Project Specific
Preliminary Water Quality Management Plan

For: **COVA - Tentative Tract Map 39330**

SEC of Avenue 52 and Van Buren Street

Coachella, CA 92236

DESIGN REVIEW NO. **TBD**

DEVELOPMENT NO. **TBD**

Prepared for:
Relevant Coachella Owner, LLC
6417 Selma Avenue
Hollywood, CA 90028
Telephone: (310) 270-6222

Prepared By:
Jesus Herrera-Cortes, CPSWQ, QSD/QSP
MSA Consulting, Inc.
34200 Bob Hope Drive
Rancho Mirage, CA 92270
Jherrera-cortes@msaconsultinginc.com

Prepared Under the Direction of:
Julian A. De La Torre, PE
MSA Consulting, Inc.
34200 Bob Hope Drive
Rancho Mirage, CA 92270
Telephone: (760) 320-9811
Fax No. (760) 323-7893
Jdelatorre@msaconsultinginc.com

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Revision Date(s): N/A

OWNER'S CERTIFICATION

This project-specific Preliminary Water Quality Management Plan has been prepared for:

Relevant Coachella Owner, LLC by MSA Consulting, Inc. for the project known as **COVA - Tentative Tract Map 39330** in the **City of Coachella, CA.**

This WQMP is intended to comply with the requirements of Coachella for a portion of **APNs 780-040-001, 780-040-003, 780-060-001, and 780-060-002** which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Coachella (Coachella Code of Ordinances, Chapter 13.16, Water Quality Control).

If the undersigned transfers its interest in the subject property/project, the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I, the undersigned, certify under penalty of law that I am the owner of the property that is the subject of this WQMP, and that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

_____
Owner's Signature

_____
Owner's Printed Name

_____
Owner's Title/Position

_____
Date

6417 Selma Avenue
Hollywood, CA 90028

ATTEST

_____
Notary Signature

_____
Printed Name

_____
Title/Position

_____
Date

THIS FORM SHALL BE NOTARIZED BEFORE ACCEPTANCE OF THE FINAL PROJECT SPECIFIC WQMP

Contents

SECTION **PAGE**

I. Project Description 1
II. Site Characterization 5
III. Pollutants of Concern 7
IV. Hydrologic Conditions of Concern 9
V. Best Management Practices 11
V.1 Site Design BMP Concepts, LID/Site Design and Treatment Control BMPs 11
V.1.A Site Design BMP Concepts and LID/Site Design BMPs 13
V.1.B Treatment Control BMPs 19
V.1.C Measurable Goal Summary 20
V.2 Source Control BMPs 22
V.3 Equivalent Treatment Control BMP Alternatives 25
V.4 Regionally-Based BMPs 25
VI. Operation and Maintenance Responsibility for BMPs 26
VII. Funding 29

TABLES

Table 1. Pollutant of Concern Summary 7
Table 2. BMP Selection Matrix Based Upon Pollutant of Concern Removal Efficiency 12
Table 3. Implementation of Site Design BMP Concepts 14
Table 4. LID/Site Design BMPs Meeting the LID/Site Design Measurable Goal 18
Table 5: Treatment Control BMP Summary 19
Table 6: Measurable Goal Summary 21
Table 7. Source Control BMPs 22

APPENDICES

A. Conditions of Approval
B. Vicinity Map, WQMP Site Plan, and Receiving Waters Map
(Appendix B includes overall site plan, retention basin plan and hydrology plans)
C. Supporting Detail Related to Hydrologic Conditions of Concern (If Applicable)
D. Educational Materials
E. Soils Report (if applicable)
F. Structural BMP and/or Retention Facility Sizing Calculations and Design Details
G. Agreements – CC&Rs, Covenant and Agreements, BMP Maintenance Agreements and/or Other Mechanisms for ensuring ongoing Operation, Maintenance, Funding and Transfer of Requirements for this project-specific WQMP
H. Phase 1 Environmental Site Assessment – Summary of Site Remediation Conducted and Use Restrictions
I. Project-Specific WQMP Summary Data Form

I. Project Description

Project Owner: Relevant Coachella Owner, LLC
6417 Selma Avenue
Hollywood, CA 90028
Telephone: (310) 270-6222

WQMP Preparer: Under the Direct Supervision of Julian A. De La Torre
MSA Consulting, Inc.
34200 Bob Hope Drive
Rancho Mirage, CA 92270
Telephone: (760) 323-7893
Fax No.: (760) 323-7893

Project Site Address:	**SEC of Avenue 52 and Van Buren Street Coachella, CA 92236**
Planning Area:	**Van Buren Corridor General Plan Subarea**
Community Name:	**Coachella**
Development Name:	**COVA - Tentative Tract Map 39330**
APN Number(s):	**780-040-001, 780-040-003, 780-060-001, 780-060-002**
Latitude & Longitude:	**33.6686, -116.2023**
Receiving Water:	**Coachella Valley Stormwater Channel**
Hydrologic Area:	**81.14 Acres**

Standard Industrial Classification (SIC) Code(s):

- 7011: Hotels
- Not applicable to the residential development

Formation of Home Owners' Association (HOA)
or Property Owners Association (POA): Y ☒ N ☐

Additional Permits/Approvals required for the Project:

AGENCY	Permit required
State Department of Fish and Wildlife, Fish and Game Code §1602 Streambed Alteration Agreement	Y ☐ N☒
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Certification	Y ☐ N☒
US Army Corps of Engineers, CWA Section 404 permit	Y ☐ N☒
US Fish and Wildlife, Endangered Species Act Section 7 biological opinion	Y ☐ N☒
Statewide Construction General Permit Coverage	Y ☒ N☐
Statewide Industrial General Permit Coverage	Y ☐ N☒
Other: City of Coachella Grading Permit City of Coachella Building Permit	 Y ☒ N☐ Y ☒ N☐

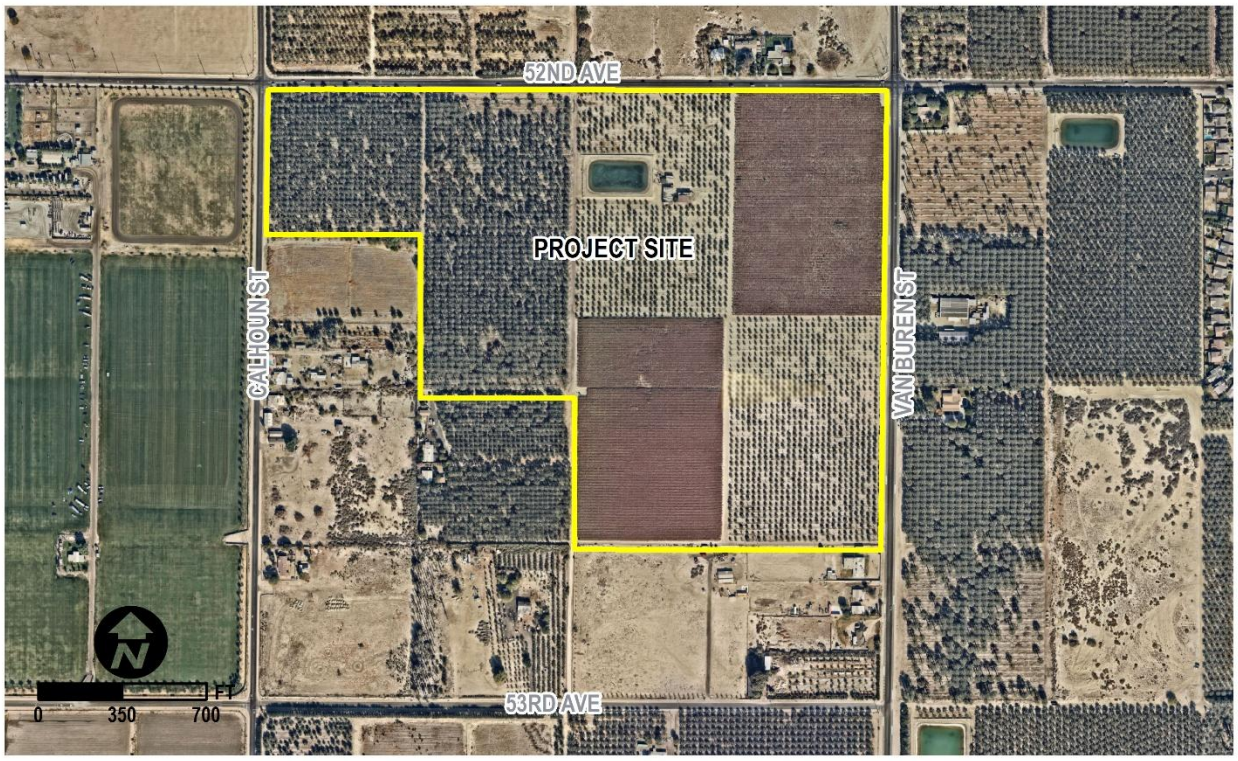
- The project will not divert or obstruct the natural flow or change the bed, channel, or bank of any stream, river or lake. Therefore, a State Department of Fish and Game, 1601 Streambed Alteration Agreement is not required.
- The project will not result in discharge into navigable waters; therefore, a Clean Water Act Section 401 Water Quality Certification permit is not required.
- The project will not result in the discharge of dredged or fill materials into the waters of the United States, including wetlands. A Clean Water Act Section 404 Permit is not required for this project.
- The project site is not recognized as a habitat of an endangered species nor does it form part of a Conservation Area under the Coachella Valley Multiple Species Habitat Conservation Plan. A U.S. Fish and Wildlife, Endangered Species Act Section 7 biological opinion is not required for this project.
- The project is not industrial in nature. Therefore, coverage under the General Permit for Storm Water Discharges Associated with Industrial Activities is not required. This project will obtain coverage under the State Water Board NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.

Existing Conditions and Proposed Development:

This Project-Specific Preliminary WQMP applies to the master-plan scope of COVA - Tentative Tract Map 39330. The site is located south of 52nd Avenue; east of Calhoun Street; and west of Van Buren Street in the City of Coachella, County of Riverside, California. The project site is characterized by agricultural uses and the presence of accessory structures. Other than maintained agricultural drainage and irrigation reservoir facilities, the site does include natural drainage courses, such as those associated with streams, rivers, or washes.

The scope of this project involves a master-planned destination resort and residential community with 162 residential dwelling units and 240-key condominium hotel units. Associated amenities include water recreation, well and fitness facilities, dining, and hospitality. The scope, content, and level of detail of this Preliminary WQMP is based on the master-plan development plans and preliminary engineering prepared for entitlement approvals. Future conditions of approval and engineering plans will be incorporated into the Final WQMP to provide additional design detail.

Figure 1 – Project Location and Existing Conditions



Proposed Storm Drain Improvements

Based on the preliminary grading and hydrology design, the project has a single hydrologic (tributary) area of 81.14 acres, encompassing the entire development. The Final WQMP will identify applicable delineation of sub-drainage management areas, as determined by final engineering and hydrology design. Stormwater runoff volume resulting from the controlling 100-year storm event will be conveyed southerly along surface and piped flows to the retention facility, where the available freeboard will adequately contain the flows.

The proposed method of stormwater retention will involve two designated irrigation ponds with approximately 5.0 to 5.5 feet of available freeboard in relation to the normal irrigation water

surface elevation. The provided freeboard has been sized to accommodate the full stormwater volume generated across the project site. Storm drain inlets connected to this retention facility may be equipped with screening methods to filter out potential trash, organic debris, and other solids. Alternatively, the storm drain outlets may also be configured to allow for adequate screening prior to discharge into the retention area. Such details and information will be provided in the Final WQMP based on final (precise) grading, hydrology, and associated improvement plans.

The drainage management area identification, acreages, primary land uses, impervious cover, VBMP quantities, retention basin sizes, retention basin design depths, basin dewatering times, and provided storage are summarized in Table A. Final quantities and design details will be provided in the Final WQMP, resulting from plan review and conditions of approval.

Table A - Summary of Drainage Management Areas and Retention Capacities

Drainage Area ID	Tributary Area (In Acres)	Impervious Area (In Acres)	WQMP V_{BMP} (In Cubic Feet)	Provided Retention Capacity (In Cubic Feet)	Method of Retention
Site	81.14	56.410 (70%)	57,660	447,365	Retention Pond Freeboard
Total	**81.14**	**56.410 (70%)**	**57,660**	**447,365**	See Above
Source: Preliminary Hydrology Report for COVA, TTM 39330					

As summarized in Table A and consistent with the preliminary hydrology report, each hydrologic drainage management area of the project will include a respective retention basin system capacity to retain the controlling stormwater volume to meet the City of Coachella's hydrologic requirements, while also accounting for the smaller V_{BMP} quantities. The provided retention capacity will ensure that the project does not result in a routine stormwater discharge into any off-site facility.

Location of Activities:

The project does not have a specific area where heightened activities would warrant additional site design, source control or treatment measures other than the proposed retention facilities for the respective drainage areas.

Waste Generation:

The proposed project is expected to generate a variety of solid waste according to land use and facility type. The project's waste will be collected and managed by Burrtec Waste Industries on a typical schedule.

Materials Storage and Delivery Areas:

The proposed project is expected to generate non-hazardous solid waste typical of most residential and resort land uses. The project's waste will be collected and managed by Burrtec Waste Industries on a typical schedule. Pollution prevention, waste reduction, and recycling practices will be implemented on-site. The Final WQMP will identify the final location, configuration and details of these facilities based on final engineering design.

Appendix A will include complete copy of the final Conditions of Approval.

Appendix B of this project-specific WQMP includes:

a. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail; and

b. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:

- Location and identification of all structural BMPs, including Source Control, LID/Site Design and Treatment Control BMPs. **To be provided in Final WQMP based on final engineering design, as applicable.**
- Landscaped areas. **To be provided in Final WQMP based on final engineering design. Current preliminary hydrology calculations account for pervious cover.**
- Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.). **To be provided in Final WQMP based on final engineering design, as applicable. Current preliminary hydrology calculations account for impervious/pervious cover.**
- Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.).
- Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation.
- Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated. **To be provided in Final WQMP based on final engineering design, as applicable.**
- Location(s) of Receiving Waters to which the project directly or indirectly discharges.
- Location of points where onsite (or tributary offsite) flows exit the property/project site. **To be provided in Final WQMP based on final engineering design, as applicable.**
- Delineation of proposed drainage area boundaries, including tributary offsite areas, for each location where flows exit the project site and existing site (where existing site flows are required to be addressed). Each tributary area should be clearly denoted.
- Pre- and post-project topography.

Appendix I is a one-page form that summarizes pertinent information relative to this project-specific WQMP.

II. Site Characterization

Existing/Proposed General Plan: Regional Retail District

Existing/Proposed Zoning: Regional Commercial (R-C)

Current Property Use:	Agricultural
Proposed Property Use:	Residential and Hospitality
Availability of Soils Report:	Y ☒ N ☐
Phase 1 Site Assessment:	Y ☒ N ☐

Receiving Waters for Urban Runoff from Site

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use Designated Receiving Waters
Coachella Valley Stormwater Channel	Ammonia, DDT (Dichlorodiphenyltrichloroethane), Dieldrin, Disulfoton, Indicator Bacteria, Oxygen, Dissolved, PCBs (Polychlorinated biphenyls), Toxaphene, Toxicity	FRSH, REC I *c*, REC II *c*, WARM, WILD, RARE *d*	Approximately 2 miles

The preceding table is based on the **2020-2022 Integrated Report (Clean Water Act Section 303(d) List/305(b) Report.**

Abbreviations:
I – Intermittent Beneficial Use
FRSH – Freshwater Replenishment
REC I – Water Contact Recreation
REC II – Non-Contact Water Recreation
WARM – Warm Freshwater Habitat
WILD – Wildlife Habitat
RARE – Preservation of Rare, Threatened, or Endangered Species
MUN – Municipal & Domestic Supply
AGR – Agricultural Supply
GWR – Groundwater Recharge
AQUA – Acuaculture
COLD – Cold Freshwater Habitat
POW – Hydropower Generation

a. Although it is not encouraged, children play in the water infrequently on the wildlife reserve
b. Section of perennial flow from approximately Indio to the Salton Sea.
c. Unauthorized use.
d. Rare, endangered, or threatened wildlife exists in or utilizes some of this waterway.

III. Pollutants of Concern

Table 1. Pollutant of Concern Summary

Pollutant Category	Potential for Project	Causing Receiving Water Impairment
Bacteria/Virus (Pathogens)	Yes	Yes (Pathogens)
Heavy Metals	No	No
Nutrients	Yes	No
Toxic Organic Compounds	No	Yes
Sediment/Turbidity	Yes	No
Trash & Debris	Yes	No
Oil & Grease	Yes	No

Based on the 2020-2022 Integrated Report (Clean Water Act Section 303(d) List/305(b) Report, the Coachella Valley Stormwater Channel is impaired by **Ammonia, DDT (Dichlorodiphenyltrichloroethane), Dieldrin, Disulfoton, Indicator Bacteria, Oxygen, Dissolved, PCBs (Polychlorinated biphenyls), Toxaphene, Toxicity**

- The proposed new residential and hospitality development is not expected to be a source of DDT contamination because the use of this substance (synthetic organic compound) has been banned since 1972; therefore, it will not be handled or form part of the proposed development.
- The proposed new residential and hospitality development is not expected to be a source of Dieldrin contamination because the use of this substance (synthetic organic compound) was related to agricultural operations (found in pesticides for crops) and it has been illegal since 1987; therefore, it will not be handled or form part of the proposed development.
- The proposed new residential and hospitality development is not expected to be a source of polychlorinated biphenyls (PCBs) because manufacturing this substance (synthetic organic compound) stopped in 1977 and its application was banned in 1979; therefore, it will not be handled or form part of the proposed development.
- The proposed new residential and hospitality development is not expected to be a source of toxaphene because the use of this substance (synthetic organic compound) has been illegal since 1990; therefore, it will not be handled or form part of the proposed development.
- The proposed new residential and hospitality development is not expected to be a source of Nitrogen, ammonia (Total Ammonia).
- The project has the potential to generate small amounts of pathogens (bacteria/virus). These pollutants are generally associated with various human activities, but pathogens are also present in natural environments. Moreover, pathogens can be associated with wild and domesticated animal waste. Source control measures to address this potential pollutant are discussed in the subsequent sections of this report.
- The project is not expected to generate or discharge toxicants, such as toxic metals and synthetic organic compounds that would result in detrimental physiological responses in human, plant, animal, or indigenous aquatic life in the receiving waters.

Table 1 (*Potential Pollutants Generated by Land Use Type*) of the *Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development* identifies eight (8) land use categories with their corresponding potential pollutants that may be generated.

Type of Development (Land Use)	Sediment/ Turbidity	Nutrients	Toxic Organic Compounds	Trash & Debris	Bacteria & Viruses (*Also: Pathogens*)	Oil & Grease	Heavy Metals
Detached Residential Development	P	P	N	P	P	P	N
Attached Residential Development	P	P	N	P	P	P(2)	N
Restaurants (Resort)	N	N	N	P	P	P	N
Parking Lots	P	P(1)	P(4)	P	P	P	P

Abbreviations:

P = Potential **N** = Not potential

Notes:

(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected.
(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected.
(3) A potential Pollutant if land use involves food or animal waste products.
(4) Specifically, petroleum hydrocarbons.
(5) Specifically, solvents; however, this Pollutant is not expected at commercial office or commercial retail sites, unless said retail is vehicle related.
(6) A potential Pollutant if the project includes outdoor storage or metal roofs; otherwise not expected.

Pollutants of Concern: Based on the comparison of potential project pollutants with the pollutant categories causing receiving water impairments, the pollutants of concern include **bacteria/virus**. The project's proposed storm drain improvements are designed to intercept and retain the locally required stormwater volume. Therefore, the project will not produce runoff or pollutants that could affect off-site or downstream resources, such as the proximate receiving waters.

IV. Hydrologic Conditions of Concern

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☒ The project will be required to retain urban runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater"). This section does not need to be completed; however, retention facility design details and sizing calculations must be included in Appendix F.

The project is obligated to meet the City of Coachella's hydrologic requirements by demonstrating that stormwater runoff from the developed condition can be adequately conveyed and retained on-site. In accordance with the hydrology report, the project's retention facilities have been sized to adequately contain the required stormwater volume for hydrology and water quality purposes for the on-site areas. Therefore, the project will not result in changes to the hydrologic regime that will permanently impact downstream channels, receiving waters, or habitat integrity. No Hydrologic Conditions of Concern are expected to result from the project.

No ☐ This section must be completed.

This Project meets the following condition:

☐ **Condition A**: 1) Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4 or engineered and maintained channel, 2) the discharge is in full compliance with local land use authority requirements for connections and discharges to the MS4 (including both quality and quantity requirements), 3) the discharge would not significantly impact stream habitat in proximate Receiving Waters, **and** 4) the discharge is authorized by the local land use authority.

☐ **Condition B**: The project disturbs less than 1 acre and is not part of a larger common plan of development that exceeds 1 acre of disturbance. The disturbed area calculation must include all disturbances associated with larger plans of development.

☐ **Condition C**: The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by, where applicable, complying with the local land use authority's on-site retention ordinance, or minimizing impervious area on a site and incorporating other Site-Design BMP concepts and LID/Site Design BMPs that assure non-exceedance of pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the local land use authority.

☐ **None:** Refer to Section 3.4 of the Whitewater River Region WQMP Guidance document for additional requirements.

Supporting engineering studies, calculations, and reports are included in Appendix C.

	2 year – 24 hour		10 year – 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)				
Velocity (fps)				
Volume (cubic feet)				
Duration (minutes)				

V. Best Management Practices

This project implements Best Management Practices (BMPs) to address the Pollutants of Concern that may potentially be generated from the use of the project site. These BMPs have been selected and implemented to comply with Section 3.5 of the WQMP Guidance document, and consist of Site Design BMP concepts, Source Control, LID/Site Design and, if/where necessary, Treatment Control BMPs as described herein.

V.1 Site Design BMP Concepts, LID/Site Design and Treatment Control BMPs

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☒ The project will be required to retain Urban Runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater). **The LID/Site Design measurable goal has thus been met (100%), and Sections V.1.A and V.1.B do not need to be completed**; however, retention facility design details and sizing calculations must be included in Appendix F, and '100%' should be entered into Column 3 of Table 6 below.

The project is obligated to meet the City of Coachella's hydrologic requirements by demonstrating that stormwater runoff from the developed condition can be adequately conveyed and retained on-site. In accordance with the hydrology report, the project's retention facilities have been sized to adequately contain the required stormwater volume for hydrology and water quality purposes for the on-site areas. Therefore, the project will not result in changes to the hydrologic regime that will permanently impact downstream channels, receiving waters, or habitat integrity. No Hydrologic Conditions of Concern are expected to result from the project.

No ☐ Section V.1 must be completed.

This section of the Project-Specific WQMP documents the LID/Site Design BMPs and, if/where necessary, the Treatment Control BMPs that will be implemented on the project to meet the requirements detailed within Section 3.5.1 of the WQMP Guidance document. Section 3.5.1 includes requirements to implement Site Design Concepts and BMPs, and includes requirements to address Pollutants of Concern with BMPs. Further, sub-section 3.5.1.1 specifically requires that Pollutants of Concern be addressed with LID/Site Design BMPs to the extent feasible.

LID/Site Design BMPs are those BMPs listed within Table 2 below which promote retention and/or feature a natural treatment mechanism; off-site and regionally-based BMPs are also LID/Site Design BMPs, and therefore count towards the measurable goal, if they fit these criteria. This project incorporates LID/Site Design BMPs to fully address the Treatment Control BMP requirement where and to the extent feasible. If and where it has been acceptably demonstrated to the local land use authority that it is infeasible to fully meet this requirement with LID/Site Design BMPs, Section V.1.B (below) includes a description of the conventional Treatment Control BMPs that will be substituted to meet the same requirements. In addressing Pollutants of Concern, BMPs are selected using Table 2 below.

Table 2. BMP Selection Matrix Based Upon Pollutant of Concern Removal Efficiency (1)

(Sources: Riverside County Flood Control & Water Conservation District Design Handbook for Low Impact Development Best Management Practices, dated September 2011, the Orange County Technical Guidance Document for Water Quality Management Plans, dated May 19, 2011, and the Caltrans Treatment BMP Technology Report, dated April 2010 and April 2008)

Pollutant of Concern	Landscape Swale[2, 3]	Landscape Strip[2, 3]	Biofiltration (with underdrain)[2, 3]	Extended Detention Basin[2]	Sand Filter Basin[2]	Infiltration Basin[2]	Infiltration Trench[2]	Permeable Pavement[2]	Bioretention (w/o underdrain)[2, 3]	Other BMPs Including Proprietary BMPs[4, 6]
Sediment & Turbidity	M	M	H	M	H	H	H	H	H	Varies by Product[5]
Nutrients	L/M	L/M	M	L/M	L/M	H	H	H	H	
Toxic Organic Compounds	M/H	M/H	M/H	L	L/M	H	H	H	H	
Trash & Debris	L	L	H	H	H	H	H	L	H	
Bacteria & Viruses (also: Pathogens)	L	M	H	L	M	H	H	H	H	
Oil & Grease	M	M	H	M	H	H	H	H	H	
Heavy Metals	M	M/H	M/H	L/M	M	H	H	H	H	

Abbreviations:

L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Expected performance when designed in accordance with the most current edition of the document, "Riverside County, Whitewater River Region Stormwater Quality Best Management Practice Design Handbook".

(3) Performance dependent upon design which includes implementation of thick vegetative cover. Local water conservation and/or landscaping requirements should be considered; approval is based on the discretion of the local land use authority.

(4) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP (including proprietary filters, hydrodynamic separators, inserts, etc.), or newly developed/emerging stormwater treatment technologies.

(5) Expected performance should be based on evaluation of unit processes provided by BMP and available testing data. Approval is based on the discretion of the local land use authority.

(6) When used for primary treatment as opposed to pre-treatment, requires site-specific approval by the local land use authority.

V.1.A Site Design BMP Concepts and LID/Site Design BMPs

Note: This section is not applicable Due to conformance with local retention ordinance per Section 3.5.1.2 of Whitewater River Region WQMP Guidance Document.

This section documents the Site Design BMP concepts and LID/Site Design BMPs that will be implemented on this project to comply with the requirements detailed in Section 3.5.1 of the WQMP Guidance document.

- Table 3 herein documents the implementation of the Site Design BMP Concepts described in sub-sections 3.5.1.3 and 3.5.1.4.
- Table 4 herein documents the extent to which this project has implemented the LID/Site Design goals described in sub-section 3.5.1.1.

Table 3. Implementation of Site Design BMP Concepts

Note: Completion of this sub-section is not required since the project retains urban runoff on-site in conformance with the local ordinances.

Design Concept	Technique	Specific BMP	Included			Brief Reason for BMPs Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 1	**Minimize Urban Runoff, Minimize Impervious Footprint, and Conserve Natural Areas (See WQMP Section 3.5.1.3)**	Conserve natural areas by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.	☐	☐	☒	The project is not located in an environmentally sensitive area.
		Conserve natural areas by incorporating the goals of the Multi-Species Habitat Conservation Plan or other natural resource plans.	☐	☐	☒	The project site is not located in an environmentally sensitive area of the Coachella Valley MSHCP.
		Preserve natural drainage features and natural depressional storage areas on the site.	☐	☐	☒	The project does not have naturally occurring storage areas.
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☐	☐	☒	The project site doesn't have canopy coverage that can be preserved. The project's landscape design will follow local water efficiency and drought tolerant requirements.
		Use natural drainage systems.	☐	☒	☐	The site does not involve using any natural drainage systems.
		Where applicable, incorporate Self-Treating Areas	☐	☒	☐	Not proposed.
		Where applicable, incorporate Self-Retaining Areas	☒	☐	☐	Self-retaining areas will occur where applicable in the form of a retention facilities.
		Increase the building floor to area ratio (i.e., number of stories above or below ground).	☐	☐	☒	Lot coverage will follow the local development standards.
		Construct streets, sidewalks and parking lot aisles to minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.	☐	☐	☒	Widths of sidewalks and streets are designed per City standards.
		Reduce widths of streets where off-street parking is available.	☐	☐	☒	Street widths will follow the local development standards.
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐	Landscaping improvements are proposed to reduce impervious surfaces.
		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☒	☐	No other Site Design BMP concepts are proposed.

Table 3. Site Design BMP Concepts (continued)

Note: Completion of this sub-section is not required since the project retains urban runoff on-site in conformance with the local ordinances.

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 2	**Minimize Directly Connected Impervious Area** **(See WQMP Section 3.5.1.4)**	Design residential and commercial sites to contain and infiltrate roof runoff, or direct roof runoff to landscaped swales or buffer areas.	☐	☐	☐	All roof runoff and other impervious runoff will be conveyed indirectly to the designated retention facilities.
		Drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☒	☐	☐	
		Incorporate landscaped buffer areas between sidewalks and streets.	☐	☒	☐	Not proposed in approved site plan.
		Use natural or landscaped drainage swales in lieu of underground piping or imperviously lined swales.	☐	☒	☐	The project will primarily rely on imperviously lined conveyances (piped and surface)
		Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒	☐	Not proposed
		Maximize the permeable area by constructing walkways, trails, patios, overflow parking, alleys, driveways, low-traffic streets, and other low-traffic areas with open-jointed paving materials or permeable surfaces such as pervious concrete, porous asphalt, unit pavers, and granular materials.	☐	☒	☐	As designed, there are currently no proposed open-jointed paving materials or other permeable surfaces (except for landscaped areas and retention facilities) that would help maximize permeable areas.
		Use one or more of the following:				
		Rural swale system: street sheet flows to landscaped swale or gravel shoulder, curbs used at street corners, and culverts used under driveways and street crossings.	☐	☒	☐	This form of improvements is not proposed.
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaped swale or biofilter.	☐	☒	☐	This form of improvements is not proposed.
		Dual drainage system: first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder; high flows connect directly to MS4s.	☐	☒	☐	Storm runoff from the site will be conveyed to the on-site retention facilities.
		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☐	☐	None are proposed.
		Use one or more of the following for design of driveways and private residential parking areas:				
		Design driveways with shared access, flared (single lane at street), or wheel strips (paving only under the tires).	☐	☒	☐	Not proposed.
		Uncovered temporary or guest parking on residential lots paved with a permeable surface, or designed to drain into landscaping.	☐	☒	☐	Not proposed

Table 3. Site Design BMP Concepts (continued)

Note: Completion of this sub-section is not required since the project retains urban runoff on-site in conformance with the local ordinances.

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 2 (cont'd)	**Minimize Directly Connected Impervious Area (See WQMP Section 3.5.1.4)**	Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☐	☒	☐	Not proposed.
		Use one or more of the following for design of parking areas:				
		Where landscaping is proposed in parking areas, incorporate parking area landscaping into the drainage design.	☐	☐	☒	The entire project, including parking areas, will be incorporated into the drainage design.
		Overflow parking (parking stalls provided in excess of the Permittee's minimum parking requirements) may be constructed with permeable pavement.	☐	☒	☐	No additional comparable or equally effective BMPs are proposed under Site Design Concept 2. Landscaping improvements are proposed to help minimize directly connected impervious areas.
		Other comparable and equally effective Site Design BMP (or BMPs) as approved by the local land use authority (Note: Additional narrative required describing BMP and how it addresses site design concept).	☐	☒	☐	Not proposed.

Project Site Design BMP Concepts:

Note: This section is not applicable Due to conformance with local retention ordinance per Section 3.5.1.2 of Whitewater River Region WQMP Guidance Document.

Alternative Project Site Design BMP Concepts:

Not Applicable

Table 4. LID/Site Design BMPs Meeting the LID/Site Design Measurable Goal

(1) DRAINAGE SUB-AREA ID OR NO.	(2) LID/SITE DESIGN BMP TYPE* (See Table 2)	(3) POTENTIAL POLLUTANTS OF CONCERN WITHIN DRAINAGE SUB-AREA (Refer to Table 1)	(4) POTENTIAL POLLUTANTS WITHIN SUB-AREA CAUSING RECEIVING WATER IMPAIRMENTS (Refer to Table 1)	(5) EFFECTIVENESS OF LID/SITE DESIGN BMP AT ADDRESSING IDENTIFIED POTENTIAL POLLUTANTS (U, L, M, H/M, H; see Table 2)	(6) BMP MEETS WHICH DESIGN CRITERIA? (Identify as V_{BMP} OR Q_{BMP})	(7) TOTAL AREA WITHIN DRAINAGE SUB-AREA (Nearest 0.1 acre)
1A	Retention BMP	Bacteria/virus	Bacteria/virus	H	**VBMP = 57,660 CU-FT** **Provided Capacity: 447,365 CU-FT**	81.14 AC.
TOTAL PROJECT AREA TREATED WITH LID/SITE DESIGN BMPs (NEAREST 0.1 ACRE)						**81.14 AC.**

*** LID/Site Design BMPs listed in this table are those that completely address the 'Treatment Control BMP requirement' for their drainage sub-area.** ***Conformance with the local retention requirements will be satisfied by conveying project runoff into the proposed on-site retention facilities.***

Justification of infeasibility for sub-areas not addressed with LID/Site Design BMPs

Not applicable.

V.1.B TREATMENT CONTROL BMPS

Conventional Treatment Control BMPs shall be implemented to address the project's Pollutants of Concern as required in WQMP Section 3.5.1 where, and to the extent that, Section V.1.A has demonstrated that it is infeasible to meet these requirements through implementation of LID/Site Design BMPs.

☒ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP completely address the 'Treatment Control BMP requirement' for the entire project site (and where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP Guidance document. Supporting documentation for the sizing of these LID/Site Design BMPs is included in Appendix F. ***Section V.1.B does not need to be completed**.

☐ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP do **NOT** completely address the 'Treatment Control BMP requirement' for the entire project site (or where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP. ***Section V.1.B must be completed.**

The Treatment Control BMPs identified in this section are selected, sized and implemented to treat the design criteria of V_{BMP} and/or Q_{BMP} for all project (and if required, existing site) drainage sub-areas which were not fully addressed using LID/Site Design BMPs. Supporting documentation for the sizing of these Treatment Control BMPs is included in Appendix F.

Table 5: Treatment Control BMP Summary

(1) DRAINAGE SUB-AREA ID OR NO.	(2) TREATMENT CONTROL BMP TYPE* (See Table 2)	(3) POTENTIAL POLLUTANTS OF CONCERN WITHIN DRAINAGE SUB-AREA (Refer to Table 1)	(4) POTENTIAL POLLUTANTS WITHIN SUB-AREA CAUSING RECEIVING WATER IMPAIRMENTS (Refer to Table 1)	(5) EFFECTIVENESS OF TREATMENT CONTROL BMP AT ADDRESSING IDENTIFIED POTENTIAL POLLUTANTS (U, L, M, H/M, H; see Table 2)	(6) BMP MEETS WHICH DESIGN CRITERIA? (Identify as V_{BMP} OR Q_{BMP})	(7) TOTAL AREA WITHIN DRAINAGE SUB-AREA (Nearest 0.1 acre)
N/A	N/A	N/A	N/A	N/A	N/A	N/A
	TOTAL PROJECT AREA TREATED WITH TREATMENT CONTROL BMPs (NEAREST 0.1 ACRE)					N/A

Note: Conformance with the local retention requirements will be satisfied by conveying project runoff into the proposed on-site retention facilities.

V.1.C MEASURABLE GOAL SUMMARY

This section documents the extent to which this project has met the measurable goal described in WQMP Section 3.5.1.1 of addressing 100% of the project's 'Treatment Control BMP requirement' with LID/Site Design BMPs. Projects required to retain Urban Runoff onsite in conformance with local ordinance are considered to have met the measurable goal; for these instances, '100%' is entered into Column 3 of the Table.

Table 6: Measurable Goal Summary

(1) **Total Area Treated with <u>LID/Site Design</u> BMPs** **(Last row of Table 4)**	(2) **Total Area Treated with <u>Treatment Control</u> BMPs** **(Last row of Table 5)**	(3) **% of Treatment Control BMP Requirement addressed with LID/Site Design BMPs**
81.14	**N/A** *Due to conformance with local retention ordinance per Section 3.5.1.2 of Whitewater River Region WQMP Guidance Document.*	**100**

Note: Conformance with the local retention requirements will be satisfied by conveying project runoff into the proposed on-site retention facilities.

V.2 SOURCE CONTROL BMPS

This section identifies and describes the Source Control BMPs applicable and implemented on this project.

Table 7. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Private Streets and Parking Lots	☒	☐	
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
Storm Drain Inlet Stenciling and Signage	☒	☐	
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☒	☐	
Provide Community Car Wash Racks	☐	☒	Not part of project.
Properly Design*:			
Fueling Areas	☐	☒	Not part of project.
Air/Water Supply Area Drainage	☐	☒	Not part of project.
Trash Storage Areas	☐	☒	Not part of project.
Loading Docks	☐	☒	Not part of project.
Maintenance Bays	☐	☒	Not part of project.
Vehicle and Equipment Wash Areas	☐	☒	Not part of project.
Outdoor Material Storage Areas	☐	☒	Not part of project.
Outdoor Work Areas or Processing Areas	☐	☒	Not part of project.
Provide Wash Water Controls for Food Preparation Areas	☐	☒	Not part of project.

*Details demonstrating proper design must be included in Appendix F.

Non-Structural Source Control BMPs

Education Program:

Residents and maintenance staff should be informed on topics related to stormwater pollution and prevention through various means, which can include the distribution of printed materials or public posting of rules or activity restrictions. Staff may also be referred to the education materials in Appendix D of this WQMP or to the Riverside County Watershed Protection web site at the following link:

https://www.rcwatershed.org/

Activity Restrictions:

Activity restrictions should prohibit littering, dumping of waste or non-stormwater discharge into storm drain system, hosing of debris or non-stormwater materials into storm drain system, or causing nuisance non-stormwater flows into storm drain system. Improper handling of categorized hazardous materials is often prohibited under federal law. Additional activity restrictions may be established in the CC&Rs for the residential communities to be provided in the Final WQMP.

Irrigation System and Landscape Maintenance:

The irrigation and landscape maintenance will help increase the effectiveness of these systems and minimize the amount of runoff that enters the storm drain system. Erosion and the conveyance of pesticides/fertilizers in runoff should also be prevented through proper routine maintenance. Routine irrigation system and landscape maintenance will also serve as a vector control measure due to the minimization of nuisance water runoff and stagnation.

Common Area Litter Control:

Common area litter control should be implemented to reduce pollution in runoff. Routine monitoring should be performed in the landscaped areas, trash receptacles, in common areas, and along the project edges. Any observed accumulated trash, vegetation debris or improper disposal should be addressed promptly by the designated staff. Common area litter control measures can be coordinated and improved by the landscaping maintenance is currently taking place on-site. No trash should be allowed to be stored at the base of the containers. Pick-up intervals should be determined so that the containers are not overfilled. Additional information to be provided in the Final WQMP.

Paved Area Sweeping and Cleaning:

Paved area sweeping and/or cleaning is recommended on-site to prevent sediment, litter and other debris from being washed by runoff into the on-site storm drain system and facilities. Paved area sweeping should be performed during dry weather if possible and the frequency should be flexible to accommodate climate conditions and areas of concern. All collected debris should be transported to an appropriate disposal facility. Additional information to be provided in the Final WQMP.

Structural Source Control BMPs

The project will incorporate measures to discourage illegal dumping in the proposed private storm drain system.

- MS4 Stenciling:

At each storm drain inlet, a stencil or fixed sign (including medallions) should contain a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. The legibility of markers and signs should be maintained throughout the life of the project.

- Rules and Regulations:

  The residential management should establish and implement rules that prohibit improper non-stormwater discharge into the storm drain system. This measure may also be considered non-structural and form part of the activity restrictions associated with the site's standard operating procedures.

Landscape and Irrigation System Design:

The site's structural source control BMP involves an efficient landscape irrigation design consistent with the local ordinances. The system will include native or drought-tolerant plants and mechanisms to minimize excess irrigation and nuisance water into the stormwater conveyance system while working to reduce soil amendments and irrigation frequency. The system should also minimize the conveyance of landscape related chemicals, including pesticides. Additional information to be provided in the Final WQMP.

Trash Receptacles in Common Areas:

Trash containers shall be leak proof and have attached covers or lids.

Storm Drain System Facilities:

Catch basins and storm drainage facilities on-site should be inspected, cleaned, and maintained routinely. Maintenance staff should take prompt action to correct or repair malfunctioning facilities.

Protection of Slopes and Channels:

Landscaping improvements will help stabilize the proposed landscaped areas and prevent erosion. These areas will be subject to routine maintenance to address potential instances of soil erosion. Basin slopes should be visually inspected on a quarterly basis and after major rainfall events. Physical obstructions caused by vegetation debris or littering should be cleared to ensure that the slopes continue to function as designed. Any material collected (e.g. landscape debris or trash) should be properly handled and disposed of. Additional information to be provided in the Final WQMP.

Building and Grounds Maintenance (CASQA SC-41): (Property management/operator)

A series of maintenance practices can be implemented to prevent or reduce the discharge of potential pollutants into the storm drain system resulting from building and grounds maintenance activities. The BMP implementation will be achieved with the following guidelines under SC-41: washing and cleaning up with as little water as possible; following good landscape management practices; preventing and cleaning up spills immediately; keeping debris from entering the storm drains; and properly maintaining the stormwater collection system. Additional information to be provided in the Final WQMP.

Appendix D includes copies of the educational materials (described in Section 3.5.2.1 of the WQMP Guidance document) that will be used in implementing this project-specific WQMP.

V.3 EQUIVALENT TREATMENT CONTROL BMP ALTERNATIVES

Not applicable.

V.4 REGIONALLY-BASED BMPS

Not Applicable

VI. Operation and Maintenance Responsibility for BMPs

Appendix G of this project-specific WQMP includes copies of CC&Rs, Covenant and Agreements, BMP Maintenance Agreement and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.

TABLE 8 -OPERATIONS AND MAINTENANCE

BMP Requiring Maintenance	Party Responsibility	Recommended Inspection and Maintenance Frequency	Recommended Self-Inspection and Record Keeping	Implementation Period	Recommended O & M Activities and Process
Landscaped Areas	Property Owner, Operator, Hired Management, Home Owner's Association	At least twice monthly or according to a maintenance schedule.	Quarterly summaries of inspection and maintenance activities should be appended to the WQMP.	Post-Construction	(See following page for
Irrigation System	Property Owner, Operator, Hired Management, Home Owner's Association	At least twice monthly or according to a maintenance schedule.		Post-Construction	(See following page)
Trash Receptacles and Common Area Litter Control	Property Owner, Operator, Hired Management, Home Owner's Association	Based on trash pick-up intervals and according to a maintenance schedule.		Post-Construction	(See following page)
Paved Area Sweeping	Property Owner, Operator, Hired Management, Home Owner's Association	Based on HOA Maintenance Schedule to be Determined		Post-Construction	(See following page)
Storm Drain System	Property Owner, Operator, Hired Management, Home Owner's Association	Quarterly and after storm events or according to a maintenance schedule		Post-Construction	(See following page)
Retention Facilities	Property Owner, Operator, Hired Management, Home Owner's Association	Quarterly and after storm events or according to an established maintenance schedule		Post-Construction	(See following page)

*Note: "Storm events" refer to precipitation events producing 0.5 inches of rain or greater within a 48-hour period. The occurrence of these events may be confirmed against the local rain event summaries published in the National Weather Service or National Oceanic and Atmospheric Administration web site (www.noaa.gov). The recommended inspection, maintenance, and recordkeeping practices in this WQMP may be addressed by a formal schedule, operations manual, and other standard operating procedures which may be developed for this site.

Note: The following maintenance recommendations, including the responsible parties, inspection intervals, and maintenance intervals, are not intended to be exhaustive in nature and should not serve as the sole source of on-site operating procedures. Where applicable, refer to the equipment manufacturer's recommendations, other relevant maintenance recommendations, and the *Declaration of Covenants,*

Conditions and Restrictions, Reservation of Easements that apply to this site. Additional information to be provided in the Final WQMP.

Description of Maintenance Requirements:

Landscaped Areas: All trimming, pruning, and removal of fallen organic material from plants, shrubs, and trees should be collected per an established landscape maintenance plan for proper disposal in green waste collection facilities. Mechanical equipment or associated materials temporarily staged during maintenance activities should be placed away from storm water drainage facilities, including inlets and conveyances. Where applicable, collected waste resulting from the maintenance activities should be promptly transported to the designated disposal containers or locations. In conjunction with the routine activities, maintenance staff should visually inspect for indicators of improper watering levels so that adequate adjustments can be made.

Irrigation Systems: Water conservation practices should be upheld at all times per the approved irrigation plans and established practices. Monitoring of the irrigation system should be performed as necessary to ensure that appropriate watering levels are maintained and to verify that no piping or irrigation heads are leaking. Any debris, sediment, mineral and grit deposits should be removed from the irrigation system at regular intervals to provide consistent watering levels. The irrigation and landscape maintenance will help increase the effectiveness of these systems and minimize the amount of runoff that enters the storm drain system. Erosion and the conveyance of pesticides/fertilizers in runoff will also be reduced through routine maintenance.

Trash Management and Common Area Litter Control: Common area litter control should be implemented to reduce pollution in runoff. Routine monitoring should be performed in the landscaped areas, trash receptacles, in common areas, and along the project edges. Any observed accumulated trash, vegetation debris or improper disposal should be addressed promptly by the designated staff. Common area litter control measures can be coordinated and improved by the landscaping maintenance is currently taking place on-site. No trash should be allowed to be stored at the base of the containers. Pick-up intervals should be determined so that the containers are not overfilled.

Storm Drain System: Storm water conveyance systems, including inlets, swales, outlets, cleanouts, manholes and pipelines within the project should be inspected quarterly and after each major storm event or according to a maintenance schedule. All parts of the system should be periodically cleaned to ensure that the system works properly during any storm event. Any waste collected from the cleaning activities should be collected and handled for proper disposal.

Paved Area Sweeping and Cleaning

Paved area sweeping is recommended to prevent sediment, litter and other debris from being washed by runoff into the on-site storm drain system. Paved area sweeping should be performed during dry weather if possible and the frequency should be flexible to accommodate climate conditions and areas of concern. Street sweeping equipment must be operated only by trained personnel based on the manufacturer's specifications. Street sweeping equipment should be properly maintained off-site by the operator. Debris should be collected for proper handling and disposal.

Retention Facilities: WQMP Operation and maintenance should consider and prioritize the maintenance procedures established for the proper operation of the irrigation pond. Irrigation pond maintenance may supersede the general operation and maintenance guidelines provided herein.

Retention facilities should be visually inspected on a quarterly basis or according to a landscaping maintenance schedule. Physical obstructions caused by vegetation debris or littering should be promptly cleared to ensure that the facility continues to function as designed. Any material collected (e.g. landscape debris or trash) should be properly handled and disposed of. Retention facility outlets must be inspected for signs of erosion or obstruction.

Before annual storm seasons and following rainfall events producing precipitation of 0.5 inches or more:

- Maintain landscaping and irrigation system as needed.
- Remove debris and litter from the entire irrigation pond and retention freeboard to minimize clogging and improve aesthetics.
- Inspect for obvious problems and repair as needed. Address odor, insects, and overgrowth issues.
- Check for erosion and sediment laden areas in the basin shoreline. Repair as needed.
- Re-stabilize the basin slopes as needed.

Perform the following inspection procedures within 72 hours after a rainfall event producing precipitation of 0.5 inches or greater:

- Examine the tributary inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element.
- Check for erosion, slumping and overgrowth. Repair as needed.
- Check basin depth for sediment build up and reduced total capacity.
- No algae formation should be visible.

Record Keeping: A copy of this project-specific WQMP should be maintained on-site or remotely by the project owner or operator (Home Owner's Association). Records of maintenance shall be appended to this WQMP.

VII. Funding

The funding source for operation and maintenance of each BMP identified in the Project Specific Water Quality Management Plan shall be the responsibility Relevant Coachella Owner, LLC. The owner recognizes that a source of funding is required to support the on-going operation and maintenance of BMPs, and that funding will continue for the life of the project.

By certifying the final project specific WQMP, the Project applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners. One example of how to adhere to the requirement to transfer operation and maintenance responsibilities is to record the project specific WQMP against the title to the property.

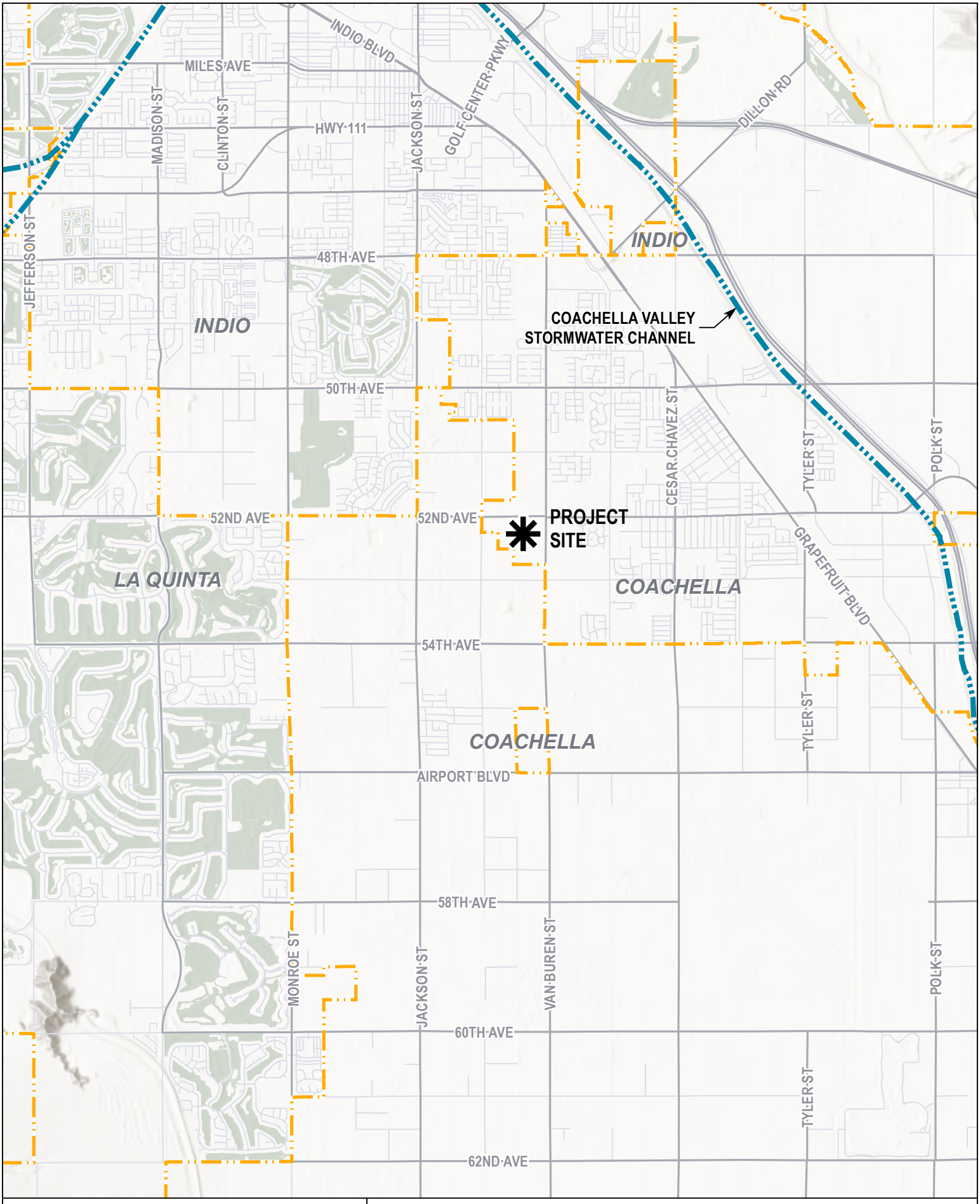
Appendix A

CONDITIONS OF APPROVAL

Planning Commission Resolution	To Be Provided
Dated	To Be Provided

Appendix B

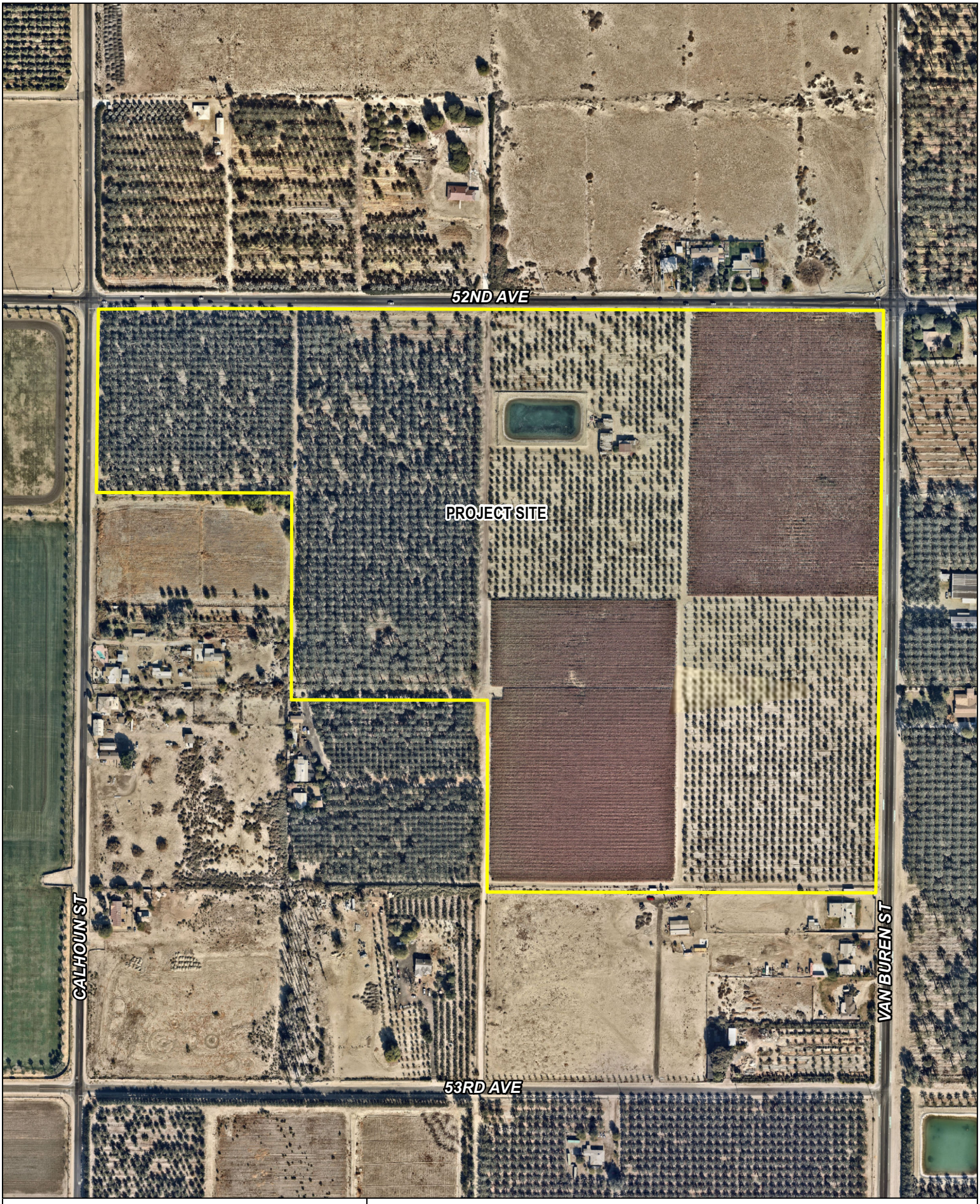
VICINITY MAP, WQMP SITE PLAN, AND RECEIVING WATERS MAP



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Planning • Environmental Services • Dry Utility Coordination • GIS

0 NORTH 5,000 FT

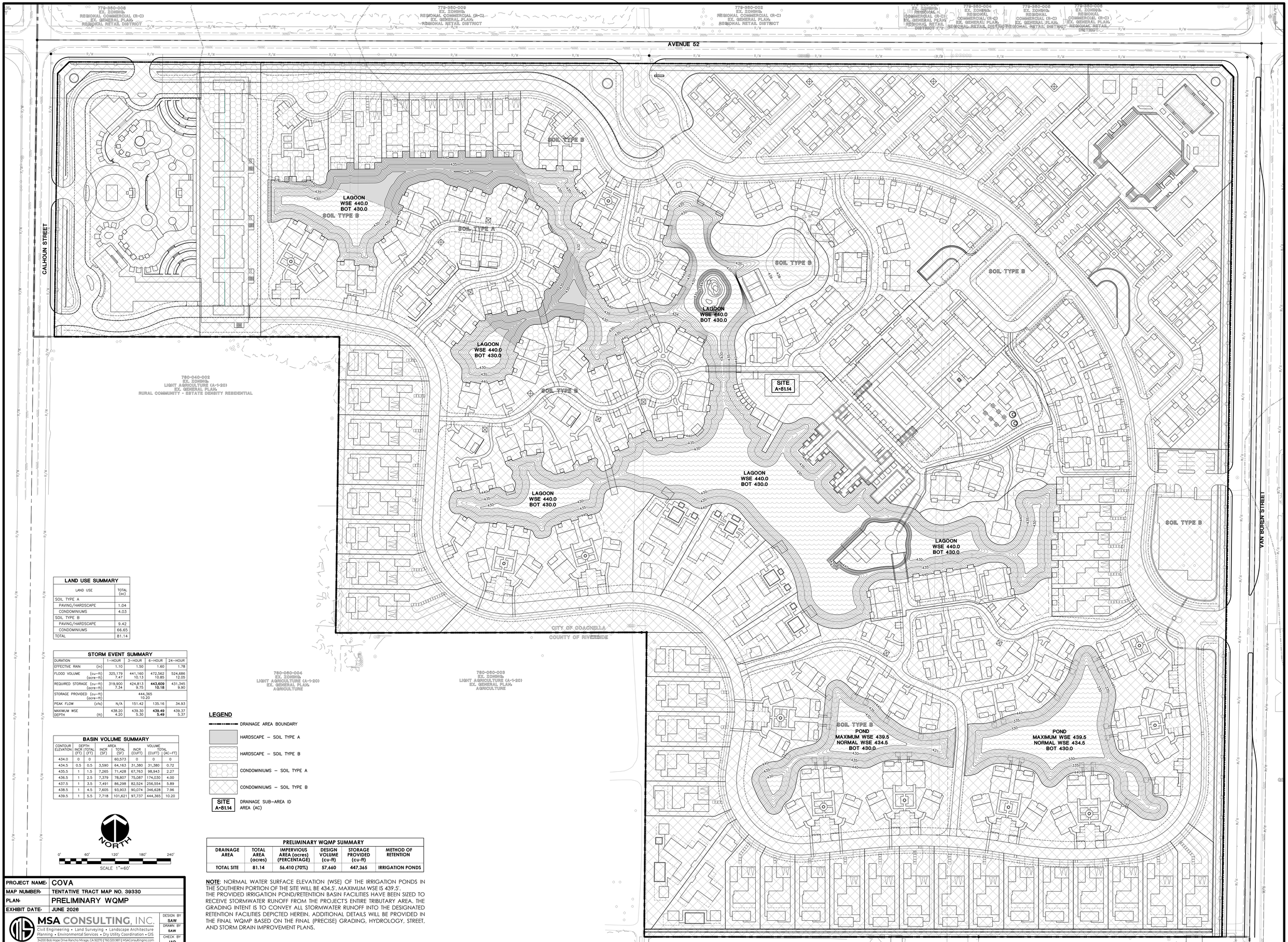
THE RANCH - TTM 39330
VICINITY MAP



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Planning • Environmental Services • Dry Utility Coordination • GIS

0 NORTH 400 FT

THE RANCH - TTM 39330
EXISTING CONDITIONS



LAND USE SUMMARY	
LAND USE	TOTAL (ac)
SOIL TYPE A	
PAVING/HARDSCAPE	1.04
CONDOMINIUMS	4.03
SOIL TYPE B	
PAVING/HARDSCAPE	9.42
CONDOMINIUMS	66.65
TOTAL	81.14

STORM EVENT SUMMARY					
DURATION		1-HOUR	3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.10	1.50	1.60	1.78
FLOOD VOLUME	(cu-ft)	325,179	441,160	472,562	524,686
	(acre-ft)	7.47	10.13	10.85	12.05
REQUIRED STORAGE	(cu-ft)	319,900	424,813	**443,609**	431,345
	(acre-ft)	7.34	9.75	**10.18**	9.90
STORAGE PROVIDED	(cu-ft)		444,365		
	(acre-ft)		10.20		
PEAK FLOW	(cfs)	N/A	151.42	135.16	34.93
MAXIMUM WSE		438.20	439.30	**439.49**	439.37
DEPTH	(ft)	4.20	5.30	**5.49**	5.37

BASIN VOLUME SUMMARY							
CONTOUR ELEVATION	DEPTH INCR (FT)	DEPTH TOTAL (FT)	AREA INCR (SF)	AREA TOTAL (SF)	VOLUME INCR (CUFT)	VOLUME TOTAL (CUFT)	VOLUME TOTAL (AC-FT)
434.0	0	0		60,573	0	0	0
434.5	0.5	0.5	3,590	64,163	31,380	31,380	0.72
435.5	1	1.5	7,265	71,428	67,763	98,943	2.27
436.5	1	2.5	7,379	78,807	75,087	174,030	4.00
437.5	1	3.5	7,491	86,298	82,524	256,554	5.89
438.5	1	4.5	7,605	93,903	90,074	346,628	7.96
439.5	1	5.5	7,718	101,621	97,737	444,365	10.20

NORTH

0' 60' 120' 180' 240'

SCALE 1"=60'

LEGEND

- DRAINAGE AREA BOUNDARY
- HARDSCAPE – SOIL TYPE A
- HARDSCAPE – SOIL TYPE B
- CONDOMINIUMS – SOIL TYPE A
- CONDOMINIUMS – SOIL TYPE B
- SITE A-81.14 — DRAINAGE SUB-AREA ID AREA (AC)

PRELIMINARY WQMP SUMMARY					
DRAINAGE AREA	TOTAL AREA (acres)	IMPERVIOUS AREA (acres) (PERCENTAGE)	DESIGN VOLUME (cu-ft)	STORAGE PROVIDED (cu-ft)	METHOD OF RETENTION
TOTAL SITE	81.14	56.410 (70%)	57,660	447,365	IRRIGATION PONDS

NOTE: NORMAL WATER SURFACE ELEVATION (WSE) OF THE IRRIGATION PONDS IN THE SOUTHERN PORTION OF THE SITE WILL BE 434.5'. MAXIMUM WSE IS 439.5'. THE PROVIDED IRRIGATION POND/RETENTION BASIN FACILITIES HAVE BEEN SIZED TO RECEIVE STORMWATER RUNOFF FROM THE PROJECT'S ENTIRE TRIBUTARY AREA. THE GRADING INTENT IS TO CONVEY ALL STORMWATER RUNOFF INTO THE DESIGNATED RETENTION FACILITIES DEPICTED HEREIN. ADDITIONAL DETAILS WILL BE PROVIDED IN THE FINAL WQMP BASED ON THE FINAL (PRECISE) GRADING, HYDROLOGY, STREET, AND STORM DRAIN IMPROVEMENT PLANS.

PROJECT NAME:	COVA
MAP NUMBER:	TENTATIVE TRACT MAP NO. 39330
PLAN:	PRELIMINARY WQMP
EXHIBIT DATE:	JUNE 2026

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DESIGN BY	SAW
DRAWN BY	SAW
CHECK BY	JAD

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Appendix C

SUPPORTING DETAIL RELATED TO HYDROLOGIC CONDITIONS OF CONCERN

(NOT APPLICABLE – SEE APPENDIX F FOR HYDROLOGY REPORT SUMMARY)

Appendix D

EDUCATIONAL MATERIALS

CHECKLIST FOR MINIMIZING VECTOR PRODUCTION IN STORMWATER MANAGEMENT STRUCTURES

OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS

CALIFORNIA STORMWATER BMP HANDBOOK - MUNICIPAL

SC-10: Non-Stormwater Discharges

SC-11: Spill Prevention, Control & Cleanup

SC-41: Building and Grounds Maintenance

SC-60: Housekeeping Practices

SC-61: Safer Alternative Products

SC-70: Road and Street Maintenance

SC-71: Plaza and Sidewalk Cleaning

SC-72: Fountain and Pool Maintenance

SC-73: Landscape Maintenance

SC-74: Drainage System Maintenance

SD-10: Site Design & Landscape Planning

SD-12: Efficient Irrigation

SD-13: Storm Drain Signage

TC-11: Infiltration Basin

TC-30: TC-30 Vegetated Swale

Safer Alternative Products SC-35

Description

Promote the use of less harmful products and products that contain little or no TMDL pollutants. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (batteries, fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice as much as possible with existing programs at your facility.

Develop a comprehensive program based on:

- The "Precautionary Principle," which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program including no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- Policies

Objectives

- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

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- Procedures
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures
  - Bid packages (services and supplies)
- Materials
  - Preferred or approved product and supplier lists
  - Product and supplier evaluation criteria
  - Training sessions and manuals
  - Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC20 – SC22) and SC41, Building and Grounds Maintenance.

Training

- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations

This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- Specialized equipment storage and handling requirements,
- Storm water runoff sampling requirements,
- Training and licensing requirements, and
- Record keeping and reporting requirements.

Equipment

- There are no major equipment requirements to this BMP.

Limitations

- Alternative products may not be available, suitable, or effective in every case.

Requirements

Cost Considerations

- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.

- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information

Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

- Auto Recycling Project
- Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Building & Grounds Maintenance SC-41

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Switch to non-toxic chemicals for maintenance to the maximum extent possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Encourage proper lawn management and landscaping, including use of native vegetation.
- ☐ Encourage use of Integrated Pest Management techniques for pest control.
- ☐ Encourage proper onsite recycling of yard trimmings.
- ☐ Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives
▪ *Cover*
▪ *Contain*
▪ *Educate*
▪ *Reduce/Minimize*
▪ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.



Good Housekeeping

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils. See also SC-40, Contaminated and Erodible Areas, for more information.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and

solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- ☐ If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- ☐ Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- ☐ Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- ☐ Use mulch or other erosion control measures when soils are exposed.
- ☐ Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- ☐ Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- ☐ Use hand weeding where practical.

Fertilizer and Pesticide Management

- ☐ Do not use pesticides if rain is expected.
- ☐ Do not mix or prepare pesticides for application near storm drains.
- ☐ Use the minimum amount needed for the job.
- ☐ Calibrate fertilizer distributors to avoid excessive application.
- ☐ Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- ☐ Apply pesticides only when wind speeds are low.
- ☐ Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- ☐ Irrigate slowly to prevent runoff and then only as much as is needed.
- ☐ Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Inspection

- ☐ Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Building & Grounds Maintenance SC-41



Spill Response and Prevention Procedures

- ☐ Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- ☐ Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- ☐ Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- ☐ Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- ☐ Clean up spills immediately.



Material Handling and Waste Management

- ☐ Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- ☐ Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- ☐ Dispose of empty pesticide containers according to the instructions on the container label.
- ☐ Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- ☐ Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.



Employee Training Program

- ☐ Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- ☐ Train employees and contractors in proper techniques for spill containment and cleanup.
- ☐ Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff.



Quality Assurance and Record Keeping

- ☐ Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- ☐ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

Maintenance

- Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

Supplemental Information

Fire Sprinkler Line Flushing

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

City of Seattle, Seattle Public Utilities Department of Planning and Development, 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual.*

Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook.* Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control.* Available online at:

http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

US EPA, 1997. *Best Management Practices Handbook for Hazardous Waste Containers*. Available online at: http://www.epa.gov/region6/6en/h/handbk4.pdf.

Ventura Countywide Stormwater Management Program Clean Business Fact Sheets. Available online at: http://www.vcstormwater.org/documents/programs_business/building.pdf.

Road and Street Maintenance SC-70



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.

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- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
  - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
  - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
  - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
  - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
  - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
  - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
  - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
  - Traffic control officers may be required to enforce parking restrictions.
  - Skillful design of cleaning routes is required for program to be productive.
  - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM10). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.
- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.
- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.
- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.
- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

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Landscape Maintenance SC-73



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	
Oxygen Demanding	☑

Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

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- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.
- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.
- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.
- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.
- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).
- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.
- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.
- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Place temporarily stockpiled material away from watercourses and storm drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.
- Inspect pesticide/fertilizer equipment and transportation vehicles daily.

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a know in location
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

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Drainage System Maintenance SC-74



Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑
Oxygen Demanding	☑

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

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- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

- The State Department of Fish and Game has a hotline for reporting violations called Cal TIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).
- The California Department of Toxic Substances Control's Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

- Refer to SC-11, Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.

- Arrangements must be made for proper disposal of collected wastes.

- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to

cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

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Efficient Irrigation SD-12



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Appendix E

SOILS REPORT

Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, California 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863
www.sladdenengineering.com

October 22, 2024

Project No. 544-24159
24-10-561

Relevant Living
6417 Selma Avenue, 2nd Floor
Los Angeles, California 90028

Project: Proposed The Ranch at Coachella
Mixed-Use Development
APN's 780-040-001, 003, 780-060-001 & 002
SWC 52nd Avenue & Van Buren Street
Coachella, California

Subject: Percolation/Infiltration Testing for Stormwater Management

Ref: Geotechnical Investigation report, Proposed "The Ranch at Coachella" Mixed-Use Development, APNs 780-040-001, 003 & 780-060-001 & 002 Coachella, California, Project No. 544-24159, Report No. 24-07-358.

In accordance with your request, we have performed percolation testing on the subject site to evaluate the infiltration potential of the near-surface soil to assist in stormwater management system design. It is our understanding that on-site stormwater retention including infiltration is planned for the proposed project.

Percolation testing has been performed within 8 shallow test holes excavated on the site. Testing was performed at a depth of approximately 4 and 6 feet below the existing ground surface. The approximate locations of the test holes are presented on the attached Test Location Photograph (Figure 3). Proposed testing locations were provided to Sladden Engineering by MSA Consulting, Inc. However, final locations were adjusted based on encountered field conditions and by on site tenant's request.

Testing was performed by placing water within the test bores and recording the drop in the water surface with time. Testing was performed in general accordance with Section 2.3 of Riverside County – Low Impact Development BMP Design Handbook for percolation testing. Test results are summarized in the following table.

PERCOLATION/INFILTRATION TEST RESULTS

Test No.	Depth (Ft)	USCS	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	6.00	SM	24.00	3.00
P-2	6.00	SM	27.50	3.64
P-3	4.00	SM	40.00	6.67
P-4	6.00	SM	40.00	6.67

P-5	6.00	SM	32.50	4.68
P-6	4.00	SM	40.00	6.67
P-7	4.00	SM	40.00	6.67
P-8	4.00	SM	40.00	6.67

The percolation rates determined represent the ultimate field rates that do not include a safety factor. The corresponding infiltration rates were calculated using the Porchet Method. An appropriate safety factor should be incorporated into stormwater retention/infiltration system design.

If you have any questions regarding this memo, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

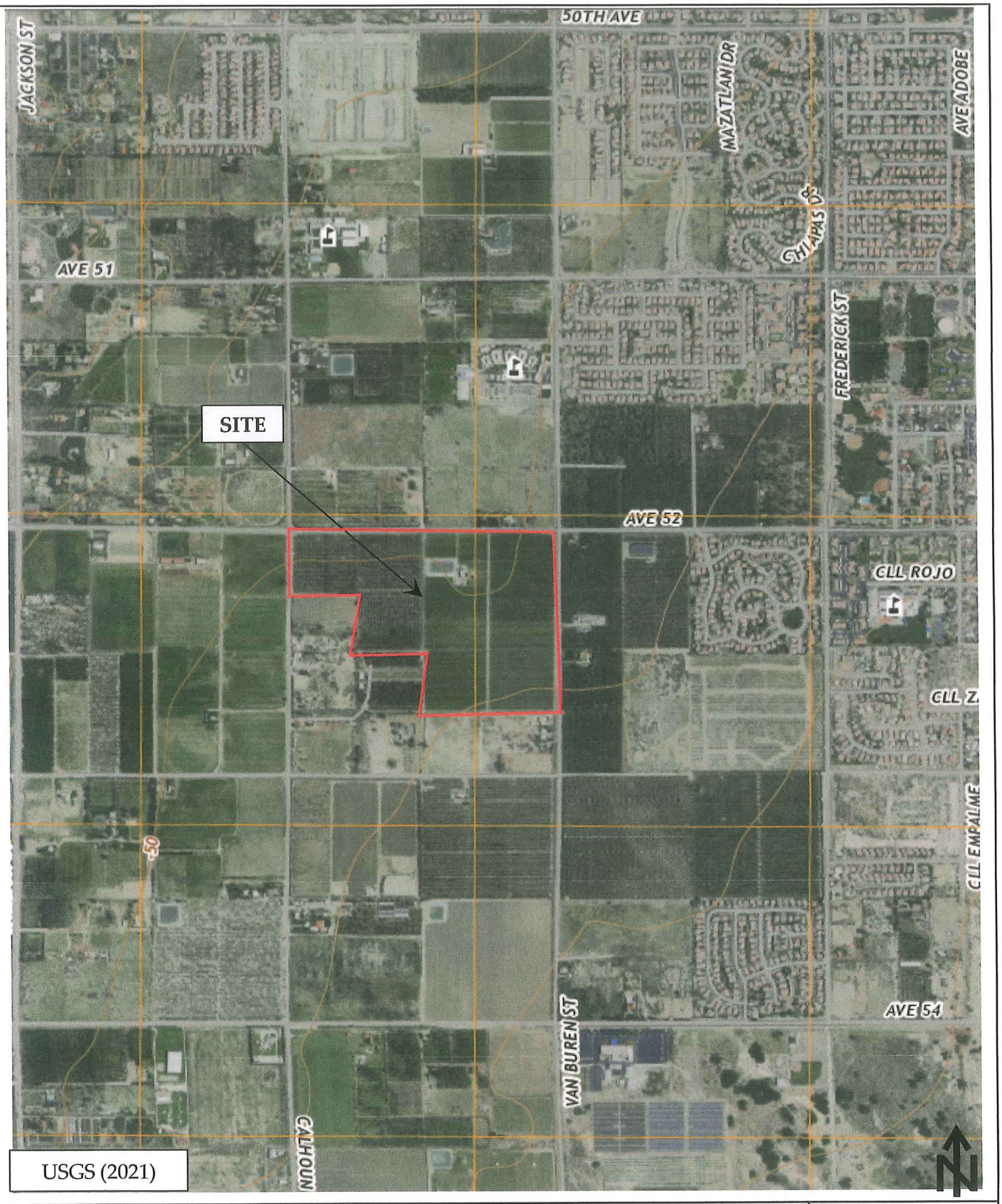
PROFESSIONAL GEOLOGIST
JAMES W. MINOR III
No. 9735
STATE OF CALIFORNIA

Brett L. Anderson
Principal Engineer

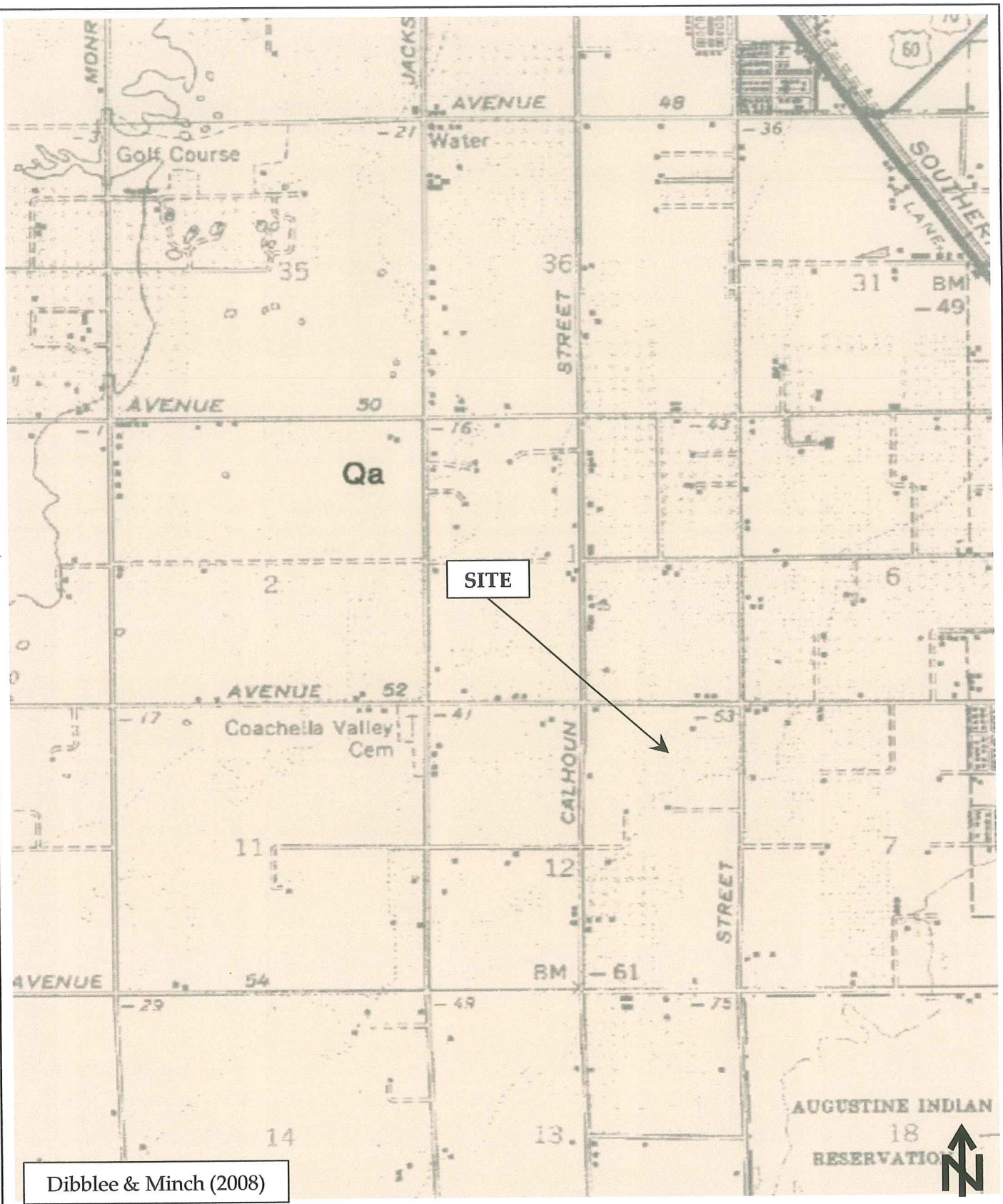
REGISTERED PROFESSIONAL ENGINEER
BRETT L. ANDERSON
No. C45389
CIVIL ENGINEERING
STATE OF CALIFORNIA

Copies: pdf/Addressee

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
TEST LOCATION PHOTOGRAPH



	SITE LOCATION MAP		FIGURE
Sladden Engineering	Project Number:	544-24159	1
	Report Number:	24-10-561	
	Date:	October 22, 2024	



Dibblee & Minch (2008)

Sladden Engineering	REGIONAL GEOLOGIC MAP		FIGURE 2
	Project Number:	544-24159	
	Report Number:	24-10-561	
	Date:	October 22, 2024	



LEGEND

P-8 Approximate Percolation Testing Location

Google Earth (2024)

Sladden Engineering

TEST LOCATION PHOTOGRAPH

FIGURE 3

Project Number:	544-24159
Report Number:	24-10-561
Date:	October 22, 2024

BORING LOGS
STORMWATER TESTING DATA SHEETS

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, moist, fine-to coarse-grained, micaceous, with trace of clay.
							4		
							6		
							8		Terminated at ~ 6 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	1
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, moist, fine-to coarse-grained, micaceous, with trace of clay.
							4		
							6		
							8		Terminated at ~ 6 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	2
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		
							10		Terminated at ~ 4 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	3
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		Terminated at ~ 6 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
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							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	4
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		Terminated at ~ 6 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	5
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		
							10		Terminated at ~ 4 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	6
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		
							10		Terminated at ~ 4 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

Project No:	544-24159	Page	7
Report No:	24-10-561		

Sladden Engineering

BORE LOG

Equipment:	MOBILE B-61	Date Drilled:	9/26/2024
Elevation:	-50 FT MSL	Boring No:	P-8

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); grayish brown, slightly moist, fine-to coarse-grained, micaceous.
							4		
							6		
							8		
							10		Terminated at ~ 4 ft bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

MIXED-USE DEVELOPMENT
SWC 52ND AVENUE & VAN BUREN, COACHELLA

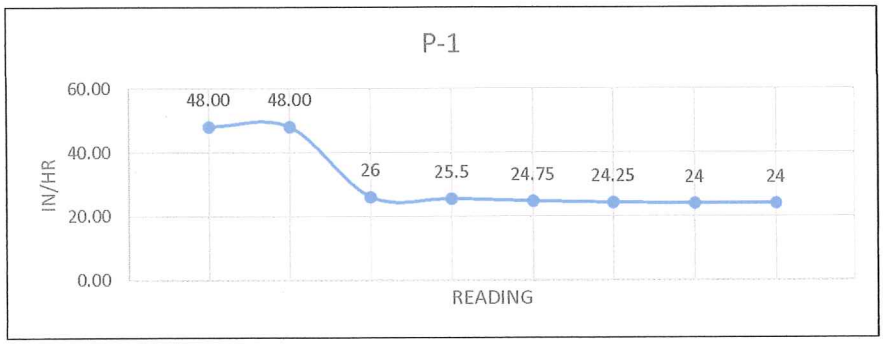
Project No:	544-24159	Page	8
Report No:	24-10-561		

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	6.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-1	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	6.00	20	0	20	48.00
B	25.00	6.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	6.00	20	7	13	26
2	30.00	6.00	20	7 2/8	12 6/8	25.5
3	30.00	6.00	20	7 5/8	12 3/8	24.75
4	30.00	6.00	20	7 7/8	12 1/8	24.25
5	30.00	6.00	20	8	12	24
6	30.00	6.00	20	8	12	24



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	64.00
r =	4.00
D_0 =	52
D_t =	72.00
H_0 =	20
H_f =	8
ΔH =	12.00
H_{avg} =	14.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

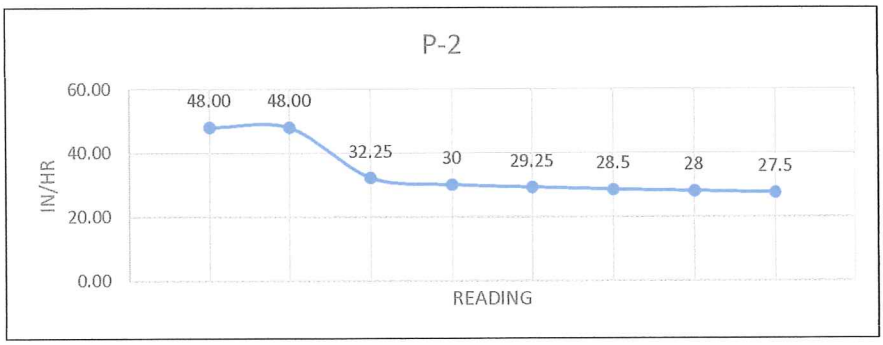
Field Rate:	24 in/hr
Infiltration Rate:	3.00 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	6.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-2	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	6.00	20	0	20	48.00
B	25.00	6.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	6.00	20	3 7/8	16 1/8	32.25
2	30.00	6.00	20	5	15	30
3	30.00	6.00	20	5 3/8	14 5/8	29.25
4	30.00	6.00	20	5 6/8	14 2/8	28.5
5	30.00	6.00	20	6	14	28
6	30.00	6.00	20	6 2/8	13 6/8	27.5



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	65.75
r =	4.00
D_0 =	52
D_t =	72.00
H_0 =	20
H_f =	6.25
ΔH =	13.75
H_{avg} =	13.13

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

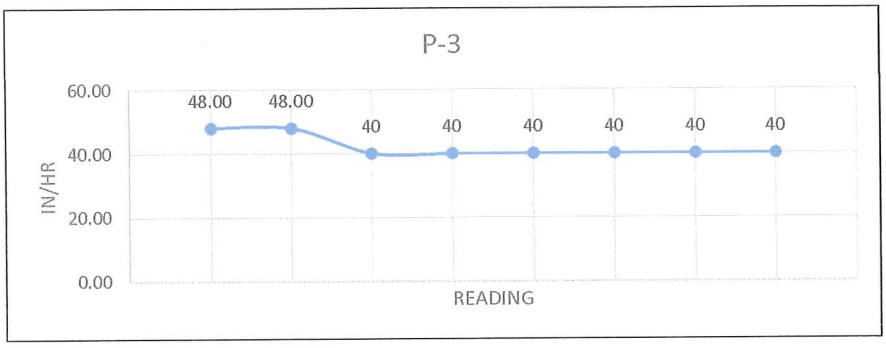
Field Rate:	27.5 in/hr
Infiltration Rate:	3.64 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	4.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-3	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	4.00	20	0	20	48.00
B	25.00	4.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	4.00	20	0	20	40
2	30.00	4.00	20	0	20	40
3	30.00	4.00	20	0	20	40
4	30.00	4.00	20	0	20	40
5	30.00	4.00	20	0	20	40
6	30.00	4.00	20	0	20	40



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	48.00
r =	4.00
D_0 =	28
D_t =	48.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

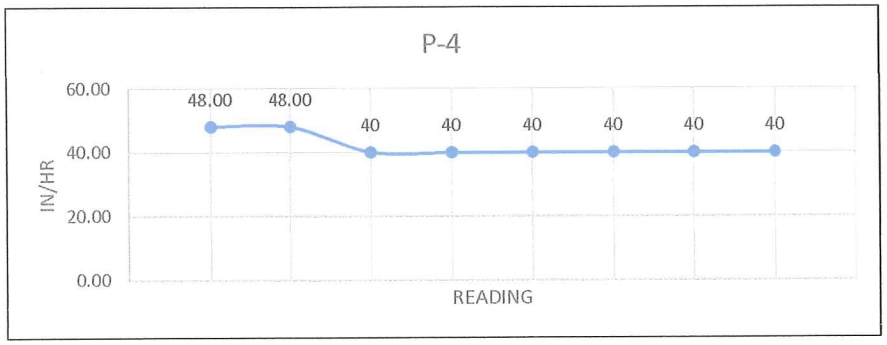
Field Rate:	40 in/hr
Infiltration Rate:	6.67 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	6.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-4	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	6.00	20	0	20	48.00
B	25.00	6.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	6.00	20	0	20	40
2	30.00	6.00	20	0	20	40
3	30.00	6.00	20	0	20	40
4	30.00	6.00	20	0	20	40
5	30.00	6.00	20	0	20	40
6	30.00	6.00	20	0	20	40



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	72.00
r =	4.00
D_0 =	52
D_t =	72.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

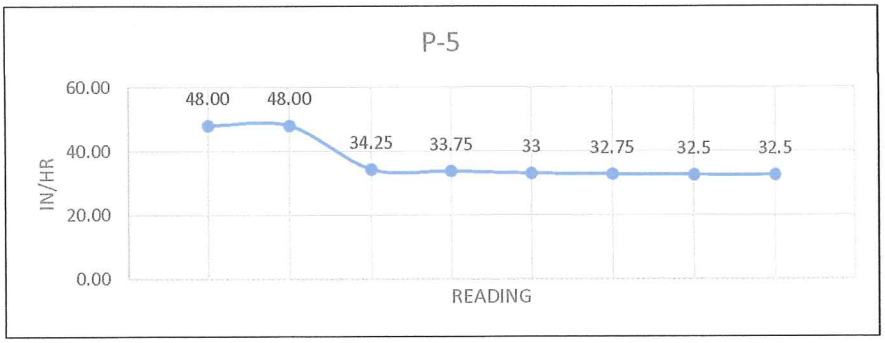
Field Rate:	40 in/hr
Infiltration Rate:	6.67 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	6.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-5	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	6.00	20	0	20	48.00
B	25.00	6.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	6.00	20	2 7/8	17 1/8	34.25
2	30.00	6.00	20	3 1/8	16 7/8	33.75
3	30.00	6.00	20	3 4/8	16 4/8	33
4	30.00	6.00	20	3 5/8	16 3/8	32.75
5	30.00	6.00	20	3 6/8	16 2/8	32.5
6	30.00	6.00	20	3 6/8	16 2/8	32.5



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	68.25
r =	4.00
D_0 =	52
D_t =	72.00
H_0 =	20
H_f =	3.75
ΔH =	16.25
H_{avg} =	11.88

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

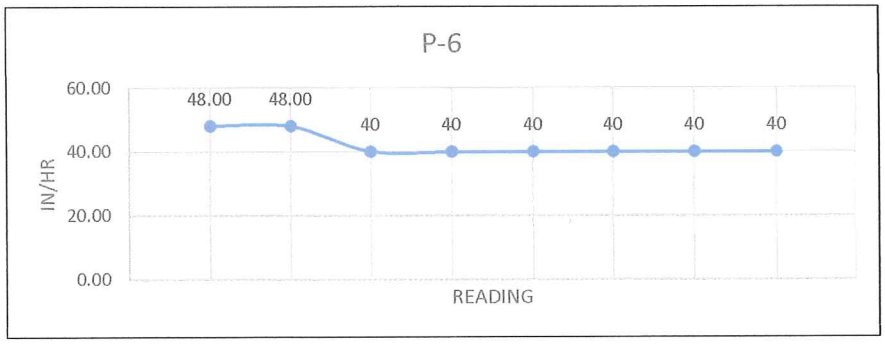
Field Rate:	32.5 in/hr
Infiltration Rate:	4.68 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	4.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-6	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	4.00	20	0	20	48.00
B	25.00	4.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	4.00	20	0	20	40
2	30.00	4.00	20	0	20	40
3	30.00	4.00	20	0	20	40
4	30.00	4.00	20	0	20	40
5	30.00	4.00	20	0	20	40
6	30.00	4.00	20	0	20	40



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	48.00
r =	4.00
D_0 =	28
D_t =	48.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

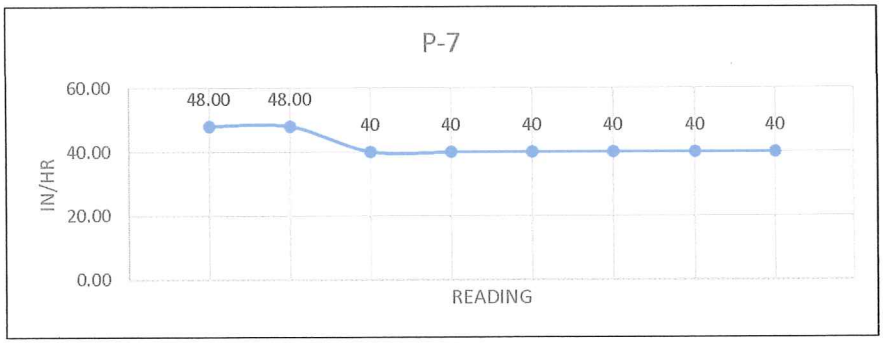
Field Rate:	40 in/hr
Infiltration Rate:	6.67 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	4.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-7	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	4.00	20	0	20	48.00
B	25.00	4.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	4.00	20	0	20	40
2	30.00	4.00	20	0	20	40
3	30.00	4.00	20	0	20	40
4	30.00	4.00	20	0	20	40
5	30.00	4.00	20	0	20	40
6	30.00	4.00	20	0	20	40



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	48.00
r =	4.00
D_0 =	28
D_t =	48.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

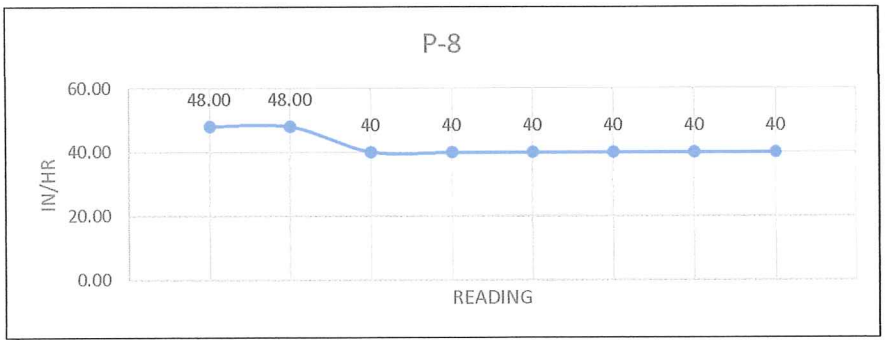
Field Rate:	40 in/hr
Infiltration Rate:	6.67 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	Mixed-Use Development	Depth (ft):	4.00
Job No. :	544-24159	USCS Soil Class:	SM
Date:	10/21/2024	Sandy Soil:	Favorable
Test Hole #:	P-8	Tested By:	Robert

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	4.00	20	0	20	48.00
B	25.00	4.00	20	0	20	48.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	30.00	4.00	20	0	20	40
2	30.00	4.00	20	0	20	40
3	30.00	4.00	20	0	20	40
4	30.00	4.00	20	0	20	40
5	30.00	4.00	20	0	20	40
6	30.00	4.00	20	0	20	40



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	30.00
D_f =	48.00
r =	4.00
D_0 =	28
D_t =	48.00
H_0 =	20
H_f =	0
ΔH =	20.00
H_{avg} =	10.00

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

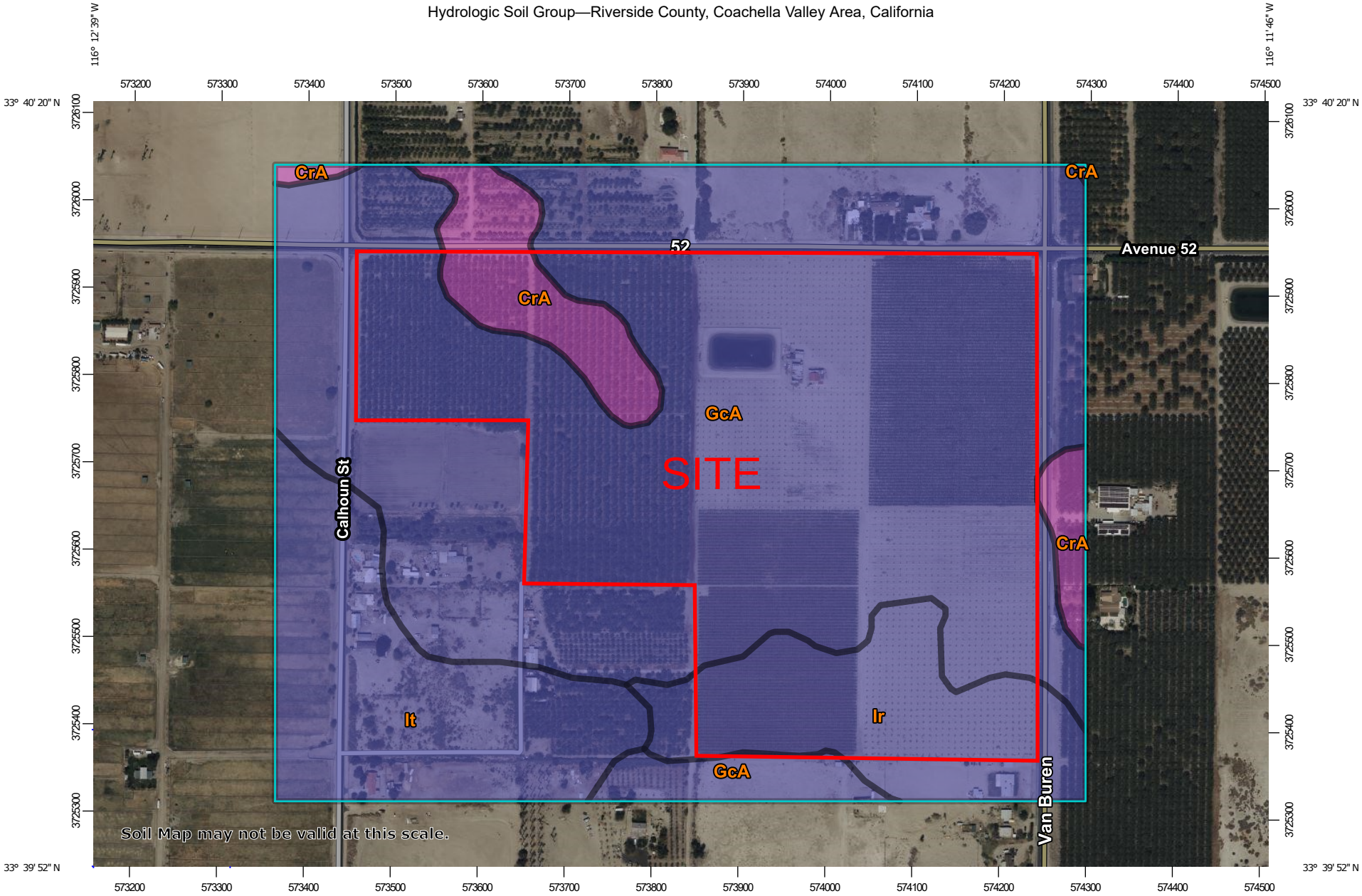
ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

Field Rate:	40 in/hr
Infiltration Rate:	6.67 in/hr



Map Scale: 1:6,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Riverside County, Coachella Valley Area, California
Survey Area Data: Version 17, Sep 10, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 15, 2022—May 28, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CrA	Coachella fine sand, wet, 0 to 2 percent slopes	A	10.4	6.2%
GcA	Gilman fine sandy loam, wet, 0 to 2 percent slopes	B	118.2	70.0%
Ir	Indio fine sandy loam, wet	B	17.4	10.3%
It	Indio very fine sandy loam, wet	B	22.7	13.5%
Totals for Area of Interest			**168.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix F

STRUCTURAL BMP AND/OR RETENTION FACILITY SIZING CALCULATIONS AND DESIGN DETAILS

SUMMARY HYDROLOGY REPORT

Whitewater Watershed

BMP Design Volume, V_{BMP} & Design Flow Rate, Q_{BMP} (Rev. 06-2014)

Legend: Required Entries / Calculated Cells

Company Name	MSA Consulting, Inc	Date	December 10, 2025
Designed By	SAW	County/City Case No.	
Company Project Number/Name	COVA - MSA Job No. 2811		
Drainage Area Number/Name	Site		

Enter the Area Tributary to this Feature (A_{TRIB}) — A_{TRIB} = 81.140 acres

Determine the Impervious Area Ratio

Determine the Impervious Area Within A_{TRIB} (A_{IMP}) — A_{IMP} = 56.410 acres

Calculate the Impervious Area Ratio (I_F)

$I_F = A_{IMP}/A_{TRIB}$ — I_F = 0.70

Calculate the Composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C_{BMP} = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ — C_{BMP} = 0.49

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 80% Unit Storage Volume $V_U = 0.40 \times C_{BMP}$ — V_U = 0.20 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12(in/ft)}$$

V_{BMP} = 57,660 ft^3

BMP Design Flow Rate, Q_{BMP}

$Q_{BMP} = C_{BMP} \times I \times A_{TRIB}$ — Q_{BMP} = 7.94 ft^3/s

I = Design Rainfall Intensity, 0.2 in/hr

Notes:

BASIN VOLUME WORKSHEET

PROECT COVA
JOB No. 2811
BASIN DESIGNATION: Retention Basin

BASIN CHARACTERISTICS

CONTOUR ELEVATION	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
434	0	0		60,573	0	0	0.00
434.5	0.5	0.5	3,590	64,163	31,180	31,180	0.72
435.5	1	1.5	7,265	71,428	67,763	98,943	2.27
436.5	1	2.5	7,379	78,807	75,087	174,030	4.00
437.5	1	3.5	7,491	86,298	82,524	256,554	5.89
438.5	1	4.5	7,605	93,903	90,074	346,628	7.96
439.5	1	5.5	7,718	101,621	97,737	444,365	10.20

WHERE:

$$V = \frac{1}{3}(E_1 - E_2)\left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$$

RCFCD SYNTHETIC UNIT HYDROGRAPH - SHORTCUT METHOD

DATA INPUT SHEET

DATE	December 10, 2025
WORKSHEET PREPARED BY:	saw
PROJECT NAME	COVA
PROJECT NUMBER	2811
CONCENTRATION POINT DESIGNATION	Retention Basin
AREA DESIGNATION	Site
AMC NUMBER	2

Low Loss Conditions: X=Existing; D=Developed; BS=Retention

AREA DESIG	SOIL GROUP	TRIBUTARY AREAS	ACRES	LOW LOSS CONDITION	RI NUMBER	AMC II INFILTRATION RATE	IMPERVIOUS PERCENT
2	A	PAVING/HARDSCAPE	1.04	D	32	0.74	1.00
6	A	MF - CONDIMINIUMS	4.03	D	32	0.74	0.65
2	B	PAVING/HARDSCAPE	9.42	D	56	0.51	1.00
6	B	MF - CONDIMINIUMS	66.65	D	56	0.51	0.65

LENGTH OF WATERCOURSE (L)	2,675 ft
LENGTH TO POINT OPPOSITE CENTROID (Lca)	1,120 ft
ELEVATION OF HEADWATER	449.9 ft
ELEVATION OF CONCENTRATION POINT	440.4 ft
AVERAGE MANNINGS 'N' VALUE	0.015
STORM FREQUENCY (YEAR)	100
LOW LOSS RATE (Storm Events > 10 Years)	**85%**
POINT RAIN FROM NOAA ATLAS	**14**
1-HOUR	1.30 in
3-HOUR	2.08 in
6-HOUR	2.75 in
24-HOUR	4.38 in

BASIN CHARACTERISTICS:

ELEVATION	AREA
434.0 ft	60,573 sf
434.5 ft	64,163 sf
435.5 ft	71,428 sf
436.5 ft	78,807 sf
437.5 ft	86,298 sf
438.5 ft	93,903 sf
439.5 ft	101,621 sf

PERCOLATION RATE (in/hr)	0.9 in/hr
DRYWELL DATA	
NUMBER USED	0
PERCOLATION RATE	0.00 cfs
LOWEST FLOWLINE ELEVATION	440
LOWEST PAD ELEVATION	442

RCFC & WCD HYDROLOGY MANUAL	SYNTHETIC UNIT HYDROGRAPH METHOD BASIC DATA CALCULATION FORM	PROJECT: COVA Job No.: 2811 BY: saw DATE: 12/10/25

PHYSICAL DATA

[1] CONCENTRATION POINT	Retention Basin
[2] AREA DESIGNATION	Site
[3] AREA - ACRES	81.14
[4] L-FEET	2675
[5] L-MILES	0.507
[6] La-FEET	1120.00
[7] La-MILES	0.212
[8] ELEVATION OF HEADWATER	449.87
[9] ELEVATION OF CONCENTRATION POINT	440.39
[10] H-FEET	9.48
[11] S-FEET/MILE	18.7
[12] S^0.5	4.33
[13] L*LCA/S^0.5	0.025
[14] AVERAGE MANNINGS 'N'	0.015
[15] LAG TIME-HOURS	0.09
[16] LAG TIME-MINUTES	5.3
[17] 100% OF LAG-MINUTES	5.3
[18] 200% OF LAG-MINUTES	10.6

RAINFALL DATA

[1] AMC	II
[2] FREQUENCY-YEARS	100
FROM NOAA ATLAS	**14**
[3] STORM DURATION:	Point Rain
1-HOUR	1.30 in
3-HOUR	2.08 in
6-HOUR	2.75 in
24-HOUR	4.38 in

STORM EVENT SUMMARY

STORM DURATION		1-HOUR	3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.10	1.50	1.60	1.78
FLOOD VOLUME	(cu-ft)	325,179	441,160	472,562	**524,686**
	(acre-ft)	7.47	10.13	10.85	**12.05**
REQUIRED STORAGE	(cu-ft)	319,900	424,813	**443,609**	431,345
	(acre-ft)	7.34	9.75	**10.18**	9.90
FACTOR OF SAFETY		1.39	1.05	1.00	1.03
STORAGE PROVIDED	(cu-ft)	444,365			
	(acre-ft)	10.20			
PEAK FLOW	(cfs)	n/a	151.42	135.16	34.93
MAXIMUM WSEL	(ft)	438.20	439.30	**439.49**	439.37
DEPTH	(ft)	4.20	5.30	**5.49**	5.37
LOWEST FLOWLINE ELEVATION		440.00			
DIFFERENCE	(ft)	1.80	0.70	0.51	0.63
LOWEST PAD ELEVATION		442.00			
DIFFERENCE	(ft)	3.80	2.70	2.51	2.63
ESTIMATED TIME TO DEWATER BASIN Based on Total Flood Volume & Average Percolation Rate	(days)	2.6	3.4	3.9	4.0

NOTE: PEAK FLOW FOR THE 1-HOUR STORM IS NOT REPRESENTATIVE. PER RCFCD PEAK DISCHARGES FROM THE 3-HOUR STORM SHOULD NORMALLY COMPARE WELL WITH RATIONAL PEAKS.

RCFC & WCD HYDROLOGY MANUAL	SYNTHETIC UNIT HYDROGRAPH METHOD BASIC DATA CALCULATION FORM AMC II	PROJECT: COVA Job No.: 2811 BY: saw DATE: 12/10/25

AVERAGE ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA	AREA WEIGHTED AVERAGE	MAX AVERAGE ADJUSTED INFILTRATION RATE (in/hr)	LOW LOSS CONDITION	LOW LOSS RATE PER RCFC/2322	MIN AVERAGE ADJUSTED INFILTRATION RATE
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.04	0.013	0.0009	DEVELOPED	0.1000	0.0013
A	MF - CONDIMINIUMS	32	0.74	65%	0.31	4.03	0.050	0.0153	DEVELOPED	0.3800	0.0189
B	PAVING/HARDSCAPE	56	0.51	100%	0.05	9.42	0.116	0.0059	DEVELOPED	0.1000	0.0116
B	MF - CONDIMINIUMS	56	0.51	65%	0.21	66.65	0.821	0.1739	DEVELOPED	0.3800	0.3121
					SUM	81.14	SUM	0.1960			0.3439

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.097987833

C= 0.00181

$F_t=C(24-(T/60))^{1.55}+F_m$ = 0.00181 (24-(T/60))^1.55 + 0.10 in/hr

CONSTANT LOSS RATE (3 & 6 HOUR STORMS) = **0.1960**

LOW LOSS RATE = **0.8500**

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

NOTE: Low loss rates established per RCFC/2322 (Dated: May-30-95)
For 10 Year Storms or Less
Undeveloped Condition: Low Loss = 90%
Developed Condition: Low Loss = 0.9 - (0.8 * %impervious)
Basin Site: Low Loss = 10%
For 100 Year Storm - Low Loss should be between 80% & 90% of the Rainfall Rate

RCFC & WCD
HYDROLOGY
MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

1-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	5.30
UNIT TIME-PERCENT OF LAG	94.3
TOTAL ADJUSTED STORM RAIN-INCHES	1.30
CONSTANT LOSS RATE-in/hr	0.20
LOW LOSS RATE - PERCENT	85.00%

Basin Percolation Rate	0.9 in/hr	
Maxwell Drywells		
Number	0	
Drywell Percolation Rate	0.00 cfs	0.00 cfm

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cu-ft	cu-ft	Percolation Area sf	Maximum Percolation cu-ft	Percolation Out cu-ft	cu-ft	ac-ft	ft
1	5	0.08	3.6	0.56	0.20	0.48	0.37	29.91	8,974	8,974	61,606	368	368	8,606	0.20	434.14
2	10	0.17	4.2	0.66	0.20	0.56	0.46	37.57	11,272	19,878	62,862	375	375	19,503	0.45	434.31
3	15	0.25	4.4	0.69	0.20	0.58	0.49	40.12	12,037	31,540	64,202	383	383	31,157	0.72	434.50
4	20	0.33	4.6	0.72	0.20	0.61	0.52	42.68	12,803	43,960	65,533	391	391	43,568	1.00	434.68
5	25	0.42	5.0	0.78	0.20	0.66	0.58	47.78	14,335	57,903	67,028	400	400	57,503	1.32	434.89
6	30	0.50	5.6	0.87	0.20	0.74	0.68	55.44	16,632	74,135	68,768	411	411	73,724	1.69	435.13
7	35	0.58	6.4	1.00	0.20	0.85	0.80	65.65	19,695	93,420	70,836	423	423	92,997	2.13	435.41
8	40	0.67	8.1	1.26	0.20	1.07	1.07	87.35	26,205	119,202	73,419	438	438	118,763	2.73	435.76
9	45	0.75	13.1	2.04	0.20	1.74	1.85	151.17	45,350	164,113	77,832	465	465	163,648	3.76	436.36
10	50	0.83	34.5	5.38	0.20	4.57	5.19	**424.30**	**127,291**	290,939	89,201	533	533	290,406	6.67	437.88
11	55	0.92	6.7	1.05	0.20	0.89	0.85	69.48	20,844	311,250	90,916	543	543	310,707	7.13	438.10
12	60	1.00	3.8	0.59	0.20	0.50	0.40	32.47	9,740	320,447	91,693	548	548	**319,900**	**7.34**	**438.20**

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN	1.10 in
FLOOD VOLUME	7.47 acft
FLOOD VOLUME	325,179 cu-ft
REQUIRED STORAGE	7.34
REQUIRED STORAGE	319,900 cu-ft
MAX WSEL	438.20 ft
PEAK FLOW RATE	424.30 cfs
TOTAL BASIN LOSSES	5,279 cu-ft
AVERAGE PERCOLATION RATE	87.98 cf/min

RCFC & WCD
HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

3-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE

DRAINAGE AREA-ACRES	81.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	5.30
UNIT TIME-PERCENT OF LAG	94.3
TOTAL ADJUSTED STORM RAIN (in)	2.08
CONSTANT LOSS RATE (in/hr)	0.20
LOW LOSS RATE - PERCENT	85.00%

Basin Percolation Rate	0.9 in/hr	
Maxwell Drywells		
Number	0	
Drywell Percolation Rate	0.00 cfs	0.00 cfm

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Volume	Basin	Basin Losses			Total In Basin		Basin
	Minutes	Hours	Percent	Rain	in/hr		Rain	Hydrograph	In	Volume	Percolation	Maximum	Percolation			WSEL
				in/hr				Flow			Area	Percolation	Out			
			(Plate E-5.9)		Max	Low	in/hr	cfs	cu-ft	cu-ft	sf	cu-ft	cu-ft	cu-ft	ac-ft	ft
1	5	0.08	1.3	0.32	0.20	0.28	0.13	10.51	3,154	3,154	60,936	364	364	2,790	0.06	434.04
2	10	0.17	1.3	0.32	0.20	0.28	0.13	10.51	3,154	5,944	61,257	366	366	5,578	0.13	434.09
3	15	0.25	1.1	0.27	0.20	0.23	0.08	6.43	1,929	7,507	61,437	367	367	7,140	0.16	434.11
4	20	0.33	1.5	0.37	0.20	0.32	0.18	14.60	4,379	11,520	61,899	370	370	11,150	0.26	434.18
5	25	0.42	1.5	0.37	0.20	0.32	0.18	14.60	4,379	15,530	62,361	372	372	15,157	0.35	434.24
6	30	0.50	1.8	0.45	0.20	0.38	0.25	20.72	6,217	21,374	63,034	376	376	20,998	0.48	434.34
7	35	0.58	1.5	0.37	0.20	0.32	0.18	14.60	4,379	25,377	63,495	379	379	24,998	0.57	434.40
8	40	0.67	1.8	0.45	0.20	0.38	0.25	20.72	6,217	31,216	64,167	383	383	30,832	0.71	434.49
9	45	0.75	1.8	0.45	0.20	0.38	0.25	20.72	6,217	37,050	64,792	387	387	36,663	0.84	434.58
10	50	0.83	1.5	0.37	0.20	0.32	0.18	14.60	4,379	41,042	65,220	390	390	40,653	0.93	434.64
11	55	0.92	1.6	0.40	0.20	0.34	0.20	16.64	4,992	45,645	65,714	392	392	45,252	1.04	434.71
12	60	1.00	1.8	0.45	0.20	0.38	0.25	20.72	6,217	51,470	66,338	396	396	51,073	1.17	434.79
13	65	1.08	2.2	0.55	0.20	0.47	0.35	28.89	8,668	59,741	67,225	401	401	59,340	1.36	434.92
14	70	1.17	2.2	0.55	0.20	0.47	0.35	28.89	8,668	68,008	68,111	407	407	67,601	1.55	435.04
15	75	1.25	2.2	0.55	0.20	0.47	0.35	28.89	8,668	76,269	68,997	412	412	75,857	1.74	435.16
16	80	1.33	2.0	0.50	0.20	0.42	0.30	24.81	7,443	83,299	69,751	417	417	82,883	1.90	435.26
17	85	1.42	2.6	0.65	0.20	0.55	0.45	37.06	11,118	94,001	70,898	423	423	93,578	2.15	435.42
18	90	1.50	2.7	0.67	0.20	0.57	0.48	39.10	11,731	105,309	72,054	430	430	104,879	2.41	435.58
19	95	1.58	2.4	0.60	0.20	0.51	0.40	32.98	9,893	114,772	72,984	436	436	114,336	2.62	435.71
20	100	1.67	2.7	0.67	0.20	0.57	0.48	39.10	11,731	126,067	74,094	443	443	125,625	2.88	435.86
21	105	1.75	3.3	0.82	0.20	0.70	0.63	51.36	15,407	141,032	75,564	451	451	140,580	3.23	436.05
22	110	1.83	3.1	0.77	0.20	0.66	0.58	47.27	14,182	154,762	76,913	459	459	154,303	3.54	436.24
23	115	1.92	2.9	0.72	0.20	0.62	0.53	43.19	12,956	167,259	78,142	467	467	166,792	3.83	436.40
24	120	2.00	3.0	0.75	0.20	0.64	0.55	45.23	13,569	180,361	79,382	474	474	179,887	4.13	436.57

RCFC & WCD
HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

3-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE

DRAINAGE AREA-ACRES	81.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	5.30
UNIT TIME-PERCENT OF LAG	94.3
TOTAL ADJUSTED STORM RAIN (in)	2.08
CONSTANT LOSS RATE (in/hr)	0.20
LOW LOSS RATE - PERCENT	85.00%

Basin Percolation Rate	0.9 in/hr	
Maxwell Drywells		
Number	0	
Drywell Percolation Rate	0.00 cfs	0.00 cfm

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain in/hr	Flood Hydrograph Flow cfs	Volume In cu-ft	Basin Volume cu-ft	Basin Losses			Total In Basin		Basin WSEL ft
	Minutes	Hours	(Plate E-5.9)		Max	Low					Percolation Area sf	Maximum Percolation cu-ft	Percolation Out cu-ft	cu-ft	ac-ft	
25	125	2.08	3.1	0.77	0.20	0.66	0.58	47.27	14,182	194,069	80,626	482	482	193,588	4.44	436.74
26	130	2.17	4.2	1.05	0.20	0.89	0.85	69.74	20,921	214,508	82,481	493	493	214,016	4.91	436.98
27	135	2.25	5.0	1.25	0.20	1.06	1.05	86.07	25,822	239,838	84,781	506	506	239,331	5.49	437.29
28	140	2.33	3.5	0.87	0.20	0.74	0.68	55.44	16,632	255,963	86,244	515	515	255,448	5.86	437.49
29	145	2.42	6.8	1.70	0.20	1.44	1.50	122.83	36,849	292,298	89,316	533	533	291,764	6.70	437.89
30	150	2.50	7.3	1.82	0.20	1.55	1.63	133.04	39,913	331,677	92,641	553	553	331,124	7.60	438.33
31	155	2.58	8.2	2.05	0.20	1.74	1.85	**151.42**	**45,426**	376,550	96,266	575	575	375,975	8.63	438.80
32	160	2.67	5.9	1.47	0.20	1.25	1.28	104.45	31,336	407,311	98,695	589	589	406,722	9.34	439.11
33	165	2.75	2.0	0.50	0.20	0.42	0.30	24.81	7,443	414,164	99,236	593	593	413,571	9.49	439.18
34	170	2.83	1.8	0.45	0.20	0.38	0.25	20.72	6,217	419,789	99,680	595	595	419,194	9.62	439.24
35	175	2.92	1.8	0.45	0.20	0.38	0.25	20.72	6,217	425,411	100,124	598	598	**424,813**	**9.75**	**439.30**
36	180	3.00	0.6	0.15	0.20	0.13	0.02	1.84	551	425,364	100,121	598	598	424,766	9.75	439.30

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN	1.50 in
FLOOD VOLUME	10.13 acft
FLOOD VOLUME	441,160 cu-ft
REQUIRED STORAGE	9.75 acft
REQUIRED STORAGE	424,813 cu-ft
MAX WSEL	439.30 ft
PEAK FLOW RATE	151.42 cfs
TOTAL BASIN LOSSES	16,394 cu-ft
AVERAGE PERCOLATION RATE	91.08 cf/min

RCFC & WCD
HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

6-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	5.30
UNIT TIME-PERCENT OF LAG	94.3
TOTAL ADJUSTED STORM RAIN (in)	2.75
CONSTANT LOSS RATE (in/hr)	0.20
LOW LOSS RATE - PERCENT	85.00%

Basin Percolation Rate	0.9 in/hr	
Maxwell Drywells		
Number	0	
Drywell Percolation Rate	0.00 cfs	0.00 cfm

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
	Minutes	Hours	Percent	in/hr	Max	Low	in/hr	Flow cfs	cu-ft	cu-ft	Percolation Area sf	Maximum Percolation cu-ft	Percolation Out cu-ft	cu-ft	ac-ft	ft
			(Plate E-5.9)													
1	5	0.08	0.5	0.17	0.20	0.14	0.02	2.02	607	607	60,643	362	362	245	0.01	434.00
2	10	0.17	0.6	0.20	0.20	0.17	0.00	0.17	50	295	60,607	362	295	0	0.00	434.00
3	15	0.25	0.6	0.20	0.20	0.17	0.00	0.17	50	50	60,579	362	50	0	0.00	434.00
4	20	0.33	0.6	0.20	0.20	0.17	0.00	0.17	50	50	60,579	362	50	0	0.00	434.00
5	25	0.42	0.6	0.20	0.20	0.17	0.00	0.17	50	50	60,579	362	50	0	0.00	434.00
6	30	0.50	0.7	0.23	0.20	0.20	0.04	2.87	860	860	60,672	362	362	497	0.01	434.01
7	35	0.58	0.7	0.23	0.20	0.20	0.04	2.87	860	1,357	60,729	363	363	994	0.02	434.02
8	40	0.67	0.7	0.23	0.20	0.20	0.04	2.87	860	1,854	60,786	363	363	1,491	0.03	434.02
9	45	0.75	0.7	0.23	0.20	0.20	0.04	2.87	860	2,351	60,844	363	363	1,987	0.05	434.03
10	50	0.83	0.7	0.23	0.20	0.20	0.04	2.87	860	2,847	60,901	364	364	2,483	0.06	434.04
11	55	0.92	0.7	0.23	0.20	0.20	0.04	2.87	860	3,343	60,958	364	364	2,979	0.07	434.05
12	60	1.00	0.8	0.26	0.20	0.22	0.07	5.57	1,670	4,648	61,108	365	365	4,284	0.10	434.07
13	65	1.08	0.8	0.26	0.20	0.22	0.07	5.57	1,670	5,953	61,258	366	366	5,587	0.13	434.09
14	70	1.17	0.8	0.26	0.20	0.22	0.07	5.57	1,670	7,257	61,409	367	367	6,890	0.16	434.11
15	75	1.25	0.8	0.26	0.20	0.22	0.07	5.57	1,670	8,560	61,559	368	368	8,192	0.19	434.13
16	80	1.33	0.8	0.26	0.20	0.22	0.07	5.57	1,670	9,862	61,708	369	369	9,493	0.22	434.15
17	85	1.42	0.8	0.26	0.20	0.22	0.07	5.57	1,670	11,163	61,858	369	369	10,794	0.25	434.17
18	90	1.50	0.8	0.26	0.20	0.22	0.07	5.57	1,670	12,463	62,008	370	370	12,093	0.28	434.19
19	95	1.58	0.8	0.26	0.20	0.22	0.07	5.57	1,670	13,763	62,158	371	371	13,391	0.31	434.21
20	100	1.67	0.8	0.26	0.20	0.22	0.07	5.57	1,670	15,061	62,307	372	372	14,689	0.34	434.24
21	105	1.75	0.8	0.26	0.20	0.22	0.07	5.57	1,670	16,359	62,457	373	373	15,986	0.37	434.26
22	110	1.83	0.8	0.26	0.20	0.22	0.07	5.57	1,670	17,655	62,606	374	374	17,281	0.40	434.28
23	115	1.92	0.8	0.26	0.20	0.22	0.07	5.57	1,670	18,951	62,755	375	375	18,576	0.43	434.30
24	120	2.00	0.9	0.30	0.20	0.25	0.10	8.27	2,480	21,056	62,997	376	376	20,680	0.47	434.33
25	125	2.08	0.8	0.26	0.20	0.22	0.07	5.57	1,670	22,349	63,146	377	377	21,972	0.50	434.35
26	130	2.17	0.9	0.30	0.20	0.25	0.10	8.27	2,480	24,452	63,388	379	379	24,073	0.55	434.39
27	135	2.25	0.9	0.30	0.20	0.25	0.10	8.27	2,480	26,553	63,630	380	380	26,173	0.60	434.42
28	140	2.33	0.9	0.30	0.20	0.25	0.10	8.27	2,480	28,652	63,872	381	381	28,271	0.65	434.45
29	145	2.42	0.9	0.30	0.20	0.25	0.10	8.27	2,480	30,751	64,114	383	383	30,368	0.70	434.49
30	150	2.50	0.9	0.30	0.20	0.25	0.10	8.27	2,480	32,847	64,342	384	384	32,463	0.75	434.52
31	155	2.58	0.9	0.30	0.20	0.25	0.10	8.27	2,480	34,943	64,566	386	386	34,557	0.79	434.55
32	160	2.67	0.9	0.30	0.20	0.25	0.10	8.27	2,480	37,037	64,791	387	387	36,650	0.84	434.58
33	165	2.75	1.0	0.33	0.20	0.28	0.13	10.97	3,290	39,939	65,102	389	389	39,551	0.91	434.62
34	170	2.83	1.0	0.33	0.20	0.28	0.13	10.97	3,290	42,840	65,413	391	391	42,450	0.97	434.67
35	175	2.92	1.0	0.33	0.20	0.28	0.13	10.97	3,290	45,739	65,724	393	393	45,347	1.04	434.71

RCFC & WCD
HYDROLOGY
MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

6-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	5.30
UNIT TIME-PERCENT OF LAG	94.3
TOTAL ADJUSTED STORM RAIN (in)	2.75
CONSTANT LOSS RATE (in/hr)	0.20
LOW LOSS RATE - PERCENT	85.00%

Basin Percolation Rate	0.9 in/hr	
Maxwell Drywells		
Number	0	
Drywell Percolation Rate	0.00 cfs	0.00 cfm

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
	Minutes	Hours	Percent	in/hr	Max	Low	in/hr	Flow cfs	cu-ft	cu-ft	Percolation Area sf	Maximum Percolation cu-ft	Percolation Out cu-ft	cu-ft	ac-ft	ft
			(Plate E-5.9)													
36	180	3.00	1.0	0.33	0.20	0.28	0.13	10.97	3,290	48,636	66,035	394	394	48,242	1.11	434.75
37	185	3.08	1.0	0.33	0.20	0.28	0.13	10.97	3,290	51,532	66,345	396	396	51,135	1.17	434.79
38	190	3.17	1.1	0.36	0.20	0.31	0.17	13.67	4,100	55,235	66,742	399	399	54,836	1.26	434.85
39	195	3.25	1.1	0.36	0.20	0.31	0.17	13.67	4,100	58,936	67,139	401	401	58,535	1.34	434.90
40	200	3.33	1.1	0.36	0.20	0.31	0.17	13.67	4,100	62,635	67,535	403	403	62,231	1.43	434.96
41	205	3.42	1.2	0.40	0.20	0.34	0.20	16.37	4,910	67,141	68,018	406	406	66,735	1.53	435.02
42	210	3.50	1.3	0.43	0.20	0.36	0.23	19.07	5,720	72,454	68,588	410	410	72,045	1.65	435.10
43	215	3.58	1.4	0.46	0.20	0.39	0.27	21.77	6,530	78,574	69,244	414	414	78,161	1.79	435.19
44	220	3.67	1.4	0.46	0.20	0.39	0.27	21.77	6,530	84,690	69,900	417	417	84,273	1.93	435.28
45	225	3.75	1.5	0.50	0.20	0.42	0.30	24.47	7,340	91,612	70,642	422	422	91,190	2.09	435.39
46	230	3.83	1.5	0.50	0.20	0.42	0.30	24.47	7,340	98,530	71,384	426	426	98,103	2.25	435.49
47	235	3.92	1.6	0.53	0.20	0.45	0.33	27.17	8,150	106,253	72,146	431	431	105,822	2.43	435.59
48	240	4.00	1.6	0.53	0.20	0.45	0.33	27.17	8,150	113,972	72,905	435	435	113,536	2.61	435.69
49	245	4.08	1.7	0.56	0.20	0.48	0.37	29.87	8,960	122,496	73,743	440	440	122,055	2.80	435.81
50	250	4.17	1.8	0.59	0.20	0.50	0.40	32.56	9,769	131,825	74,659	446	446	131,379	3.02	435.93
51	255	4.25	1.9	0.63	0.20	0.53	0.43	35.26	10,579	141,958	75,655	452	452	141,507	3.25	436.07
52	260	4.33	2.0	0.66	0.20	0.56	0.46	37.96	11,389	152,896	76,730	458	458	152,438	3.50	436.21
53	265	4.42	2.1	0.69	0.20	0.59	0.50	40.66	12,199	164,637	77,884	465	465	164,172	3.77	436.37
54	270	4.50	2.1	0.69	0.20	0.59	0.50	40.66	12,199	176,372	79,020	472	472	175,900	4.04	436.52
55	275	4.58	2.2	0.73	0.20	0.62	0.53	43.36	13,009	188,909	80,158	479	479	188,430	4.33	436.67
56	280	4.67	2.3	0.76	0.20	0.65	0.56	46.06	13,819	202,250	81,369	486	486	201,764	4.63	436.84
57	285	4.75	2.4	0.79	0.20	0.67	0.60	48.76	14,629	216,393	82,652	494	494	215,900	4.96	437.01
58	290	4.83	2.4	0.79	0.20	0.67	0.60	48.76	14,629	230,529	83,936	501	501	230,028	5.28	437.18
59	295	4.92	2.5	0.83	0.20	0.70	0.63	51.46	15,439	245,467	85,292	509	509	244,958	5.62	437.36
60	300	5.00	2.6	0.86	0.20	0.73	0.66	54.16	16,249	261,207	86,691	518	518	260,689	5.98	437.55
61	305	5.08	3.1	1.02	0.20	0.87	0.83	67.66	20,299	280,988	88,361	528	528	280,461	6.44	437.77
62	310	5.17	3.6	1.19	0.20	1.01	0.99	81.16	24,349	304,810	90,372	540	540	304,270	6.99	438.03
63	315	5.25	3.9	1.29	0.20	1.09	1.09	89.26	26,779	331,049	92,588	553	553	330,496	7.59	438.32
64	320	5.33	4.2	1.39	0.20	1.18	1.19	97.36	29,209	359,706	94,936	567	567	359,139	8.24	438.63
65	325	5.42	4.7	1.55	0.20	1.32	1.36	110.86	33,259	392,398	97,517	582	582	391,815	8.99	438.96
66	330	5.50	5.6	1.85	0.20	1.57	1.65	**135.16**	**40,549**	432,364	100,673	601	601	431,763	9.91	439.37
67	335	5.58	1.9	0.63	0.20	0.53	0.43	35.26	10,579	442,342	101,461	606	606	441,736	10.14	439.47
68	340	5.67	0.9	0.30	0.20	0.25	0.10	8.27	2,480	444,216	101,609	607	607	**443,609**	**10.18**	**439.49**
69	345	5.75	0.6	0.20	0.20	0.17	0.00	0.17	50	443,659	101,565	607	607	443,052	10.17	439.49
70	350	5.83	0.5	0.17	0.20	0.14	0.02	2.02	607	443,660	101,565	607	607	443,053	10.17	439.49

RCFC & WCD HYDROLOGY MANUAL	SYNTHETIC UNIT HYDROGRAPH METHOD SHORTCUT METHOD 6-HOUR STORM UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM	PROJECT: COVA Job No.: 2811 BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14	Basin Percolation Rate	0.9 in/hr
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	5.30	Maxwell Drywells	
UNIT TIME-PERCENT OF LAG	94.3	Number	0
TOTAL ADJUSTED STORM RAIN (in)	2.75	Drywell Percolation Rate	0.00 cfs 0.00 cfm
CONSTANT LOSS RATE (in/hr)	0.20		
LOW LOSS RATE - PERCENT	85.00%		

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Volume	Basin	Basin Losses			Total In Basin		Basin
	Minutes	Hours	Percent	Rain	in/hr		Rain	Hydrograph	In	Volume	Percolation	Maximum	Percolation			WSEL
				in/hr	Max	Low		Flow			Area	Percolation	Out			
			(Plate E-5.9)				in/hr	cfs	cu-ft	cu-ft	sf	cu-ft	cu-ft	cu-ft	ac-ft	ft
71	355	5.92	0.3	0.10	0.20	0.08	0.01	1.21	364	443,418	101,546	606	606	442,811	10.17	439.48
72	360	6.00	0.2	0.07	0.20	0.06	0.01	0.81	243	443,054	101,518	606	606	442,448	10.16	439.48

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN	1.60 in
FLOOD VOLUME	10.85 acft
FLOOD VOLUME	472,562 cu-ft
REQUIRED STORAGE	10.18 acft
REQUIRED STORAGE	443,609 cu-ft
MAX WSEL	439.49 ft
PEAK FLOW RATE	135.16 cfs
TOTAL BASIN LOSSES	30,114 cu-ft
AVERAGE PERCOLATION RATE	83.65 cf/min

RCFC & WCD
HYDROLOGY
MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

24-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14	VARIABLE LOSS RATE (AVG) IN/HR		Basin Percolation Rate	0.9 in/hr
UNIT TIME-MINUTES	15	Fm = Minimum value on loss curve (in/hr)	0.10		
LAG TIME - MINUTES	5.30	C	0.00181	Maxwell Drywells	
UNIT TIME-PERCENT OF LAG	283%	Low Loss Rate (percent)	85.00%	Number	0
TOTAL ADJUSTED STORM RAIN (in)	4.38			Drywell Percolation Rate	0.00 cfs 0.00 cfm

Unit Time Period	Time Minutes	Hours	Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
											Percolation Area	Maximum Percolation	Percolation Out			
			(Plate E-5.9)		Max	Low	in/hr	cfs	cu-ft	cu-ft	sf	cu-ft	cu-ft	cu-ft	ac-ft	ft
1	15	0.25	0.2	0.035	0.346	0.030	0.01	0.43	387	387	60,618	1,086	387	0	0.00	434.00
2	30	0.50	0.3	0.053	0.342	0.045	0.01	0.65	581	581	60,640	1,086	581	0	0.00	434.00
3	45	0.75	0.3	0.053	0.338	0.045	0.01	0.65	581	581	60,640	1,086	581	0	0.00	434.00
4	60	1.00	0.4	0.070	0.334	0.060	0.01	0.86	774	774	60,662	1,087	774	0	0.00	434.00
5	75	1.25	0.3	0.053	0.330	0.045	0.01	0.65	581	581	60,640	1,086	581	0	0.00	434.00
6	90	1.50	0.3	0.053	0.326	0.045	0.01	0.65	581	581	60,640	1,086	581	0	0.00	434.00
7	105	1.75	0.3	0.053	0.322	0.045	0.01	0.65	581	581	60,640	1,086	581	0	0.00	434.00
8	120	2.00	0.4	0.070	0.318	0.060	0.01	0.86	774	774	60,662	1,087	774	0	0.00	434.00
9	135	2.25	0.4	0.070	0.315	0.060	0.01	0.86	774	774	60,662	1,087	774	0	0.00	434.00
10	150	2.50	0.4	0.070	0.311	0.060	0.01	0.86	774	774	60,662	1,087	774	0	0.00	434.00
11	165	2.75	0.5	0.088	0.307	0.074	0.01	1.08	968	968	60,684	1,087	968	0	0.00	434.00
12	180	3.00	0.5	0.088	0.303	0.074	0.01	1.08	968	968	60,684	1,087	968	0	0.00	434.00
13	195	3.25	0.5	0.088	0.299	0.074	0.01	1.08	968	968	60,684	1,087	968	0	0.00	434.00
14	210	3.50	0.5	0.088	0.296	0.074	0.01	1.08	968	968	60,684	1,087	968	0	0.00	434.00
15	225	3.75	0.5	0.088	0.292	0.074	0.01	1.08	968	968	60,684	1,087	968	0	0.00	434.00
16	240	4.00	0.6	0.105	0.288	0.089	0.02	1.29	1,161	1,161	60,707	1,088	1,088	73	0.00	434.00
17	255	4.25	0.6	0.105	0.285	0.089	0.02	1.29	1,161	1,234	60,715	1,088	1,088	147	0.00	434.00
18	270	4.50	0.7	0.123	0.281	0.104	0.02	1.51	1,355	1,501	60,746	1,088	1,088	413	0.01	434.01
19	285	4.75	0.7	0.123	0.277	0.104	0.02	1.51	1,355	1,767	60,777	1,089	1,089	679	0.02	434.01
20	300	5.00	0.8	0.140	0.274	0.119	0.02	1.72	1,548	2,227	60,829	1,090	1,090	1,137	0.03	434.02
21	315	5.25	0.6	0.105	0.270	0.089	0.02	1.29	1,161	2,298	60,838	1,090	1,090	1,208	0.03	434.02
22	330	5.50	0.7	0.123	0.267	0.104	0.02	1.51	1,355	2,562	60,868	1,091	1,091	1,472	0.03	434.02
23	345	5.75	0.8	0.140	0.263	0.119	0.02	1.72	1,548	3,020	60,921	1,091	1,091	1,929	0.04	434.03
24	360	6.00	0.8	0.140	0.260	0.119	0.02	1.72	1,548	3,477	60,973	1,092	1,092	2,384	0.05	434.04
25	375	6.25	0.9	0.158	0.256	0.134	0.02	1.94	1,742	4,126	61,048	1,094	1,094	3,032	0.07	434.05
26	390	6.50	0.9	0.158	0.253	0.134	0.02	1.94	1,742	4,774	61,123	1,095	1,095	3,679	0.08	434.06
27	405	6.75	1.0	0.175	0.250	0.149	0.03	2.15	1,935	5,614	61,219	1,097	1,097	4,517	0.10	434.07
28	420	7.00	1.0	0.175	0.246	0.149	0.03	2.15	1,935	6,452	61,316	1,099	1,099	5,353	0.12	434.09
29	435	7.25	1.0	0.175	0.243	0.149	0.03	2.15	1,935	7,288	61,412	1,100	1,100	6,188	0.14	434.10
30	450	7.50	1.1	0.193	0.240	0.164	0.03	2.37	2,129	8,317	61,531	1,102	1,102	7,214	0.17	434.12
31	465	7.75	1.2	0.210	0.236	0.179	0.03	2.58	2,322	9,537	61,671	1,105	1,105	8,432	0.19	434.14
32	480	8.00	1.3	0.228	0.233	0.194	0.03	2.80	2,516	10,947	61,833	1,108	1,108	9,839	0.23	434.16
33	495	8.25	1.5	0.263	0.230	0.223	0.03	2.70	2,432	12,271	61,986	1,111	1,111	11,160	0.26	434.18
34	510	8.50	1.5	0.263	0.227	0.223	0.04	2.96	2,667	13,828	62,165	1,114	1,114	12,714	0.29	434.20
35	525	8.75	1.6	0.280	0.223	0.238	0.06	4.66	4,191	16,905	62,519	1,120	1,120	15,785	0.36	434.25
36	540	9.00	1.7	0.298	0.220	0.253	0.08	6.35	5,713	21,498	63,048	1,130	1,130	20,368	0.47	434.33
37	555	9.25	1.9	0.333	0.217	0.283	0.12	9.47	8,523	28,891	63,900	1,145	1,145	27,746	0.64	434.44
38	570	9.50	2.0	0.350	0.214	0.298	0.14	11.16	10,040	37,787	64,871	1,162	1,162	36,624	0.84	434.58
39	585	9.75	2.1	0.368	0.211	0.313	0.16	12.84	11,556	48,180	65,986	1,182	1,182	46,998	1.08	434.73
40	600	10.00	2.2	0.385	0.208	0.328	0.18	14.52	13,069	60,067	67,260	1,205	1,205	58,862	1.35	434.91
41	615	10.25	1.5	0.263	0.205	0.223	0.06	4.73	4,260	63,122	67,588	1,211	1,211	61,911	1.42	434.95
42	630	10.50	1.5	0.263	0.202	0.223	0.06	4.98	4,478	66,389	67,938	1,217	1,217	65,172	1.50	435.00
43	645	10.75	2.0	0.350	0.199	0.298	0.15	12.38	11,146	76,318	69,002	1,236	1,236	75,081	1.72	435.15

RCFC & WCD
HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

24-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14	VARIABLE LOSS RATE (AVG) IN/HR		Basin Percolation Rate	0.9 in/hr
UNIT TIME-MINUTES	15	Fm = Minimum value on loss curve (in/hr)	0.10		
LAG TIME - MINUTES	5.30	C	0.00181	Maxwell Drywells	
UNIT TIME-PERCENT OF LAG	283%	Low Loss Rate (percent)	85.00%	Number	0
TOTAL ADJUSTED STORM RAIN (in)	4.38			Drywell Percolation Rate	0.00 cfs 0.00 cfm

Unit Time Period	Time Minutes	Hours	Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
											Percolation Area	Maximum Percolation	Percolation Out			
			(Plate E-5.9)		Max	Low	in/hr	cfs	cu-ft	cu-ft	sf	cu-ft	cu-ft	cu-ft	ac-ft	ft
44	660	11.00	2.0	0.350	0.196	0.298	0.15	12.62	11,360	86,441	70,088	1,256	1,256	85,186	1.96	435.30
45	675	11.25	1.9	0.333	0.193	0.283	0.14	11.42	10,282	95,468	71,055	1,273	1,273	94,195	2.16	435.43
46	690	11.50	1.9	0.333	0.190	0.283	0.14	11.66	10,492	104,687	71,992	1,290	1,290	103,397	2.37	435.56
47	705	11.75	1.7	0.298	0.188	0.253	0.11	9.02	8,120	111,517	72,664	1,302	1,302	110,215	2.53	435.65
48	720	12.00	1.8	0.315	0.185	0.268	0.13	10.68	9,615	119,830	73,481	1,317	1,317	118,513	2.72	435.76
49	735	12.25	2.5	0.438	0.182	0.372	0.26	20.94	18,849	137,362	75,204	1,347	1,347	136,015	3.12	435.99
50	750	12.50	2.6	0.456	0.179	0.387	0.28	22.60	20,340	156,355	77,070	1,381	1,381	154,974	3.56	436.25
51	765	12.75	2.8	0.491	0.177	0.417	0.31	25.69	23,118	178,092	79,176	1,419	1,419	176,673	4.06	436.53
52	780	13.00	2.9	0.508	0.174	0.432	0.33	27.34	24,604	201,278	81,280	1,456	1,456	199,821	4.59	436.81
53	795	13.25	3.4	0.596	0.171	0.506	0.42	34.72	31,248	231,070	83,985	1,505	1,505	229,565	5.27	437.17
54	810	13.50	3.4	0.596	0.169	0.506	0.43	**34.93**	**31,439**	261,004	86,674	1,553	1,553	259,452	5.96	437.53
55	825	13.75	2.3	0.403	0.166	0.343	0.24	19.37	17,437	276,889	88,015	1,577	1,577	275,312	6.32	437.71
56	840	14.00	2.3	0.403	0.164	0.343	0.24	19.58	17,623	292,935	89,370	1,601	1,601	291,334	6.69	437.89
57	855	14.25	2.7	0.473	0.161	0.402	0.31	25.52	22,968	314,302	91,174	1,634	1,634	312,668	7.18	438.12
58	870	14.50	2.6	0.456	0.159	0.387	0.30	24.29	21,859	334,527	92,881	1,664	1,664	332,863	7.64	438.35
59	885	14.75	2.6	0.456	0.156	0.387	0.30	24.49	22,037	354,900	94,556	1,694	1,694	353,206	8.11	438.57
60	900	15.00	2.5	0.438	0.154	0.372	0.28	23.25	20,923	374,129	96,075	1,721	1,721	372,408	8.55	438.76
61	915	15.25	2.4	0.420	0.151	0.357	0.27	22.01	19,806	392,214	97,503	1,747	1,747	390,467	8.96	438.95
62	930	15.50	2.3	0.403	0.149	0.343	0.25	20.76	18,687	409,154	98,841	1,771	1,771	407,383	9.35	439.12
63	945	15.75	1.9	0.333	0.147	0.283	0.19	15.22	13,695	421,078	99,782	1,788	1,788	419,290	9.63	439.24
64	960	16.00	1.9	0.333	0.145	0.283	0.19	15.40	13,860	433,150	100,735	1,805	1,805	**431,345**	**9.90**	**439.37**
65	975	16.25	0.4	0.070	0.142	0.060	0.01	0.86	774	432,119	100,654	1,803	1,803	430,316	9.88	439.36
66	990	16.50	0.4	0.070	0.140	0.060	0.01	0.86	774	431,090	100,573	1,802	1,802	429,288	9.86	439.35
67	1005	16.75	0.3	0.053	0.138	0.045	0.01	0.65	581	429,869	100,476	1,800	1,800	428,068	9.83	439.33
68	1020	17.00	0.3	0.053	0.136	0.045	0.01	0.65	581	428,649	100,380	1,798	1,798	426,850	9.80	439.32
69	1035	17.25	0.5	0.088	0.134	0.074	0.01	1.08	968	427,818	100,314	1,797	1,797	426,021	9.78	439.31
70	1050	17.50	0.5	0.088	0.132	0.074	0.01	1.08	968	426,988	100,249	1,796	1,796	425,192	9.76	439.30
71	1065	17.75	0.5	0.088	0.130	0.074	0.01	1.08	968	426,160	100,183	1,795	1,795	424,365	9.74	439.30
72	1080	18.00	0.4	0.070	0.128	0.060	0.01	0.86	774	425,139	100,103	1,794	1,794	423,345	9.72	439.28
73	1095	18.25	0.4	0.070	0.126	0.060	0.01	0.86	774	424,119	100,022	1,792	1,792	422,327	9.70	439.27
74	1110	18.50	0.4	0.070	0.124	0.060	0.01	0.86	774	423,101	99,942	1,791	1,791	421,311	9.67	439.26
75	1125	18.75	0.3	0.053	0.123	0.045	0.01	0.65	581	421,891	99,846	1,789	1,789	420,102	9.64	439.25
76	1140	19.00	0.2	0.035	0.121	0.030	0.01	0.43	387	420,489	99,736	1,787	1,787	418,702	9.61	439.24
77	1155	19.25	0.3	0.053	0.119	0.045	0.01	0.65	581	419,283	99,640	1,785	1,785	417,498	9.58	439.23
78	1170	19.50	0.4	0.070	0.117	0.060	0.01	0.86	774	418,272	99,561	1,784	1,784	416,488	9.56	439.21
79	1185	19.75	0.3	0.053	0.116	0.045	0.01	0.65	581	417,069	99,466	1,782	1,782	415,286	9.53	439.20
80	1200	20.00	0.2	0.035	0.114	0.030	0.01	0.43	387	415,673	99,355	1,780	1,780	413,893	9.50	439.19
81	1215	20.25	0.3	0.053	0.113	0.045	0.01	0.65	581	414,474	99,261	1,778	1,778	412,695	9.47	439.18
82	1230	20.50	0.3	0.053	0.111	0.045	0.01	0.65	581	413,276	99,166	1,777	1,777	411,499	9.45	439.16
83	1245	20.75	0.3	0.053	0.110	0.045	0.01	0.65	581	412,080	99,072	1,775	1,775	410,305	9.42	439.15
84	1260	21.00	0.2	0.035	0.109	0.030	0.01	0.43	387	410,692	98,962	1,773	1,773	408,919	9.39	439.14
85	1275	21.25	0.3	0.053	0.107	0.045	0.01	0.65	581	409,499	98,868	1,771	1,771	407,728	9.36	439.13
86	1290	21.50	0.2	0.035	0.106	0.030	0.01	0.43	387	408,115	98,758	1,769	1,769	406,346	9.33	439.11

RCFC & WCD
HYDROLOGY MANUAL

SYNTHETIC UNIT HYDROGRAPH METHOD

SHORTCUT METHOD

24-HOUR STORM

UNIT HYDROGRAPH and EFFECTIVE RAIN CALCULATION FORM

PROJECT: COVA
Job No.: 2811
BY: saw DATE 12/10/25

DRAINAGE AREA-ACRES	81.14	VARIABLE LOSS RATE (AVG) IN/HR		Basin Percolation Rate	0.9 in/hr
UNIT TIME-MINUTES	15	Fm = Minimum value on loss curve (in/hr)	0.10		
LAG TIME - MINUTES	5.30	C	0.00181	Maxwell Drywells	
UNIT TIME-PERCENT OF LAG	283%	Low Loss Rate (percent)	85.00%	Number	0
TOTAL ADJUSTED STORM RAIN (in)	4.38			Drywell Percolation Rate	0.00 cfs 0.00 cfm

Unit Time Period	Time Minutes	Hours	Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Volume In	Basin Volume	Basin Losses			Total In Basin		Basin WSEL
					Max	Low					Percolation Area	Maximum Percolation	Percolation Out			
			(Plate E-5.9)				in/hr	cfs	cu-ft	cu-ft	sf	cu-ft	cu-ft	cu-ft	ac-ft	ft
87	1305	21.75	0.3	0.053	0.105	0.045	0.01	0.65	581	406,926	98,665	1,768	1,768	405,158	9.30	439.10
88	1320	22.00	0.2	0.035	0.104	0.030	0.01	0.43	387	405,545	98,556	1,766	1,766	403,780	9.27	439.08
89	1335	22.25	0.3	0.053	0.103	0.045	0.01	0.65	581	404,360	98,462	1,764	1,764	402,596	9.24	439.07
90	1350	22.50	0.2	0.035	0.102	0.030	0.01	0.43	387	402,983	98,353	1,762	1,762	401,221	9.21	439.06
91	1365	22.75	0.2	0.035	0.101	0.030	0.01	0.43	387	401,608	98,245	1,760	1,760	399,848	9.18	439.04
92	1380	23.00	0.2	0.035	0.100	0.030	0.01	0.43	387	400,235	98,136	1,758	1,758	398,476	9.15	439.03
93	1395	23.25	0.2	0.035	0.099	0.030	0.01	0.43	387	398,863	98,028	1,756	1,756	397,107	9.12	439.02
94	1410	23.50	0.2	0.035	0.099	0.030	0.01	0.43	387	397,494	97,920	1,754	1,754	395,740	9.08	439.00
95	1425	23.75	0.2	0.035	0.098	0.030	0.01	0.43	387	396,127	97,812	1,752	1,752	394,374	9.05	438.99
96	1440	24.00	0.2	0.035	0.098	0.030	0.01	0.43	387	394,761	97,704	1,751	1,751	393,011	9.02	438.97

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN	1.78 in
FLOOD VOLUME	12.05 acft
FLOOD VOLUME	524,686 cu-ft
REQUIRED STORAGE	9.90 acft
REQUIRED STORAGE	431,345 cu-ft
MAX WSEL	439.37 ft
PEAK FLOW RATE	34.93 cfs
TOTAL BASIN LOSSES	131,675 cu-ft
AVERAGE PERCOLATION RATE	91.44 cf/min

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS, BMP MAINTENANCE AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

(NOT AVAILABLE)

Appendix I

PROJECT-SPECIFIC WQMP SUMMARY DATA FORM

Project-Specific WQMP Summary Data Form

Applicant Information	
Name and Title	Jeremy Smith
Company	Relevant Coachella Owner, LLC
Phone	(310) 270-6222
Email	grant@relevantgroup.com

Project Information	
Project Name (as shown on project application/project-specific WQMP)	The Ranch - Tentative Tract Map 39330
Street Address	SEC of Avenue 52 and Van Buren Street
Nearest Cross Streets	Van Buren Street
Municipality (City or Unincorporated County)	Coachella
Zip Code	92236
Tract Number(s) and/or Assessor Parcel Number(s)	APNs 780-040-001, 780-040-003, 780-060-001, 780-060-002
Other (other information to help identify location of project)	

Indicate type of project.	**Priority Development Projects (Use an "X" in cell preceding project type):**	
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 25%
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 10% & erosive soils
		Commercial or Industrial ≥ 100,000 sq. ft.
		Automotive repair shop
		Retail Gasoline Outlet disturbing > 5,000 sq. ft.
		Restaurant disturbing > 5,000 sq. ft.
	X	Home subdivision ≥ 10 housing units
	X	Parking lot ≥ 5,000 sq. ft. or ≥ 25 parking spaces

Date Project-Specific WQMP Submitted	October 1, 2025, June 8, 2026
Size of Project Area (nearest 0.1 acre)	81.14 Acres
Will the project replace more than 50% of the impervious surfaces on an existing developed site?	No
Project Area managed with LID/Site Design BMPs (nearest 0.1 acre)	81.14 Acres
Are Treatment Control BMPs required?	No
Is the project subject to onsite retention by ordinance or policy?	Yes
Did the project meet the 100% LID/Site Design Measurable Goal?	Yes
Name of the entity that will implement, operate, and maintain the post-construction BMPs	Relevant Coachella Owner, LLC
Contact Name	Grant King
Street or Mailing Address	6417 Selma Avenue
City	Hollywood, CA
Zip Code	90028
Phone	(310) 270-6222

Space Below for Use by City/County Staff Only	
Preceding Information Verified by (consistent with information in project-specific WQMP)	**Name:** **Date:**
Date Project-Specific WQMP Approved:	
Data Entered by	**Name:** **Date:**
Other Comments	