PDP SWQMP

PRIORITY DEVELOPMENT PROJECT (PDP)
STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)

Project Name Otay Ranch Village 8 East

Assessor's Parcel Number(s) 646-010-08, 644-070-20 & 644-070-21

Permit Application Number TM22-0005

Drawing Numbers _____

CIVIL ENGINEER NAME: Alisa Vialpando ; PE # 47945

Wet Signature and Stamp

REGISTERED PROFESSIONAL ENGINEER
ALISA VIALPANDO
C 47945
EXP. 12/31/23
CIVIL
STATE OF CALIFORNIA

PREPARED FOR:

Applicant Name: Homefed Village II Master, LLC

Address: 1903 Wright Place, Suite 220
Carlsbad, CA 92008

Telephone # 760-918-8200

PREPARED BY:

Company Name: Hunsaker & Associates Inc.

Address: 9707 Waples Street
San Diego, CA 92121

Telephone # 858-558-4500

DATE: 11-14-2023

Approved By: City of Chula Vista Date:
(print Name & Sign)

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Otay Ranch Village 8 East

Project Name/_____

TABLE OF CONTENTS

The checklist on this page summarized the table and attachments to be included with this PDP SWQMP Submittal. Tables & attachments with boxes already checked (√) are required for all Projects

- ☒ **Acronym Sheet**
- ☒ **Certification Page**
- ☒ **Submittal Record**
- ☒ **Project Vicinity Map**
- ☒ **Attach a copy of the Intake Form: Storm Water Requirements Applicability Checklist**
- ☒ **HMP Exemption Exhibit (if Applicable)**
- ☒ **FORM I-3B Site Information Checklist for PDPs**
- ☒ **FORM I-4: Source Control BMP Checklist for All Development Projects**
- ☒ **FORM I-5: Site Design BMP Checklist for All Development Projects**
- ☒ **FORM I-6: Summary of PDP Structural BMPs**
- ☒ **ATTACHEMNT 1: Backup for PDP Pollutant Control BMPs**

  Attachment 1A: DMA Exhibit

  Attachment 1B: Tabular Summary of DMAs and Design Capture Volume Calculations

  Attachment 1C: FORM I-7 Harvest and Use Feasibility Screening (when applicable)

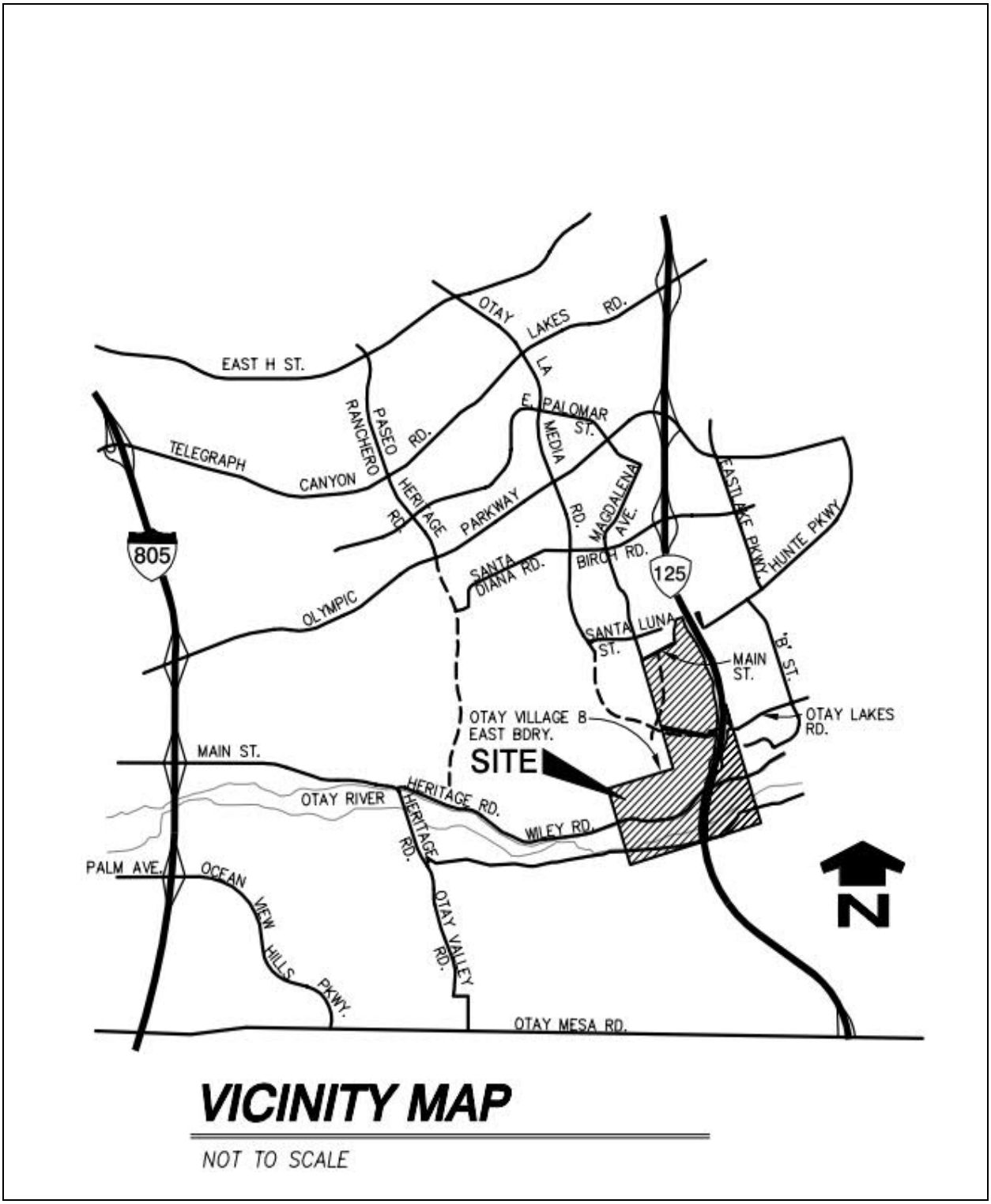
  Attachment 1D: Infiltration Information Attachment 1E: Pollutant Control BMP Design Worksheets / Calculations for each DMA and Structural BMP Worksheets from Appendix B, as applicable

- ☐ **ATTACHMENT 2: Backup for PDP Hydromodification Control Measures**
  - Attachment 2A: Hydromodification Management Exhibit
  - Attachment 2B: Management of Critical Coarse Sediment Yield Areas N/A
  - Attachment 2C: Geomorphic Assessment of Receiving Channels
  - Attachment 2D: Flow Control Facility Design; Overflow Design Summary for each structural BMP
- ☒ **ATTACHMENT 3: Structural BMP Maintenance Plan**
- ☒ **ATTACHMENT 4: Copy of Plan Sheets Showing Permanent Storm Water BMPs**
- ☒ **ATTACHMENT 5: Project's Drainage Report**
- ☒ **ATTACHMENT 6: Project's Geotechnical and Groundwater Investigation Report**

ACRONYMS

APN	Assessor's Parcel Number
BMP	Best Management Practice
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan

Project Vicinity Map



Otay Ranch Village 8 East

Project Name/_____

Certification Page

Otay Ranch Village 8 East

Project Name: _____

TM22-0005

Permit Application Number: _____

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the City of Chula Vista BMP Design Manual, which is based on the requirements of the San Diego Regional Water Quality Control Board Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Alisa S. Vialpando, 11/14/2023

Engineer of Work's Signature, Date

47945, 12/31/23

PE #, Expiration Date

Alisa S. Vialpando

Print Name

Hunsaker & Associates San Diego

Company

REGISTERED PROFESSIONAL ENGINEER
ALISA S. VIALPANDO
C 47945
CIVIL
STATE OF CALIFORNIA

Engineer's Seal

Otay Ranch Village 8 East

Project Name/_____

SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Summary of Changes
1	09/30/22	☒ Preliminary Design / Planning/ CEQA ☐ Final Design	Initial Submittal
2	05/12/23	☒ Preliminary Design / Planning/ CEQA ☐ Final Design	Second Submittal
3	09/14/23	☒ Preliminary Design / Planning/ CEQA ☐ Final Design	Third Submittal
4	11/14/2023	☒ Preliminary Design / Planning/ CEQA ☐ Final Design	Final Submittal

Project Name/_____

Insert Completed Intake Form (Storm Water Requirements Applicability Checklist)

https://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports

Storm Water Requirements Applicability Checklist for All Permit Applications

Intake Form

August 2023 Update

Project Information

Project Address: West of State Road 125 & North of Main Street	Project Application # TM22-0005
Project Name: Otay Ranch - Village 8 East	APN(s) 646-010-08, 644-070-20, & 644-070-21
	Parcel Area (ft^2) 23,824,296 / Project Disturbed Area (ft^2) 12,128,801

Brief Description of Work Proposed:

Project to mainly consist of multifamily residential units as well as private roads, utility infrastructure, parks, school, and basins with their respective Water Quality BMPs.

The project is (select one):

☒ New Development Total Impervious Area 7,736,560 **ft^2**
(New development is the creation of impervious surface on an undeveloped site.)

☐ Redevelopment Total new and/or replaced Impervious Area _____ **ft^2**
(Redevelopment is the creation and/or replacement of impervious surface on an already developed site).

☐ Other: _____
(Includes projects such as: Roof Mount Solar, Residential Minor Utility, Residential Interior Remodel, Commercial Interior Tenant Improvement, Cell Site Modification, etc.)

Name of Person Completing this Form: _____

Role: ☐ Property Owner ☐ Contractor ☐ Architect ☒ Engineer ☐ Other _____

Email: AVialpando@Hunsakersd.com Phone: 858-558-4500

Signature: Alissa S. Vialpando Date Completed: 11-14-2023

Answer each section below, starting with Section 1 and progressing through each section. Additional information for determining the requirements is found in the Chula Vista BMP Design Manual available on the City's website at http://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports.

SECTION 1: Storm Water BMP Requirements

Please answer the following two questions:

1)	Does the project involve repair or improvements to an existing building or structure that do not alter the size such as: tenant improvements, interior remodeling, electrical work, fire alarm, fire sprinkler system, HVAC work, gas, plumbing, etc.?	☐ **Yes** ☑ **No**
2)	Does the project involve routine maintenance activities such as: roof or exterior structure surface replacement; resurfacing existing roadways and parking lots including dig outs, slurry seal, overlay and restriping; repair damaged sidewalks or pedestrian ramps on existing roads without expanding the impervious footprint; routine replacement of damaged pavement, trenching and resurfacing associated with utility work (i.e. sewer, water, gas or electrical laterals, etc.), and pot holing or geotechnical investigation borings?	☐ **Yes** ☒ **No**

CHECK ONE:

☐ If you answered **YES** to **either** question 1 or 2**,** review and sign **"Construction Storm Water BMP Certification Statement"** on Page 2. **DO NOT** complete Sections 2, 3, 4, or 5. The Project is **NOT** subject to Permanent Storm Water BMP requirements**.** It **IS** subject to Construction BMP requirements.

☒ If you answered **NO** to **both** questions 1 and 2**, Skip to Section 2, Page 3.**

Construction Storm Water BMP Certification Statement

The following storm water quality protection measures are required by City Chula Vista Municipal Code Chapter 14.20 and the City's Jurisdictional Runoff Management Program.

1) All applicable construction BMPs and non-stormwater discharge BMPs shall be installed and maintained for the duration of the project in accordance with the Appendix K "Construction BMP Standards" of the Chula Vista BMP Design Manual.
2) Erosion control BMPs shall be implemented for all portions of the project area in which no work has been done or is planned to be done over a period of 14 or more days. All onsite drainage pathways that convey concentrated flows shall be stabilized to prevent erosion.
3) Run-on from areas outside the project area shall be diverted around work areas to the extent feasible. Run-on that cannot be diverted shall be managed using appropriate erosion and sediment control BMPs.
4) Sediment control BMPs shall be implemented, including providing fiber rolls, gravel bags, or other equally effective BMPs around the perimeter of the project to prevent transport of soil and sediment offsite. Any sediment tracked onto offsite paved areas shall be removed via sweeping at least daily.
5) Trash and other construction wastes shall be placed in a designated area at least daily and shall be disposed of in accordance with applicable requirements.
6) Materials shall be stored to avoid being transported in storm water runoff and non-storm water discharges. Concrete washout shall be directed to a washout area and shall not be washed out to the ground.
7) Stockpiles and other sources of pollutants shall be covered when the chance of rain within the next 48 hours is at least 50%.

I certify that the storm water quality protection measures listed above will be implemented at the project described on Intake Form. I understand that failure to implement these measures may result in monetary penalties or other enforcement actions. This certification is signed under penalty of perjury and does not require notarization.

Name: _____ Title: _____

Signature: _____ Date: _____

SECTION 2: Determine if Project is a Standard Project or Priority Development Project

Is the project in any of the following categories, (a) through (f)?

(a) New development that **creates 10,000 square feet** or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☒ **Yes** ☐ **No**

(b) Redevelopment project that **creates and/or replaces 5,000 square feet** or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ **Yes** ☒ **No**

(c) New development or redevelopment projects that **creates and/or replaces a combined total of 5,000 square feet** or more of impervious surface (collectively over the entire project site) and support one or more of the following uses: ☒ **Yes** ☐ **No**

(i) **Restaurant.** This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification Code 5812).

(ii) **Hillside development projects**. This category includes development on any natural slope that is twenty-five percent or greater.

(iii) **Parking Lots.** This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.

(iv) **Streets, roads, highways, freeways, and driveways**. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

(d) New development or redevelopment project that **creates and/or replaces 2,500 square feet** or more of impervious surface (collectively over the entire project site), discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ **Yes** ☒ **No**

See narrative in Form I-3B page 10 of 10.

(e) New development or redevelopment project that creates and/or replaces a combined total of 5,000 square feet or more of impervious surface, that support one or more of the following used: ☐ **Yes** ☒ **No**

(i) **Automotive repair shops.** This category is defined as a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.

(ii) **Retail gasoline outlets.** This category includes retail gasoline outlets that meet the meet one of the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

(f) New development or redevelopment that result in the disturbance of **one or more acres** of land and are expected to generate pollutants post construction.
NOTE: Pollutant generating development projects are those projects that generate pollutants at levels greater than background levels. Background pollutant levels means the pollutants generated from an undeveloped site. Projects disturbing one or more acres of land are presumed to generate pollutants post construction unless the applicant presents a design that satisfies the City Engineer that pollutants in storm water discharges will not exceed preconstruction background levels. ☐ **Yes** ☒ **No**

The project is (select one):

☐ If "No" is checked for every category in Section 2, Project is a **"Standard Development Project."** Site Design and Source Control BMP requirements apply. **Complete and submit Standard SWQMP** (refer to Chapter 4 and Appendix E of the BMP Design Manual for guidance).

Skip to Section 5.

☒ If "Yes" is checked for ANY category in Section 2, **Project is a "Priority Development Project (PDP)."** ***Complete next part, if applicable, and continue to Section 3.***

Complete for PDP *Redevelopment* Projects ONLY:

The total existing (pre-project) impervious area at the project site is: _____ ft^2 (A)

The total proposed newly created or replaced impervious area is _____ ft^2 (B)

Percent impervious surface created or replaced (B/A) x 100 = _____%

The percent impervious surface created or replaced is (select one based on the above calculation):

☐ Less than or equal to fifty percent (50%) – **only new impervious areas are considered a PDP**
OR

☐ Greater than fifty percent (50%) – **the entire project site is considered a PDP**

Continue to Section 3

SECTION 3: Determine if Project is PDP Exempt

1) Does the project ONLY include new or retrofit sidewalk, bicycle lane or trails that:

- Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
- Are designed and constructed to be hydraulically disconnected from paved streets or roads? Or;
- Are designed and constructed with permeable pavements or surfaces in accordance with USEPA Green Streets guidance?

☐ **Yes. Project is PDP Exempt.**

Complete and submit **Standard SWQMP** (refer to Chapter 4 of the BMP Design Manual for guidance). **Continue to Section 5.**

☒ **No. Next question**

2) Does the project ONLY include retrofitting or redevelopment of existing paved alleys, streets or roads designed and constructed in accordance with Green Streets standards?

☐ **Yes. Project is PDP Exempt.**

Complete and submit Standard SWQMP (refer to Chapter 4 of the BMP Design Manual for guidance). **Continue to Section 5.**

☒ **No. Project is a PDP.**

Continue to Section 4.

SECTION 4: Alternative Compliance

Does the project elect to meet stormwater obligations onsite?

☐ **Yes. Onsite Compliance.**

Site design, source control, and structural pollutant control BMPs apply. Complete and submit **PDP SWQMP** (refer to Chapters 4, 5 & 6 of the BMP Design Manual for guidance). **Continue to Section 5.**

☐ **No. Please contact City Storm Water Management Section at stormwater@chulavistaca.gov**

On-site site design, source control, and flow-through pollutant control BMPs apply. Complete and submit **PDP SWQMP** (refer to Chapters 4, 5 & 6 of the BMP Design Manual for guidance) and **Alternative Compliance forms** for pollutant control obligations (refer to the Alternative Compliance Program Guidelines and Development in Appendix J of the BMP Design Manual).
Continue to Section 5.

SECTION 5: Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the BMP Design Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP), which is administered by the State Water Resource Control Board.

1) Does the project include Building/Grading/Construction permits proposing less than 5,000 square feet of ground disturbance and has less than 5-foot elevation change over the entire project area?

☐ Yes. Review and sign Construction Storm Water Certification Statement on Page 2, *skip questions 2-4*

☒ No; next question

2) Does the project propose construction or demolition activity, including but not limited to, clearing grading, grubbing, excavation, or other activity that results in ground disturbance of less than one acre and more than 5,000 square feet?

☐ Yes. Complete and submit Construction Storm Water Pollution Control Plan (CSWPCP), *skip questions 3-4*

☒ No; next question

3) Does the project result in the disturbance of an acre or more of total land area and is considered a regular maintenance project performed to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as sewer/storm drain/utility replacement)

☐ Yes. Complete and submit Construction Storm Water Pollution Control Plan (CSWPCP), *skip question 4*

☒ No; next question

4) Is the project proposing land disturbance greater than or equal to one acre OR the project is part of a larger common plan of development disturbing 1 acre or more?

☒ Yes. Storm Water Pollution Prevention Plan (SWPPP) is required. Refer to online CASQA or Caltrans Template. Visit the SWRCB web site at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

Note: Projects that result in disturbance of one to five acres of total land area and can demonstrate that there will be no adverse water quality impacts by applying for a Construction Rainfall Erosivity Waiver, may be allowed to submit a CSWPCP in lieu of a SWPPP.

Project Name/_____

HMP Exemption Exhibit

Attach this Exhibit (if Applicable) that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drains line and/or concrete lined channels, outfall information and exempt waterbody. Reference applicable drawing number(s). **Exhibit must be provided on 11"x17" or larger paper.**

Janet Khabbaz

From: Janet Khabbaz
Sent: Thursday, March 16, 2023 6:23 PM
To: 'Ranie Hunter'; Boushra Salem; Ramon Esquer; Charisse Phillips; Alisa Vialpando; joconnor@hfc-ca.com
Subject: RE: Village 8 East - Storm Water Follow-up
Attachments: OTAY VILLAGE 8-EAST HMP EXEMTION.pdf

Hi Boushra,

Hope you and your family are doing well.
Using the FIS study from FEMA and the published BFE (100 year WSE), the BFE (100 Year flood plain WSE) at the discharge location from the site is at 199 ft, and the 10 year WSE is at 195 ft (see page #6 of the attached PDF). The flow line elevation at the discharge location is at 197.5 ft which is under the 100 year WSE and even under the 50 year WSE. However, as you can see from the cross section provided at the discharge location (please see page # 2), the 10 year WSE is at the very bottom of the river and it does not make sense trying to discharge under it. Per section 1.6 (page 1-14) of the BMP design Manual, the City engineer can accept the HMP exemption with invert elevation at or under the 100 year WSE, and based on the provided information, Otay River conditions and the history of the project; we are requesting to approve the project as an HMP exempted project with the proposed discharge outlet.

We understand that the flood plain as mapped per FEMA doesn't show the discharge invert within the 100 year flood inundation area, but based on the existing topo and FIS study from FEMA, the invert is under the 100 WSE. The FEMA Map usually is at a 500 scale and does not get updated with natural topo changes.

Please note that both FIS Study and the topo use the NAVD 88 datum.

Please let me know if you have any questions or you need any more documents or information to help us discuss this topic on Monday.

Thank you

Janet Khabbaz, Water Resources Manager
Hunsaker & Associates San Diego, Inc.
9707 Waples Street, San Diego, CA 92121
(858) 558-4500 ph (858) 558-1414 fax
JKhabbaz@HunsakerSD.com

-----Original Appointment-----
From: Ranie Hunter <Ranie@RHConsultinggroup.com>
Sent: Thursday, March 16, 2023 4:56 PM
To: Boushra Salem; Ramon Esquer; Charisse Phillips; Alisa Vialpando; Janet Khabbaz; joconnor@hfc-ca.com
Subject: Village 8 East - Storm Water Follow-up
When: Monday, March 20, 2023 1:00 PM-2:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Microsoft Teams Meeting

From: Ramon Esquer <resquer@chulavistaca.gov>
Sent: Tuesday, April 11, 2023 5:23 PM
To: Janet Khabbaz <JKhabbaz@HunsakerSD.com>; Ranie Hunter <ranie@rhconsultinggroup.com>; Boushra Salem <bsalem@chulavistaca.gov>; Charisse Phillips <CPhillips@chulavistaca.gov>; Alisa Vialpando <AVialpando@HunsakerSD.com>; joconnor@hfc-ca.com
Subject: RE: Village 8 East - Storm Water Follow-up

Good afternoon All,

Hope all is well.

At City Engineer's discretion, HMP exemption will be granted once documentation/exhibits are provided as part of the PDP SWQMP for TM22-0005 that demonstrate the discharge outlet conveyance invert from the proposed development is located at the 100-year floodplain elevation.

In regards to the detention requirements, although we do understand the rationale for not providing detention due to the extended lag times in Otay River Watershed there are no exceptions in the City of Chula Vista Subdivision Manual that support this rationale. Section 3-201.2 clearly states that on-site detention facilities are required to mitigate any increases from the pre-developed condition due to the proposed development.

Please feel free to contact us for any questions.

Respectfully,
Ramón Esquer, PE, CPSWQ, QSD/QSP
Associate Civil Engineer
City of Chula Vista | Development Services Department
276 Fourth Avenue, Bldg. B, Chula Vista, CA 91910
☎ 619-476-2557| ✉ resquer@chulavistaca.gov

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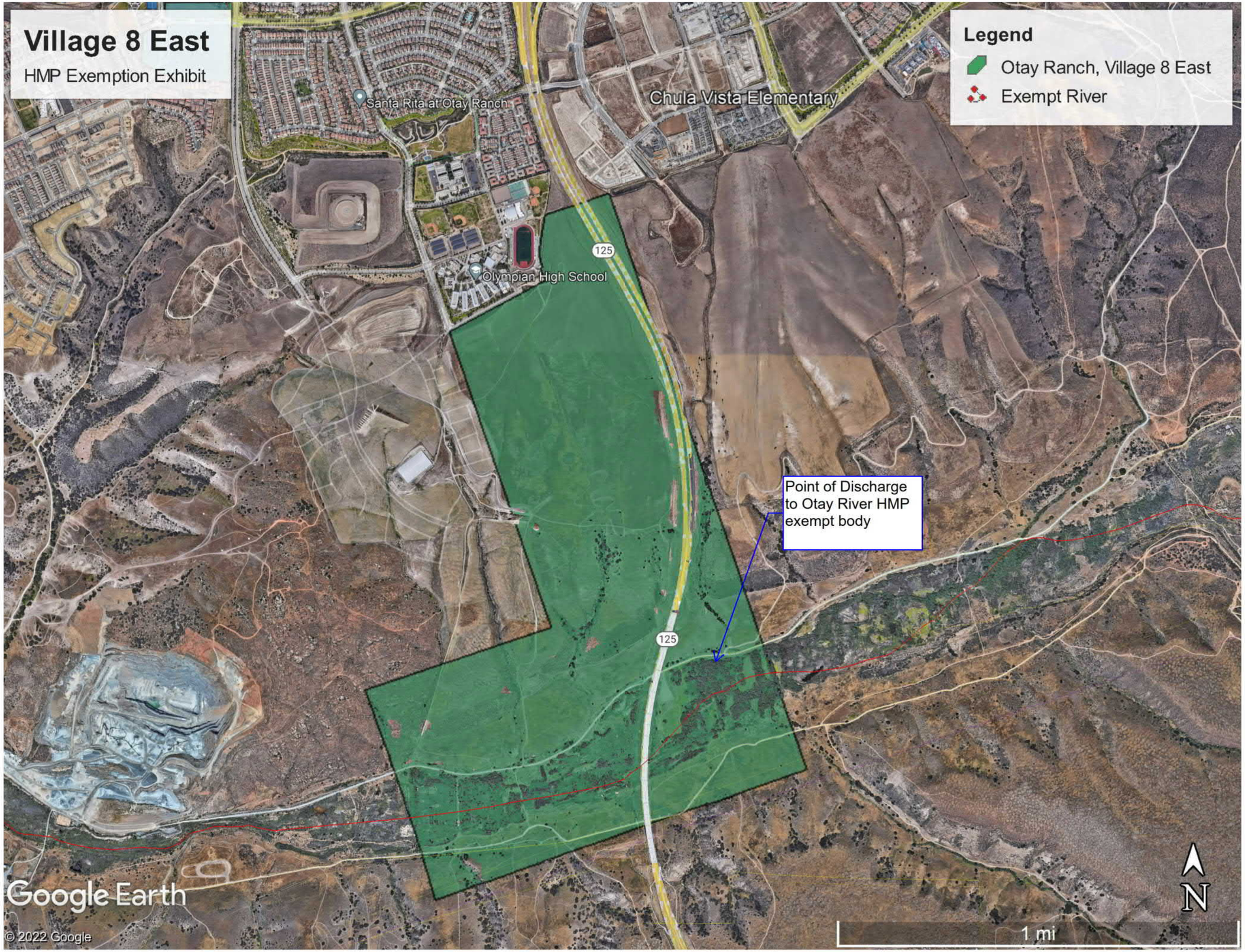
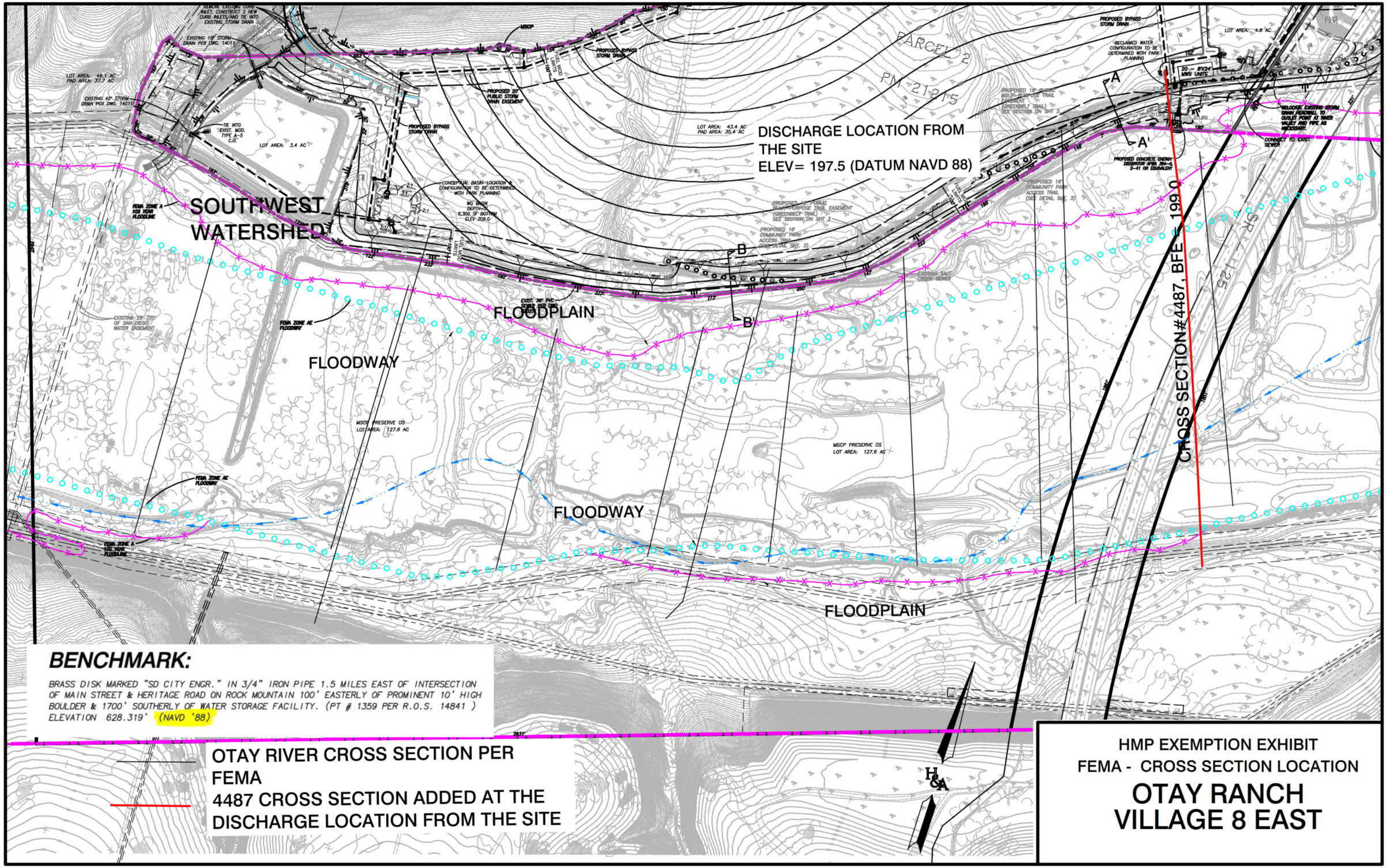
Village 8 East

HMP Exemption Exhibit





BENCHMARK:

BRASS DISK MARKED "SD CITY ENGR." IN 3/4" IRON PIPE 1.5 MILES EAST OF INTERSECTION OF MAIN STREET & HERITAGE ROAD ON ROCK MOUNTAIN 100' EASTERLY OF PROMINENT 10' HIGH BOULDER & 1700' SOUTHERLY OF WATER STORAGE FACILITY. (PT # 1359 PER R.O.S. 14841)
ELEVATION 628.319' (NAVD '88)

OTAY RIVER CROSS SECTION PER FEMA
4487 CROSS SECTION ADDED AT THE DISCHARGE LOCATION FROM THE SITE

HMP EXEMPTION EXHIBIT
FEMA - CROSS SECTION LOCATION

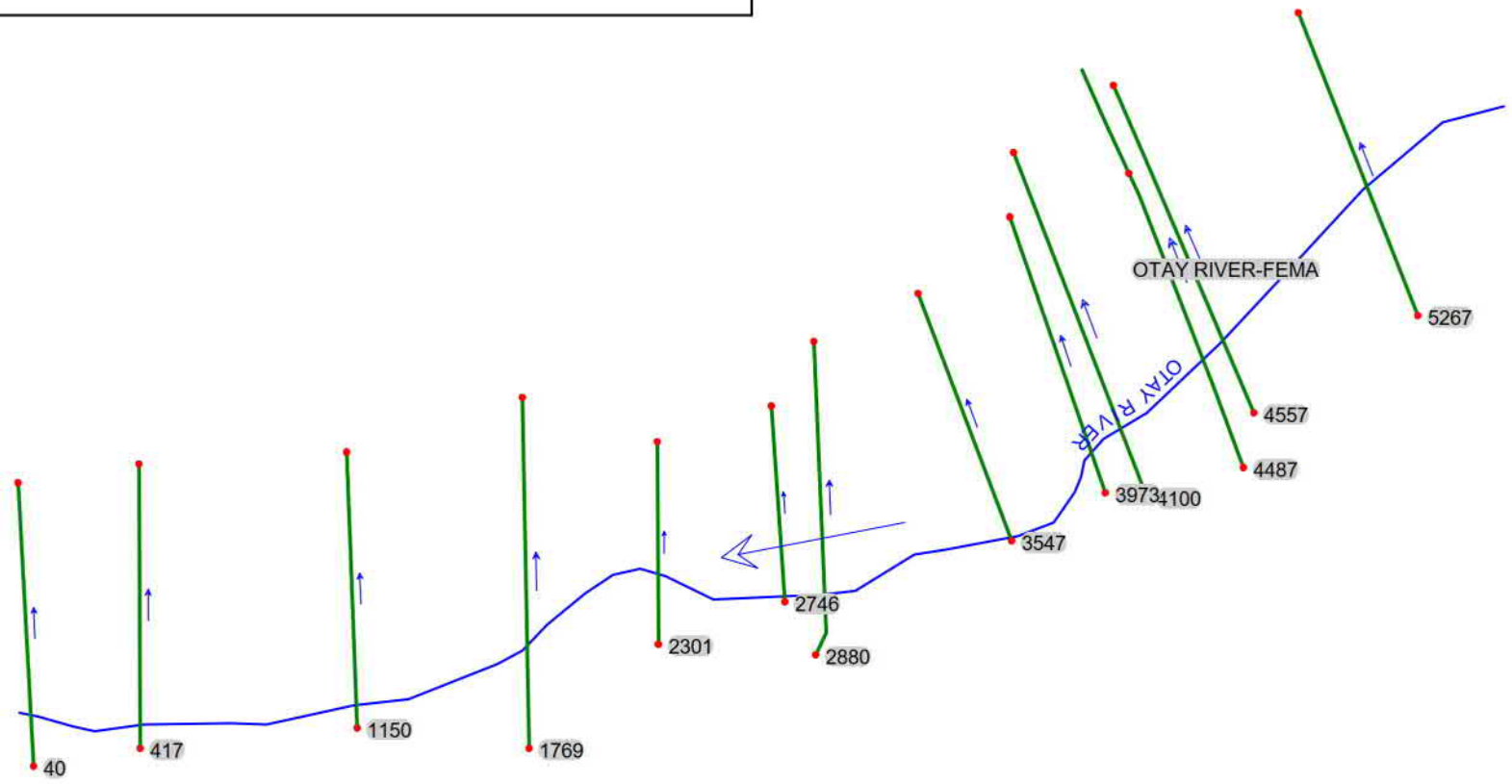
OTAY RANCH VILLAGE 8 EAST

W.O.# 2825-0003

R:\0920\Hyd\ACAD\HYDRO\FEMA-920$H01-HYDRO Exhibit HEC-RAS crossing PR-V8 TM.dwg[]Mar-16-2023:17:36


OTAY RIVER VILLAGE 8-EAST Plan: Plan 01 3/16/2023
RS = 4487 DISCHARGE LOCATION
.04
PF1 = 100 YEAR FLOOD PLAIN PER FEMA FIS STUDY VOLUME 8
PF2 = 10 YEAR WATER SURFACE ELEVATION PER FEMA FIS STUDY VOLUME 8
DISCHARGE LOCATION FROM THE SITE STATION #1274, ELEV AT 197.5
Legend
EG PF 1
WS PF 1
EG PF 2
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
225
220
215
210
205
200
195
190
0
200
400
600
800
1000
1200
1400
1600

CROSS SECTION # 4487 ADDED AT THE DISCHARGE POINT FROM OTAY VILLAGE 8- EAST



FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 8 OF 12

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
CARLSBAD, CITY OF	060285	NATIONAL CITY, CITY OF	060293
CHULA VISTA, CITY OF	065021	OCEANSIDE, CITY OF	060294
CORONADO, CITY OF	060287	POWAY, CITY OF	060702
DEL MAR, CITY OF	060288	SAN DIEGO, CITY OF	060295
EL CAJON, CITY OF	060289	SAN DIEGO COUNTY, UNINCORPORATED AREAS	060284
ENCINITAS, CITY OF	060726	SAN MARCOS, CITY OF	060296
ESCONDIDO, CITY OF	060290	SANTEE, CITY OF	060703
IMPERIAL BEACH, CITY OF	060291	SOLANA BEACH, CITY OF	060725
LA MESA, CITY OF	060292	VISTA, CITY OF	060297
LEMON GROVE, CITY OF	060723		

REVISED: March 22, 2022

FLOOD INSURANCE STUDY NUMBER
06073CV008F

Version Number 2.4.3.0

FEMA

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

A countywide conversion factor of +2.20 feet was calculated for San Diego County.

Table 19: Countywide Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

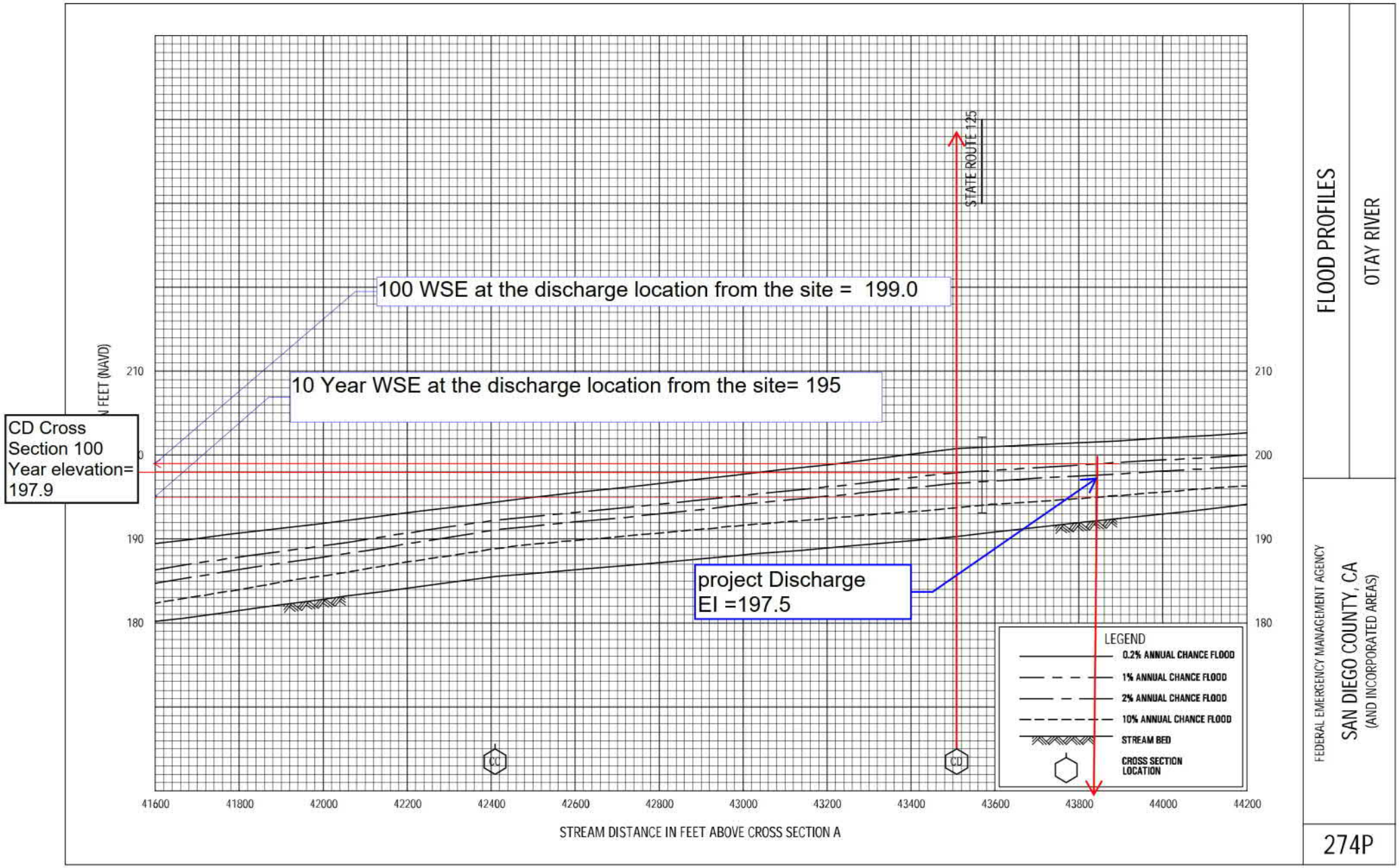
Table 20: Stream-Based Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/flood-maps/guidance-partners/guidelines-standards.

Base map information shown on the FIRM was derived from the sources described in Table 22.



FLOOD PROFILES

OTAY RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA

(AND INCORPORATED AREAS)

274P

Table 23: Floodway Data (continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BS	35,779	446	1,892	11.6	160.5	160.5	160.5	0.0
BT	36,599	520	3,324	6.6	166.0	166.0	166.1	0.1
BU	37,049	406	3,069	7.2	167.1	167.1	167.2	0.1
BV	37,549	268	1,600	13.7	169.9	169.9	169.9	0.0
BW	37,749	280	2,171	10.1	172.9	172.9	172.9	0.0
BX	38,239	315	1,872	11.7	175.3	175.3	175.3	0.0
BY	38,479	380	2,002	11.0	177.8	177.8	177.8	0.0
BZ	38,829	462	2,865	7.7	180.4	180.4	180.6	0.2
CA	39,629	762	5,569	3.9	181.5	181.5	182.5	1.0
CB	41,309	741	3,587	6.1	184.3	184.3	184.5	0.2
CC	42,409	501	2,035	10.8	192.3	192.3	192.6	0.3
CD	43,509	873	4,270	5.2	197.9	197.9	198.1	0.2
CE	44,789	1,110	3,708	5.9	201.9	201.9	201.9	0.0
CF	45,989	579	2,484	8.9	208.3	208.3	208.3	0.0
CG	46,789	794	5,009	4.4	211.2	211.2	211.4	0.2
CH	47,989	828	2,393	9.2	216.9	216.9	216.9	0.0
CI	48,989	1,155	2,657	8.3	231.4	231.4	231.4	0.0
CJ	49,889	775	3,154	7.0	238.3	238.3	238.6	0.3
CK	50,189	615	2,112	10.4	240.1	240.1	240.4	0.3
CL	50,559	619	2,878	7.6	243.5	243.5	244.2	0.7
CM	50,909	415	2,577	8.5	245.2	245.2	245.8	0.6
CN	51,569	368	1,824	12.1	250.2	250.2	250.2	0.0
CO	52,049	390	2,923	7.5	254.6	254.6	255.2	0.6

[1]Feet above cross section A

HMP Exemption Exhibit

Village 8- East

Legend

- 06073C - Floodway per FEMA
- 06073C- 500 year inundation per FEMA
- 06073C- flood plain per FEAM

Project Discharge location
IE= 197.5

Hard Rock Rd

Hard Rock Rd

Tiger Trail Xing S

193

195

197

197.9

199

125

125

N

1000 ft

Google Earth

Project Name/_____

Insert Completed Form I-3B: Site Information Checklist for PDPs

https://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports

Project Name: Otay Ranch Village 8 East

Site Information Checklist	Form I-3B
Project Summary Information	
Project Name	Otay Ranch, Village 8 East
Project Address	West of State Rd. 125 & South of Main Street (Existing Rock Mountain Rd.)
Assessor's Parcel Number(s) (APN(s))	646-010-08, 644-070-20 & 644-070-21
Permit Application Number	TM22-0005
Project Watershed	X San Diego Bay
Hydrologic Subarea name with Numeric Identifier up to two decimal places	Select One: ☐ Pueblo San Diego 908 ☐ Sweetwater 909 X Otay 910
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	546.93 Acres (23,824,296 Square Feet)
Area to be Disturbed by the Project (Project Footprint)	278.44 Acres (12,128,801 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	177.61 Acres (7,736,560 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	100.83 Acres (4,392,241 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	100 %

Project Name: Otay Ranch Village 8 East

Form I-3B Page 3 of 10

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Demolition completed without new construction
- ☒ Agricultural or other non-impervious use
- ☒ Vacant, undeveloped/natural

Description / Additional Information:

The site is currently used for dry farming, majority of the site is undeveloped that include rolling hills, canyons, etc.

Existing Land Cover Includes (select all that apply):

- ☒ Vegetative Cover
- ☒ Non-Vegetated Pervious Areas
- ☐ Impervious Areas

Description / Additional Information:

Vegetation consisting of mainly brush and farmland. Non vegetated areas include rolling hills and canyons.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☒ NRCS Type C
- ☒ NRCS Type D

Approximate Depth to Groundwater (GW):

- ☐ GW Depth < 5 feet
- ☐ 5 feet < GW Depth < 10 feet
- ☐ 10 feet < GW Depth < 20 feet
- ☒ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☒ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☐ None

Description / Additional Information:

The site is bordered on the south by Otay River. The southern portion of the site is punctuated by "v" shaped channels

Otay Ranch Village 8 East

Project Name: _____

Form I-3B Page 3 of 10

Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. whether existing drainage conveyance is natural or urban;
2. Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
4. Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

The topography for existing Village 8 East project area is characterized by farmland, rolling hills, vegetation consisting mainly of brush and incised canyons that partition the site into several defined watersheds. Approximately 6.13 acres within the north-east portion of the site currently drains towards an existing storm drain located at the eastern edge of Main Street (Rock Mountain Road). This runoff is directed west and connects to the Village 8 West development at the intersection of Main Street and Magdalena Avenue. Approximately 51.5 acres along the eastern project boundary drains east towards SR125. Runoff along the upper portion of the eastern boundary is conveyed via trapezoidal channel and storm drain. A storm drain directs this runoff to the east side of SR125. The southern portion is channeled south along the eastern project boundary en route to the Otay River.

The northern half of Main Street currently extends approximately 1,130 feet east of the Magdalena Avenue – Main Street intersection. This constructed street portion allows access to Olympian High School located on its north side. As part of this TM, a small area within the northeast portion of the project boundary will be developed as Neighborhood R-16. However, this area is currently undeveloped and drains to-wards the current eastern limit of Main Street. A headwall and storm drain direct this runoff west along Main Street within the existing storm drain which will tie in to the Village 8 West storm drain. The Village 8 West storm drain will outlet into the Otay River downstream.

The remaining areas within the project boundary currently drain via the incised canyons located throughout the site. These canyons flow south and empty directly into the Otay River. The Otay River flows from east to west accumulating runoff from each tributary canyon along the way. The Otay River empties into the San Diego Bay approximately 8.5 miles downstream.

Project Name: Otay Ranch Village 8 East

Form I-3B Page 4 of 10

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

Otay Ranch Village 8 East is south of the extension of Main Street, north of the Otay River Valley, east of Village 8 West and west of SR-125. This urban village was originally approved by the Chula Vista City Council in 2014 and subsequently amended in 2020. Current entitlements accommodate a total of 3,276 residential units, including 943 detached homes, 1,893 attached homes and 440 multi-family units in a mixed-use setting, 20,000 square feet of retail/commercial uses, an elementary school site, a neighborhood park and the 51.5-acre (gross) Otay Ranch Community Park South. Access to the village is provided via the extension of Main Street and La Media Parkway with emergency and pedestrian access to the community park provided along a utility corridor in the southeast portion of Village 8 East. Primary access to the community park is via existing Avenida Caprise within Village West. HomeFed Otay Land II, LLC, (Applicant), proposes to amend the Village 8 East land use plan to reflect current market conditions and housing needs and to ensure the community relates more closely to the adjacent Village 8 West community and future Village 9 planned east of SR-125. The replanning effort also addresses the redesign of the SR-125 interchanges at Main Street and La Media Parkway. **Village 8 East Proposed Land Use**: The Proposed Village 8 East Land Use Plan would include a Village Core area that would accommodate a mix of uses including multi-family residential and retail/commercial uses along with an elementary school site and a centrally located neighborhood park. A future multi-modal bridge, planned to accommodate Neighborhood Electric Vehicles (NEV), bicycles and pedestrians is also planned in the Village Core linking Village 8 East and future Village 9.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Impervious areas included are the following: roofs, roadways, sidewalk, and driveways.

List/describe proposed pervious features of the project (e.g., landscape areas):

Pervious areas included are the following: landscaped parkways, vegetated slopes, and biofiltration basin.

Does the project include grading and changes to site topography?

- ☒ Yes
- ☐ No

Description / Additional Information:

Grading is to be done to shape the construction site, to create the adequate slopes for building purposes which generally includes flattening the land.

Project Name: Otay Ranch Village 8 East

Form I-3B Page 5 of 10

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

- [x] Yes
- [ ] No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:

The storm drain system within the Village 8 East development will consist of inlets, catch basins, RCP pipe, cleanouts, and headwalls. The entire developed site with its neighborhoods and streets will generally slope towards the southern project boundary.

Inlets will be located along the proposed streets to collect roadway runoff; Future inlets will be proposed to collect runoff from the graded pads prior to discharging to the proposed storm drain systems located within the streets. Biofiltration basin and water quality storage basin with its respective MWS units are located in Lot P-2 south of the property to treat runoff from the site prior to discharge into Otay River.

Village 8 East site has two major outflall locations, the majority of the onsite runoff is conveyed by the eastern storm drain system. The western storm drain system conveys the offsite developed flow from the Village 8 West development and will confluence onsite flows from the western portion of the park site and a portion of the Preserve area which is located within the project boundary. The eastern storm drain will be routed towards the southeastern corner of the development in the vicinity of the proposed basin. The proprietary biofiltration units located downstream of the project will treat the 'first flush' (85th percentile) flows. To direct these lower water quality flows (compared to the peak flows), a cleanout with an internal diversion will be located at the downstream portion of the system. The cleanout's invert will be set below that of the peak flow outlet pipe which will allow peak flows to continue towards the discharge point at the Otay River.

Project Name: _____

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- ☒ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☒ Need for future indoor & structural pest control
- ☒ Landscape/Outdoor Pesticide Use
- ☒ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☐ Refuse areas
- ☐ Industrial processes
- ☐ Outdoor storage of equipment or materials
- ☐ Vehicle and Equipment Cleaning
- ☐ Vehicle/Equipment Repair and Maintenance
- ☐ Fuel Dispensing Areas
- ☐ Loading Docks
- ☒ Fire Sprinkler Test Water
- ☒ Miscellaneous Drain or Wash Water
- ☒ Plazas, sidewalks, and parking lots

Description / Additional Information:

Otay Ranch Village 8 East

Project Name: _____

Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

Runoff from majority of the site will be collected via inlets and catch basins and then routed via stormdrain to the proposed water quality storage basin and proprietary biofiltration MWS units to address water quality requirements prior to discharge into Otay River.The western portion of P-2 site will be draining in a southwest direction to a proposed biofiltration basin which discharges into Otay River. Flow then travels via otay River to San Diego Bay.

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Otay River	Benthic Community Effects, Bifenthrin, Copper, Cyfluthrin, Indicator Bacteria, Nitrogen, Oxygen, Dissolved, Phosphorus, Pyrethroids, Total Dissolved Solids, Toxicity, Zinc	None
San Diego Bay	Mercury, PAHs, PCBs	

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☐	☐
Nutrients	☐	☐	☐
Heavy Metals	☐	☐	☐
Organic Compounds	☐	☐	☐
Trash & Debris	☐	☐	☐
Oxygen Demanding Substances	☐	☐	☐
Oil & Grease	☐	☐	☐
Bacteria & Viruses	☐	☐	☐
Pesticides	☐	☐	☐

Project Name: Otay Ranch Village 8 East

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

- ☐ Yes, hydromodification management flow control structural BMPs required.
- ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☒ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

The runoff will be discharged towards Otay River.
Based on Section 1.6 of the City of Chula Vista updated BMP Design Manual, the project is HMP exempt.

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*
***This Section only required if hydromodification management requirements apply**

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

- ☐ Yes
- ☐ No

Description / Additional Information:

Project is HMP Exempt CCSYA management is not required

Otay Ranch Village 8 East

Project Name: _____

Flow Control for Post-Project Runoff*

***This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project HMP Exhibit.

POC number 1 is located Southwest of the project where water quality storage basin\MWS units discharges into Otay River. POC2 located southeast of the site at the discharge location of the proposed biofiltration basin for western portion of P-2 into the Otay River.

Has a geomorphic assessment been performed for the receiving channel(s)?

- ☐ No, the low flow threshold is 0.1Q2 (default low flow threshold)
- ☐ Yes, the result is the low flow threshold is 0.1Q2
- ☐ Yes, the result is the low flow threshold is 0.3Q2
- ☐ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

NA

Discussion / Additional Information: (optional)

Otay Ranch Village 8 East

Project Name: _____

Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

The project also includes 253.6 acres of Preserve Open Space south

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

It's important to note that a project can be classified as HMP exempt without directly discharging into an ESA. Conversely, a project might directly discharge to an ESA but not qualify as HMP exempt. Let me elaborate further:

The criteria for direct discharge in the context of HMP exemption involve the outlet pipe invert being situated below the 100-year Water Surface Elevation (WSE). This is a specific technical requirement for HMP exemption.

On the other hand, the definition of direct discharge in relation to an ESA refers to the pipe's discharge representing an isolated flow originating solely from our project to the ESA, without intermingling with flows from adjacent lands. This is aimed at ensuring the integrity of the discharge's contribution to the ESA's ecosystem.

It's important to highlight that our project's discharge point experiences the mixing of basin outflows with bypass flows prior to reaching the ESA. As a result, while the project still satisfies the criteria for HMP exemption, its discharge is not considered "direct" into the ESA due to the flow commingling with others before entering the ESA.

Project Name/_____

Insert Completed Form I-4: Source Control BMP Checklist for All Development Projects

https://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports

Otay Ranch, Village 8 East

Project Name: _____

Source Control BMP Checklist for All Development Projects	Form I-4

All development projects must implement source control BMPs. Refer to **Chapter 4** and **Appendix E** of the BMP Design Manual for information to implement BMPs shown in this checklist.

Note: All selected BMPs must be shown on the site/construction plans.

Answer each category below pursuant to the following:

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☒ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented: Units have not yet been calculated.			
4.2.2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if 4.2.4 not implemented:			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: Otay Ranch, Village 8 East

Source Control BMP Checklist for All Development Projects			Form I-4 (Page 2 of 2)
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	☒ Yes	☐ No	☐ N/A
SC-A Onsite storm drain inlets	☒ Yes	☐ No	☐ N/A
SC-B Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☒ N/A
SC-C Interior parking garages	☐ Yes	☐ No	☒ N/A
SC-D1 Need for future indoor & structural pest control	☒ Yes	☐ No	☐ N/A
SD-D2 Landscape/outdoor pesticide use	☒ Yes	☐ No	☐ N/A
SC-E Pools, spas, ponds, decorative fountains, and other water features	☒ Yes	☐ No	☐ N/A
SC-F Food Service	☐ Yes	☐ No	☒ N/A
SC-G Refuse areas	☐ Yes	☐ No	☒ N/A
SC-H Industrial processes	☐ Yes	☐ No	☒ N/A
SC-I Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
SC-J Vehicle and equipment cleaning	☐ Yes	☐ No	☒ N/A
SC-K Vehicle/equipment repair and maintenance	☐ Yes	☐ No	☒ N/A
SC-L Fuel dispensing areas	☐ Yes	☐ No	☒ N/A
SC-M Loading docks	☐ Yes	☐ No	☒ N/A
SC-N Fire sprinkler test water	☒ Yes	☐ No	☐ N/A
SC-O Miscellaneous drain or wash water	☒ Yes	☐ No	☐ N/A
SC-P Plazas, sidewalks, and parking lots	☒ Yes	☐ No	☐ N/A
SC-Q: Large Trash Generating Facilities	☐ Yes	☐ No	☒ N/A
SC-R: Animal Facilities	☐ Yes	☐ No	☒ N/A
SC-S: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☒ N/A
SC-T: Automotive Facilities	☐ Yes	☐ No	☒ N/A
Discussion / justification if 4.2.6 not implemented. Justification must be provided for all "No" answers shown above.			

Project Name/_____

Insert Completed Form I-5: Site Design BMP Checklist for All Development Projects

https://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports

Otay Ranch, Village 8 East

Project Name.: _____

Site Design BMP Checklist for All Development Projects	Form I-5

All development projects must implement site design BMPs where applicable and feasible. See **Chapter 4 and Appendix E** of the manual for information to implement site design BMPs shown in this checklist. **Note: All selected BMPs must be shown on the site/construction plans.**

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☒ Yes	☐ No	☐ N/A
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☒ Yes	☐ No	☐ N/A
4.3.3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
4.3.4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
4.3.5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A

Project Name/Address/N _____

Site Design BMP Checklist for All Development Projects			Form I-5
Site Design Requirement	**Applied?**		
4.3.6 Runoff Collection	☒ Yes	☐ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
4.3.8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification for all "No" answers shown above: Per Form I-7, Harvest and Use deemed to be infeasible.			

Project Name/_____

Insert Completed Form I-6: Summary of PDP Structural BMPs

https://www.chulavistaca.gov/departments/public-works/services/storm-water-pollution-prevention/documents-and-reports

Otay Ranch - Village 8 East

Project Name: _____

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see **Chapter 5 of the manual**). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in **Chapter 5**. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see **Chapter 6 of the manual**). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by City at the completion of construction. This may include requiring the project owner or project owner's representative to certify construction of the structural BMPs (see Section 1.12 of the manual). PDP structural BMPs must be maintained into perpetuity (**see Section 7 of the manual**).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page **3 of this form**) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The overall site is characterized by 3 DMAs and 3 areas that are considered Self Mitigating Areas according to Section 5.2.1.
The following steps were obtained as presented in Section 5.1 on the BMP Design Manual.
Step 1
1a. DMAs were delineated, and broken down per surface cover. Self mitigating areas were identified. Weighted runoff factor was calculated for each DMA based on area break down.
1b. DCV for all other DMAs were calculated using worksheet B.2-1 which determines water quality volume that needs to be biofiltrated (1.5 DCV) for all DMAs
Step 2
2a. Harvest and use is not used and unfeasible according to Form I-7.
Step 3
3a. Using Form I-8 to conduct a preliminary feasibility screening determined that no infiltration to be feasible.
3b. Volume based Proprietary Biofiltration BMPs chosen for DMA1, and flow based Proprietary Biofiltration BMPs chosen for DMA3, Nutrient sensitive media biofiltration basin has been chosen for DMA2 .
3c. Worksheets B.5-1 was used to size the biofiltration Bf-2-2.
3d. Worksheeet B.6-1 was used to calculate the required treatment flow rates and size the flow based proprietary biofiltration BMP BF-3-3. Required Minimum retention was calculated and will be provided via site design BMPs for DMA 1 and DMA 3
Step 4-4a. Proposed BMPs fit minimum footprint required. Project meets pollutant control standards.

Otay Ranch - Village 8 East

Project Name: _____

Form I-6 Page 2 of _____ *(Copy and attach as many as needed)*

Structural BMP ID No. Basin 1

Construction Plan Sheet No.

Type of structural BMP:

- ☐ Retention by harvest and use (e.g. HU-1, cistern)
- ☐ Retention by infiltration basin (INF-1)
- ☐ Retention by bioretention (INF-2)
- ☐ Retention by permeable pavement (INF-3)
- ☐ Partial retention by biofiltration with partial retention (PR-1)
- ☐ Biofiltration (BF-1)
- ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- ☐ Detention pond or vault for hydromodification management
- ☒ Other (describe in discussion section below)

Detention basin for DCV Storage upstream of volume based MWS units

Purpose:

- ☐ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification control
- ☒ Pre-treatment/forebay for another structural BMP
- ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the City Engineer (See Section 1.12 of the manual)	Alisa S. Vialpando Hunsaker & Associates-San Diego, Inc. 9707 Waples Street San Diego, CA 92121
Who will be the final owner of this BMP?	HOA for Otay Ranch - Village 8 East
Who will maintain this BMP into perpetuity?	HOA for Otay Ranch - Village 8 East
What is the funding mechanism for maintenance?	Homeowners fees to the HOA for Otay Ranch -Village 8 East

Project Name: _____

Form I-6 Page 3 *of* *(Copy and attach as many as needed)*
Structural BMP ID No. Basin 1
Construction Plan Sheet No.

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMP):

The proposed basin is a standard graded DCV Storage, flow control, and detention basin that is 6 feet deep with a bottom area of 90,000 sf. The basin will have installed a 4'x3' open top concrete outlet structure (riser) with a rim height of 4.96' for overflow. The water quality design capture volume will be discharged gradually through WQ flow control orifices (7-6" diameter) at invert elevation of 0 which are to control the flows downstream towards the MWS units.
The storage volume was sized using worksheet B-2.1 to store the total 1.5 DCV which was calculated to be 476,562 ft^3. Calculations are shown in this report.
This volume was used to size the proposed MWS units as shown previously.

Project Name: Otay Ranch - Village 8 East

Form I-6 Page 2 of _____ *(Copy and attach as many as needed)*

Structural BMP ID No. BF-2-2

Construction Plan Sheet No.

Type of structural BMP:

- ☐ Retention by harvest and use (e.g. HU-1, cistern)
- ☐ Retention by infiltration basin (INF-1)
- ☐ Retention by bioretention (INF-2)
- ☐ Retention by permeable pavement (INF-3)
- ☐ Partial retention by biofiltration with partial retention (PR-1)
- ☒ Biofiltration (BF-1) BF-2 Nutrient sensitive media
- ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- ☐ Detention pond or vault for hydromodification management
- ☐ Other (describe in discussion section below)

Purpose:

- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification control
- ☐ Pre-treatment/forebay for another structural BMP
- ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the City Engineer (See Section 1.12 of the manual)	Alisa S. Vialpando Hunsaker & Associates-San Diego, Inc. 9707 Waples Street San Diego, CA 92121
Who will be the final owner of this BMP?	HOA for Otay Ranch - Village 8 East
Who will maintain this BMP into perpetuity?	HOA for Otay Ranch - Village 8 East
What is the funding mechanism for maintenance?	Homeowners fees to the HOA for Otay Ranch -Village 8 East

Project Name: _____

Form I-6 Page 3 *of* *(Copy and attach as many as needed)*
Structural BMP ID No. BF-2-2
Construction Plan Sheet No.

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMP):

BF-2-2 is to be designed as a biofiltration basin, working as a pollution control BMP.

Basin was calculated using worksheet B.5-1.

Otay Ranch - Village 8 East

Project Name: _____

Form I-6 Page 2 of _____ *(Copy and attach as many as needed)*

Structural BMP ID No. BF-3-1

Construction Plan Sheet No.

Type of structural BMP:

- ☐ Retention by harvest and use (e.g. HU-1, cistern)
- ☐ Retention by infiltration basin (INF-1)
- ☐ Retention by bioretention (INF-2)
- ☐ Retention by permeable pavement (INF-3)
- ☐ Partial retention by biofiltration with partial retention (PR-1)
- ☒ Biofiltration (BF-1) BF-3 Proprietary Biofiltration
- ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- ☐ Detention pond or vault for hydromodification management
- ☐ Other (describe in discussion section below)

Purpose:

- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification control
- ☐ Pre-treatment/forebay for another structural BMP
- ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the City Engineer (See Section 1.12 of the manual)	Alisa S. Vialpando Hunsaker & Associates-San Diego, Inc. 9707 Waples Street San Diego, CA 92121
Who will be the final owner of this BMP?	HOA for Otay Ranch - Village 8 East
Who will maintain this BMP into perpetuity?	HOA for Otay Ranch - Village 8 East
What is the funding mechanism for maintenance?	Homeowners fees to the HOA for Otay Ranch -Village 8 East

Project Name: _____

Form I-6 Page 3 *of* *(Copy and attach as many as needed)*
Structural BMP ID No. BF-3-1
Construction Plan Sheet No.

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMP):

The required total DCV from worksheet B.2-1 is 317,708 ft^3. The design cubic feet corresponds to a 1.5 DCV of 476,562 ft^3.

The proposed BF-3-1 which consists of Twenty (20) - MWS L-8-24. This is based off of volume based sizing to treat 1.5 DCV and draw-down within the 36-Hour Period. The total 1.5 DCV was provided to Contech and per their consultation the size and number of Modular Wetland Units were calculated. These details are shown in the SWQMP Report.

Otay Ranch, Village 8 East

Project Name: _____

Form I-6 Page 2 of _____ *(Copy and attach as many as needed)*

Structural BMP ID No. BF-3-3

Construction Plan Sheet No.

Type of structural BMP:

- ☐ Retention by harvest and use (e.g. HU-1, cistern)
- ☐ Retention by infiltration basin (INF-1)
- ☐ Retention by bioretention (INF-2)
- ☐ Retention by permeable pavement (INF-3)
- ☐ Partial retention by biofiltration with partial retention (PR-1)
- ☒ Biofiltration (BF-1) BF-3 Proprietary Biofiltration
- ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)
- ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)
- ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)
- ☐ Detention pond or vault for hydromodification management
- ☐ Other (describe in discussion section below)

Purpose:

- ☒ Pollutant control only
- ☐ Hydromodification control only
- ☐ Combined pollutant control and hydromodification control
- ☐ Pre-treatment/forebay for another structural BMP
- ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the City Engineer (See Section 1.12 of the manual)	Alisa S. Vialpando Hunsaker & Associates-San Diego 9707 Waples Street San Diego, CA 92121 (858)558-4500
Who will be the final owner of this BMP?	HOA for Otay Ranch - Village 8 East
Who will maintain this BMP into perpetuity?	HOA for Otay Ranch - Village 8 East
What is the funding mechanism for maintenance?	Homeowners fees to the HOA for Otay Ranch -Village 8 East

CITY OF CHULA VISTA

Project Name: _____

Form I-6 Page 3 *of* *(Copy and attach as many as needed)*
Structural BMP ID No. BF-3-3
Construction Plan Sheet No.

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMP):

For DMA-3 shown on the DMA map, the Northeast section of the project will need to be treated with 2-Filterra Units (14 ft long by 8 ft wide). Each unit has a treatment capacity (per Table shown in SWQMP) of 0.4537 cfs.
2 Units x 0.4537 cfs = 0.9074 cfs
Final Design flow rate to be treated equates to 0.857 cfs per the Worksheet attached in SWQMP.

Project Name: Otay Ranch - Village 8 East

Form I-6 Page 2 of _____ *(Copy and attach as many as needed)*	
Structural BMP ID No. BF-3-4	
Construction Plan Sheet No.	
Type of structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☒ Other (describe in discussion section below) BF-3 Proprietary Biofiltration	
Purpose: ☒ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms if required by the City Engineer (See Section 1.12 of the manual)	Alisa S. Vialpando Hunsaker & Associates-San Diego, Inc. 9707 Waples Street San Diego, CA 92121
Who will be the final owner of this BMP?	HOA for Otay Ranch - Village 8 East
Who will maintain this BMP into perpetuity?	HOA for Otay Ranch - Village 8 East
What is the funding mechanism for maintenance?	Homeowners fees to the HOA for Otay Ranch -Village 8 East

Project Name: _____

Form I-6 Page 3 *of* *(Copy and attach as many as needed)*

Structural BMP ID No. BF-3-4

Construction Plan Sheet No.

Discussion (as needed, must include worksheets showing BMP sizing calculations in the SWQMP):

The required total DCV from worksheet B.2-1 is 828 ft^3. The design cubic feet corresponds to a 1.5 DCV of 1242 ft^3.

The proposed BF-3-4 consists of one flow based MWS L-8-8. This is based off of flow based sizing to treat 1.5 DCV. The total 1.5 DCV was provided to Contech and per their consultation the size of the Modular Wetland Unit was provided, in lieu of this information this report also provides another way of calculating the flow based MWS unit with the use of a table provided through Contech.

In line with prevailing Water Quality standards, as mentioned above we are **proposing the installation of a BF-3-4 flow-based Modular Wetlands System (MWS)** unit on Magadela Avenue.

The specifics presented on PDF page 128-131 regarding the BF-3-4 unit are derived from analyses conducted on the region outlined as **DMA 4A**, identifying the target treatment area. Initially, we determined the Design Capture Volume (DCV) essential to dictate the necessary flow rate to be managed by the BMP unit.

Post determination, leveraging the data from the Storm Water Equivalency Calculation outlined on page 130 of the PDF, we refined our strategy to address the treatment requirements in a different location (**DMA 4B**), as mentioned in Magadela Avenue. This adjustment became imperative owing to the challenges posed by DMA 4A's location in facilitating efficient treatment.

To ensure compliance, we made calculations to establish the exact acreage necessary on Magadela Avenue for treating the designated flow rate, the details of which are documented in the accompanying sheet.

Project Name/_____

ATTACHMENT 1

Backup for PDP Pollutant Control BMPs

Project Name/ Otay Ranch Village 8 East

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1A	**DMA Exhibit (Required)** See DMA Exhibit Checklist.	☒ Included
Attachment 1B	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included on DMA Exhibit in Attachment 1A ☒ Included as Attachment 1B, separate from DMA Exhibit
Attachment 1C	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☒ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1D	Infiltration Feasibility Information. Contents of Attachment 1D depend on the infiltration condition: ☒ **No Infiltration Condition**: ☒ Infiltration Feasibility Condition ☒ Letter (***Note: must be stamped & signed by licensed geotechnical engineer***) ☐ Form I-8A (optional) ☐ Form I-8B (optional) ☐ **Partial Infiltration Condition**: ☐ Infiltration Feasibility Condition ☐ Letter (***Note: must be stamped & signed by licensed geotechnical engineer***) ☐ Form I-8A ☐ Form I-8B ☐ **Full Infiltration Condition:** ☐ Form I-8A ☐ Form I-8B ☐ Worksheet C.4-3 ☐ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☒ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1E	**Pollutant Control BMP Design Worksheets/ Calculations (Required)** Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☒ Included

Project Name/ Otay Ranch Village 8 East

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify all the following:

- ☒ Underlying hydrologic soil group
- ☒ Approximate depth to groundwater
- ☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☒ Critical coarse sediment yield areas to be protected
- ☒ Existing topography and impervious areas
- ☒ Existing and proposed site drainage network and connections to drainage offsite
- ☒ Proposed grading
- ☒ Proposed impervious features
- ☒ Proposed design features and surface treatments used to minimize imperviousness
- ☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☒ Structural BMPs (identify location, type of BMP, and size/detail, and include cross-sections)

Attachment 1A

DMA Exhibit

LEGEND

- PROPERTY BOUNDARY
- DMA BOUNDARY 1
- DMA BOUNDARY 2
- DMA BOUNDARY 3
- FLOW DIRECTION
- 00.00 ACRES — SUBAREA ACREAGE
- DMA 1 — DMA ICON
- MULTI-FAMILY RESIDENTIAL (R)
- SCHOOL
- COMMUNITY PURPOSE FACILITY (CPF)
- PARK
- MIXED USE AREA (VC)
- PERVIOUS - DETENTION BASIN
- OPEN SPACE/ LANDSCAPE/SLOPES
- SELF-MITIGATING AREA (SLOPES/LANDSCAPE/DG OPEN SPACE)
- ROADS
- D — HYDROLOGIC SOIL TYPE PER NRCS WEB SOIL SURVEY DATA: C & D
- DETENTION BASIN (STRUCTURAL BMP)
- PROPRIETARY BIOFILTRATION BMP
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- OTAY RIVER FLOODWAY
- OTAY RIVER FLOODPLAIN
- CRITICAL COURSE
- POC1 — POINT OF COMPLIANCE
- PARK (P-2A) DRAINING TO EX. BASIN (OS-5) IN VILLAGE 8 WEST SWQMP REPORT TRACT NO. 19-03 SEE WORKSHEET B.5-1 FOR SIZIING IN THIS SWQMP
- DMA 4A, AREA FROM HALE ENGINEERING TO BE TREATED PER THIS SWQMP SEE AREA BREAKDOWN IN SWQMP REPORT FOR MORE DETAILS

IMPERVIOUS ROAD PER HALE ENGINEERING SWQMP VILLAGE 8 WEST OR-651G, RUNOFF THAT COMINGLES WITH ON-SITE FLOWS TO BE TREATED VIA ON-SITE BMPS BEFORE DISCHARGING INTO THE RIVER.

DMA 4B, EXISTING UNDISTURBED (DOES NOT REQUIRED TREATMENT) TO BE TREATED VIA PROPOSED BMP TO COUNT FOR DMA 4A THAT CANNOT BE TREATED. (WATER QUALITY EQUIVALENCY)

BF-3-4
1-8'x8' PROP. MODULAR WETLAND

DMA 4B
1.12 ACRES

DMA 3
3.78 ACRES

BF-3-3

SM-1
2.63 ACRES

VILLAGE 8 WEST

VILLAGE 9 NORTH

MAIN STREET

STREET "A"

STREET "D"

STREET "E"

STREET "F"

SANTA MARISOL

CALLE ESCUELA

OTAY VALLEY ROAD

DMA 1
262.12 ACRES

DMA 4A
0.92 ACRES

SM-2
5.75 ACRES

CPF-1

VILLAGE 9 SOUTH

BASIN BOTTOM ELEVATION= 209.0'
BOTTOM AREA=6,000 SF
DEPTH= 5.0'

BASIN 1

BASIN BOTTOM ELEVATION= 218.0'
BOTTOM AREA= 90,000 SF
DEPTH= 6.0'

DMA 2
12.83 ACRES

BF- 2-2

SM-3
4.76 ACRES

BF-3-1
20-8'x24' MWS PROP. MODULAR WETLANDS

OTAY RIVER FLOODWAY

VILLAGE 8 EAST STORMWATER DISCHARGE POINT

SCALE 1" = 300'

SCALE 1" = 200'

SOURCE CONTROL BMPs (APPLY TO THE ENTIRE PROJECT)

- SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
- SC-2 STORM DRAIN STENCILING OR SIGNAGE
- SC-5 PROTECT TRASH STORAGE AREAS
- SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
  - SC-6A ON-SITE STORM DRAIN INLETS
  - SC-6D1 NEED FOR FUTURE INDOOR & STRUCTURAL PEST CONTROL
  - SC-6D2 LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-6E POOLS, SPAS, PONDS, FOUNTAINS, AND OTHER WATER FEATURES
  - SC-6N FIRE SPRINKLER TEST WATER
  - SC-6O MISCELLANEOUS DRAIN OR WASH WATER
  - SC-6P PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMPs

- SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREAS
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-6 RUNOFF COLLECTION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

UNDERLYING SOIL GROUP : D & C
APPROXIMATE DEPTH TO GROUNDWATER > 20'
CRITICAL COARSE AREAS ARE NOT APPLICABLE
HMP-EXEMPT

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

PROPOSED DMA MAP

VILLAGE 8 EAST

CITY OF CHULA VISTA, CALIFORNIA

MAP 1 OF 1

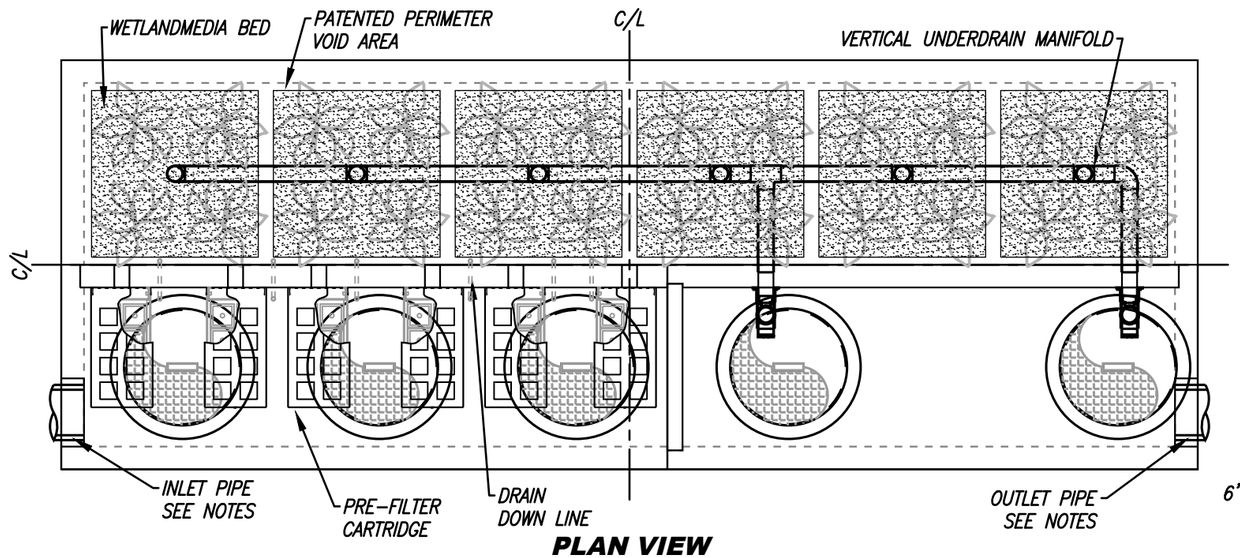
SITE SPECIFIC DATA			
PROJECT NUMBER		733072	
PROJECT NAME		VILLAGE 8 EAST	
PROJECT LOCATION		CHULA VISTA, CA	
STRUCTURE ID		UNIT 1 OF 20	
TREATMENT REQUIRED			
VOLUME BASED (CF)		MAX. DISCHARGE (CFS)	
476,580 (23829 PER UNIT)		0.185	
TREATMENT HGL AVAILABLE (FT)			N/K
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	215.90	PVC	12"
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE	214.82	RCP	12"
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION	220.90	220.90	220.90
SURFACE LOAD	PEDESTRIAN	N/A	PEDESTRIAN
FRAME & COVER	3EA ø30"	OPEN PLANTER	2EA ø30"
WETLANDMEDIA VOLUME (CY)			18.24
ORIFICE SIZE (DIA. INCHES)			ø1.35 EA
NOTES: PRELIMINARY NOT FOR CONSTRUCTION. ENGINEER TO SET UPSTREAM BYPASS AT 218.42. (20) TOTAL UNITS NEED TO MEET REQUIRED TREATMENT VOLUME.			

INSTALLATION NOTES

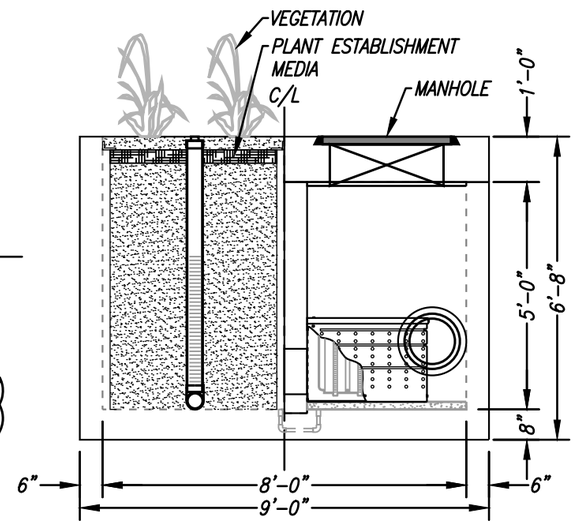
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS' SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATERTIGHT PER MANUFACTURER'S STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURER'S WARRANTY IS VOID WITHOUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

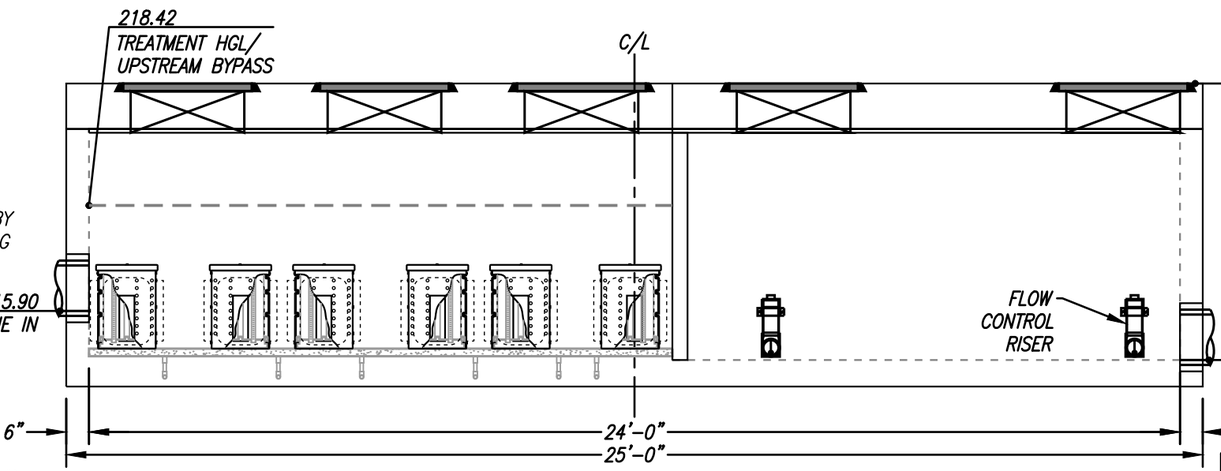
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



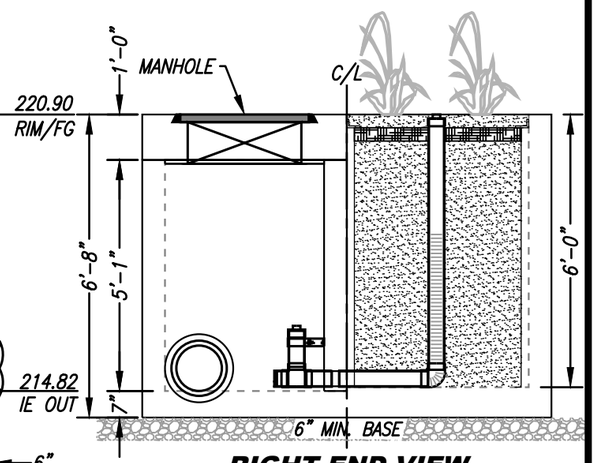
PLAN VIEW



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

REQUIRED TREATMENT VOLUME (CF)		23,829
DRAINDOWN DURATION (HOURS)		36
MAXIMUM DISCHARGE RATE PER MWS UNIT(GPM)		83.12
OPERATING HEAD (FT)		3.6
WETLANDMEDIA INFILTRATION RATE (IN/HR)	OR	26
WETLANDMEDIA LOADING RATE (GPM/SF)		0.26

MODULAR WETLANDS
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com

MWS-L-8-24-6'-0"-V-HC
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

4/18/23 JOHN HAYDEN

Attachment 1B

Tabular Summary of DMAs

VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 1								
	Imp. RF	Pervious RF	% Imp	AREA (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
BASIN	0.90	0.10	0	2.09	0.1%	0.000	2.091	0.21
PARK	0.90	0.10	20	30.43	4.7%	6.086	24.344	7.91
SCHOOL	0.90	0.10	80	9.96	4.4%	7.972	1.993	7.37
ROAD	0.90	0.10	90	37.75	18.4%	33.974	3.775	30.95
MIXED USE	0.90	0.10	85	47.77	22.1%	40.601	7.165	37.26
SLOPES/LANDSCAPE	0.90	0.30	0	23.43	4.2%	0.000	23.431	7.03
MULTIFAMILY	0.90	0.10	75	109.48	45.5%	82.113	27.371	76.64
COMMUNITY PURPOSE	0.90	0.10	85	1.20	0.6%	1.024	0.181	0.94
	0.90	0.3	85		0.0%	0.000	0.000	0.00
				262.12	100.0%	171.769	90.350	168.31
							Weighted C =	0.64

OTAY RANCH - VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 2								
	Imp. RF	Pervious RF	% Imp	**AREA** (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
BASIN	0.90	0.10	0	0.396	1.1%	0.000	0.396	0.04
PARK	0.90	0.10	20	11.898	86.7%	2.380	9.518	3.09
ROAD	0.90	0.10	90	0.532	12.2%	0.479	0.053	0.44
				12.826	**1.000**	**2.858**	**9.967**	**3.569**
							Weighted C =	**0.28**

OTAY RANCH - VILLAGE 8 EAST

DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 3								
	Imp. RF	Pervious RF	% Imp	**AREA** (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
SLOPES/LANDSCAPE	0.90	0.30	0	0.467	4.9%	0.000	0.467	0.14
ROAD	0.90	0.10	90	3.312	95.1%	2.980	0.331	2.72
				3.778	**1.000**	**2.980**	**0.798**	**2.856**
							Weighted C =	**0.76**

VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 4A								
	Imp. RF	Pervious RF	% Imp	AREA (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
SINGLE-FAMILY (SF)	0.90	0.10	75	0.78	82.6%	0.582	0.194	0.54
ROAD	0.90	0.10	90	0.14	17.4%	0.126	0.014	0.11
				0.92	100.0%	0.708	0.208	0.66
							Weighted C =	0.72

Runoff factors & Impervious Areas used for Single Family and Road were obtained from Hale Engineering **SWQMP Otay Ranch Village 8 West.**

DMA DATA - SOUTH BASIN

LAND USE	AREA (AC)	% IMPERVIOUS	IMPERVIOUS AREA (AC)	RUNOFF FACTOR	AREA X RUNOFF FACTOR (AC)	PERVIOUS AREA (AC)	RUNOFF FACTOR	AREA X RUNOFF FACTOR (AC)	EFFECTIVE AREA	% DCV
OFFSITE-RES	16.4	40	6.56	0.90	5.90	9.84	0.10	0.98	6.89	7.09
MULTI-FAMILY (MF)	45.0	85	38.24	0.90	34.42	6.75	0.10	0.67	35.09	36.13
ROADS	26.8	90	24.12	0.90	21.71	2.68	0.10	0.27	22.06	22.71
SINGLE-FAMILY (SF)	30.3	75	22.73	0.90	20.45	7.58	0.10	0.76	2121	21.84
SCHOOL (SC)	10.5	80	8.43	0.90	7.59	2.11	0.10	0.21	7.80	8.03
LANDSCAPE/OPEN SPACE	26.5	0	0.00	0.90	0.00	26.50	0.10	2.65	2.65	2.73
PARK (P)	5.5	20	1.10	0.90	0.99	4.41	0.10	0.44	1.43	1.47
TOTAL	**161.1**		**101.27**		**91.14**	**59.87**		**5.99**	**97.13**	**100.00**

WEIGHTED RUNOFF FACT 97.1/161.1 = 0.60

200 0 200 400 600
SCALE 1" = 200'

HALE ENGINEERING

EXEMPTION EXHIBIT FOR VILLAGE 8 WEST
SOUTH BASIN
OTAY RANCH, VILLAGE 8 WEST
CHULA VISTA TRACT NO. 19-03
CITY OF CHULA VISTA, CALIFORNIA

SHEET 1 OF 1

12/18/19

Attachment 1C

Form I-7 Harvest and Use Feasibility

Otay Ranch Village 8 East

Project Name: _____

Harvest and Use Feasibility Screening	FORM I-7 (Worksksheet B.3-1)

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?

   - ☐ Toilet and urinal flushing
   - ☒ Landscape irrigation
   - ☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.

[Provide a summary of calculations here]

36 hr. toilet use per resident = 9.3 gal/resident x 2.0 residents per unit x 2101 units x 1.5 days = 58,617.9 cf

390 gals/ac x 291.87 ac = 113,829 gals = 15,217.78 cf

73,835.68 cf

3. Calculate the DCV using worksheet B-2.1.

[Provide a result here]

DCV = 329,835 cf

0.25 DCV= 82,458.75 cf

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
Yes / No ⇨	Yes ⇩ / No ⇨	Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Note: 36-hour demand calculations are for feasibility analysis only, once the feasibility analysis is complete the applicant may be allowed to use a different drawdown time provided they meet the 80 percent of average annual (long term) runoff volume performance standard.

Atachement 1D

Categorization of Infiltration Feasibility Condition Letter

Otay Ranch - Village 8 East

Project Name: _____

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Form I-8A[1] (Worksheet C.4-1)
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
DMA 1, DMA 2, DMA 3, DMA 4A & 4B	Planning

Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[2]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☐ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☒ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☐ Yes; Continue to Step 1C. ☒ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☒ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.

[1] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.
[2] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Project Name: Otay Ranch - Village 8 East

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Form I-8A[1] (Worksheet C.4-1)
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

Per the Geotechnical Report attached in this document.
"Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time."
"Infiltration areas are considered infeasible due to poor percolation and lateral migration characteristics."

Please refer to the geotechnical report Dated September 30, 2022 by Geocon Incorporated for additional information.

Criteria 2: Geologic/Geotechnical Screening	
2A	**If all questions in Step 2A are answered "Yes," continue to Step 2B.** For any "No" answer in Step 2A answer "No" to Criteria 2 and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.

Otay Ranch - Village 8 East

Project Name: _____

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Form I-8A[1] (Worksheet C.4-1)	
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☒ Yes	☐ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☒ Yes	☐ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☒ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No

Otay Ranch - Village 8 East

Project Name: _____

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Form I-8A[1] (Worksheet C.4-1)	
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐ Yes	☐ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No

Summarize findings and basis; provide references to related reports or exhibits.

Per the Geotechnical Report attached in this document.
"Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time."
"Infiltration areas are considered infeasible due to poor percolation and lateral migration characteristics."

Please refer to the geotechnical report Dated September 30, 2022 by Geocon Incorporated for additional information.

Part 1 Result – Full Infiltration Geotechnical Screening [3]	**Result**
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐ **Full infiltration Condition** ☒ **Complete Part 2**

[3] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Otay Ranch - Village 8 East

Project Name: _____

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Form I-8A[1] (Worksheet C.4-1)
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
DMA 1, DMA 2, DMA 3, DMA 4A & 4B	Planning

Criteria 3 : Infiltration Rate Screening

3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☒ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

Per the Geotechnical Report attached in this document.
"Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time."
"Infiltration areas are considered infeasible due to poor percolation and lateral migration characteristics."

Please refer to the geotechnical report Dated September 30, 2022 by Geocon Incorporated for additional information.

Project Name: Otay Ranch - Village 8 East

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Form I-8A[1] (Worksheet C.4-1)	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☒ Yes	☐ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☒ Yes	☐ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☒ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No

Project Name: _____

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Form I-8A[1] (Worksheet C.4-1)	
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☒ No
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No

Project Name: Otay Ranch - Village 8 East

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Form I-8A[1] (Worksheet C.4-1)
Summarize findings and basis; provide references to related reports or exhibits. Per the Geotechnical Report attached in this document. "Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time." "Infiltration areas are considered infeasible due to poor percolation and lateral migration characteristics." Please refer to the geotechnical report Dated September 30, 2022 by Geocon Incorporated for additional information.	

Part 2 – Partial Infiltration Geotechnical Screening Result[4]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ **Partial Infiltration Condition** ☒ **No Infiltration Condition**

[4] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

INFILTRATION FEASIBILITY CONDITION LETTER

OTAY RANCH VILLAGE 8 EAST
CHULA VISTA, CALIFORNIA

PREPARED FOR

HOMEFED CORPORATION

GEOCON INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

MAY 5, 2023
PROJECT NO. G1006-52-05

Project No. G1006-52-05
May 5, 2023

Homefed Otay Land II, LLC
1903 Wright Place, Suite 220
Carlsbad, California 92008

Attention: Mr. Jeff O'Connor

Subject: INFILTRATION FEASIBILITY CONDITION LETTER
OTAY RANCH VILLAGE 8 EAST
CHULA VISTA, CALIFORNIA

References:
1. *Update Geotechnical Report, Otay Ranch Village 8 East, Chula Vista, California,* prepared by Geocon Incorporated, revised March 27, 2023 (Project No. G1006-52-05).
2. *Final Report of Testing and Observation Services During Site Grading, Otay Ranch Village 8 East, Borrow and Disposal Sites,* prepared by Geocon Inc., dated September 9, 2022 (Project No. G1006-52-04).
3. *Proposed DMA Map – Village 8 East, City of Chula Vista, California,* prepared by Hunsaker and Associates San Diego, Inc., undated, received April 17, 2023.

Dear Mr. O'Connor:

In accordance with the request of Mr. Brian Lessa with Hunsaker and Associates, San Diego Inc., we prepared this letter to describe the existing geotechnical conditions for the purposes of storm water management for the subject property. We reviewed the referenced update geotechnical report to evaluate the current geologic conditions on the property in accordance with the *City of Chula Vista Best Management Practices (BMP) Design Manual, August 2021*.

SITE AND PROJECT DESCRIPTION

Otay Ranch Village 8 East is located south of future Main Street (currently Rock Mountain Road) and Olympian High School, west of State Route 125, north of the Otay River drainage and Wiley Road access easement, and east of undeveloped land in the southeastern portion of Chula Vista, California. The property is approximately 575 gross acres with about 265 gross acres planned for open space resulting in the development of about 310 acres. The site consists of a series of south trending ridges and canyons draining to the south into Otay River. Site elevations range from approximately 180 feet above mean sea level (MSL) at the southwest corner of the Community Park site adjacent to the Otay River drainage to approximately 610 feet MSL at the northeast corner of the site. Cut and fill slopes exist on the northern portion of the site created during the previous grading of Main Street, Rock

Mountain Road, and Santa Luna Street. Previous grading for Main Street and Olympian High School included the construction of canyon subdrains and a buttress fill along the northern boundary of the site. Most recent grading of the consisted of placement of compacted fill from export material from Village 8 East within the disposal site. Additionally, a borrow site was utilized for fill placement in Village 8 West. A Chula Vista sewer line easement and an SDG&E overhead transmission line are located on the southern portion of the project within the un-improved Wiley Road. Wiley Road provides access to the Vulcan material plant to the west and further east within the Otay River Valley The City of San Diego's, Otay 2nd 40-inch and Otay 3rd 54-inch-inch waterlines (constructed in the late 1920s by cut and cover techniques) cross the site from east to west in the middle portion of the project. We understand the invert elevations of the pipeline are 10 to 15 below the existing grades based on observation of portion of mass grading on Village 8 West. We understand the existing waterlines will be removed or abandoned from the eastern and western points of connection, respectively. Portions of the existing 54-inch pipeline are partially exposed above ground as it crosses several tributary drainages. Site vegetation consists of sparse native coastal sage scrub and grassland habitats disturbed by farming. Some riparian vegetation occurs on the north side of the Otay River drainage area. The Existing Site Map shows the current site conditions on the subject property. The Project Location Map shows the areas surrounding the Village 8 West development area.

Project Location Map

We understand the development will generally occur from the north to south property lines leaving local areas designated as open space and preserve for environmental purposes (MSCP). The site will

accommodate multi-family residential (108.8), village core (47.7 acres), park sites (73.2 acres), school site (11.3 acres), community purpose facilities (2.0 acres), parks (73.2 acres, respectively), future development lots (9.3 acres), circulation roadways (31.8 acres), active recreation (22.6 acres), and open space (253.6 acres of preserve land, and basins (31.6 acres). A large community park is proposed on the southern portion of the property adjacent to the Otay River drainage channel. In addition, water quality basins will be constructed on the southeast and southwest portion of the site to the south of the developed area and along the north side of the Otay River drainage. Mass grading of the site will consist of maximum cuts and fills of approximately 75 feet with cut and fill slopes having a maximum height of 45 and 50 feet, respectively, and a maximum slope inclination of 2:1 (horizontal to vertical). Several reinforced earth retaining walls are proposed on the site with maximum heights on the order of 25 feet. The proposed grading will require approximately 4.86 million cubic yards of excavation and fill.

Based on review of the referenced Drainage Management Area (DMA), the proposed site consists of three, DMA areas 1 through 3. DMA area 1 is located along the northern property line along future Main Street, the existing roadways preclude areas of infiltration. Planned DMA areas 2 and 3 are located within the southwestern and southeastern margins of the site, respectively. Due to the planned fill thickness and planned slopes greater than 5 feet precludes areas of infiltration within DMA areas 2 and 3, respectively, preclude areas of infiltration. The proposed Drainage Management Area (DMA) plan presents the proposed project are presented on Figure 1.

The locations and descriptions of the site and proposed development are based on the referenced site plan and our understanding of project development. If project details vary significantly from those described herein, Geocon Incorporated should be contacted to evaluate the necessity for review and revision of this report.

PREVIOUS SITE DEVELOPMENT

In general, a portion of Otay Ranch Village 8 East has been partially grading during mass grading operations for Village 8 West. The disposal and borrow areas within Village 8 West consisted of remedial grading of surficial soil and placing compacted fill resulting in a total maximum thickness ranging up to approximately 40 feet. The surficial soil (topsoil) and upper weathered formational materials were excavated to expose competent Otay Formation. The topsoil and portions of the weathered Otay Formation were stockpiled for environmental purposes highlighted blue and labeled environmental stockpile. Prior to fill placement, toe drains were installed and canyon subdrains were placed within the former canyon drainages. The grading contractor generated additional fill material from within the Otay Formation and placed within the lower temporary slope zone margins subsequent to the installation of the toe drains. Excavation depths ranged from 5 feet within the former mesa areas and up to 10 feet within the flanks of the central canyon drainage.

The middle member of the Otay Formation (informally named the "gritstone" unit) is expected to be predominately exposed at the surface on the central and southern portion of the site. Subsequent to mass grading, dense to very dense, compacted fill and formational materials will be exposed at grade across the site. The formational materials are typically cemented and very difficult excavation should be expected. Localized cemented or very hard zones will be encountered within the Otay Formation that will require very heavy effort to excavate with oversize chunks generated. Based on observations during mass grading, we expect that at a minimum a D9 or D10 bulldozer would be required to perform excavations within the cemented portions of the "gritstone member" of the Otay Formation. Additionally, planned 5-foot undercuts within bentonitic claystone are planned within the resulting fill thickness of greater than feet.

STORM WATER INFILTRATION FEASIBILITY

The following information provided responses to discussions requested from Section C.1.1 of the *2021 City of City of Chula Vista Best Management Practices (BMP) Design Manual, August 2021*.

The Phase of the Project In which the geotechnical engineer first analyzed the site for infiltration feasibility:

The current submittal is in the design phase.

Results of previous geotechnical analyses conducted in the project area, if any.

During our field investigation, disposal and borrow site grading operations, we encountered four surficial deposits (consisting of previously placed fill, undocumented fill, topsoil, and alluvium) and two formational units (consisting of Pleistocene age Terrace Deposits and Tertiary-age Otay Formation). We subdivided the Otay Formation into the upper sandstone/siltstone/claystone member (To) and an underlying middle gritstone member (Tog). The gritstone member is typically well cemented, very difficult excavation should be expected. Localized cemented or very hard zones will be encountered within the Otay Formation that will require very heavy effort to excavate with oversize chunks generated. Based on observations during mass grading within the gritstone member, we expect that at a minimum a D9 or D10 bulldozer would be required to perform excavations within the cemented portions of the "gritstone member" of the Otay Formation. We did not encounter the lower basal conglomerate member of the Otay Formation on site. Tertiary-age Otay Formation is exposed across the site or located below the surficial soil and Terrace Deposits. The upper member of this unit (To) consists of interbeds of dense to very dense, slightly cemented, silty to clayey sandstone and hard, siltstone and claystone layers. In addition, several layers of bentonitic claystone (Tob) with a maximum thickness of approximately 1 foot thick are present within this unit on the northern and middle portions of the site that can create slope instability. Some of the layers are locally discontinuous and range in elevations as high as 573 feet MSL to as low as 416 feet MSL. Additionally, some minor discontinuous layers of bentonitic claystone are also present with a thickness of 1 to 3 inches. The Tertiary-age (upper Oligocene) Otay Formation underlies the site on canyon slopes or underlying the younger geologic formations and surficial soil at depth. The Otay Formation consists of dense, silty, fine- to coarse-grained sandstone, clayey and sandy siltstone, and silty claystone with continuous and discontinuous interbeds of highly expansive bentonitic claystone. The coarse-grained portions of the Otay Formation typically possess a "very low" to "low" expansion potential (expansion index of 50 or less) and adequate shear strength. The fine-

grained siltstone and claystone portions of the formation can exhibit a “medium” to “very high” expansion potential (expansion index greater than 50). With the exception of the bentonitic claystone, the Otay Formation is suitable for the support of compacted fill and structural loads. The formational materials ae fine-grained in nature and are hard/cemented.

Pleistocene-age Terrace Deposits are deposited as shallow marine and non-marine near shore soil located on the southern portion of the site and the northern flank of the Otay River canyon drainage. We expect this unit may be in excess of 50 feet thick. The Terrace Deposits are generally dense to very dense, reddish brown, silty to clayey sandstone with portions of the unit containing intermittent layers of cobbles and boulders up to about 2 feet in diameter. The Terrace Deposits are suitable for the support of proposed fill and structural loads; however, select grading operations will be required to properly place the cobble and boulders where encountered.

Alluvium exists within the canyon drainages located in the central portion of the project. The alluvium within the canyon drainages is loose to medium dense, can become saturated and difficult to excavate during the rainy season. We estimate the thickness of the alluvium to range up to approximately 7 feet within the tributary canyons and 11 feet within the Otay River Drainage on the south side of the site. Due to the relatively unconsolidated nature of these deposits, remedial grading will be necessary in areas to receive proposed fill or structures and alluvium will not be present in the final graded condition.

The coarse-grained units of the formational units possess a “low” to “medium” expansion potential (expansion index of 21 to 90). The fine-grained bentonitic claystone of the Otay Formation possesses a “high” to “very high” expansive potential (expansion index greater than 90). Expansion would occur on the existing soil if infiltration we to be allowed on the property.

Planned development and mass grading of Otay Ranch Village 8 East area has not been completed and buttresses will need to be constructed due to the presence of bentonitic claystone layers (Tob). Buttress designs have assumed a 1:1 (horizontal to vertical) frontcut and backcut extending down to intercept the bentonite. Infiltration should not occur because we will be installing buttresses to help increase the factor of safety of the adjacent slope for the planned development. Buttress and fill slopes are presented on Figure 1.

The development status of the site prior to the project application.

The central area has been used as a fil placement site from rock materials generated from the Otay Ranch Village 8 West property. The remaining areas have not been graded and the topography is in a generally natural condition. Additional mass grading will be required to achieve the current design grade and construct planned BMPs.

The history of design discussion for the project footprint, resulting the final design determination.

Based on the discussion herein, infiltrating storm water devices will not be allowed on the property due to the fill thicknesses, the “expansive” characteristics of the soil and the planned buttress/graded fill slope. The storm water devices are planned to be lined to prevent infiltration and distress from occurring on the subject and adjacent properties.

Full/partial infiltration BMP standard setbacks to underground utilities, structures, retaining walls, fill slopes, and natural slopes applicable to the DMA that prevent full/partial infiltration.

Existing utilities are located within the adjacent public right-of-way/roadways on the site. Full or partial infiltration should not be allowed in the areas of the utilities to help prevent potential damage/distress to improvements. Mitigation measures to prevent water from infiltrating the utilities consist of setbacks, installing cutoff walls around the utilities and installing subdrains and/or installing liners. The horizontal and vertical setbacks for infiltration devices should be a minimum of 10 feet and a 1:1 plane of 1 foot below the closest edge of the deepest adjacent utility, respectively.

Due to the presence of bentonite layers in the Otay Formation, some buttresses will be required. Water should not be allowed in buttress areas to help reduce the potential for slope instability and movement. In addition, infiltration should not occur adjacent to proposed slopes to help prevent seepage from occurring and surficial instability.

Physical impairments (i.e., fire road egress, public safety considerations, etc.) that prevent full/partial infiltration.

There are existing improvements and structures located adjacent to the northern property margin. The storm drains and water lines within the site would require setbacks for infiltration if it were allowed. Infiltration near these structures and improvements should not be allowed. In addition, allowing infiltration would saturate the underlying fill and result decrease of the factor of safety for the adjacent slope. The slope is not designed as a saturated condition and the slope would possess an increased risk of movement if infiltration were to occur.

Consideration of site design alternative to achieve partial/full infiltration within the DMA.

Based on the existing fill materials, expansion index and adjacent slopes, full and partial infiltration should not be allowed on the property. Other options of infiltration would be deep dry wells. However, the depth of the dry wells would need to extended relatively deep to not affect the adjacent southern drainage areas. The existing materials are fine-grained where the infiltration rates would be very slow. Therefore, dry wells are not an efficient design potential in this area.

The extent site design BMPs requirements were included in the overall design.

BMPs are being incorporated into the site design for storm water management. The planned storm water management devices should be properly lined to prevent water infiltration.

Conclusion or recommendation from the geotechnical engineer regarding the DMA's infiltration condition.

Infiltration should be considered infeasible and proposed storm water management devices should be lined due to the fill soil with thicknesses greater than 5 feet, shallow hard and dense/cemented Otay Formation and expansive soils, planned undercuts of expansive soils, the location of the descending slopes, and the requirements for buttresses on the descending slopes. Additional geotechnical investigation is not required due to our previous experience with the geologic conditions and the infiltration characteristics of the existing soil encountered during previous mass-grading operations and previous geotechnical investigations within the geologic units. In addition, other areas of potential infiltration do not exist on the property. We opine the existing soil cannot be mitigated to allow infiltration on the property. Based on the discussion

herein, we opine full and partial infiltration is considered infeasible at the site. We recommend storm water management BMPs be designed so that infiltration does not occur. Figures 1, presents the DMA Exhibit Map overlayed with our geologic map presenting the existing slope area, fill slope areas, shallow Otay Formation and expansive soils, and expected existing fill greater than 5 feet.

An Exhibit for all applicable DMA's that clearly labels:

- **Proposed development areas and development type.**
- **All applicable features and setbacks that prevent partial or full infiltration, including underground utilities, structures, retaining walls, fill slopes, natural slopes, and existing fill materials greater than 5 feet.**
- **Potential locations for structural BMPs.**
- **Areas where full/partial infiltration BMPs cannot be proposed.**

The DMA Exhibit Map, Figure 1, presents the development plan as a base map. The figure shows the development area and improvements, and the area on the site infeasible to infiltration due to fill thickness greater than 5 feet, shallow hard and dense/cemented Otay Formation and expansive soils, and slope stabilization/planned sloping conditions. We opine the entire project site is infeasible for infiltration.

If you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Michael C. Ertwine
CEG 2659

Shawn Foy Weedon
GE 2714

SFW:MCE:am

(e-mail) Addressee

LEGEND

- PROPERTY BOUNDARY
- DMA BOUNDARY 1
- DMA BOUNDARY 2
- DMA BOUNDARY 3
- FLOW DIRECTION
- 00.00 ACRES — SUBAREA ACREAGE
- DMA 1 — DMA ICON
- MULTI-FAMILY RESIDENTIAL (R)
- SCHOOL
- COMMUNITY PURPOSE FACILITY (CPF)
- PARK
- MIXED USE AREA (VC)
- PERVIOUS - DETENTION BASIN
- OPEN SPACE
- OPEN SPACE (SELF-MITIGATING)
- ROADS
- D — HYDROLOGIC SOIL TYPE PER NRCS WEB SOIL SURVEY DATA: C & D
- DETENTION BASIN (STRUCTURAL BMP)
- PROPRIETARY BIOFILTRATION BMP
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- OTAY RIVER FLOODWAY
- OTAY RIVER FLOODPLAIN
- CRITICAL COURSE
- POC1 — POINT OF COMPLIANCE

VILLAGE 8 WEST

VILLAGE 9 NORTH

VILLAGE 9 SOUTH

VILLAGE 8 EAST

BF-3-3

DMA 3
3.78 ACRES

SM-1
2.63 ACRES

DMA 1

SM-2
ACRES

DMA 2
12.83 ACRES

BF- 2-2

SM-3
4.76 ACRES

BASIN 1

BASIN BOTTOM ELEVATION= 209.0'
BOTTOM AREA=4,900 SF
DEPTH= 5.0'

BASIN BOTTOM ELEVATION= 218.0'
BOTTOM AREA= 90,000 SF
DEPTH= 6.0'

BF-3-1
20-8'x24' MWS
PROP. MODULAR
WETLANDS

OTAY RIVER FLOODWAY

VILLAGE 8 EAST STORMWATER DISCHARGE POINT

MAIN STREET
STREET "D"
STREET "E"
STREET "F"
SANTA MARISOL
CALLE ESCUELA
OTAY VALLEY ROAD
WILEY ROAD
SR-125
LOT 25
LOT 16
LOT 17
LOT 30
LOT 19
LOT 22
LOT B
OTAY RANCH VILLAGE 8 WEST
OTAY RANCH VILLAGE 9 EAST
NAP

GEOCON LEGEND

- Qcf ..... COMPACTED FILL
- Qudf ..... UNDOCUMENTED FILL
- Qpf ..... PREVIOUSLY PLACED FILL
- Qal ..... ALLUVIUM
- Qt ..... TERRACE DEPOSITS (Dotted Where Buried)
- To ..... OTAY FORMATION (Dotted Where Buried)
- Tog ..... OTAY FORMATION (Gritstone) (Dotted Where Buried)
- ..... APPROX. LOCATION OF GEOLOGIC CONTACT (Dotted Where Buried, Queried Where Uncertain)
- ..... APPROX. LOCATION OF EXISTING 8-INCH SOIL-ROCK FILL SUBDRAIN
- ..... APPROX. LOCATION OF EXISTING 6-INCH SOIL-ROCK FILL SUBDRAIN
- ..... APPROX. LOCATION OF PROPOSED 8-INCH CANYON SUBDRAIN
- ..... APPROX. LOCATION OF PROPOSED 6-INCH CANYON SUBDRAIN
- ..... APPROX. LOCATION OF EXISTING 8-INCH SUBDRAIN (Geotechnics, 2005)
- 350 ..... APPROX. ELEVATION OF SUBDRAIN (In Feet, MSL)
- ..... PROPOSED FILL GREATER THAN 5 FEET
- ..... PROPOSED BUTTRESS/FILL SLOPES
- ..... SHALLOW DENSE OTAY FORMATION AND EXPANSIVE SOILS

200 0 200 400 600
SCALE 1" = 200'

GRAPHIC SCALE
0' 10' 20' 30' 40' 60' 80'
SCALE 1"=20' (on 36x24)

DMA EXHIBIT MAP - OTAY RANCH VILLAGE 8 EAST

VILLAGE 8 EAST
CHULA VISTA, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

SCALE	1" = 200'	DATE	05 - 04 - 2023
PROJECT NO.	G1006 - 52 - 05	FIGURE	1
SHEET	1 OF 1		

Plotted:05/05/2023 11:17AM | By:ALVIN LADRILLONO | File Location:Y:\PROJECTS\G1006-52-05 (Village 8 East)\SHEETS\G1006-52-05 DMA Exhibit.dwg

Attachment 1e

Pollutant Control BMP Design Worksheets/Calculations

VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 1								
	Imp. RF	Pervious RF	% Imp	AREA (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
BASIN	0.90	0.10	0	2.09	0.1%	0.000	2.091	0.21
PARK	0.90	0.10	20	30.43	4.7%	6.086	24.344	7.91
SCHOOL	0.90	0.10	80	9.96	4.4%	7.972	1.993	7.37
ROAD	0.90	0.10	90	37.75	18.4%	33.974	3.775	30.95
MIXED USE	0.90	0.10	85	47.77	22.1%	40.601	7.165	37.26
SLOPES/LANDSCAPE	0.90	0.30	0	23.43	4.2%	0.000	23.431	7.03
MULTIFAMILY	0.90	0.10	75	109.48	45.5%	82.113	27.371	76.64
COMMUNITY PURPOSE	0.90	0.10	85	1.20	0.6%	1.024	0.181	0.94
	0.90	0.3	85		0.0%	0.000	0.000	0.00
				262.12	100.0%	171.769	90.350	168.31
							Weighted C =	0.64

OTAY RANCH - VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 2								
	Imp. RF	Pervious RF	% Imp	**AREA** (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
BASIN	0.90	0.10	0	0.396	1.1%	0.000	0.396	0.04
PARK	0.90	0.10	20	11.898	86.7%	2.380	9.518	3.09
ROAD	0.90	0.10	90	0.532	12.2%	0.479	0.053	0.44
				12.826	**1.000**	**2.858**	**9.967**	**3.569**
							Weighted C =	**0.28**

OTAY RANCH - VILLAGE 8 EAST

DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 3								
	Imp. RF	Pervious RF	% Imp	**AREA** (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
SLOPES/LANDSCAPE	0.90	0.30	0	0.467	4.9%	0.000	0.467	0.14
ROAD	0.90	0.10	90	3.312	95.1%	2.980	0.331	2.72
				3.778	**1.000**	**2.980**	**0.798**	**2.856**
							Weighted C =	**0.76**

VILLAGE 8 EAST
DMA CALCULATIONS

Otay Ranch Village 8 East Area DMA 4A								
	Imp. RF	Pervious RF	% Imp	AREA (ac.)	Fraction of Total	Imp Area (ac.)	Pervious Area (ac.)	Summation RF x A
SINGLE-FAMILY (SF)	0.90	0.10	75	0.78	82.6%	0.582	0.194	0.54
ROAD	0.90	0.10	90	0.14	17.4%	0.126	0.014	0.11
				0.92	100.0%	0.708	0.208	0.66
							Weighted C =	0.72

Runoff factors & Impervious Areas used for Single Family and Road were obtained from Hale Engineering **SWQMP Otay Ranch Village 8 West.**

DMA DATA - SOUTH BASIN

LAND USE	AREA (AC)	% IMPERVIOUS	IMPERVIOUS AREA (AC)	RUNOFF FACTOR	AREA X RUNOFF FACTOR (AC)	PERVIOUS AREA (AC)	RUNOFF FACTOR	AREA X RUNOFF FACTOR (AC)	EFFECTIVE AREA	% DCV
OFFSITE-RES	16.4	40	6.56	0.90	5.90	9.84	0.10	0.98	6.89	7.09
MULTI-FAMILY (MF)	45.0	85	38.24	0.90	34.42	6.75	0.10	0.67	35.09	36.13
ROADS	26.8	90	24.12	0.90	21.71	2.68	0.10	0.27	22.06	22.71
SINGLE-FAMILY (SF)	30.3	75	22.73	0.90	20.45	7.58	0.10	0.76	2121	21.84
SCHOOL (SC)	10.5	80	8.43	0.90	7.59	2.11	0.10	0.21	7.80	8.03
LANDSCAPE/OPEN SPACE	26.5	0	0.00	0.90	0.00	26.50	0.10	2.65	2.65	2.73
PARK (P)	5.5	20	1.10	0.90	0.99	4.41	0.10	0.44	1.43	1.47
TOTAL	**161.1**		**101.27**		**91.14**	**59.87**		**5.99**	**97.13**	**100.00**

WEIGHTED RUNOFF FACT 97.1/161.1 = 0.60

200 0 200 400 600

SCALE 1" = 200'

HALE ENGINEERING

EXEMPTION EXHIBIT FOR VILLAGE 8 WEST
SOUTH BASIN
OTAY RANCH, VILLAGE 8 WEST
CHULA VISTA TRACT NO. 19-03
CITY OF CHULA VISTA, CALIFORNIA

SHEET 1 OF 1

12/18/19

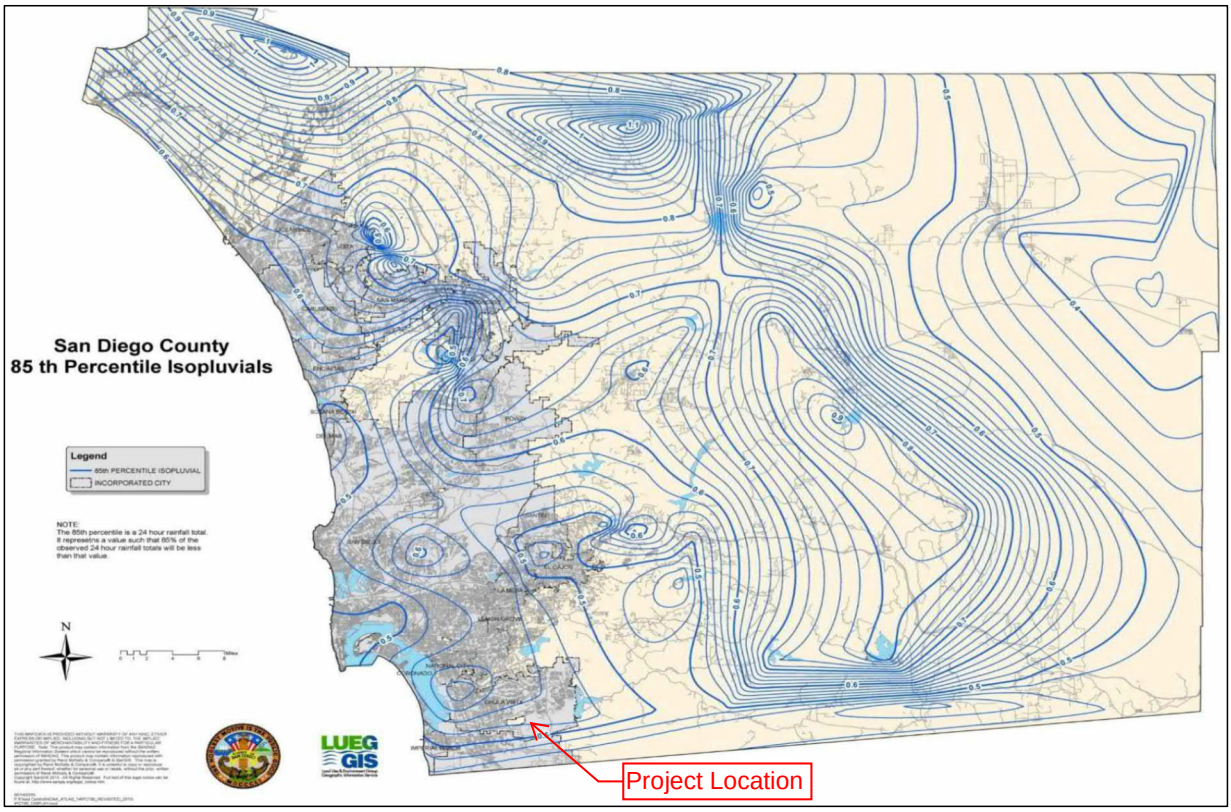


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

VILLAGE 8 EAST
DCV CALCULATION

DMA 1: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	262.12	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.64	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	317,708	cubic-feet
		1.5DCV=	476,562	cubic-feet

DMA 2: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	12.83	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.28	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	6,737	cubic-feet
		1.5DCV=	10,106	cubic-feet

DMA 3: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	3.78	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.76	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	5,390	cubic-feet
DMA 4: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.52	inches
2	Area tributary to BMP (s)	A=	0.92	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.72	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	1,242	cubic-feet

Table B.5-5: Storage required for different drawdown times

Drawdown Time (hours)	Storage requirement (below the overflow elevation, or below outlet elevation that bypass the biofiltration BMP)
12	0.85 DCV
24	1.25 DCV
36	1.50 DCV
48	1.80 DCV
72	2.20 DCV
96	2.60 DCV
120	2.80 DCV

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East	
	BMP ID	BF-3-1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	**11417900**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.64**	
3	85th percentile 24-hour rainfall depth	**0.52**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**317708**	**cu. ft.**
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	**0**	**in/hr.**
6	Factor of safety	**2**	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	**0**	**in/hr.**
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	**3.5**	**%**
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	**0.023**	
10	Target volume retention [Line 9 x Line 4]	**7307**	**cu. ft.**

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East
	BMP ID	BF-3-1

Volume Retention for No Infiltration Condition — Worksheet B.5-6

1	Area draining to the biofiltration BMP	11417900	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.64	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	7331719	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	219952	sq. ft.
5	Biofiltration BMP Footprint	1776	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	1776	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	0.01	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	7307	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	7234.206742	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Implement Additional Site Design BMPs		

The volume retention credits will be provided in Village 8 East Final Engineering SWQMP via other means of retention credits and San Diego BMPs such as dispersion areas SD-B & SD-F, these will incorporated in the FE SWQMP.
BMP footprint was obtained by 20 MWS units 8'x'24'.

wetland perimeter=88.80 square feet, 88.80 sf x 20 units = 1,776 square feet.

- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East
	BMP ID	BF-3-1(DMA1)

Alternative Minimum Footprint Sizing Factor for	Worksheet B.5-4

1	Area draining to the BMP	11417900.00	sq. ft.
2	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.64	
3	Load to Clog (default value when using Appendix E fact sheets is 2.0)	3	lb/sq. ft.
4	Allowable Period to Accumulate Clogging Load (T_L) (default value is 10)	0.5	years

Volume Weighted EMC Calculation

Land Use	Fraction of Total DCV	TSS EMC (mg/L)	Product
Single Family Residential		123	0
Commercial		128	0
Industrial		125	0
Education (Municipal)	0.044	132	5.808
Transportation	0.184	78	14.352
Multi-family Residential	0.682269716	40	27.29078865
Roof Runoff		14	0
Low Traffic Areas		50	0
Open Space	0.088769447	216	19.17420045
Other, specify:			0
Other, specify:			0
Other, specify:			0

5	Volume Weighted EMC (sum of all products)	66.6249891	mg/L

Sizing Factor for Clogging

6	Adjustment for pretreatment measures Where: Line 6 = 0 if no pretreatment; Line 6 = 0.25 when pretreatment is included; Line 6 = 0.5 if the pretreatment has an active Washington State TAPE approval rating for "pre-treatment."	0	
7	Average Annual Precipitation [Provide documentation of the data source in the discussion box; SanGIS has a GIS layer for average annual precipitation]	12	inches
8	Calculate the Average Annual Runoff (Line 7/12) x Line 1 x Line2	7331719	cu-ft/yr
9	Calculate the Average Annual TSS Load (Line 8 x 62.4 x Line 5 x (1 – Line 6))/10^6	30481	lb/yr
10	Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3	5080	sq. ft.
11	Calculate the Minimum Footprint Sizing Factor for Clogging [Line 10/ (Line 1 x Line 2)]	0.000693	

Discussion:

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East
	BMP ID	BF-3-1 (DMA 1)

Optimized Biofiltration BMP Footprint when Downstream of a Storage Unit			Worksheet B.5-5	
1	Area draining to the storage unit and biofiltration BMP		11417900.00	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.64	
3	Effective impervious area draining to the storage unit and biofiltration BMP [Line 1 x Line 2]		7331718.599	sq. ft.
4	Remaining DCV after implementing retention BMPs		317,708	cu. ft.
5	Design infiltration rate (measured infiltration rate / 2)		0	ft./hr.
6	Media thickness [1.5 feet minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations		1.666666667	ft.
7	Media filtration rate to be used for sizing (0.42 ft/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate)		8.333333	ft./hr.
8	Media retained pore space		0.05	in/in
Storage Unit Requirement				
9	Drawdown time of the storage unit, minimum(from the elevation that bypasses the biofiltration BMP, overflow elevation)		36	hours
10	Storage required to achieve greater than 92 percent capture (see Table B.5-5)		1.5	fraction
11	Storage required in cubic feet (Line 4 x Line 10)		476561.709	cu. ft.
12	Storage provided in the design, minimum(from the elevation that bypasses the biofiltration BMP, overflow elevation)		476580	cu. ft.
13	Is Line 12 ≥ Line 11?	Storage Requirement is Met		
Criteria 1: BMP Footprint Biofiltration Capacity				
14	Peak flow from the storage unit to the biofiltration BMP (using the elevation used to evaluate the percent capture)		14.602	cfs
15	Required biofiltration footprint [(3,600 x Line 14)/Line 7]		6308	sq. ft.
Criteria 2: Alternative Minimum Sizing Factor (Clogging)				
16	Alternative Minimum Footprint Sizing Factor [Line 11 of Worksheet B.5-4]		0.000693	fraction
17	Required biofiltration footprint [Line 3 x Line 16]		5081	sq. ft.
Criteria 3: Retention requirement [Not applicable for No Infiltration Condition]				
18	Retention Target (Line 10 in Worksheet B.5-2)			cu. ft.
19	Average discharge rate from the storage unit to the biofiltration BMP			cfs
20	Depth retained in the optimized biofiltration BMP {Line 6 x Line 8} + {[(Line 4)/(2400 x Line 19)] x Line 5}		0	ft
21	Required optimized biofiltration footprint (Line 18/Line 20)		0	sq. ft.
Optimized Biofiltration Footprint				
22	Optimized biofiltration footprint, maximum(Line 15, Line 17, Line 21)		6308	sq. ft.

BMP Bio-filtration footprint required (per calculation above) = 6308 square feet
BMP Bio-filtration footprint provided (per MWS details in SWQMP report) = 6393.6 square feet

1 MWS Unit Wetland Media Surface Area = 319.68 sf ft. x 20 MWS units = 6393.6 square feet.
***See Page 96 in this PDF for more information.**

- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'

Modular Wetland System Flow Calculations

Date: May 16th, 2023

Project: Village 8 East (PN 733072)

To Whom It May Concern,

The MWS Linear will be sized in accordance with its TAPE GULD approval. The system is approved at a loading rate of up to 1.0 gpm/sq ft for the Wetlandmedia and 2.1 gpm/sq ft for the pre-treatment media. Volume-based MWS implement a Wetlandmedia loading rate safety factor of 2 to 4 due to the large amount of water treated over longer duration, which helps longevity of active media.

Modular Wetland Systems for this project will be designed with flow control risers containing orifices to achieve the required drain-down durations of the upstream detention systems containing the water quality volumes/design capture volumes (DCV).

The required treatment volume of 476,562 CF will be dispersed into 20 identical MWS-Linear-8-24-V. The design capture volume per MWS will be equal to 23,829 CF.

If you have any questions, please feel free to contact us at your convenience.

Sincerely,

Ben Boegeman

Ben Boegeman
Stormwater Design Engineer

BMP 1:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

9100 Centre Pointe Drive
West Chester, OH 45069
Ph: 800.338.1122
www.conteches.com

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 2:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 3:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 4:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 5:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 6:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 7:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 8:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 9:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 10:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 11:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 12:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 13:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 14:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 15:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 16:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 17:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 18:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 19:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

BMP 20:

Design Capture Volume = 23,829 cf; $t_{drain\text{-}down}$ = 36 hours

MWS-L-8-24-V-HC:

- MWS-Linear-8-24-V set Treatment Capacity = 0.185 cfs or 83.12 gpm @ 3.6 ft Operating HGL
  - Operating HGL determined by top of upstream weir notch
- WetlandMedia Surface Area = Wetland Perimeter x operating HGL = 319.68 sq ft
  - MWS-L-8-24 wetland perimeter = 88.80'
- WetlandMedia Loading Rate = 83.12 gpm / 319.68 sq ft = 0.26 gpm/sq ft
  - Wetland Media safety factor ≥ 2

Orifice Sizing

- Treatment flow = 83.12 gpm or 0.185 cfs
- Operating head = 3.6'
- System of equations:

$$Given\ that: Q = VA;\ \ Q = treatment\ flow\ rate, V = c_d\sqrt{2gh}\,, A = \frac{\pi D^2}{4}$$

$$c_d\ is\ the\ discharge\ coefficent\ \&\ h\ is\ the\ treatment\ HGL$$

$$Rewrite\ to\ solve\ for\ the\ diameter\ of\ the\ orifice.$$

$$\left[A = \frac{Q}{V}\right] \xrightarrow[rewrite]{} \frac{\pi D^2}{4} = \frac{Q}{c_d\sqrt{2gh}}$$

$$D = \sqrt{\frac{4Q}{\pi c_d\sqrt{2gh}}};\ c_d = c_v c_c = (0.98)(0.62) = 0.6076$$

$$D = \sqrt{\frac{4 * (0.185)}{\pi(2 * 0.6076)\sqrt{2(32.17)(3.6)}}} = 0.1129' = \boxed{1.35"}$$

The diameter of the flow control orifice must be 1.35" in order to produce a head of 3.6' to treat 23,829 cf in 36 hours.

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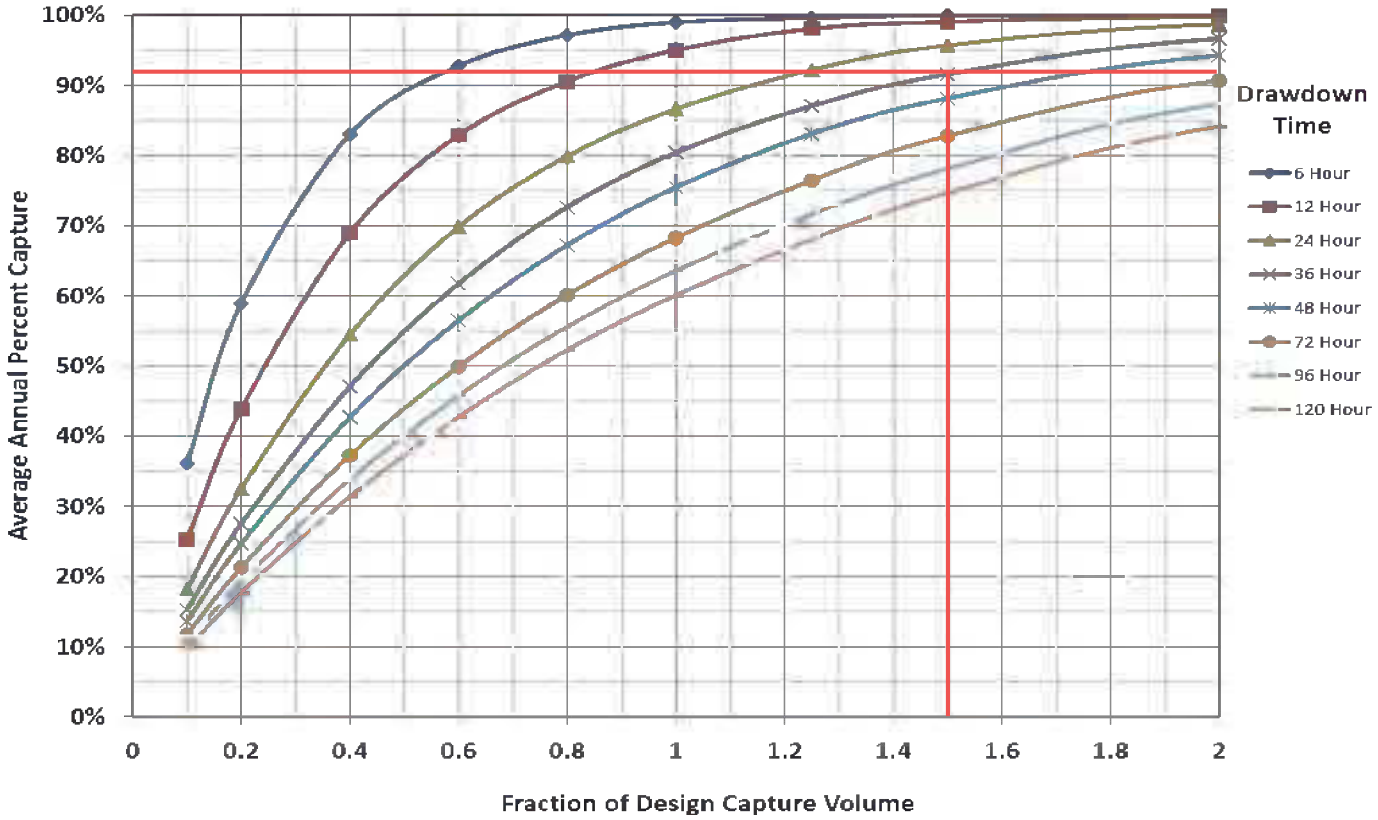


Figure B.4-1: Percent Capture Nomograph

The BMP achieves 92% Average Annual Percent Capture of 1.5DCV @ 36hrs of Drawdown time.

Village 8 East					
Basin #1					
Input DCV			317,708		
Input Factor			1.5		
WQ Ponding Depth			4.96	ft	
Note: Find out the elevation value in relation to required WQ volume					
Basin #1 Stage Storage					
depth	area	area (ac)	elevation	volume (cf)	volume (acft)
0.0	90000	0.0000	229.5	0	0.00
0.1	90250	2.0718	229.6	9,012	0.21
0.2	90499	2.0776	229.7	18,050	0.41
0.3	90749	2.0833	229.8	27,112	0.62
0.4	90998	2.0890	229.9	36,200	0.83
0.5	91248	2.0948	230.0	45,312	1.04
0.6	91498	2.1005	230.1	54,449	1.25
0.7	91747	2.1062	230.2	63,612	1.46
0.8	91997	2.1120	230.3	72,799	1.67
0.9	92246	2.1177	230.4	82,011	1.88
1.0	92496	2.1234	230.5	91,248	2.09
1.1	92746	2.1291	230.6	100,510	2.31
1.2	92995	2.1349	230.7	109,797	2.52
1.3	93245	2.1406	230.8	119,109	2.73
1.4	93494	2.1463	230.9	128,446	2.95
1.5	93744	2.1521	231.0	137,808	3.16
1.6	93994	2.1578	231.1	147,195	3.38
1.7	94243	2.1635	231.2	156,607	3.60
1.8	94493	2.1693	231.3	166,044	3.81
1.9	94742	2.1750	231.4	175,505	4.03
2.0	94992	2.1807	231.5	184,992	4.25
2.1	95242	2.1864	231.6	194,504	4.47
2.2	95491	2.1922	231.7	204,040	4.68
2.3	95741	2.1979	231.8	213,602	4.90
2.4	95990	2.2036	231.9	223,188	5.12
2.5	96240	2.2094	232.0	232,800	5.34
2.6	96490	2.2151	232.1	242,436	5.57
2.7	96739	2.2208	232.2	252,098	5.79
2.8	96989	2.2266	232.3	261,784	6.01
2.9	97238	2.2323	232.4	271,496	6.23
3.0	97488	2.2380	232.5	281,232	6.46
3.1	97738	2.2437	232.6	290,993	6.68
3.2	97987	2.2495	232.7	300,780	6.90
3.3	98237	2.2552	232.8	310,591	7.13
3.4	98486	2.2609	232.9	320,427	7.36
3.5	98736	2.2667	233.0	330,288	7.58
3.6	98986	2.2724	233.1	340,174	7.81

3.7	99235	2.2781	233.2	350,085	8.04
3.8	99485	2.2839	233.3	360,021	8.26
3.9	99734	2.2896	233.4	369,982	8.49
4.0	99984	2.2953	233.5	379,968	8.72
4.1	100234	2.3010	233.6	389,979	8.95
4.2	100483	2.3068	233.7	400,015	9.18
4.3	100733	2.3125	233.8	410,076	9.41
4.4	100982	2.3182	233.9	420,161	9.65
4.5	101232	2.3240	234.0	430,272	9.88
4.6	101482	2.3297	234.1	440,408	10.11
4.7	101731	2.3354	234.2	450,568	10.34
4.8	101981	2.3412	234.3	460,754	10.58
4.9	102230	2.3469	234.4	470,964	10.81
4.96	102380	2.3503	234.5	477,103	10.95
5.0	102480	2.3526	234.5	481,200	11.05
5.1	102730	2.3583	234.6	491,460	11.28
5.2	102979	2.3641	234.7	501,746	11.52
5.3	103229	2.3698	234.8	512,056	11.76
5.4	103478	2.3755	234.9	522,392	11.99
5.5	103728	2.3813	235.0	532,752	12.23
5.6	103978	2.3870	235.1	543,137	12.47
5.7	104227	2.3927	235.2	553,548	12.71
5.8	104477	2.3985	235.3	563,983	12.95
5.9	104726	2.4042	235.4	574,443	13.19
6.0	104976	2.4099	235.5	584,928	13.43

1.5 DCV = 476,561 cfs

Basin 1 Discharge Riser

Discharge vs Elevation Table

Low orifice:	6.00 "	Top orifice:	4 "
Number:	7	Number:	0
Cg-low:	0.61	Cg-low:	0.61
invert elev:	0.00 ft	invert elev:	3.95 ft
Middle orifice:	1 "	Emergency inlet:	
number of orif:	0	Rim height:	4.96 ft
Cg-middle:	0.61	Riser Box D	4X3 ft
invert elev:	2.90 ft	Weir Length	10.00 ft

h	H/D-low	H/D-mid	H/D-top	Qlow-orif	Qlow-weir	Qtot-low	Qmid-orif	Qmid-weir	Qtot-med	Qtop-orif	Qtop-weir	Qtot-top	Qpeak-top	Qtot
(ft)	-	-	-	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
0.0	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000
0.1	0.20	0.00	0.00	0.000	0.164	0.164	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.1643
0.2	0.40	0.00	0.00	0.000	0.624	0.624	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.6238
0.3	0.60	0.00	0.00	1.504	1.327	1.327	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.3268
0.4	0.80	0.00	0.00	2.606	2.212	2.212	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.2124
0.5	1.00	0.00	0.00	3.364	3.214	3.214	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.2141
0.6	1.20	0.00	0.00	3.980	4.264	3.980	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.9805
0.7	1.40	0.00	0.00	4.513	5.296	4.513	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.5134
0.8	1.60	0.00	0.00	4.990	6.250	4.990	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.9898
0.9	1.80	0.00	0.00	5.424	7.077	5.424	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.4245
1.0	2.00	0.00	0.00	5.827	7.739	5.827	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.8268
1.1	2.20	0.00	0.00	6.203	8.217	6.203	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.2031
1.2	2.40	0.00	0.00	6.558	8.514	6.558	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.5579
1.3	2.60	0.00	0.00	6.894	8.657	6.894	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.8944
1.4	2.80	0.00	0.00	7.215	8.701	7.215	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.2152
1.5	3.00	0.00	0.00	7.522	8.735	7.522	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.5224
1.6	3.20	0.00	0.00	7.817	8.883	7.817	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.8175
1.7	3.40	0.00	0.00	8.102	9.312	8.102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.1019
1.8	3.60	0.00	0.00	8.377	10.229	8.377	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.3766
1.9	3.80	0.00	0.00	8.643	11.892	8.643	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.6426
2.0	4.00	0.00	0.00	8.901	14.610	8.901	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.9006
2.1	4.20	0.00	0.00	9.151	18.746	9.151	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.1514
2.2	4.40	0.00	0.00	9.395	24.723	9.395	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.3955
2.3	4.60	0.00	0.00	9.633	33.029	9.633	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.6334
2.4	4.80	0.00	0.00	9.866	44.215	9.866	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.8655
2.5	5.00	0.00	0.00	10.092	58.907	10.092	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.0923
2.6	5.20	0.00	0.00	10.314	77.801	10.314	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.3142
2.7	5.40	0.00	0.00	10.531	101.675	10.531	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.5313
2.8	5.60	0.00	0.00	10.744	131.387	10.744	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.7441
2.9	5.80	0.00	0.00	10.953	167.881	10.953	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.9528
3.0	6.00	1.20	0.00	11.158	212.192	11.158	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.1575
3.1	6.20	2.40	0.00	11.359	265.448	11.359	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.3586
3.2	6.40	3.60	0.00	11.556	328.872	11.556	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.5561
3.3	6.60	4.80	0.00	11.750	403.792	11.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.7503
3.4	6.80	6.00	0.00	11.941	491.637	11.941	0.000	0.000	0.000	0.000	0.000	0.000	0.000	11.9414
3.5	7.00	7.20	0.00	12.129	593.948	12.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.1295
3.6	7.20	8.40	0.00	12.315	712.377	12.315	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.3147
3.7	7.40	9.60	0.00	12.497	848.692	12.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.4971
3.8	7.60	10.80	0.00	12.677	1004.781	12.677	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.6770
3.9	7.80	12.00	0.00	12.854	1182.657	12.854	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.8543
4.0	8.00	13.20	0.15	13.029	1384.460	13.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.0292
4.1	8.20	14.40	0.45	13.202	1612.462	13.202	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.2017
4.2	8.40	15.60	0.75	13.372	1869.069	13.372	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3721
4.3	8.60	16.80	1.05	13.540	2156.828	13.540	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.5403
4.4	8.80	18.00	1.35	13.706	2478.428	13.706	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.7064
4.5	9.00	19.20	1.65	13.871	2836.705	13.871	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.8706
4.6	9.20	20.40	1.95	14.033	3234.645	14.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.0328
4.7	9.40	21.60	2.25	14.193	3675.388	14.193	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.1932
4.8	9.60	22.80	2.55	14.352	4162.234	14.352	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.3518
4.9	9.80	24.00	2.85	14.509	4698.644	14.509	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.5087
4.96	9.92	24.72	3.03	14.602	5045.782	14.602	0.000	0.000	0.000	0.000	0.000	0.000	0.000	14.6020
5.0	10.00	25.20	3.15	14.664	5288.244	14.664	0.000	0.000	0.000	0.000	0.000	0.000	0.266	14.9302
5.1	10.20	26.40	3.45	14.817	5934.830	14.817	0.000	0.000	0.000	0.000	0.000	0.000	1.744	16.5617
5.2	10.40	27.60	3.75	14.969	6642.372	14.969	0.000	0.000	0.000	0.000	0.000	0.000	3.915	18.8846
5.3	10.60	28.80	4.05	15.120	7415.016	15.120	0.000	0.000	0.000	0.000	0.000	0.000	6.602	21.7216
5.4	10.80	30.00	4.35	15.269	8257.091	15.269	0.000	0.000	0.000	0.000	0.000	0.000	9.719	24.9878
5.5	11.00	31.20	4.65	15.416	9173.108	15.416	0.000	0.000	0.000	0.000	0.000	0.000	13.214	28.6303
5.6	11.20	32.40	4.95	15.562	10167.770	15.562	0.000	0.000	0.000	0.000	0.000	0.000	17.050	32.6120
5.7	11.40	33.60	5.25	15.707	11245.969	15.707	0.000	0.000	0.000	0.000	0.000	0.000	21.198	36.9051
5.8	11.60	34.80	5.55	15.851	12412.795	15.851	0.000	0.000	0.000	0.000	0.000	0.000	25.637	41.4874
5.9	11.80	36.00	5.85	15.993	13673.538	15.993	0.000	0.000	0.000	0.000	0.000	0.000	30.348	46.3412
6.0	12.00	37.20	6.15	16.134	15033.692	16.134	0.000	0.000	0.000	0.000	0.000	0.000	35.318	51.4516

WQ Drawdown @				36
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.00	0.16	9012.48	15.24	36
0.10	0.62	9037.44	4.02	21
0.20	1.33	9062.40	1.90	17
0.30	2.21	9087.36	1.14	15
0.40	3.21	9112.32	0.79	14
0.50	3.98	9137.28	0.64	13
0.60	4.51	9062.40	0.56	13
0.70	4.99	9187.20	0.51	12
0.80	5.42	9212.16	0.47	11
0.90	5.83	9062.40	0.43	11
1.00	6.20	9262.08	0.41	11
1.10	6.56	9287.04	0.39	10
1.20	6.89	9137.28	0.37	10
1.30	7.22	9336.96	0.36	9
1.40	7.52	9361.92	0.35	9
1.50	7.82	9386.88	0.33	9
1.60	8.10	9411.84	0.32	8
1.70	8.38	9436.80	0.31	8
1.80	8.64	9461.76	0.30	8
1.90	8.90	9486.72	0.30	7
2.00	9.15	9062.40	0.28	7
2.10	9.40	9511.68	0.28	7
2.20	9.63	9561.60	0.28	7
2.30	9.87	9586.56	0.27	6
2.40	10.09	19198.08	0.53	6
2.50	10.31	9287.04	0.25	6
2.60	10.53	9661.44	0.25	5
2.70	10.74	9336.96	0.24	5
2.80	10.95	9711.36	0.25	5
2.90	11.16	9736.32	0.24	5
3.00	11.36	9761.28	0.24	4
3.10	11.56	9786.24	0.24	4
3.20	11.75	9811.20	0.23	4
3.30	11.94	9836.16	0.23	4
3.40	12.13	9861.12	0.23	3
3.50	12.31	9886.08	0.22	3
3.60	12.50	9911.04	0.22	3
3.70	12.68	9936.00	0.22	3
3.80	12.85	9960.96	0.22	2
3.90	13.03	9985.92	0.21	2
4.00	13.20	10010.88	0.21	2
4.10	13.37	10035.84	0.21	2
4.20	13.54	10060.80	0.21	2
4.30	13.71	10085.76	0.20	1
4.40	13.87	10110.72	0.20	1
4.50	14.03	10135.68	0.20	1
4.60	14.19	10160.64	0.20	1
4.70	14.35	10185.60	0.20	1
4.80	14.51	10210.56	0.20	0
4.90	14.60	5114.64	0.10	0
4.96	14.93	5120.88	0.10	0

At Elevation 4.96, WQ Flow to draw down within the 36 hour period as portrayed in this sheet.

CITY OF CHULA VISTA		Project Name	Otay Ranch Village 8 East
		BMP ID	BF-2-2 Basin 2 (Biofiltration)

Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1	
1	Area draining to the BMP	**558682**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.28**	
3	85th percentile 24-hour rainfall depth	**0.52**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**6737**	**cu. ft.**
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	**6**	**inches**
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	**18**	**inches**
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	**15**	**inches**
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	**0**	**inches**
9	Freely drained pore storage of the media	**0.2**	**in/in**
10	Porosity of aggregate storage	**0.4**	**in/in**
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	**5**	**in/hr.**
Baseline Calculations			
12	Allowable routing time for sizing	**6**	**hours**
13	Depth filtered during storm [Line 11 x Line 12]	**30**	**inches**
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	**15.6**	**inches**
15	Total Depth Treated [Line 13 + Line 14]	**45.6**	**inches**
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	**10106**	**cu. ft.**
17	Required Footprint [Line 16/ Line 15] x 12	**2659**	**sq. ft.**
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	**5053**	**cu. ft.**
19	Required Footprint [Line 18/ Line 14] x 12	**3887**	**sq. ft.**
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	**0.03**	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	**4664**	**sq. ft.**
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	**4664**	**sq. ft.**
23	Provided BMP Footprint	**6000**	**sq. ft.**
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

Worksheet B.5-1: Sizing Method for Pollutant Removal Criteria

Sizing Method for Pollutant Removal Criteria		Worksheet B.5-1	
1	Area draining to the BMP	7,056,720	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.60	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	193,908	cu. ft.
BMP Parameter			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert(12 inches typical) – use 0 inches if the aggregate is not over the entire bottom	24	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area		inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet-controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	25.2	inches
15	Total Depth Treated [Line 13 + Line 14]	55.2	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	290,862	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	63,231	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	145,431	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	69,253	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	.012	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	50,769	sq. ft.
22	Footprint of the BMP = Maximum (Minimum (Line 17, Line 19), Line 21)	63,231	sq. ft.
23	Provided BMP Footprint	63,743	sq. ft.
24	Is Line 23 = Line 22? If Yes, then footprint criterion is met. If No, increase the footprint of the BMP.	YES	

Provided BMP Footprint for South Basin in Village 8 West Tract No. 19-03 per SWQMP Report is 63,743 sf which is more than minimum that needs to be provided by an amount portrayed above of 12,974 sf.

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 West	
	BMP ID	South Basin on Village 8 West SWQMP	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	**55567**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.60**	
3	85th percentile 24-hour rainfall depth	**0.55**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**1528**	**cu. ft.**
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	**12**	**inches**
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	**18**	**inches**
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	**24**	**inches**
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	**0**	**inches**
9	Freely drained pore storage of the media	**0.2**	**in/in**
10	Porosity of aggregate storage	**0.4**	**in/in**
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	**5**	**in/hr.**
Baseline Calculations			
12	Allowable routing time for sizing	**6**	**hours**
13	Depth filtered during storm [Line 11 x Line 12]	**30**	**inches**
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	**25.2**	**inches**
15	Total Depth Treated [Line 13 + Line 14]	**55.2**	**inches**
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	**2292**	**cu. ft.**
17	Required Footprint [Line 16/ Line 15] x 12	**498**	**sq. ft.**
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	**1146**	**cu. ft.**
19	Required Footprint [Line 18/ Line 14] x 12	**546**	**sq. ft.**
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	**0.12**	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	**4001**	**sq. ft.**
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	**4001**	**sq. ft.**
23	Provided BMP Footprint	**12,974**	**sq. ft.**
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

As shown on the previous sheet the excess BMP Footprint for South Basin in Village 8 West Tract No. 19-03 per SWQMP Report equates to 12,974 sf.
This calculation is to reaffirm that the DCV of the proposed Park 2A in Village 8 East can be captured in the aforementioned basin. As shown on this worksheet the minimum BMP footprint that is required is far less (12,974 sf - 4001 sf) than the provided additional square footage in the basin.

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East	
	BMP ID	BF-3-3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	**164590**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.76**	
3	85th percentile 24-hour rainfall depth	**0.52**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**5390**	**cu. ft.**
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix G or enter 0.05	**0**	**in/hr.**
6	Factor of safety	**2**	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	**0**	**in/hr.**
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	**3.5**	**%**
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	**0.023**	
10	Target volume retention [Line 9 x Line 4]	**124**	**cu. ft.**

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East
	BMP ID	BF-3-3

Volume Retention for No Infiltration Condition — Worksheet B.5-6

1	Area draining to the biofiltration BMP	164590	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.76	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	124388	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	3732	sq. ft.
5	Biofiltration BMP Footprint	224	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	224	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	0.06	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	124	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	116.5345212	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Implement Additional Site Design BMPs		

2 Filterra units x 112 sf = 224 square footage BMP Footprint

Available Filterra Box Sizes			Filterra Flow Rate, Q (ft3/sec)	100% Imperv. DA (acres)	Commercial max DA (acres)	Residential max DA (acres)
L (ft)	W (ft)	Filterra Surface Area (ft2)				
14	8	112	0.4537	1.579	1.765	3.000

The volume retention credits will be provided in Village 8 East Final Engineering SWQMP via other means of retention credits and San Diego BMPs such as dispersion areas SD-B & SD-F, these will incorporated in the FE SWQMP.

Flow-Based Proprietary Biofiltration Sizing

OTAY RANCH VILLAGE 8 EAST		
Description	Units	Filterra
Drainage Basin ID or Name	unitless	DMA 3
Location	N/A	-
Total Tributary Area	ac	3.778
Total Tributary Area	sq ft	164590
Final Adjusted Runoff Factor	unitless	0.76
85th Percentile Design Rainfall Depth	inches	0.52
Design Capture Volume	cubic-feet	5,390
85th Percentile Design Rainfall Intensity	in/hr	0.2
WQ Flow Rate	CFS	0.571
Flow Rate Safety Factor	unitless	1.5
Design Flow Rate	CFS	0.857
Final Design Flow Rate	CFS	0.857
2-Filterra 14'x8' (112ft^2) Units	unitless	UNIT ID
Filterra Treatment Flow Rate (each)	CFS	0.454
Number of Units	#	2
Filterra Treatment Flow Rate (Total)	CFS	0.907
Is The BMP Adequately Sized?	unitless	Yes

Filterra Sizing Spreadsheet
San Diego Region
Uniform Intensity Approach
Storm Intensity = 0.20 in/hr

Filterra Infiltration Rate = 175 (in/hr)
Filterra Flow per Square Foot = 0.00405 (ft3/sec/ft2)

Filterra Flow Rate, Q = 0.00405 ft3/sec x Filterra Surface Area
Rational Method, Q = C x I x A
San Diego Multiplier, M = 1.5

Site Flowrate, Q = (C x DI x DA x M x 43560) / (12 x3600)
OR DA = (12 x 3600 x Q) / (C x 43560 x DI x M)

where
Q = Flow (ft3/sec)
DA = Drainage Area (acres)
DI = Design Intensity (in/hr)
C = Runoff coefficient (dimensionless)
M = Multiplier (dimensionless)

			DI 0.2	C 0.95	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra Flow Rate, Q	100% Imperv. DA	Commercial max DA	Residential max DA
L (ft)	W (ft)	Filterra Surface Area (ft2)	(ft3/sec)	(acres)	(acres)	(acres)
4	4	16	0.0648	0.226	0.252	0.429
6	4	24	0.0972	0.338	0.378	0.643
6.5	4	26	0.1053	0.367	0.410	0.696
8	4	32	0.1296	0.451	0.504	0.857
12	4	48	0.1944	0.677	0.756	1.286
6	6	36	0.1458	0.507	0.567	0.964
8	6	48	0.1944	0.677	0.756	1.286
10	6	60	0.2431	0.846	0.945	1.607
12	6	72	0.2917	1.015	1.134	1.928
13	7	91	0.3686	1.283	1.434	2.437
12	8	96	0.3889	1.353	1.512	2.571
14	8	112	0.4537	1.579	1.765	3.000
16	8	128	0.5185	1.804	2.017	3.428
18	8	144	0.5833	2.030	2.269	3.857
20	8	160	0.6481	2.255	2.521	4.285
22	8	176	0.7130	2.481	2.773	4.714

Each Filterra unit can treat 0.4537 cfs.
2 Units x 0.4537 cfs = 0.907 cfs

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East	
	BMP ID	BF-3-4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	**39901**	**sq. ft.**
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	**0.72**	
3	85th percentile 24-hour rainfall depth	**0.52**	**inches**
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	**1242**	**cu. ft.**
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix G or enter 0.05	**0**	**in/hr.**
6	Factor of safety	**2**	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	**0**	**in/hr.**
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	**3.5**	**%**
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	**0.023**	
10	Target volume retention [Line 9 x Line 4]	**29**	**cu. ft.**

CITY OF CHULA VISTA	Project Name	Otay Ranch Village 8 East
	BMP ID	BF-3-4

Volume Retention for No Infiltration Condition — Worksheet B.5-6

1	Area draining to the biofiltration BMP	39901	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.72	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	28662	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	860	sq. ft.
5	Biofiltration BMP Footprint		sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	0	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	0	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	29	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	28.5669384	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Implement Additional Site Design BMPs		

The volume retention credits will be provided in Village 8 East Final Engineering SWQMP via other means of retention credits and San Diego BMPs such as dispersion areas SD-B & SD-F, these will incorporated in the FE SWQMP.

PROPRIETARY BIOFILTRATION FLOW-THRU SIZING CALCULATION

DMA 4A: Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	1,242	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	1.5 DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	1,242	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.92	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.72	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.132	cfs
10	Treamtent Flow Rate = 1.5 X Q	Q=	0.197	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and dlow based)e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or
3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

DMA 4B: Flow-thru Design Flows		Worksheet B.6-1		
1	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	1.12	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.9	unitless
10	Treamtent Flow Rate = 1.5 X Q	Q=	0.3024	cfs

Land use factor = 0.65
Q=0.65x0.3024=0.197 cfs

DMA 4A is portion of Village 8 West. This area drains towards the proposed browditch west of Village 8 East . This area is not disturbed by Village 8 east project. However, water quality for this area was not addressed in Hale SWQMP for Village 8 West. In order to address water quality requirements for this area, water quality equivalency calculation has been provided to treat a portion of the existing road " Magdalena Avenue" that drains to the Otay River instead of the portion of Village 8 West that can not be treated in our basin.

DMA 4A Area not being treated with Village 8 West Basin (Refer to SWQMP for Village 8 West Prepared by Hale) is 0.92 ac
Land Use of this area is single family and transportation.
The runoff factor of this area is 0.72, Required flow to be treated is =1.5x0.2x0.92x0.72 = 0.197 cfs

DMA 4B is portion of exiting Magdalena Avenue street that is not treated or disturbed, this area will be treated instead of DMA4-A. A proposed proprietary biofiltration BMP (MWS or equivalent) is proposed by the existing inlet to treat the required flow.
DMA4 B area is 1.12 ac, Runoff factor is 0.9.
Land use of this area is transportation.
Land use factor was determined to be 0.65.
Flow generated from the equivalent area= 0.2x1.5x0.9x0.65x1.12= 0.197 cfs.
The porposed MWS capacity =0.23 cfs

Automated Spreadsheet Calculation for Worksheet A.5: Land Use Factor Determination (Version 1.0)

Land Use Designation	ACP Tributary Characteristics		Reference Tributary Characteristics [2]		Relative Pollutant Concentrations by Land Use [3]						
	Area (Acres)	Runoff Factor [1]	Area (Acres)	Runoff Factor [1]	TSS	TP	TN	TCu	TPb	TZn	FC
Agriculture		0.10		0.10	0.45	1.00	1.00	1.00	1.00	0.59	1.00
Commercial		0.80		0.80	0.13	0.16	0.16	0.56	0.48	1.00	0.87
Education		0.50		0.50	0.13	0.20	0.11	0.14	0.25	0.39	0.13
Industrial		0.90		0.90	0.13	0.19	0.15	0.54	0.68	0.89	0.49
Multi Family Residential		0.60		0.60	0.10	0.13	0.13	0.14	0.15	0.29	0.27
Orchard		0.10		0.10	0.18	0.17	0.67	1.00	1.00	0.59	0.11
Rural Residential		0.30		0.30	1.00	0.51	0.14	0.10	0.71	0.13	0.19
Single Family Residential	0.78	0.40		0.40	0.13	0.20	0.15	0.27	0.43	0.35	0.63
Transportation	0.14	0.90	1.12	0.90	0.11	0.26	0.12	0.53	0.31	0.62	0.12
Vacant / Open Space		0.10		0.10	0.16	0.10	0.10	0.12	0.10	0.10	0.10
Water		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.92	-	1.12	-	-	-	-	-	-	-	-
Relative Pollutant Concentration for ACP Tributary [4]					0.12	0.22	0.14	0.34	0.40	0.43	0.48
Relative Pollutant Concentration for Reference Tributary [4]					0.11	0.26	0.12	0.53	0.31	0.62	0.12
Watershed Management Area					San Diego Bay						
Hydrologic Unit					Otay (910.00)						
Land Use Factor [5]					1.13	-	1.18	0.65	-	-	4.03

Notes:

* Applicants must provide user input for yellow shaded cells. Values for all other cells will be automatically generated.

1. Revisions to default runoff factors must be supported to the satisfaction of the applicable Copermittee.
2. Applicant-Implemented ACPs must identify reference tributary characteristics that are representative of their specific PDP. Independent ACPs must reference Table 2-3 for appropriate area and runoff factor information applicable to their watershed management area.
3. Relative Pollutant Concentrations by Land Use have been identified through examination of available EMC data. Additional information on how these relative concentrations were developed is provided in Appendix B.

Example: An ACP Tributary with 5.25 acres of Commercial, 1.63 Acres of Education, and 2.65 acres of Transportation land uses produces a relative pollutant concentration 0.12 for Total Suspended Solids (assumes default runoff factors are applied).

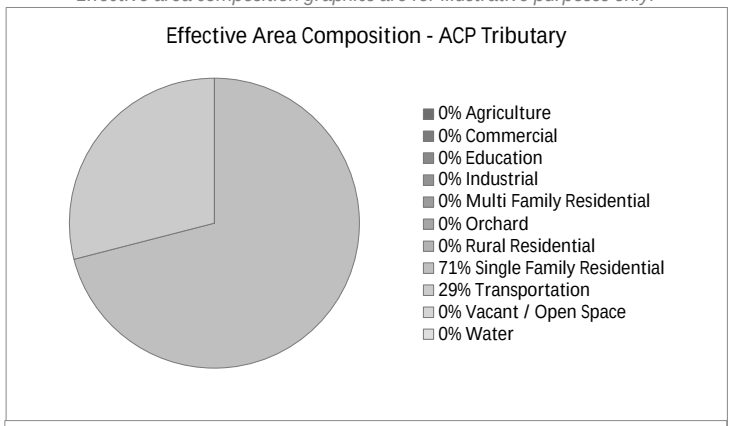
Equation 2-2:

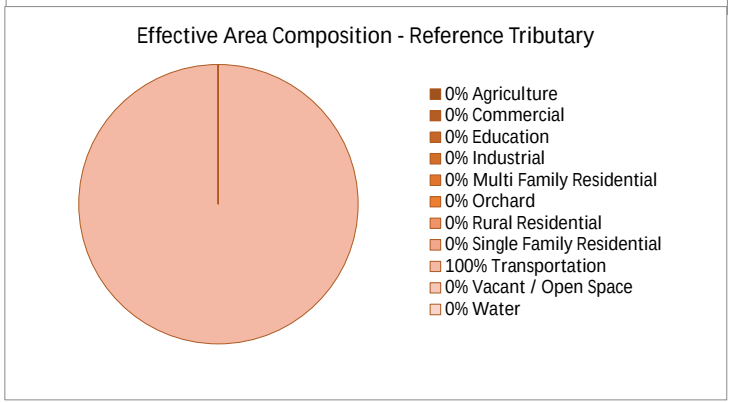
$$P_1 = \frac{\sum P_{1a}A_aC_a + P_{1b}A_bC_b + \ldots\ldots P_{1k}A_kC_k}{\sum A_aC_a + A_bC_b + \ldots\ldots A_kC_k}$$

Equation 2-2 Applied to Example:

$$P_{TSS} = \frac{(0.13x5.25x0.80) + (0.13x1.63x0.50) + (0.11x2.65x0.90)}{(5.25x0.80) + (1.63x0.50) + (2.65x0.90)} = 0.12$$

Effective area composition graphics are for illustrative purposes only.





MWS Linear | *Sizing Options*

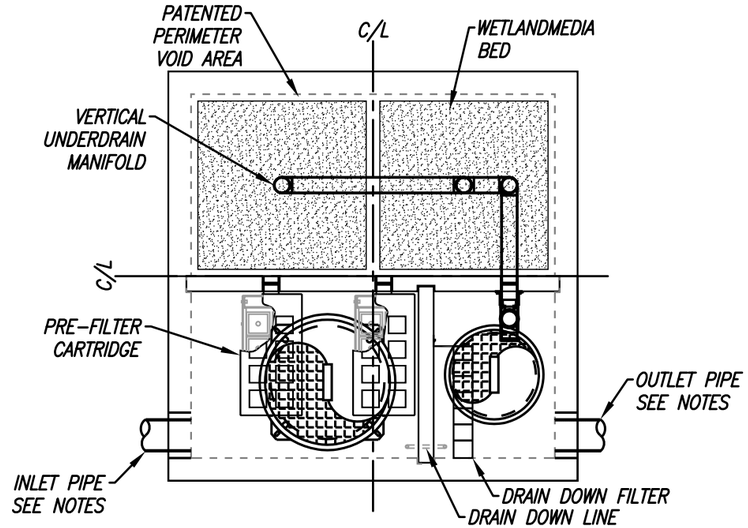
Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

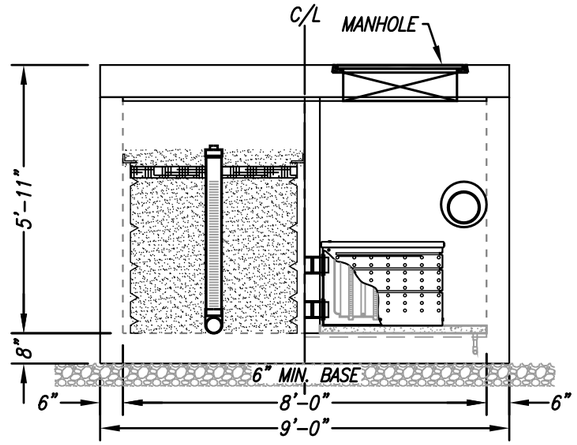
Model #	Dimensions	WetlandMEDIA Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4′ x 4′	23 sq. ft.	0.052
MWS-L-4-6	4′ x 6′	32 sq. ft.	0.073
MWS-L-4-8	4′ x 8′	50 sq. ft.	0.115
MWS-L-4-13	4′ x 13′	63 sq. ft.	0.144
MWS-L-4-15	4′ x 15′	76 sq. ft.	0.175
MWS-L-4-17	4′ x 17′	90 sq. ft.	0.206
MWS-L-4-19	4′ x 19′	103 sq. ft.	0.237
MWS-L-4-21	4′ x 21′	117 sq. ft.	0.268
MWS-L-6-8	7′ x 9′	64 sq. ft.	0.147
MWS-L-8-8	8′ x 8′	100 sq. ft.	0.230
MWS-L-8-12	8′ x 12′	151 sq. ft.	0.346
MWS-L-8-16	8′ x 16′	201 sq. ft.	0.462
MWS-L-8-20	9′ x 21′	252 sq. ft.	0.577
MWS-L-8-24	9′ x 25′	302 sq. ft.	0.693

Required flow to be treated = 0.197 cfs

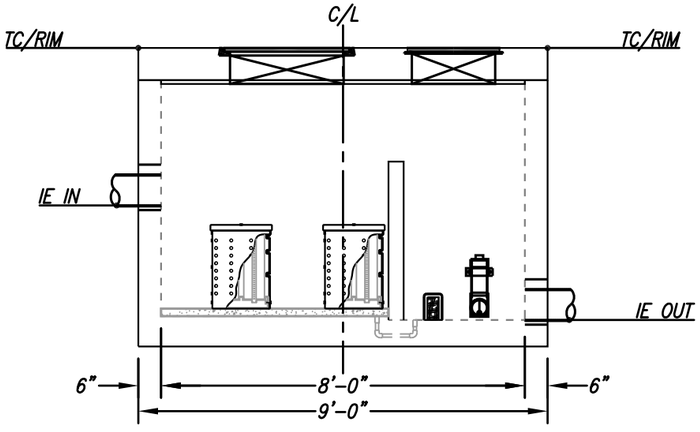
SITE SPECIFIC DATA			
PROJECT NAME		Village 8 East	
PROJECT LOCATION		CHULA VISTA, CA	
STRUCTURE ID		BF-3-4	
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
		0.23	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PARKWAY	OPEN PLANTER	PARKWAY
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			4.84
WETLANDMEDIA DELIVERY METHOD			TBD
ORIFICE SIZE (DIA. INCHES)			ø2.16"
MAXIMUM PICK WEIGHT (LBS)			TBD
NOTES:			



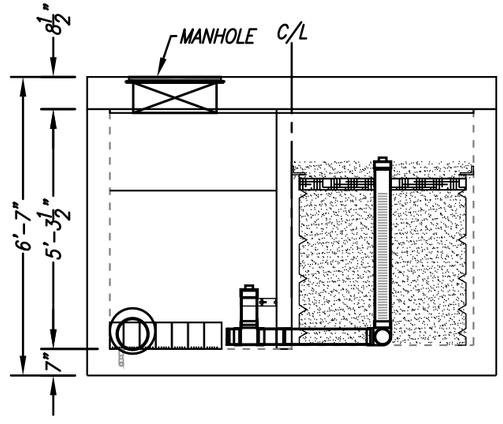
PLAN VIEW



LEFT END VIEW
BIOFILTRATION/PRETREATMENT



ELEVATION VIEW



RIGHT END VIEW
DISCHARGE/BIOFILTRATION

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURERS STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.

TREATMENT FLOW (CFS)	0.230
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	TBD
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS
www.ModularWetlands.com | (855) 5MOD-WET

MWS-L-8-8-V
STORMWATER BIOFILTRATION SYSTEM STANDARD DETAIL

5/2/17LTOWNSEND

FOR VOLUME BASED

BF-2-2 (DMA 2)

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	○ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	⊗ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊙ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	○ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

FOR VOLUME BASED

BF-3-1 (DMA 1)

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	○ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	⊗ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊙ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	○ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

FOR FLOW-BASED PROPRIETARY BIOFILTRATION UNIT

BF-3-3 (DMA 3)

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊗ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊙ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	○ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

FOR FLOW-BASED PROPRIETARY BIOFILTRATION UNIT

BF-3-4 (DMA 4A & 4B)

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊗ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	⊙ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.		

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	○ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

WASHINGTON STATE DEPARTMENT OF ECOLOGY

August 2021

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS) ENHANCED AND PHOSPHORUS TREATMENT

For

MWS-Linear Modular Wetland

Ecology's Decision

Based on Modular Wetland Systems, Inc, application submissions, including the Technical Evaluation Report, dated April 1, 2014, Ecology hereby issues the following use level designation:

1. General Use Level Designation (GULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic, Phosphorus, and Enhanced treatment
    - Sized at a hydraulic loading rate of:
        - 1 gallon per minute (gpm) per square foot (sq ft) of Wetland Cell Surface Area
        - Prefilter box (approved at either 22 inches or 33 inches tall)
            - 3.0 gpm/sq ft of prefilter box surface area for moderate pollutant loading rates (low to medium density residential basins).
            - 2.1 gpm/sq ft of prefilter box surface area for high pollutant loading rates (commercial and industrial basins).
2. Ecology approves the MWS – Linear Modular Wetland Stormwater Treatment System units for Basic, Phosphorus, and Enhanced treatment at the hydraulic loading rate listed above. Designers shall calculate the water quality design flow rates using the following procedures:
    - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute water quality treatment design flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology- approved continuous runoff model.

- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute water quality treatment design flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality treatment design flow rate is the full 2-year release rate of the detention facility.

3. These use level designations have no expiration date but may be amended or revoked by Ecology, and are subject to the conditions specified below.

Ecology's Conditions of Use

Applicants shall comply with the following conditions:

1) Design, assemble, install, operate, and maintain the MWS – Linear Modular Wetland Stormwater Treatment System units, in accordance with Modular Wetland Systems, Inc. applicable manuals and documents and the Ecology Decision.
2) Each site plan must undergo Modular Wetland Systems, Inc. review and approval before site installation. This ensures that site grading and slope are appropriate for use of a MWS – Linear Modular Wetland Stormwater Treatment System unit.
3) MSW – Linear Modular Wetland Stormwater Treatment System media shall conform to the specifications submitted to and approved by Ecology.
4) The applicant tested the MWS – Linear Modular Wetland Stormwater Treatment System with an external bypass weir. This weir limited the depth of water flowing through the media, and therefore the active treatment area, to below the root zone of the plants. This GULD applies to MWS – Linear Modular Wetland Stormwater Treatment Systems whether plants are included in the final product or not.
5) Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of stormwater treatment technology.
    - Typically, Modular Wetland Systems, Inc. designs MWS – Linear Modular Wetland systems for a target prefilter media life of 6 to 12 months.
    - Indications of the need for maintenance include effluent flow decreasing to below the design flow rate or decrease in treatment below required levels.
    - Owners/operators must inspect MWS – Linear Modular Wetland systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. You must conduct inspections monthly during the wet season, and every other month during the dry season (According to the SWMMWW, the wet season in western Washington is October 1 to April

30. According to the SWMMEW, the wet season in eastern Washington is October 1 to June 30). After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.

- Conduct inspections by qualified personnel, follow manufacturer's guidelines, and use methods capable fo determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
- When inspections are performed, the following findings typically serve as maintenance triggers:
    - Standing water remains in the vault between rain events, or
    - Bypass occurs during storms smaller than the design storm.
    - If excessive floatables (trash and debris) are present (but no standing water or excessive sedimentation), perform a minor maintenance consisting of gross solids removal, not prefilter media replacement.
    - Additional data collection will be used to create a correlation between pretreatment chamber sediment depth and pre-filter clogging (see *Issues to be Addressed by the Company* section below)

6) Discharges from the MWS – Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant:	Modular Wetland Systems, Inc.
Applicant's Address:	5796 Armada Drive, Suite 250 Carlsbad, CA 92008

Application Documents:

Original Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011

Quality Assurance Project Plan: Modular Wetland System – Linear Treatment System Performance Monitoring Project, draft, January 2011

Revised Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011

Memorandum: Modular Wetland System-Linear GULD Application Supplementary Data, April 2014

Technical Evaluation Report: Modular Wetland System Stormwater Treatment System Performance Monitoring, April 2014

Applicant's Use Level Request:

- General Use Level Designation as a Basic, Enhanced, and Phosphorus treatment device in accordance with Ecology's Guidance for Evaluating Emerging Stormwater Treatment Technologies Technology Assessment Protocol – Ecology (TAPE) January 2011 Revision.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/L.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of total phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/L.
- The MWS – Linear Modular wetland is capable of removing a minimum 30-percent of dissolved copper from stormwater with influent concentrations between 0.005 and 0.020 mg/L.
- The MWS – Linear Modular wetland is capable of removing a minimum 60-percent of dissolved zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/L.

Ecology's Recommendations:

- Modular Wetland System, Inc. has shown Ecology, through laboratory and field-testing, that the MWS – Linear Modular Wetland Stormwater Treatment System filter system is capable of attaining Ecology's Basic, Phosphorus, and Enhanced treatment goals.

Findings of Fact:

<u>Laboratory Testing</u>

The MWS-Linear Modular wetland has the:

- Capability to remove 99 percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91 percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93 percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79 percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.

- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Field Testing

- Modular Wetland Systems, Inc. conducted monitoring of an MWS-Linear (Model # MWS-L-4-13) from April 2012 through May 2013, at a transportation maintenance facility in Portland, Oregon. The manufacturer collected flow-weighted composite samples of the system's influent and effluent during 28 separate storm events. The system treated approximately 75 percent of the runoff from 53.5 inches of rainfall during the monitoring period. The applicant sized the system at 1 gpm/sq ft. (wetland media) and 3gpm/sq ft. (prefilter).
- Influent TSS concentrations for qualifying sampled storm events ranged from 20 to 339 mg/L. Average TSS removal for influent concentrations greater than 100 mg/L (n=7) averaged 85 percent. For influent concentrations in the range of 20-100 mg/L (n=18), the upper 95 percent confidence interval about the mean effluent concentration was 12.8 mg/L.
- Total phosphorus removal for 17 events with influent TP concentrations in the range of 0.1 to 0.5 mg/L averaged 65 percent. A bootstrap estimate of the lower 95 percent confidence limit (LCL95) of the mean total phosphorus reduction was 58 percent.
- The lower 95 percent confidence limit of the mean percent removal was 60.5 percent for dissolved zinc for influent concentrations in the range of 0.02 to 0.3 mg/L (n=11). The lower 95 percent confidence limit of the mean percent removal was 32.5 percent for dissolved copper for influent concentrations in the range of 0.005 to 0.02 mg/L (n=14) at flow rates up to 28 gpm (design flow rate 41 gpm). Laboratory test data augmented the data set, showing dissolved copper removal at the design flow rate of 41 gpm (93 percent reduction in influent dissolved copper of 0.757 mg/L).

Issues to be addressed by the Company:

1. Modular Wetland Systems, Inc. should collect maintenance and inspection data for the first year on all installations in the Northwest in order to assess standard maintenance requirements for various land uses in the region. Modular Wetland Systems, Inc. should use these data to establish required maintenance cycles.
2. Modular Wetland Systems, Inc. should collect pre-treatment chamber sediment depth data for the first year of operation for all installations in the Northwest. Modular Wetland Systems, Inc. will use these data to create a correlation between sediment depth and pre-filter clogging.

Technology Description:
Download at http://www.modularwetlands.com/

Contact Information:

Applicant: Zach Kent
BioClean A Forterra Company
5796 Armada Drive, Suite 250
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zach.kent@forterrabp.com

Applicant website: http://www.modularwetlands.com/

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E. Department of Ecology Water Quality Program
(360) 870-0983
douglas.howie@ecy.wa.gov

Revision History

Date	Revision
June 2011	Original use-level-designation document
September 2012	Revised dates for TER and expiration
January 2013	Modified Design Storm Description, added Revision Table, added maintenance discussion, modified format in accordance with Ecology standard
December 2013	Updated name of Applicant
April 2014	Approved GULD designation for Basic, Phosphorus, and Enhanced treatment
December 2015	Updated GULD to document the acceptance of MWS – Linear Modular Wetland installations with or without the inclusion of plants
July 2017	Revised Manufacturer Contact Information (name, address, and email)
December 2019	Revised Manufacturer Contact Address
July 2021	Added additional prefilter sized at 33 inches
August 2021	Changed “Prefilter” to “Prefilter box”

WASHINGTON STATE DEPARTMENT OF ECOLOGY

September 2019

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, to achieve the maximum water quality design flow rate. Calculate the water quality design flow rates using the following procedures:

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.

    - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
    - Conduct maintenance following manufacturer's guidelines.

7. Filterra systems come in standard sizes.

8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:
1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

Field Testing 2015-2019

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

Contact Information:

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Applicant's Website: http://www.conteches.com

Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

Ecology:
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Water Quality Program
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Date	**Revision**
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate

ATTACHMENT 2

Backup for PDP Hydromodification Control Measures

☒ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included

Attachment Sequence	Contents	Checklist
Attachment 2A	Hydromodification Management Exhibit (Required)	☐ Included See Hydromodification Management Exhibit Checklist.
Attachment 2B	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map **(Required)** Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2C	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2D	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each Structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☐ Included ☐ Submitted as separate stand-alone document

NOT APPLICABLE

Project Name/ Otay Ranch Village 8 East

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ Point(s) of Compliance (POC) for Hydromodification Management Hydromodification Management, with a POC at each point of discharge
- ☐ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☐ Structural BMPs for hydromodification management (identify location, type of BMP, cross-section and size/detail)

NOT APPLICABLE

1.6 Applicability of Hydromodification Management Requirements

MS4 Permit Provision E.3.c.(2)

Hydromodification management requirements apply to PDPs only.

If the project is a Standard Project, hydromodification management requirements do not apply. Hydromodification management requirements apply to PDPs (both new and re-development) unless the project meets specific exemptions discussed below.

PDP exemptions from hydromodification management requirements are based on the receiving water system.

The City has the discretion to exempt a PDP from hydromodification management requirements where the project discharges storm water runoff to:

(i) Existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean;

(ii) Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean; or

(iii) An area identified by the City as appropriate for an exemption by the optional WMAA incorporated into the Water Quality Improvement Plan (WQIP) pursuant to Provision B.3.b.(4) [of the MS4 permit].

Refer to Figure 1-2 and the associated criteria describing nodes in Figure 1-2 to determine applicability of hydromodification management requirements. These criteria reflect the latest list of exemptions that are allowed under the 2013 MS4 Permit, and therefore supersede criteria found in earlier publications.

- **Figure 1-2, Node 1 –** Hydromodification management control measures are only required if the proposed project is a PDP.
- **Figure 1-2, Node 2 –** As allowed by the MS4 Permit, projects discharging directly to the Pacific Ocean, by either existing underground storm drain systems or conveyance channels, whose bed and bank are concrete-lined all the way from the point of discharge to the Pacific Ocean, are exempt.
    - This exemption is subject to the following conditions:
        a) The outfall must be located on the beach (not within or on top of a bluff),
        b) A properly sized energy dissipation system must be provided to mitigate outlet discharge velocity from the direct discharge to the ocean for the ultimate condition peak design flow of the direct discharge,

c) The invert elevation of the direct discharge conveyance system (at the point of discharge to the ocean) should be equal to or below the mean high tide water surface elevation at the point of discharge, unless the outfall discharges to quay or other non-erodible shore protection.

- **Figure 1-2, Node 3 –** As allowed by the MS4 Permit, projects discharging directly to enclosed embayments (e.g., San Diego Bay or Mission Bay), by either existing underground storm drain systems or conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to the enclosed embayment, are exempt.
    - This exemption is subject to the following conditions:
        a) The outfall must not be located within a wildlife refuge or reserve area (e.g., Kendall-Frost Mission Bay Marsh Reserve, San Diego Bay National Wildlife Refuge, San Diego National Wildlife Refuge),
        b) A properly sized energy dissipation system must be provided to mitigate outlet discharge velocity from the direct discharge to the enclosed embayment for the ultimate condition peak design flow of the direct discharge,
        c) The invert elevation of the direct discharge conveyance system (at the point of discharge to the enclosed embayment) should be equal to or below the mean high tide water surface elevation at the point of discharge, unless the outfall discharges to a quay or other non-erodible shore protection.
            - For cases in which the direct discharge conveyance system outlet invert elevation is above the mean high tide water surface elevation but below the 100-year water surface elevation, additional analysis is required to determine if energy dissipation should be extended between the conveyance system outlet and the elevation associated with the mean high tide water surface level.
            - No exemption may be granted for conveyance system outlet invert elevations located above the 100-year floodplain elevation.
- **Figure 1-2, Node 4 –** As allowed by the MS4 Permit, projects discharging directly to a water storage reservoir or lake, by either existing underground storm drain systems or conveyance channels, whose bed and bank are concrete-lined all the way from the point of discharge to the water storage reservoir or lake, are exempt.
    - This exemption is subject to the following conditions:
        a) A properly sized energy dissipation system must be provided in accordance with City design standards to mitigate outlet discharge velocity from the direct discharge to the water storage reservoir or lake for the ultimate condition peak design flow of the direct discharge,
        b) The invert elevation of the direct discharge conveyance system (at the point of discharge to the water storage reservoir or lake) should be equal to or below the lowest normal operating water surface elevation at the point of discharge, unless the outfall

discharges to a quay or other non-erodible shore protection. Normal operating water surface elevation may vary by season; contact the reservoir operator to determine the elevation. For cases in which the direct discharge conveyance system outlet invert elevation is above the lowest normal operating water surface elevation but below the reservoir spillway elevation, additional analysis is required to determine if energy dissipation should be extended between the conveyance system outlet and the elevation associated with the lowest normal operating water surface level.

c) No exemption may be granted for conveyance system outlet invert elevations located above the reservoir spillway elevation.

- **Figure 1-2, Node 5 –** As allowed by the MS4 Permit, projects discharging directly to an area identified as appropriate for an exemption in the WMAA for the watershed in which the project resides, by either existing underground storm drain systems or conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to the designated area, are exempt. Consult the WMAA within the WQIP for the watershed in which the project resides to determine areas identified as appropriate for an exemption. Exemption is subject to any criteria defined within the WMAA, and conditions described in this Manual:

  - To qualify as a direct discharge to an exempt river reach:

    a) A properly sized energy dissipation system must be provided to mitigate outlet discharge velocity from the direct discharge to the exempt river reach for the ultimate condition peak design flow of the direct discharge,

    b) The invert elevation of the direct discharge conveyance system (at the point of discharge to the exempt river reach) should be equal to or below the 10-year floodplain elevation. To qualify for this exemption, projects must discharge runoff such that the outlet is located and the discharge occurs within the limits of inundation of the river due to the occurrence of the peak flow of the 10-year flooding event. Exceptions may be made at the discretion of the City Engineer, but shall never exceed the 100-year floodplain elevation. The City Engineer may require additional analysis of the potential for erosion between the outfall and the 10-year floodplain elevation.

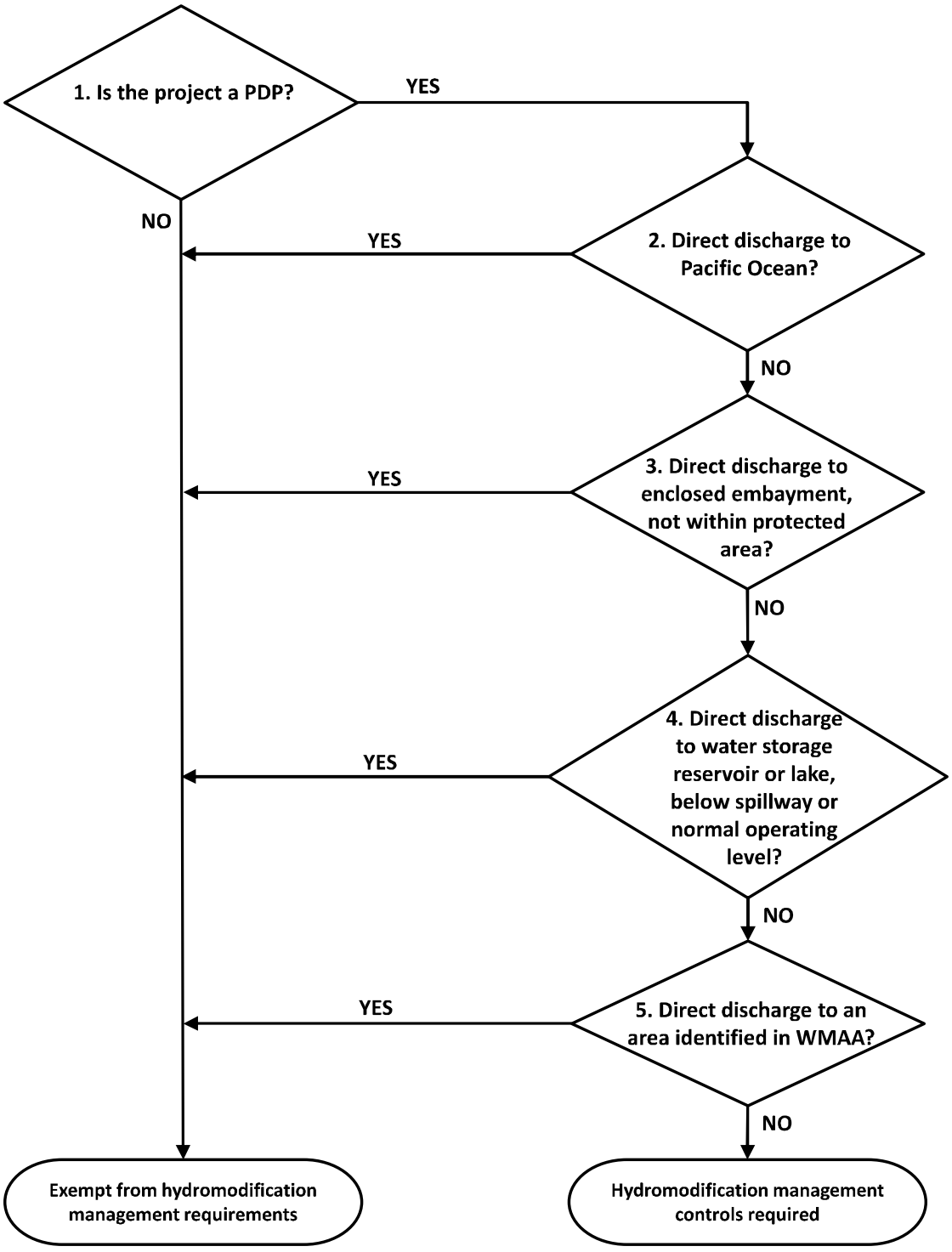
    c) No exemption may be granted for conveyance system outlet invert elevations located above the 100-year floodplain elevation.

  - Designated exempt river reaches that have been identified as appropriate for an exemption by the optional WMAA incorporated into the WQIP within the City of Chula Vista jurisdiction includes:

    a) Sweetwater River from the Sweetwater Reservoir Dam to the Outfall to San Diego Bay

    b) Otay River from Interstate 805 to the Outfall to San Diego Bay

    c) Otay River between Lower Otay Lakes to Interstate I-805



*Direct discharge refers to an uninterrupted hardened conveyance system; Note to be used in conjunction with Node Descriptions.

Figure 1-2: Applicability of Hydromodification Management BMP Requirements

Project Name/_____

ATTACHMENT 3

Structural BMP Maintenance Information
Hydromodification Control Measures

Maintenance agreement to be provided in Final Engineering Stage

SITE DESIGN, SOURCE CONTROL AND POLLUTANT CONTROL BMP OPERATION + MAINTENANCE PROCEDURE			
STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.:			
O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER: HomeFed Village II Master, LLC			
BMP DESCRIPTION	**INSPECTION FREQUENCY**	**MAINTENANCE FREQUENCY**	**MAINTENANCE ACTION**
SITE DESIGN ELEMENTS			
DESCRIPTION:IMPERVIOUS AREA DISPERSION	MONTHLY	AS-NEEDED	RE-SEED, RE-PLANT OR RE-ESTABLISH POOR VEGETATION. REMOVE DEAD OR DISEASED VEGETATION. MAKE APPROPRIATE CORRECTIVE MASURES TO SOLVE STANDING WATER IN VEGETATED PERVIOUS AREA FOR LONGER THAN 24 HRS AND PRESENCE OF MOSQUITOS.
DESCRIPTION: AMENDED SOIL	WEEKLY	ANNUAL	DETERMINE REAPPLICATION REQUIREMENTS OF AMENDED SOIL.
SOURCE CONTROL ELEMENTS			
DESCRIPTION: STORM DRAIN STENCILING	ANNUAL	BI-ANNUAL	REPAINT AS NECESSARY
POLLUTANT CONTROL BMP(S)			
DESCRIPTION:PROPRIETARY BIOFILTRATION UNIT, MODULAR WETLAND SYSTEMS, BIO CLEAN KRAKEN MEDIA FILTERS, BIO CLEAN DVERT SYSTEM	BI-ANNUAL	6-12 MONTHS AS NEEDED	REMOVE TRASH FROM SCREENING DEVICE.
	ANNUAL	12-24 MONTHS	REMOVE SEDIMENT FROM SEPARATION CHAMBER. REPLACEMENT OF MEDIA IN THE PRE-FILTER CARTRIDGE. REPLACEMENT OF DRAIN DOWN FILTER MEDIA.
DESCRIPTION:DETENTION BASIN WITH ORIFICES FOR WATER QUALITY DISCHARGE RATE CONTROL	QUARTERLY	6-12 MONTHS AS NEEDED	REMOVE DEBRIS AS NEEDED, AND CHECK ORIFICES

The following inspection and maintenance activities shall be performed and completed as indicated.

Maintenance Program for Inlet Stenciling

Inspection Frequency/Indications:	Regular Maintenance Inspections ❑ Before wet season begins (September); ❑ After wet season (April).
Maintenance Indications	**Maintenance Activities**
❑ Inlet stenciling/signage begins to weather or fade	❑ Re-stamp signage
❑ Broken or damaged structure	❑ Repair or replace signage structure

Maintenance Program for Modular Wetland Biofiltration Units

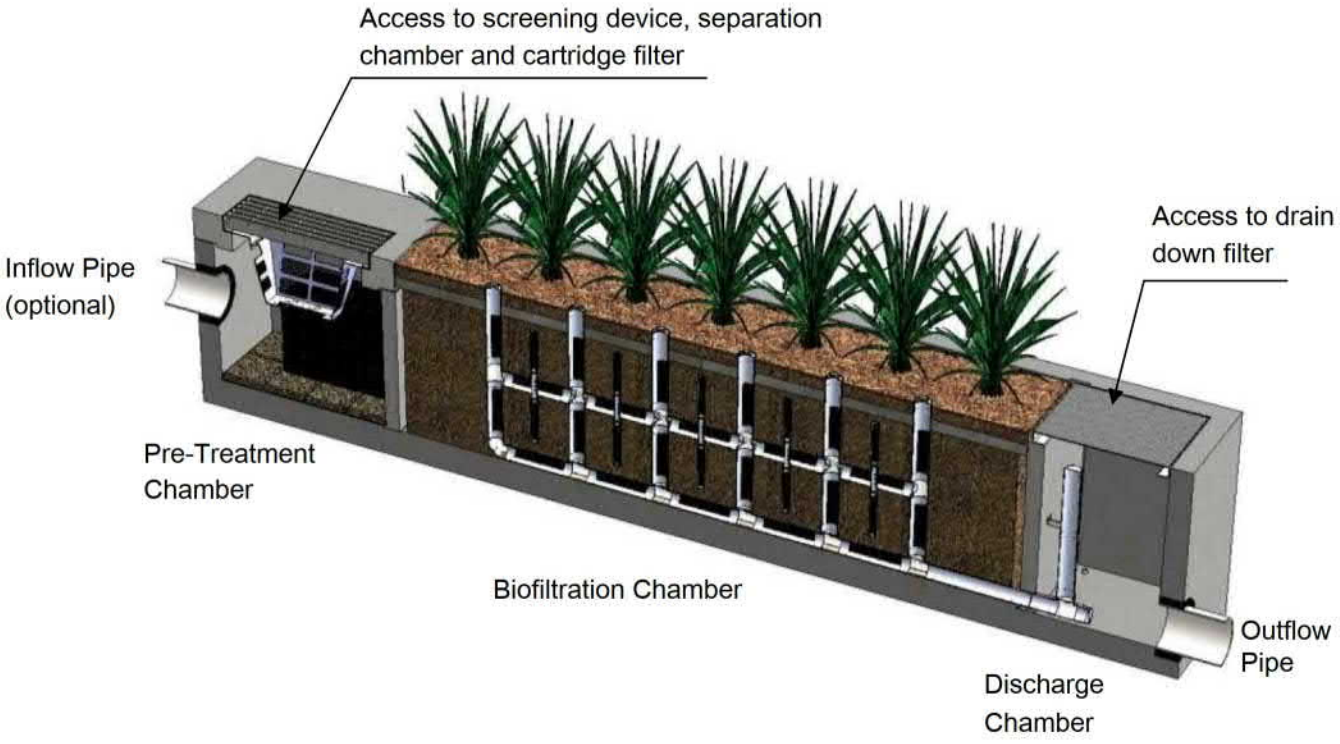
Inspection Frequency/Indications:	Regular Maintenance Inspections ❑ Monthly during wet season ❑ Annually before wet season (September) Performance Inspection ❑ 72 hrs after rainfall events greater than 0.5 in.
Maintenance Indications	**Maintenance Activities**
❑ Excessive trash, debris, or sediment in unit. (i.e., sump is 85 percent full or sump is 50 percent full during two consecutive monthly inspections)	❑ Remove trash and debris within 15 days. Empty unit when the unit is 85 percent full or 50 percent full during two consecutive monthly inspections, or annually in May.
❑ Presence of trash and debris in weir box.	❑ Remove trash and debris while onsite conducting inspection
❑ When standing water in sump is observed during annual and performance inspection.	❑ If standing water cannot be removed or remains through the wet season, notify vector control.
❑ Minor structural damage (i.e., screen becomes clogged, damaged or loose)	❑ Clean screen, re-fasten screen if appropriate.
❑ Cracked or fatigued neoprene vector seals	❑ Replace damaged seal
❑ Major damage to structures (i.e., holes in screen, large debris, damage to housing or weir box)	❑ Immediately consult with engineer and manufacturer's representative to develop a course of action and effect repairs prior to the wet season.
Waste Disposal	Sediment, other pollutants, and all other waste shall be properly disposed of in a licensed landfill or by another appropriate disposal method in accordance with local, state, and federal regulations.

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - (*5 minute average service time*).
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - (*10 minute average service time*).
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - (*10-15 minute per cartridge average service time*).
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - (*5 minute average service time*).
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - (*Service time varies*).

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.

2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.

3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.

4. Entry into chambers may require confined space training based on state and local regulations.

5. No fertilizer shall be used in the Biofiltration Chamber.

6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

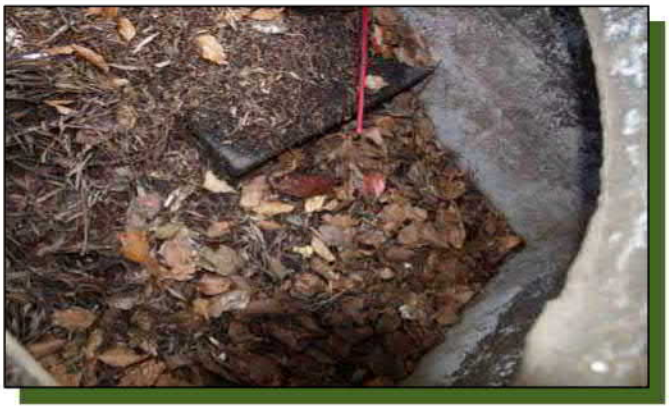
Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

Inspection Form

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Inspection Report
Modular Wetlands System

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

2972 San Luis Rey Road, Oceanside, CA 92058 P (760) 433-7640 F (760) 433-3176

Maintenance Report

Modular Wetland System, Inc.
P. 760.433-7640
F. 760-433-3176
E. Info@modularwetlands.com

www.modularwetlands.com

Cleaning and Maintenance Report
Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

2972 San Luis Rey Road, Oceanside, CA 92058 P. 760.433.7640 F. 760.433.3176

Project Name/_____

ATTACHMENT 4

Copy of Plan Sheets Showing Permanent Storm Water BMPs

Project Name/_____

Use this checklist to ensure the required information has been included on the plans:

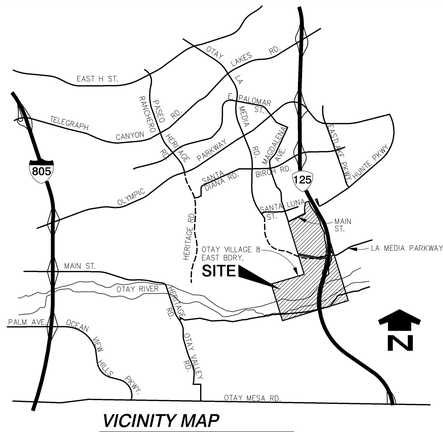
The plans must identify:

- ☒ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☒ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☒ Details and specifications for construction of structural BMP(s)
- ☒ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☒ How to access the structural BMP(s) to inspect and perform maintenance
- ☒ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☒ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☒ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☒ Recommended equipment to perform maintenance
- ☒ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☒ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☒ All BMPs must be fully dimensioned on the plans
- ☒ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

TENTATIVE MAP CVT-22-0005

OTAY RANCH - VILLAGE 8 EAST

CITY OF CHULA VISTA, CALIFORNIA



VICINITY MAP

NOT TO SCALE

LAND USE TABLE

Parcel	Permitted Density Range	Estimated Units[1]	Gross Acres[2]	Net Acres	Estimated Density[3]
Medium High Multi-Family Residential					
R-1	11-18 du/ac.	154	9.9	8.7	15.6
R-2	11-18 du/ac.	163	10.7	9.2	15.2
R-3	11-18 du/ac.	162	11.4	9.8	14.2
R-4	11-18 du/ac.	147	10.9	8.9	13.5
R-5	11-18 du/ac.	155	11.0	8.7	14.1
R-6	11-18 du/ac.	143	10.3	8.2	13.9
R-7	11-18 du/ac.	226	15.8	14.8	14.3
R-8	11-18 du/ac.	176	14.0	11.6	12.6
R-9	11-18 du/ac.	196	15.4	15.4	12.7
R-10	11-18 du/ac.	142	11.5	11.5	12.3
Total MH		**1,664**	**120.9**	**106.8**	**13.8**
Village Core[4]					
VC-1	18-45 du/ac.	275	7.6	7.4	36.2
VC-2	18-45 du/ac.	430	11.3	9.6	38.1
VC-3A	18-45 du/ac.	161	5.5	4.1	29.3
VC-3B[5]	18-45 du/ac.	0	5.6	5.4	0.0
VC-4	18-45 du/ac.	192	4.5	4.3	42.7
VC-5[5]	18-45 du/ac.	0	5.7	5.5	0.0
VC-6	18-45 du/ac.	142	5.3	4.7	26.8
VC-7	18-45 du/ac.	148	6.0	5.5	24.7
Total VC		**1,348**	**51.5**	**46.5**	**26.2**
Subtotal Residential		**3,012**	**172.4**	**153.3**	
Other					
Community Purpose Facility[6]					
CPF-1			1.2		
Subtotal CPF			**1.2**		
Parks					
P-1[7]			7.3	6.5	
P-2			43.3	35.9	
Total Parks			**50.6**	**42.4**	
School					
S-1[7,8]		264	11.3	10.0	26.4
Open Space					
Preserve (OSP Lots 1-4)			253.6		
Manufactured/Basin (OS Lots 5-7)			16.4		
Total Open Space			**270.0**		
Circulation					
Internal			22.5		
External			9.2		
Total Circulation			**31.7**		
CALTRANS Lots (To Be Dedicated)					
CT-1			1.7		
CT-2			0.1		
CT-3			1.9		
Total CALTRANS Lots			**3.7**		
Future Development					
Lot A			1.0		
Lot B			8.4		
Total Future Development			**9.4**		
Subtotal Other			**377.9**		
OVERALL TENTATIVE MAP TOTAL[9]		**3,276**	**550.3**		

Notes:

[1] Estimated Units are provided for planning purposes only, do not represent the final unit allocation for each parcel and shall not be used to limit or restrict the final units allocated to any parcel. The final unit allocation must remain consistent with the permitted density range applicable to the parcel. The final unit allocation shall be determined during Design Review and shall be documented in the Unit Tracking Table (Village 8 East SPA Plan, Attachment 1). Revisions to the Site Utilization Table shall not be required based on changes to the Estimated Units presented herein.

[2] Final acreage information to be determined during final engineering. Acreage may vary due to rounding. Residential and Village Core gross acreage includes approximately 15.3 of perimeter open space areas. Open space easements to be recorded over perimeter open space slopes that are to be maintained by the Master HOA or a Sub-Association, as determined during final design.

[3] Estimated Density calculated based on gross parcel acreage. Final density to be determined during Design Review.

[4] 20,000 SF of commercial uses are authorized within Village 8 East. Commercial SF may be developed within a single parcel designated VC or distributed among any parcel designated VC (VC-1 through VC-7). The final distribution of commercial SF to be determined during Design Review. The "Permitted Density Range" is not applicable to VC parcels with no residential units.

[5] VC-3B and VC-5 are anticipated to be developed with non-residential uses only, consistent with the Village Core zoning district. The "Permitted Density Range" is not applicable to VC parcels with no residential units.

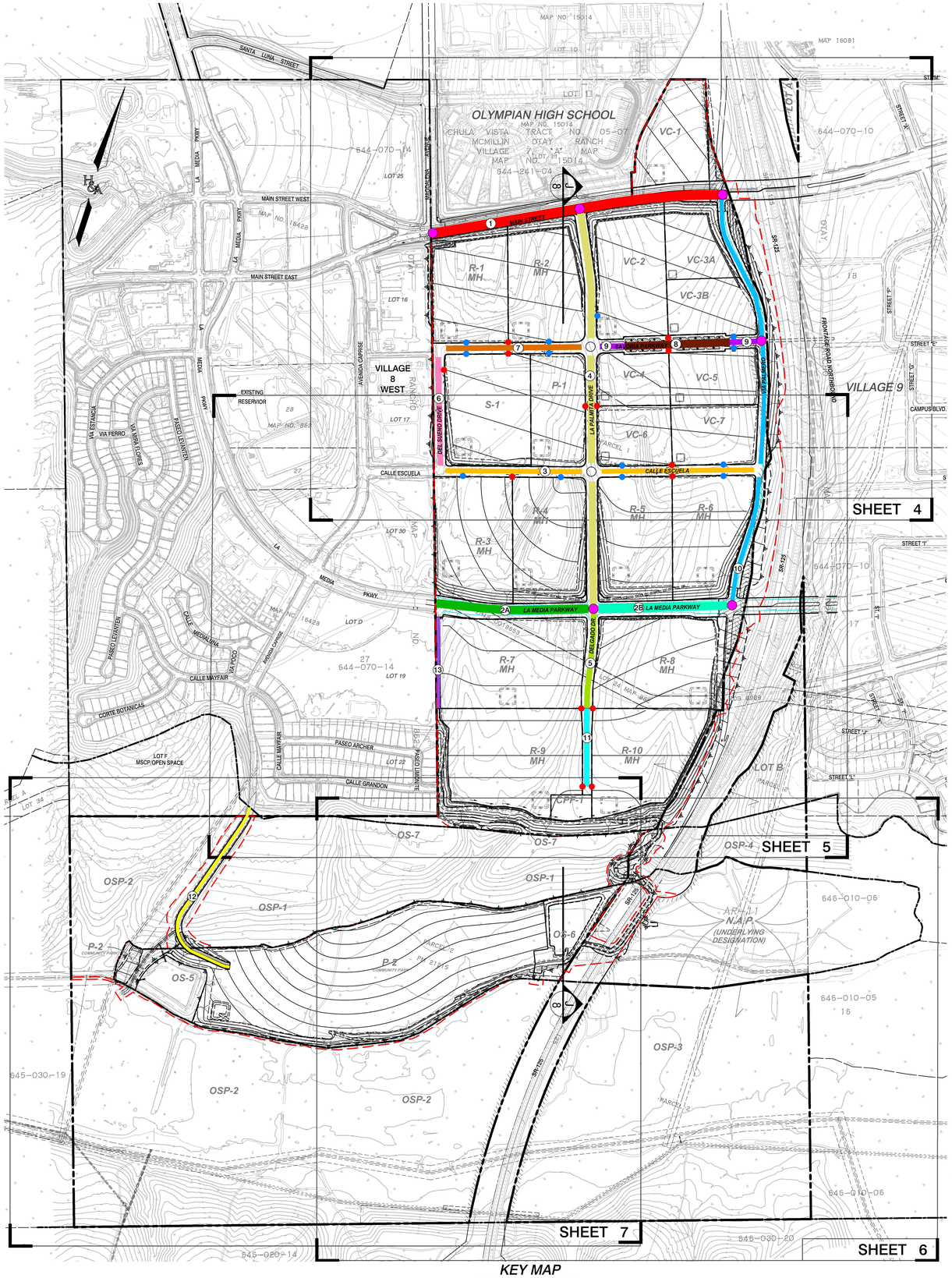
[6] Per the Land Offer Agreement (7/8/2014), the Village 8 East SPA Plan shall designate 4.0 acres of CPF land. The Applicant is proposing to meet a portion of the Village 8 East CPF obligation by designating the 1.2-acre CPF-1 site as a private recreation facility. The remaining 2.8 acre CPF obligation shall be addressed in a seperate agreement between the Applicant and the City of Chula Vista.

[7] Both the Village 8 East SPA Plan and Tentative Map include the "Proposed" and "Alternative" configuration and acreage for the S-1 School Site and P-1 Neighborhood Park. Either the Proposed or Alternative may be implemented without the need for an amendment to the SPA Plan or TM. The final neighborhood park acreage shall be addressed in the future Village 8 East Parks Construction Agreement.

[8] The S-1 school site has an underlying residential land use designation of High Residential. If the site is not developed as a school site, then it shall be developed as residential; however, if the site is developed as an elementary school, then the 264 units may be reallocated to another Village 8 East parcel or transferred to another village, as permitted in the Village 8 East PC District Regulations, Chapter 10, Implementation.

[9] Village 8 East acreage adjusted from approved 2014 development area to reflect changes in SR-125 ROW and to facilitate the future SR-125 ROW Decertification process.

THE SPECIFIC PLAN INCLUDES THE 22.6 ACRE AR-1 PARCEL, WHICH IS CURRENTLY OWNED BY THE CITY OF CHULA VISTA. THE SPECIFIC PLAN IS COMPRISED OF THE 550.3 ACRES PER THIS TENTATIVE MAP + 22.6 ACRES FOR THE AR-1, TOTALING 572.9 ACRES.



KEY MAP

1" = 300'

GENERAL NOTES

1. GROSS SITE AREA: 546.5 ACRES
2. TOTAL NUMBER OF LOTS: 41

MULTI-FAMILY RESIDENTIAL:	10 LOTS
VILLAGE CORE:	7 LOTS
COMMUNITY PURPOSE FACILITY:	2 LOTS
SCHOOL:	1 LOT
PARK:	1 LOT
COMMUNITY PARK:	2 LOTS
OPEN SPACE LOTS:	9 LOTS
OPEN SPACE PRESERVE LOTS:	4 LOTS
FUTURE DEVELOPMENT LOTS:	2 LOTS
CAL TRANS LOTS:	2 LOTS

3. TOTAL NUMBER OF UNITS PROPOSED: 3,276 UNITS
   MF RESIDENTIAL: 1,664 UNITS
   VC RESIDENTIAL: 1,348 UNITS
   S-1 (UNDERLYING RESIDENTIAL USE): 264 UNITS
4. MAXIMUM NUMBER UNITS ALLOWED PER OTAY RANCH VILLAGE 8 EAST SPA: 3,276
5. ASSESSOR'S PARCEL NUMBERS: 646-010-08 & 644-070-21
6. EXISTING/PROPOSED GENERAL PLAN DESIGNATION:
   EXISTING: MIXED USE RESIDENTIAL, MEDIUM RESIDENTIAL, PARK, SCHOOL, OPEN SPACE PRESERVE, OPEN SPACE.
   PROPOSED: VILLAGE CORE, MEDIUM HIGH RESIDENTIAL, PARK, CPF, SCHOOL, OPEN SPACE PRESERVE, OPEN SPACE.
7. ZONING: EXISTING: PC (PLANNED COMMUNITY ZONE)
   PROPOSED: SEE VILLAGE 8 EAST SPA PC DISTRICT REGULATIONS
8. PRESENT LAND USE: VACANT
   PROPOSED LAND USE: SEE LAND USE TABLE FOR PROPOSED LAND USES

LOTTING NOTES

1. CONSECUTIVE NUMBERING OR LABELING OF NEIGHBORHOODS IS NOT INTENDED TO INDICATE ORDER OF DEVELOPMENT. THE TIMING OF REQUIRED INFRASTRUCTURE ELEMENTS (STREETS, SEWER, WATER, STORM DRAIN, PUBLIC OPEN SPACE, ETC.) WILL BE ESTABLISHED BY THE DEVELOPER WITH THE CONCURRENCE OF THE CITY ENGINEER.
2. DELINEATION OF NEIGHBORHOOD BOUNDARIES IS NOT INTENDED TO BE EXACT. FURTHER REFINEMENT WILL BE ESTABLISHED WITH THE FINAL MAPS.
3. OPEN SPACE LOTS AND HOMEOWNERS MAINTENANCE LOTS SHOWN ON THE TENTATIVE MAP MAY BE SUBDIVIDED INTO ADDITIONAL LOTS TO CORRESPOND WITH PHASING AND LOGICAL EXTENSION OF ELECTRIC AND IRRIGATION SYSTEMS.

PUBLIC UTILITIES

SEWER	CITY OF CHULA VISTA
WATER	OTAY WATER DISTRICT
STORM DRAIN	CITY OF CHULA VISTA
TELEPHONE	AT&T
GAS AND ELECTRIC	SDG&E
CABLE T.V.	COX COMMUNICATIONS
POLICE & FIRE	CITY OF CHULA VISTA
SCHOOLS	CHULA VISTA ELEMENTARY SCHOOL DISTRICT SWEETWATER UNION HIGH SCHOOL DISTRICT

LEGAL DESCRIPTION

SEE SHEET 9

EXISTING EASEMENTS/ ENCUMBRANCE NOTES

SEE SHEETS 9 & 10. SEE SHEET 9 FOR PROPOSED DISPOSITION OF PLOTTABLE EASEMENTS. EASEMENTS TO REMAIN ARE SHOWN ON THE TENTATIVE MAP PLAN VIEW SHEETS. EASEMENTS TO BE QUITCLAIMED/ VACATED ARE NOT.

LEGEND

PROPOSED SUBDIVISION BOUNDARY
EXISTING SUBDIVISION BOUNDARY
EIR LIMITS
EXISTING TOPO CONTOUR (350)
NEIGHBORHOOD BOUNDARY
LOT LINE
NEIGHBORHOOD (R-1, OS-1, OSE-2)
OPEN SPACE LOT
OPEN SPACE EASEMENT
SLOPE (2:1 MAX)
PERCENT OF GRADE (2%)
STREET ELEVATION (350.4)
PUBLIC SEWER MAIN (8"•)
SEWER LATERAL
SEWER INVERT ELEVATION (343.4 IE)
WATER MAIN (8"•) (ZONE 711 OR 624 AS SHOWN ON PLAN) PUBLIC UNLESS OTHERWISE SHOWN ON PLAN (W)
FIRE HYDRANT
RECLAIMED WATER MAIN (ZONE 680 OR 815 AS SHOWN ON PLAN) PUBLIC UNLESS OTHERWISE SHOWN ON PLAN (RW)
PUBLIC STORM DRAIN (18"•)
RETAINING WALL
MSE RETAINING WALL
TOP OF WALL ELEVATION (TW)
FINISHED SURFACE ELEVATION (FS)
STREET LIGHT
EASEMENT LINE
EASEMENT NUMBER (33)
GATE
LIMITS MSCP
TRAIL
RAISED CROSSWALK
TRAIL TYPE (SEE TYP. SECTION SHEET 3) (T)
PARKING SPACE COUNT (6)
CROSS SECTION (A)
TEMPORARY SEDIMENT BASIN, FINAL SIZE AND LOCATION TO BE DETERMINED ON ROUGH GRADING PLAN.

* UNLESS SHOWN OTHERWISE

KEY MAP LEGEND

SIGNALIZED INTERSECTION
FULL MOVEMENT (WITH TURN POCKETS WHERE SHOWN ON PLAN)
RIGHT IN/RIGHT OUT

PROJECT WAIVERS

1. CORNER SIGHT DISTANCE REQUIREMENTS SHALL BE PER CALTRANS STANDARDS. A WAIVER IS REQUESTED TO ELIMINATE THE 45' CORNER SIGHT DISTANCE AND 3' SETBACK TO ALLOW THE ARCHITECTURE TO MOVE TOWARDS THE STREET AS APPROVED PER THE SPA DOCUMENT.
2. TO ALLOW INTERSECTIONS THAT ARE WITHIN HORIZONTAL CURVES OR WITHIN 100-FOOT TANGENTS OF HORIZONTAL CURVES.
3. TO ALLOW ALL INTERNAL STREETS TO BE DESIGNED FOR A 25 MPH DESIGN SPEED.
4. TO ALLOW 11' INSIDE TRAVEL LANES ON MAIN STREET INSTEAD OF 12'. TO ALLOW THE ELIMINATION OF THE SHOULDER IN FAVOR OF AN EMERGENCY PULLOUT.

SHEET INDEX

GENERAL DESIGN NOTES

1. WATER SYSTEM TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS OF THE OTAY WATER DISTRICT AND SHALL BE MAINTAINED AND OPERATED BY THE DISTRICT.
2. SPECIFIC METHODS OF HANDLING STORM WATER ARE SUBJECT TO DETAILED APPROVAL BY THE DEVELOPMENT SERVICES DEPARTMENT AT THE TIME OF SUBMISSION OF IMPROVEMENT AND GRADING PLANS. DESIGN SHALL BE ACCOMPLISHED ON THE BASIS OF THE REQUIREMENTS OF THE SUBDIVISION MANUAL. DRAINAGE EASEMENTS SHALL BE PROVIDED AS REQUIRED BY THE CITY DEVELOPMENT SERVICES DEPARTMENT.
3. SANITARY SEWER TO BE PROVIDED AND CONNECTED TO CITY OF CHULA VISTA SEWERS. SEWER MAINS ARE PUBLIC AND 8" MINIMUM P.V.C. UNLESS SHOWN OTHERWISE.
4. EVIDENCE SHALL BE PROVIDED OF HAVING OBTAINED GRADING RIGHTS UPON ADJACENT PROPERTY WHERE REQUIRED DURING FINAL ENGINEERING.
5. UTILITIES SHALL BE UNDERGROUND AND EASEMENTS PROVIDED AS NECESSARY.
6. SUBDIVIDER TO PROVIDE AND INSTALL APPROVED STREET LIGHT STANDARDS AND FIXTURES IN THE TYPE AND NUMBER APPROVED BY THE DEVELOPMENT SERVICES DEPARTMENT FOR PUBLIC RIGHT-OF-WAY.
7. SLOPE PLANTING SHALL BE IN ACCORDANCE WITH THE CITY OF CHULA VISTA LANDSCAPE MANUAL, AND/OR THE OTAY RANCH VILLAGE DESIGN PLAN.
8. GRADING SHALL BE CONSTRUCTED IN ACCORDANCE WITH TITLE 15 OF THE CITY OF CHULA VISTA MUNICIPAL CODE.
9. ALL WORK IN THE PUBLIC RIGHT-OF-WAY SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, THE SAN DIEGO AREA REGIONAL STANDARD DRAWINGS AND THE DESIGN AND CONSTRUCTION STANDARDS OF THE CITY OF CHULA VISTA.
10. FIRE HYDRANTS TO BE INSTALLED IN ACCORDANCE WITH THE CITY OF CHULA VISTA DESIGN STANDARD NO. 8. FIRE HYDRANTS AS SHOWN ON THIS MAP SHALL BE USED AS A GUIDE ONLY.
11. ONE FOOT CONTROL LOTS TO BE GRANTED TO THE CITY OF CHULA VISTA BY SEPARATE DEED WHERE DETERMINED NECESSARY BY THE DEVELOPMENT SERVICES DEPARTMENT.
12. GRADING AND MODEL HOMES MAY BE BUILT PRIOR TO FINAL MAP RECORDATION.
13. GRADING SHOWN HEREON IS PRELIMINARY AND SUBJECT TO MODIFICATION IN FINAL DESIGN SUBJECT TO SUBSTANTIAL CONFORMANCE APPROVAL BY THE CITY OF CHULA VISTA DEVELOPMENT SERVICES DEPARTMENT.
14. THIS PROJECT IS A MULTIPLE UNIT (NEIGHBORHOOD) SUBDIVISION. MULTIPLE FINAL MAPS MAY BE FILED IN ACCORDANCE WITH THE PROVISIONS OF ARTICLE 4 OF SECTION 66456.1 OF THE SUBDIVISION MAP ACT.
15. FINAL MAPS MAY BE RECORDED FOR THE PURPOSE OF SUBDIVIDING VILLAGES OR PORTIONS THEREOF INTO UNIMPROVED NEIGHBORHOODS WITH LEGAL ACCESS WITH THE INTENT OF TRANSFERING TITLE TO MERCHANT BUILDERS.
16. STORM DRAIN AND SEWER SHOWN HEREON IS PRELIMINARY AND SUBJECT TO MODIFICATION IN FINAL DESIGN.
17. TEMPORARY AND PERMANENT STRUCTURAL BEST MANAGEMENT PRACTICES WILL BE INCORPORATED IN THE DESIGN AND IMPLEMENTATION OF THE DEVELOPMENT.
18. PRELIMINARY GEOTECHNICAL REPORT PREPARED BY: GEOCON, INC. DATED SEPTEMBER 2022.
19. REFER TO THE "SWQMP DATED MAY 2023" PREPARED BY HUNSAKER & ASSOCIATES FOR COMPLIANCE WITH THE REGIONAL WATER QUALITY CONTROL BOARD JURISDICTIONAL PERMIT.
20. TEMPORARY TURNAROUNDS SHALL BE PROVIDED AT ALL DEAD END STREETS DURING FINAL ENGINEERING AS REQUESTED BY THE DEVELOPMENT SERVICES DEPARTMENT.
21. A SEPARATE CITY OF SAN DIEGO PUBLIC IMPROVEMENT PERMIT SHALL BE REQUIRED FOR CONSTRUCTION OF THE CITY OF SAN DIEGO WATER PIPELINE.

GRADING QUANTITIES

CUT: APPROX. 4,966,000 C.Y.
FILL: APPROX. 4,966,000 C.Y.

GRADING QUANTITIES SHOWN ARE RAW QUANTITIES ONLY AND DO NOT INCLUDE THE EFFECT OF REMEDIAL GRADING SHOWN IN THE PRELIMINARY SOILS REPORT.

P-2 TO BE UTILIZED AS A LOT FILL SITE. P-2 GRADES SHOWN HERE ARE DESIGNED TO TAKE APPROXIMATELY 500,000 C.Y. OF DISPOSAL MATERIAL AFTER ROUGH GRADING OF THE RESIDENTIAL AREA IS COMPLETE.

SOURCE OF TOPOGRAPHY

TOPO FLOWN BY R.J. LUNG & ASSOCIATES ON 12-21-2021.

BENCHMARK:

BRASS DISK MARKED "SD CITY ENGR." IN 3/4" IRON PIPE 1.5 MILES EAST OF INTERSECTION OF MAIN STREET & HERITAGE ROAD ON ROCK MOUNTAIN 100' EASTERLY OF PROMINENT 10' HIGH BOULDER & 1700' SOUTHERLY OF WATER STORAGE FACILITY. (PT # 1359 PER R.O.S. 14841) ELEVATION 628.319' (NAVD '88)

CONDOMINIUM NOTE

RESIDENTIAL CONDOMINIUM:
THIS SUBDIVISION IS A CONDOMINIUM PROJECT AS DEFINED IN SECTION 4125 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT. PLANNING NEIGHBORHOODS INCLUDED WITHIN THE RESIDENTIAL CONDOMINIUM DESIGNATION ARE R-1, R-2, R-3, R-4, R-5, R-6, R-7, R-8, R-9, R-10, VC-1, VC-2, VC-3, VC-3A, VC-3B, VC-4, VC-5, VC-6, VC-7 AND S-1 CONTAINING A MAXIMUM OF 3276 DWELLING UNITS. PLANNING NEIGHBORHOODS THAT ARE DETERMINED NOT TO REQUIRE THE CONDOMINIUM DESIGNATION AT SITE PLAN SHALL NOT REQUIRE A FINAL B MAP FOR DEVELOPMENT APPROVALS.

COMMERCIAL CONDOMINIUM:
THIS SUBDIVISION IS A CONDOMINIUM PROJECT AS DEFINED IN SECTION 6531 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT. PLANNING NEIGHBORHOODS INCLUDED WITHIN THE COMMERCIAL CONDOMINIUM DESIGNATION ARE VC-1, VC-2, VC-3, VC-3A, VC-3B, VC-4, VC-5, VC-6, AND VC-7 FOR A MAXIMUM OF 20,000 SQUARE FEET. PLANNING NEIGHBORHOODS THAT ARE DETERMINED NOT TO REQUIRE THE CONDOMINIUM DESIGNATION AT SITE PLAN SHALL NOT REQUIRE A FINAL B MAP FOR DEVELOPMENT APPROVALS.

OWNER/SUBDIVIDER

HOMEFED OTAY LAND II, LLC
1903 WRIGHT PLACE, SUITE 220
CARLSBAD, CA 92008
(760) 918-8200

JEFF O'CONNOR

CIVIL ENGINEER

HUNSAKER & ASSOCIATES, SAN DIEGO, INC
9707 MAPLES STREET
SAN DIEGO, CA 92121
(858) 558-4500

REGISTERED PROFESSIONAL ENGINEER ALISA S. VIALPANDO C 47945 CIVIL STATE OF CALIFORNIA

ALISA S. VIALPANDO R.C.E. 47945 DATE
MY REGISTRATION EXPIRES ON 12/31/23

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 9707 Maples Street San Diego, Ca 92121
ENGINEERING
SURVEYING PH(858)558-4500 FX(858)558-1414

NO.	REVISIONS	DATE	BY
1	FIRST SUBMITTAL	09/30/22	H&A
2	SECOND SUBMITTAL	05/18/23	H&A
3	THIRD SUBMITTAL	09/18/23	H&A

TENTATIVE MAP CVT-22-0005
OTAY RANCH VILLAGE 8 EAST
City Of Chula Vista, California

SHEET 1 OF 10

TENTATIVE MAP OTAY RANCH VILLAGE 8 EAST

OLYMPIAN HIGH SCHOOL

SANTA LUNA STREET

MAGDALENA AVE

MAIN STREET

MAIN STREET WEST

MAIN STREET EAST

LOT 25

LOT 16

LOT 17

VILLAGE 8 WEST

PER MAP NO. 16428

SEE TOWNCENTER IMPROVEMENT PLANS
C.C.V. DWG. NO. 14012
C.C.V. DWG. NO. 19036

VILLAGE 9

LOT A

VC-1
LOT AREA: 7.6 AC
PAD AREA: 7.4 AC

VC-2
LOT AREA: 11.3 AC
PAD AREA: 9.6 AC

VC-3A
LOT AREA: 5.5 AC
PAD AREA: 4.1 AC

VC-3B
LOT AREA: 5.6 AC
PAD AREA: 5.4 AC

VC-4
LOT AREA: 4.9 AC
PAD AREA: 4.3 AC

VC-5
LOT AREA: 5.7 AC
PAD AREA: 5.5 AC

VC-6
LOT AREA: 5.3 AC
PAD AREA: 4.7 AC

VC-7
LOT AREA: 6.0 AC
PAD AREA: 5.5 AC

R-1 MH
LOT AREA: 9.9 AC
PAD AREA: 8.7 AC

R-2 MH
LOT AREA: 10.7 AC
PAD AREA: 9.2 AC

P-1
LOT AREA: 7.3 AC
PAD AREA: 6.5 AC

S-1
LOT AREA: 11.3 AC
PAD AREA: 10.0 AC

CT-1
AREA: 1.7 AC

CT-2
AREA: 0.1 AC

SR-125

FRONTAGE ROAD NORTHBOUND

LA PALMITA DRIVE

DEL SUENO DRIVE

AVENIDA CAPRISE

SAVORIA PARKWAY

SAVORIA PKWAY

VIA PALMERO

CALLE ESCUELA

INTERIM CUT SLOPE

ULTIMATE CONDITIONS SLOPE

WORK WITHIN CALTRANS RIGHT-OF-WAY IS CONCEPTUAL AND SHOWN FOR REFERENCE ONLY. FINAL DESIGN TO BE PREPARED BY CALTRANS.

EXISTING SUBDIVISION BOUNDARY/ SR-125 R.O.W.

PROPOSED SUBDIVISION BOUNDARY/ SR-125 R.O.W.

PRIMARY ACCESS/PRIVATE DRIVE LOCATION TO BE DETERMINED ON SITE PLAN

150' TRANSITION TO 6 TRAVEL LANES (BOTH SIDES)

220' MEDIAN & 6 TRAVEL LANES

220' TRANS.

RIGHT-OF-WAY TO BE DEDICATED 1.3 AC

EXISTING SUBDIVISION BOUNDARY

PROPOSED SUBDIVISION BOUNDARY

CONNECT TO EXIST. DRAINAGE CHANNEL

LETTER OF PERMISSION TO GRADE OFFSITE REQUESTED

PROTECT IN PLACE: EX. 8" PVC RECL. WATER (944 ZONE) PER DWG 04078

EX. 16" PVC SEWER PER DWG 04068

EX. 12" PVC WATER (980 ZONE) PER DWG 04078

EX. 12" PVC WATER (711 ZONE) PER DWG 04078

EX. 30" RCP STORM DRAIN PER DWG 04078

EX. 12" PVC WATER (711 ZONE) PER DWG 14012

EX. 18" RCP STORM DRAIN PER DWG 04078

EX. 36" RCP STORM DRAIN PER DWG 14071

EX. 8" PVC RECL. WATER (815 ZONE) PER DWG 14012

EX. PRESSURE REDUCING STA PER DWG 14012

EX. 16" PVC WATER (711 ZONE) PER DWG 14012

EX. 12" PVC WATER (980 ZONE) PER DWG 14012

REMOVE EXISTING CURB & GUTTER

PROTECT IN PLACE: EX. 8" PVC RECL. WATER (944 ZONE) PER DWG 04060

PROTECT IN PLACE: EX. 24" RCP STORM DRAIN PER DWG 04068

EX. 18" RCP STORM DRAIN PER DWG 04068

RECONSTRUCT EXIST. DRIVEWAY

12'WX130'L BUS PULLOUT/ EMERGENCY PARKING

FILTERRA UNIT

OPEN SPACE EASEMENT

24" STORM DRAIN

30" STORM DRAIN

42" STORM DRAIN

18" STORM DRAIN

15' STORM DRAIN EASEMENT

11' TRAIL EASEMENT

SEE TRAIL [Z] ON SHEET 3

5' BENCH

24' WIDE RECIPROCAL ACCESS AND UTILITY EASEMENT. FINAL LOCATION & CONFIGURATION TO BE DETERMINED ON SITE PLAN

24' SECONDARY ACCESS EASEMENT TO VC-3A. LOCATION TO BE DETERMINED ON SITE PLAN

RIGHT IN/RIGHT OUT PRIVATE DRIVE

FULL ACCESS POINT

CROSSWALK. FINAL LOCATION TO BE DETERMINED

POTENTIAL DROP-OFF ZONE

RAISED SIDEWALK. FINAL LOCATION TO BE DETERMINED

SEE ALTERNATIVE SCHOOL AND PARK SITES ON SHEET 8

FUTURE PEDESTRIAN BRIDGE

PROPOSED SUBDIVISION BOUNDARY

711 ZONE

680 ZONE

624 ZONE

980 ZONE

PRESSURE REDUCING STATION

SCALE 1"=100'

SEE SHEET NO. 5

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TENTATIVE MAP CVT-22-0005
OTAY RANCH VILLAGE 8 EAST
City Of Chula Vista, California

SHEET 4 OF 10

TENTATIVE MAP OTAY RANCH VILLAGE 8 EAST

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REF # 2305-0039

SEE SHEET NO. 5

VILLAGE 8 WEST

OS-7
LOT AREA: 8.2 AC

CPF-1
LOT AREA: 1.2 AC
PAD AREA: 1.2 AC

OSP-1
PRESERVE OS
LOT AREA: 45.6 AC

OSP-2
PRESERVE OS
LOT AREA: 127.5 AC

P-2
COMMUNITY PARK
LOT AREA: 43.3 AC
PAD AREA: 35.9 AC

OS-5
LOT AREA: 3.4 AC

OS-6
LOT AREA: 4.8 AC

SR-125

MSCP

100' FUEL MOD

100' PRESERVE EDGE LIMITS

10' GRADING BUFFER

12' WALLS

24' GRADED WIDTH ON 30' WIDE PUBLIC TRAIL EASEMENT SEE TRAIL [4] ON SHEET 3

20' GRADED WIDTH ON 30' WIDE PUBLIC TRAIL EASEMENT SEE TRAIL [7] ON SHEET 3

30' TRAIL EASEMENT

EMERGENCY ACCESS/ PATH TO COMMUNITY PARK & ACTIVE REC. SEE TRAIL [2] ON SHEET 3

20' PUBLIC WATER EASEMENT

20' STORM DRAIN & SEWER EASEMENT

24' PUBLIC WATER EASEMENT

72" STORM DRAIN

60" STORM DRAIN

78" STORM DRAIN

24" STORM DRAIN

18" STORM DRAIN

OVERLOOK POINT

ACCESS POINT/ FIRE TURNAROUND

EX. 8" PVC SEWER PER DWG 18025 CONNECT TO EX. 8" PVC WATER (624' ZONE) PER DWG 18025

PROP. 30" PUBLIC SEWER, RECL. WATER AND STORM DRAIN ESMT.

PROP. 25' PUBLIC SEWER, RECL. WATER ESMT.

COMMUNITY PARK TRAIL/MAINTENANCE & EMERGENCY ACCESS ROAD (BASIN ACCESS)

450,000 CF DETENTION BASIN DEPTH= 5' (1' FREEBOARD (90,000 SF BOTTOM) ELEV. 218.0

PROTECT IN PLACE EXIST. 36" SD

PROTECT IN PLACE-EXISTING ARIZONA CROSSING

CONNECT TO EXIST. SEWER

24' WIDE ACCESS ROAD TO AR-11

FUEL MOD LIMITS - SEE FIRE PROTECTION PLAN FOR SITE-SPECIFIC DETAILS

PROPOSED BYPASS STORM DRAIN

PROPOSED 20' PUBLIC STORM DRAIN EASEMENT

POTENTIAL 24' RECIPROCOL ACCESS EASEMENT, LOCATION TO BE DETERMINED

PROPOSED 20' PUBLIC STORM DRAIN EASEMENT

RECYCLED WATER CONFIGURATION TO BE DETERMINED WITH PARK PLANNING

20 - 8'X24' MWS UNITS

PROPOSED 16' PUBLIC MULTI-PURPOSE TRAIL EASEMENT (GREENBELT TRAIL) SEE TRAIL [3] ON SHT. 3

PROPOSED 16' COMMUNITY PARK ACCESS TRAIL AND EASEMENT (SEE TRAIL [6] SHT. 3)

PROPOSED CONCRETE ENERGY DISSIPATOR APWA 384-D-41 OR EQUIVALENT

CONCEPTUAL BASIN ACCESS ROAD

CONCEPTUAL BASIN—LOCATION & ACCESS ROAD TO BE DETERMINED WITH PARK PLANNING

WQ BASIN DEPTH= 6,300 SF BOTTOM ELEV. 209.0

EXISTING GRADING, UTILITIES & ACCESS ROAD PER OTAY RANCH VILLAGE 8 WEST TENTATIVE MAP

PARK ACCESS ROAD PER OTAY RANCH VILLAGE 8 WEST TENTATIVE MAP

EXISTING 25' CITY OF SAN DIEGO WATER EASEMENT

EXISTING 75' CITY OF SAN DIEGO WATER EASEMENT

REMOVE EXISTING CURB INLET, CONSTRUCT 2 NEW CURB INLETS AND TIE INTO EXISTING STORM DRAIN

EXISTING 78" STORM DRAIN PER DWG. 14011

EXISTING 42" STORM DRAIN PER DWG. 1401

SEE TRAIL 1 ON SHEET 3

TIE INTO EXIST. MOD. TYPE A-5 C.O.

EXIST. HEADWALL & RIPRAP

FEMA ZONE A 100 YEAR FLOODLINE

FEMA ZONE AE FLOODWAY

PROTECT IN PLACE EXIST. 36" PVC SEWER PER DWG 02025

EXISTING SALT CREEK SEWER

PROTECT IN PLACE EXIST. 36" PVC SEWER PER DWG 02029

2631'

SCALE 1"=100'

SEE SHEET NO. 6 TENTATIVE MAP OTAY RANCH VILLAGE 8 EAST

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TENTATIVE MAP CVT-22-0005
OTAY RANCH VILLAGE 8 EAST
City Of Chula Vista, California

SHEET 7 OF 10

W.O.# 2325-5033

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Project Name/_____

ATTACHMENT 5

Drainage Report

Attach project's drainage report. Refer to the Subdivision Manual to determine the reporting requirements.

DRAINAGE REPORT TO BE PROVIDED SEPARATELY

Project Name/_____

ATTACHMENT 6

Project's Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

GEOTECHNICAL REPORT TO BE PROVIDED SEPARATELY