+Nitrite 4% [c]	47% [c], 25% [k] Soluble -6% [c]	NA	NA	47% [c]	26% [‡c]	NA	26% [c]	NA	NA	Sediment 45% [g]	◐	◐	○	V, L	◐	●
	Wet Extended Basin / Pond / Retention Pond	33% [c], 31% [q] 30% [e], 39% [g] Nitrate Nitrogen 153% [d] TKN –28% [d], 27% [g] Nitrate 61% [g] Nitrate+Nitrite 43% [c], 24% [q]	51% [c], 48% [q] 50% [e], 5% [g] 45% [k], 65% [k], 30-90% [s] Dissolved Organic -47% [d] Soluble 66% [c], 52% [q]	6% [d]	NA	80% [c], 74% [d], 80% [e], 93% [g], 67% [q], 50 to 90% [s], 80 to 90% [s]	-40% [d], 98% [g] Dissolved 57% [g]	51% [d], 99% [g] Dissolved 76% [g]	-12% [d], -93% [g] Dissolved 41% [g]	27% [d] TPH – Oil 38% [g] TPH – Diesel 91% [g]	Fecal Coliform 64% [d], 99% [g]	Sediment 80% [g]	●	●	○	V, L	○	●
	Unlined Extended Detention Basin	16% [g] Nitrate 15% [g] TKN 17% [g]	38% [g] Dissolved Ortho-Phosphate -8% [g] Particulate 41% [g]	NA	NA	69% [gs]	58% [g], 57% [q] Dissolved 5% [g] Particulate 73% [g]	72% [g] Dissolved 33% [g] Particulate 73% [g]	72% [g], 66% [c], 51% [q] Dissolved 24% [g] Particulate 84% [g]	NA	NA	NA	○	○	○	V, L	○	●
	Lined Extended Detention Basin	13% [g] Nitrate 8% [g] TKN 16% [g]	15% [g] Dissolved Ortho-Phosphate 10% [g] Particulate 58% [g]	NA	NA	40% [g]	27% [g] Dissolved 8% [g] Particulate 50% [g]	48% [g], 70 to 80% [s] Dissolved 42% [g] Particulate 55% [g]	54% [g], 40 to 50% [q] Dissolved 39% [g] Particulate 65% [g]	TPH – Oil 11% [g] TPH – Diesel 0% [g]	Fecal Coliform 12% [g]	NA	○	○	○	V, L	○	◐
BIOFILTRATION	Detention w/ Swales	9% [b] Nitrate + Nitrite, Total -9% [b]	-87% [b]	-29% [b]	14% [b]	NA	NA	22% [b]	12% [b]	NA	Fecal Coliform 47% [b] Fecal Streptococci –520% [b]	NA	○	○	●	V, L	◐	●
	Extended Detention Wetland	NA	53% [m], 69% [n]	NA	NA	95% [m], 96% [n]	NA	90% [m], 94% [n]	92% [m], 90% [n]	NA	NA	NA	●	●	◐	V, L	●	●
	Constructed Wetlands / Stormwater Wetlands	Nitrate Nitrogen (55 lb/yr[†], 34.1%)[ff] Nitrate, Nitrite Nitrogen (25 lb/yr[†], 15.4%)[ff] Nitrate+Nitrite 67% [c], 67% [q], 28% [qq], 30% [c], 21% [q] TKN (690 lb/yr[†], 63.6%)[ff]	49% [qq], 50% [o], (33 lb/yr[†], 39.6%)[ff] Soluble 35% [c], 39% [q], 49% [c], 51% [q]	NA	65% [o], 34% [gg]	41.3% [o], 67% [gg] 75% [c], 54% [q], (8,629 lb/yr[†], 41.3%)[ff]	51% [o], 40% [c], 39% [q], 41% [gg]	62% [gg]	45% [gg], 22.8% [o] 44% [c], 54% [q], (13 lb/yr[†], 22.8%)[ff]	Petroleum Hydrocarbons 87% [gg]	77% [gg]	NA	●	●	◐	V, L	◐	●
	Gravel-Based Wetlands	30% [e]	40% [e]	NA	NA	80% [e]	NA	NA	NA	NA	NA	NA	◐	◐	◐	V, L	●	●
	Bioretention / Bioinfiltration	TKN 68.6 to 80% [cc]	60% [e], 70 to 83% [h, cc], 30% [k]	NA	NA	80% [e], 90% [h, cc]	Metals 93 to 98% [h, cc]	Metals 93 to 98% [h, cc]	Metals 93 to 98% [h, cc]	NA	90% [h,cc]	Sediment 75% [k]	●	◐	○	L	●	●
	Wet Swale	40% [e]	25% [e]	NA	NA	80% [e]	NA	NA	NA	NA	NA	NA	◐	●	◐	L	◐	●
	Grass Channel	Nitrate 31.4% [i] Nitrate -25% [j]	4.5%I, 45% [j], 29% [j]	NA	NA	67.8% [i], 60% [j]	42 to 62% [i], 2 to 16% [j], 46 to 73% [j]	42 to 62% [i], 2 to 16% [j], 46 to 73% [j]	42 to 62% [i], 2 to 16% [j], 46 to 73% [j]	NA	-100% [i], -25% [j]	NA	◐	◐	●	L	●	●
	Grass Swale / Biofiltration Swale / Dry Swale	26% [g], 50% [e], 67% [h], 841% [q] Nitrate 11% [g], 66% [h], 38% [s] TKN 31% [g] Nitrate and Nitrite Nitrogen 31% [q]	8% [h], 57% [f], 34% [q] 50% [e], 15% [k], 9% [s] Dissolved 28% [f] Soluble 38% [q]	NA	NA	80% [e], 50% [g], 77% [h], 81% [s], 81% [q]	Dissolved 58% [f] 61% [g], 51% [s], 51% [q] Dissolved 50% [g]	Dissolved 9% [f] 69% [g], 67% [s] Dissolved 61% [g]	Dissolved 15% [f] 77% [g], 71% [s], 71% [q] Dissolved 74% [g]	TPH – Oil 51% [g] Hydrocarbons 62% [s]	Fecal Coliform 33% [g]	Sediment 65% [k]	◐	◐	●	L	●	●
	Biofiltration Strip/ Filter Strip	12% [g], (2.68 mg/L[¶], 15%)[h] Nitrate -1% [g], (0.58 mg/L[¶], 13%)[h] TKN (2.10 mg/L[¶], 16%)[h], 16% [g]	(0.62 mg/L[¶], -52%)[h], 50% [k] Dissolved (0.46 mg/L[¶], –206%)[h]	NA	NA	74% [g,h]	84% [g], (0.009 mg/L[¶], 84%)[h] Dissolved 77% [g], (0.007 mg/L[¶], 77%)[h]	88% [g], (0.006 mg/L[¶]. 88%)[h] Dissolved 66% [g], (0.002 mg/L[¶], 66%)[h]	72% [g], (0.055 mg/L[¶], 78%)[h] Dissolved 57% [g], (0.035 mg/L[¶], 65%)[h]	TPH – Oil 59% [g] TPH – Diesel 66% [g]	Fecal Coliform 92% [g]	Sediment 50% [k]	●	◐	●	L	●	●

Note: See Legend on page 3 of Matrix.

TREATMENT BEST MANAGEMENT PRACTICES TECHNOLOGIES MATRIX*

	BMPs	Pollutants of Concern for Source Water** – Percent Removal				Pollutants of Concern for Urban Runoff – Percent Removal							Community and Environmental Factors					
		Total Nitrogen	Total Phosphorous	Total Dissolved Solids	Total Organic Carbon	Total Suspended Solids	Total Copper	Total Lead	Total Zinc	Oil and Grease	Bacteria	Trash / Sediment	Aesthetics	Habitat	Relative Cost	Maintenance	Safety	Water Conservation
MISCELLANEOUS	Vortex Type Separators	Nitrate + Nitrite 5% [bb] TKN 41% [hh]	29% [v], 27% [v], 30% [v], 17% [bb] Dissolved 17% [bb]	-21% [bb]	19/15% [hh]	50% [v], 70% [v], 21% [bb], 51.5% [bb] 24% [hh], 63/50% [hh], 80% [hh], 26% [hh], 93% [hh], 53% [hh], 80% [hh], 84% [hh]	21.5% [bb] 12% [hh], 33/25% [hh], 21% [hh]	24% [bb], 51.2% [bb] 13% [hh], 47/33% [hh], 51% [hh]	17% [bb], 39.1% [bb] 29% [hh], 26/18% [hh], 21% [hh], 39% [hh]	PAH 32% [bb], 36% [hh] 38% [hh], 43% [hh] Diesel 16% [hh] Motor Oil 33% [hh] TPH 82% [hh]	NA	NA	◐	○	◐	V, E	●	●
	Multi-Chambered Treatment Trains	Nitrate 24% [g], 14% [h], 75% [dd], 63% [dd], TKN 62% [dd] Nitrate -9% [dd]	80% [h], 84% [h], 82% [dd] Ortho-phosphorus14% [dd]	8% [dd]	38% [dd]	83% [g], 85% [h], 83% [h], 98% [h], 81% [dd]	22% [g], 21% [dd] Dissolved 17% [g] Metals 65 to 90% [h], 91 to 100% [h], 83 to 89% [h]	93% [g], 73% [dd] Dissolved 42% [g] Metals 65 to 90% [h], 91to100% [h], 83 to 89% [h]	91% [g], 55% [dd] Dissolved 46% [g] Metals 65 to 90% [h], 91 to100% [h], 83 to 89% [h]	TPH – Oil 70% [g] TPH – Diesel 80% [g]	Fecal Coliform 14% [g] 78% [dd]	NA	○	○	○	V, E	○	○
	Oil-Water Separator – Water Quality Inlet	NA	5% [k]	NA	NA	49% [g]	NA	NA	NA	83% [g] TPH – Diesel 52% [g]	NA	Sediment 15% [g]	○	○	◐	E	●	○
	Gross Solids Removal Devices (GSRDs)/ Screens and Trash Racks/ Nets/Booms	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	[§]Gross Solids (Linear Radial: 98.4% [ii], 97% [ii], 93.7% [ii]), (Inclined Screen: 100% [ii], 82.7% [ii], 86.2% [ii]), (Baffle Box: 93.1% [ii], 99.6% [ii]) Litter (Linear Radial: 98% [ii], 93.9% [ii], 90.3% [ii]), (Inclined Screen: 100% [ii], 66.9% [ii], 81.2% [ii]), (Baffle Box: 87.2% [ii], 98% [ii])	◐	○	◐	L, E	◐	◐

* This list is intended to provide general guidance for selecting BMPs that are suitable for drinking water protection. The contents provided are not exhaustive. Project applicants are encouraged to conduct independent research if necessary. Data presented is from non-vendor sources—see footnotes below. Refer to Appendix A for additional sources of information regarding BMP technologies and water quality management approaches.

** Selecting BMPs should focus on controlling the pollutants of concern for source-water protection.
† Loading removal.
‡ Data based on fewer than 5 data points.
¶ Effluent Concentration.
# Average concentration while BMP is in operation.

§ Percent removal information for GSRDs only.

● – Best ◐ – Moderate ○ – Worst
E = Special equipment requirements **V = Potential vector control** **L = High labor requirements**
NA: Not Available

[a] Megginis Ck. Marsh Tallahassee, FL. EPA, Florida Department of Environmental Regulation. http://www.bmpdatabase.org/
[b] Alta Vista Planned Development w/ swales, Austin, TX. USGS. http://www.bmpdatabase.org/
[c] National Pollutant Removal Performance Database for Stormwater Treatment Practices: 2nd Edition, http://www.cwp.org
[d] DUST Marsh Debris Basin (Retention Pond (wet) - Surface Pond with a Permanent Pool, Fremont, CA. http://www.bmpdatabase.org/
[e] Georgia Stormwater Management Manual. http://georgiastormwater.com
[f] EPCOT Biofilter - Grass Swale, Orlando, FL. http://www.bmpdatabase.org/
[g] CalTrans BMP Retrofit Pilot Program, Los Angeles/San Diego, CA.
[h] California Stormwater Quality Association (CASQA) New Development and Redevelopment Handbook (TC-30, TC-31, TC-32, TC-40) http://cabmphandbooks.com
[i] Dayton Avenue Swale Biofiltration Study, Seattle Engineering Study, Seattle, WA. http://www.bmpdatabase.org/
[j] Biofiltration Swale Performance. Seattle Metro and Washington Department of Ecology. Seattle, WA. http://www.bmpdatabase.org/
[k] Catalog of Stormwater BMPs for Idaho Cities and Counties. http://www.deq.state.id.us/water/stormwater_catalog/index.asp
[l] US DOT FHA Fact Sheet. – Detention Tanks and Vaults. Northern Virginia District Planning Commission. http://www.fhwa.dot.gov/environment/ultraurb/3fs6/htm
[m] US DOT FHA Fact Sheet. – Wetlands and Shallow Marsh Systems. Martin & Smoot, 1996. http://www.fhwa.dot.gov/environment/ultraurb/3fs5/htm
[n] US DOT FHA Fact Sheet. – Wetlands and Shallow Marsh Systems. Occoquan Watershed Monitoring Laboratories, 1990. http://www.fhwa.dot.gov/environment/ultraurb/3fs5/htm
[o] University of Virginia, 2000, Stormwater Management Research Team.
[p] North Griffin Regional Detention Pond-Wetland Filtration, City of Griffin, Georgia, 2001.
[q] National Pollutant Removal Performance Database for Stormwater Treatment Practices: 1st Edition, http://www.cwp.org
[r] Federal Highway Administration, www.highwayBMP.dfwinfo.com/FHWA_PDF/sand%20filter.pdf. Excerpted from Young, et. Al. Evaluation and Management of Highway Runoff Water Quality
[s] EPA fact sheet 832-F-99-006, http://www.epa.gov
[t] EPA fact sheet 832-F-99-048, http://www.epa.gov
[u] Wetland Vegetation, Dept. of Civil Engineering, University of Virginia.
[v] Rivertech, Inc., Breverd County, Florida, CDS Technologies.
[w] Larry Walker & Associates for Sacramento Stormwater Management Program.
[x] Rivertech, Inc., 13 Monitoring Studies Using Sand Filters.
[y] Delaware Sand Filter BMPs at Airpark, Alexandria, Virginia. www.fwha.dot.gov/environment/ultraurb/5mcs3.htm
[z] EPA fact sheet 832-F-99-019, www.epa.gov
[aa] EPA fact sheet 832-F-99-007, www.epa.gov
[bb] Clayton, R. *Performance of a Proprietary Stormwater Treatment Device – The Storm Ceptor.*
[cc] EPA fact sheet 832-F-99-012, www.epa.gov
[dd] Urban Stormwater Retrofitting Project Fact Sheet – Packed Bed Wetland Filter System, "Stormwater Treatment Train", City of Orlando. www.stormwater-resources.com/Library/ 103BFloridaRetrofits.pdf
[ee] Urban Stormwater Retrofitting Project Fact Sheet – Bath Club Concourse Stormwater Rehabilitation Project, Florida. www.stormwater-resources.com/Library/ 103BFloridaRetrofits.pdf
[ff] North Griffin Regional Detention Pond – Wetlands Filtration. www.forester.net/sw_0106_north.html
[gg] EPA fact sheet 832-F-99-025, www.epa.gov
[hh] Guidance Manual for On-Site Stormwater Quality Control Measures, City of Sacramento. http://www.sactostormwater.org/documents.htm#guide
[ii] Design and Performance of Non-Proprietary Devices for Highway Runoff Litter Removal. http://stormwater.water-programs.com/Papers/PP031.pdf
[jj] Performance of Urban Stormwater Best Management Practices. University of North Carolina. http://www.unc.edu/depts/geog/them/projects/BMP.html
[kk] US DOT FHA Fact Sheet. – Porous Pavements. MWCOG 1983 and Hogland Et. Al. 1987. http://www.fhwa.dot.gov/environment/ultraurb/3fs15/htm
[ll] US DOT FHA Fact Sheet. – Infiltration Basin. Schueler 1987. http://www.fhwa.dot.gov/environment/ultraurb/3fs2/htm

Definitions of Community and Environmental Factors

Aesthetics: The visual appearance of a BMP. A rating of "best" indicates that the BMP may actually increase the appearance of the area (e.g., by incorporating attractive vegetation or water elements). A "moderate" rating indicates that the BMP does not measurably impact the appearance of the area, while a rating of "worst" indicates that the BMP is physically unattractive.

Habitat: The ability of a BMP to provide habitat for plants and/or animals. A rating of "best" indicates that the BMP may provide new habitat (for example, vegetated swales and constructed wetlands may provide opportunities for plants, birds, and other small animals). A rating of "moderate" indicates that the BMP is neutral: it neither creates nor reduces habitat. A rating of "worst" indicates the BMP replaces natural areas with manmade surfaces unsuitable as habitat.

Relative Cost: A generalized (non-numerical) gage of BMP cost (relative to other BMPs). A rating of "best" suggests the BMP is relatively more cost-effective. "Moderate" indicates the cost of the BMP is average, while "worst" indicates the BMP is more expensive/less cost effective.

Maintenance: The amount of labor and expense required to maintain proper function of the BMP (relative to other BMPs). A rating of "best" indicates that the BMP does not require much maintenance. "Moderate" implies an average amount of maintenance, while "worst indicates the BMP is labor-intensive or otherwise costly to maintain.

Safety: How safe the BMP is, with respect to public health and environmental protection. A rating of "best" means that the BMP poses little, if any, public health or environmental risk. "Moderate" indicates that there may be some risk (e.g., mosquito breeding), while "worst" indicates there are real potential safety risks that must be taken into consideration (e.g., risk of a person falling into a vault or pond).

Water Conservation: The extent to which a BMP helps or hinders water conservation efforts. A rating of "best" indicates that the BMP results in increased water conservation, either by not requiring additional water to function properly or by storing or re-using water (e.g., through enhanced infiltration). A rating of "moderate" is neutral, meaning that the BMP has little effect on water conservation, while a rating of "worst" indicates that the BMP actually requires additional water use.

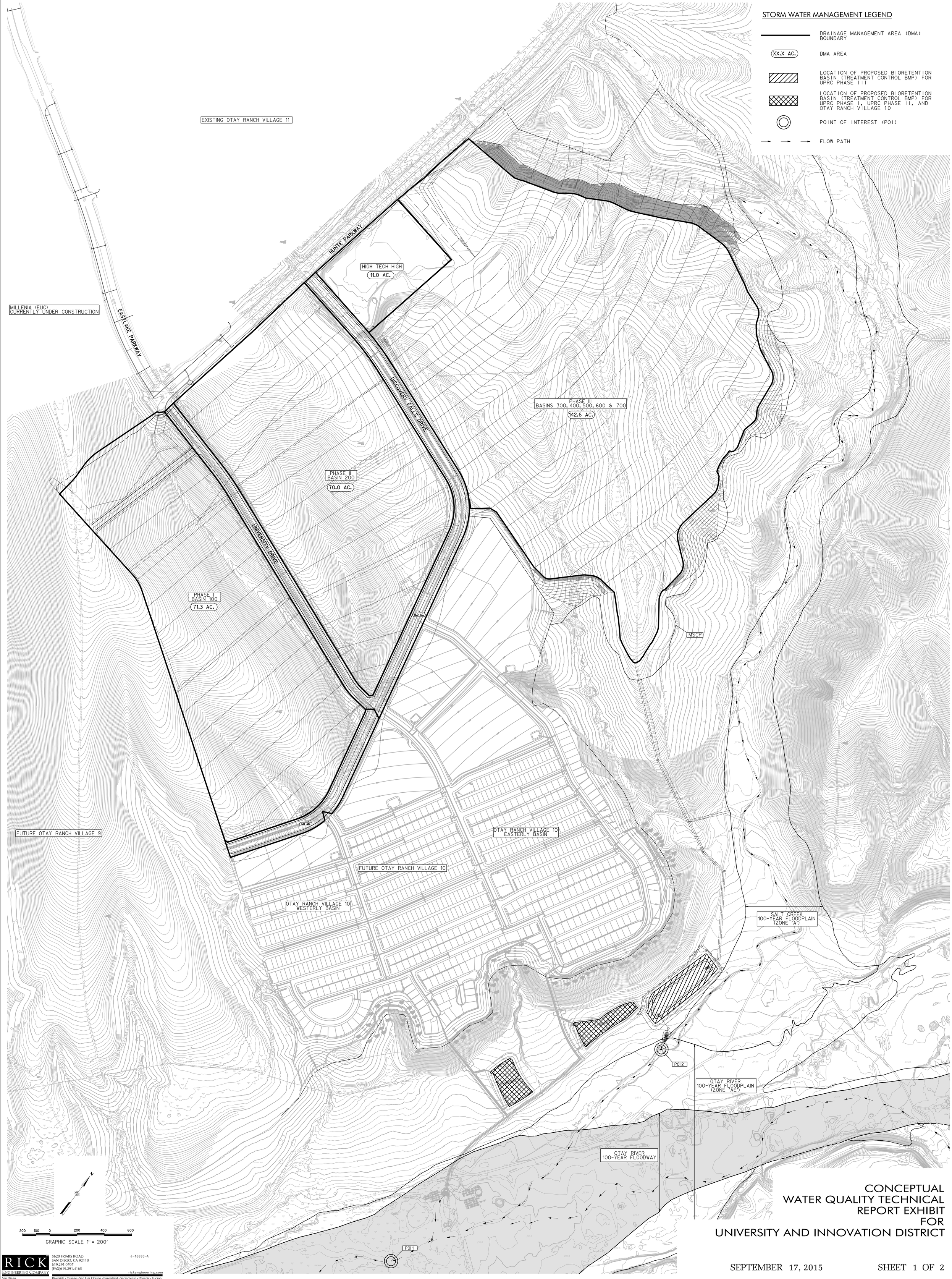
MAP POCKET 1

Water Quality Technical Report Exhibit

for

University and Innovation District (UID)

[Two (2) Sheets]



CONCEPTUAL WATER QUALITY TECHNICAL REPORT EXHIBIT FOR UNIVERSITY AND INNOVATION DISTRICT

SEPTEMBER 17, 2015

SHEET 1 OF 2

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165
rickengineering.com
San Diego Riverside - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

J-16693-A

© 2014 Rick Engineering Company

J:\16693_UPRC\WaterResource\16693wqtr01.dgn
J:\16693_UPRC\WaterResource\SD Corp5ft& 2005.dscrlpt
17-SEP-2015 14:47

STORM WATER MANAGEMENT LEGEND

———	DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
(XX.X AC.)	DMA AREA
▨	LOCATION OF PROPOSED BIORETENTION BASIN (TREATMENT CONTROL BMP) FOR UPRC PHASE IV
◎	POINT OF INTEREST (POI)
→ → →	FLOW PATH
⇨ ⇨ ⇨ ⇨ ⇨	EXISTING COBBLE DITCH

CONCEPTUAL WATER QUALITY TECHNICAL REPORT EXHIBIT FOR UNIVERSITY AND INNOVATION DISTRICT

SEPTEMBER 17, 2015

SHEET 2 OF 2

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619.291.0707
(FAX)619.291.4165
rickengineering.com
Riverside - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

J-16693-A

© 2014 Rick Engineering Company

J:\16693_UPRC\WaterResource\16693wqtr02.dgn
J:\16693_UPRC\WaterResource\SD CorpStds 2005.dscript
16-SEP-2015 15:51