**CITY OF SAN DIEGO**

**PRIORITY DEVELOPMENT PROJECT (PDP)**
**STORM WATER QUALITY MANAGEMENT PLAN (SWQMP)**
**FOR**
**Hilltop and Euclid**
**VTM/PDP PTS# 560527**

**ENGINEER OF WORK:**


**Debby Reece, PE**
**RCE 56148, REGISTRATION EXPIRES 12/31/18**

PREPARED FOR:

Affirmed Housing
13520 N Evening Creek Dr
San Diego, CA 92128

PREPARED BY:
C. Bell, MS

**PROJECT DESIGN CONSULTANTS**
**Planning | Landscape Architecture | Engineering | Survey**

701 B Street, Suite 800
San Diego, CA 92101
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DATE OF SWQMP:
1/18/2018

Job No. 4210

Project Name: **Hilltop and Euclid**

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**ACRONYMS**

| | |
|---|---|
| APN | Assessor's Parcel Number |
| ASBS | Area of Special Biological Significance |
| BMP | Best Management Practice |
| CEQA | California Environmental Quality Act |
| CGP | Construction General Permit |
| DCV | Design Capture Volume |
| DMA | Drainage Management Areas |
| ESA | Environmentally Sensitive Area |
| GLU | Geomorphic Landscape Unit |
| GW | Ground Water |
| HMP | Hydromodification Management Plan |
| HSG | Hydrologic Soil Group |
| HU | Harvest and Use |
| INF | Infiltration |
| LID | Low Impact Development |
| LUP | Linear Underground/Overhead Projects |
| MS4 | Municipal Separate Storm Sewer System |
| N/A | Not Applicable |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| PDP | Priority Development Project |
| PE | Professional Engineer |
| POC | Pollutant of Concern |
| SC | Source Control |
| SD | Site Design |
| SDRWQCB | San Diego Regional Water Quality Control Board |
| SIC | Standard Industrial Classification |
| SWPPP | Stormwater Pollutant Protection Plan |
| SWQMP | Storm Water Quality Management Plan |
| TMDL | Total Maximum Daily Load |
| WMAA | Watershed Management Area Analysis |
| WPCP | Water Pollution Control Program |
| WQIP | Water Quality Improvement Plan |

Project Name: **Hilltop and Euclid**

## CERTIFICATION PAGE

**Project Name:**
**Permit Application Number:**

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB 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 Storm Water Standards. 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 source control and site design 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.

_____
Debby Reece, PE, RCE 56148, Registration Expires 12/31/18

Debby Reece
Print Name

Project Design Consultants
Company

_____
Date

Project Name: **Hilltop and Euclid**

## 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 last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

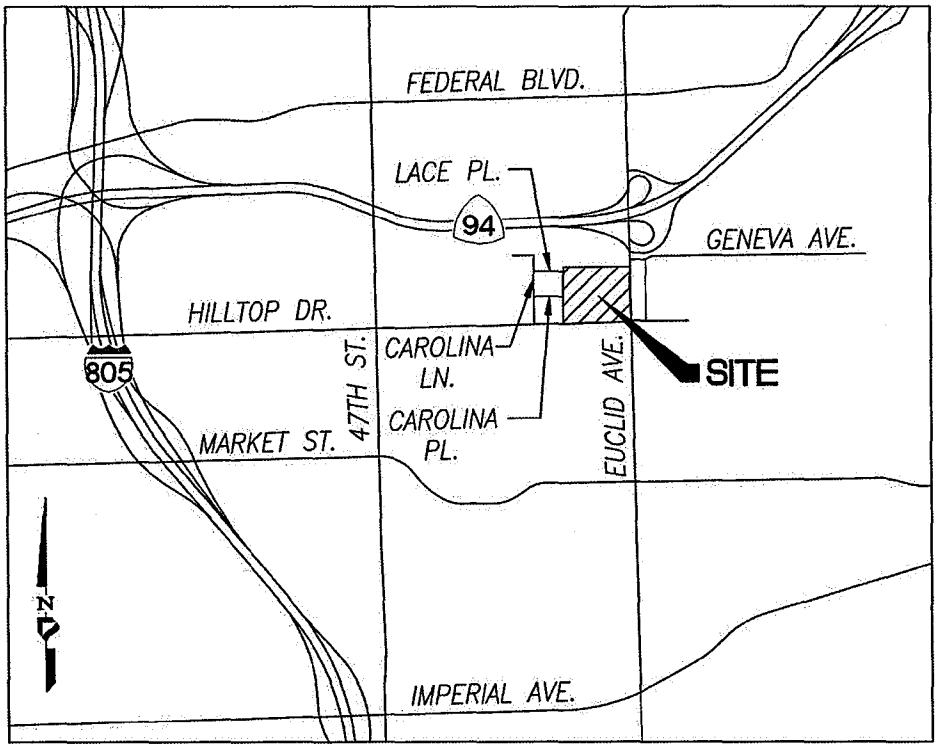
| Submittal Number | Date | Project Status | Summary of Changes |
|---|---|---|---|
| 1 | 6/29/2017 | ☒ Preliminary Design / Planning / CEQA<br>☐ Final Design | Initial Submittal |
| 2 | 9/20/2017 | ☒ Preliminary Design / Planning / CEQA<br>☐ Final Design | Second Submittal |
| 3 | 11/28/2017 | ☒ Preliminary Design / Planning / CEQA<br>☐ Final Design | Third Submittal |
| 4 | 1/18/2018 | ☒ Preliminary Design / Planning / CEQA<br>☐ Final Design | Fourth Submittal |

Project Name: **Hilltop and Euclid**

**PROJECT VICINITY MAP**

**Project Name: Hilltop and Euclid**

**Permit Application Number: 560527**




VICINITY MAP

Project Name: **Hilltop and Euclid**

| | | | |
|---|---|---|---|
| THE CITY OF SAN DIEGO | City of San Diego<br>**Development Services**<br>1222 First Ave., MD-302<br>San Diego, CA 92101<br>(619) 446-5000 | **Storm Water Requirements Applicability Checklist** | FORM<br>**DS-560**<br>February<br>2016 |

| Project Address: | Project Number *(for the City Use Only)*: |
|---|---|
| **Hilltop and Euclid** | |

**SECTION 1. Construction Storm Water BMP Requirements:**

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administrated by the State Water Resources Control Board.

**For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.**

**PART A: Determine Construction Phase Storm Water Requirements.**

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with construction activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ◉ Yes; SWPPP required, 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 any other activity that results in ground disturbance and contact with storm water runoff?

   ○ Yes; WPCP required, skip questions 3-4 ◉ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (projects such as pipeline/utility replacement)

   ○ Yes; WPCP required, skip questions 4 ◉ No; next question

4. Does the project only include the following Permit types listed below?
   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include one of the following activities and associated curb/ sidewalk repair: water services, sewer lateral, storm drain lateral, or dry utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes to the right, and continue to PART B:

☒ If you checked "Yes" for question 1,
**a SWPPP is REQUIRED. Continue to PART B**

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3,
**a WPCP is REQUIRED.** If the project processes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all question 1-3, and checked "Yes" for question 4
PART B **does not apply and no document is required. Continue to Section 2.**

More information on the City's construction BMP requirements as well as CGP requirements can be found at:
www.sandiego.gov/stormwater/regulations/swguide/constructing.shtml

Project Name: **Hilltop and Euclid**

**PART B: Determine Construction Site Priority.**

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk. Determination approach of the Stat e Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

**Complete PART B and continued to Section 2**

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed. A map of the ASBS watershed can he found here *<placeholder for ASBS map link>*

2. ☒ **High Priority**
   a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.
   b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects 1 acre or more but not subject to an ASBS or high priority designation.
   b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**
   a. Projects not subject to ASBS, high or medium priority designation.

**SECTION 2. Permanent Storm Water BMP Requirements.**

Additional information for determining the requirements is found in the Storm Water Standards Manual.

**PART C: Determine if Not Subject to Permanent Storm Water Requirements.**

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water
BMPs.

**If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".**

**If "no" is checked for all of the numbers in Part C continue to Part D.**

| | | |
|---|---|---|
| 1. | Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water? | ◉ Yes ◉ No |
| 2. | Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces? | ◉ Yes ◉ No |
| 3. | Does the project fall under routine maintenance? Examples include, but are not limited to:<br>roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair). | ◉ Yes ◉ No |

Project Name: **Hilltop and Euclid**

**PART D: PDP Exempt Requirements.**

**PDP Exempt projects are required to implement site design and source control BMPs.**

**If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."**
**If "no" was checked for all questions in Part D, continue to Part E.**

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, 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 and roads? Or;
   • Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

   ○ Yes; PDP exempt requirements apply ◉ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ○ Yes; PDP exempt requirements apply ◉ No; PDP not exempt. PDP requirements apply.

**PART E: Determine if Project is a Priority Development Project (PDP).** Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

**If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".**
**If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Project".**

| | | |
|---|---|---|
| 1. | **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. | ◉ Yes ○ No |
| 2. | **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces 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 |
| 3. | **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. | ○ Yes ◉ No |
| 4. | **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. | ◉ Yes ○ No |

Project Name: **Hilltop and Euclid**



| | |
|---|---|
| 5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** | ○ Yes ◉ No |
| 6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). | ○ Yes ◉ No |
| 7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges 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 |
| 8. **New development or redevelopment projects of a retail gasoline outlet that creates and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic of 100 or more vehicles per day. | ○ Yes ◉ No |
| 9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. | ○ Yes ◉ No |
| 10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. | ○ Yes ◉ No |

**PART F: Select the appropriate category based on the outcomes of PART C through PART E.**

| | |
|---|---|
| 1. The project is **NOT SUBJECT TO STORM WATER REQUIREMENTS.** | ☐ |
| 2. The project is a **STANDARD PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. | ☐ |
| 3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. | ☐ |
| 4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires hydromodification management. | ☒ |

Name of Owner or Agent *(Please Print):* Title:

Signature: Date:

Project Name: **Hilltop and Euclid**

| **Applicability of Permanent, Post-Construction Storm Water BMP Requirements**<br>**(Storm Water Intake Form for all Development Permit Applications)** | **Form I-1** |
|---|---|
| **Project Identification** | |
| Project Name: Hilltop and Euclid | |
| Permit Application Number: **560527** | Date: 9/20/2017 |
| **Determination of Requirements** | |
| The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.<br><br>Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below. | |

| Step | Answer | Progression |
|---|---|---|
| **Step 1:** Is the project a "development project"?<br>See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☒ Yes | Go to Step 2. |
| | ☐ No | Stop.<br>Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below. |
| Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building): | | |
| **Step 2:** Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions?<br>To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist. | ☐ Standard Project | Stop.<br>Standard Project requirements apply. |
| | ☒ PDP | PDP requirements apply, including PDP SWQMP.<br>Go to Step 3. |
| | ☐ PDP Exempt | Stop.<br>Standard Project requirements apply. Provide discussion and list any additional requirements below. |

Project Name: **Hilltop and Euclid**

| Form I-1 Page 2 | | |
|---|---|---|
| **[Step 2 Continued from Page 1]** Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable: | | |
| **Step 3:** Is the project subject to earlier PDP requirements due to a prior lawful approval?<br>See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☐Yes | Consult the City Engineer to determine requirements. Provide discussion and identify requirements below.<br>Go to Step 4. |
| | ☒No | BMP Design Manual PDP requirements apply.<br>Go to Step 4. |
| Discussion / justification of prior lawful approval, and identify requirements (*not required if prior lawful approval does not apply*): | | |
| **Step 4:** Do hydromodification control requirements apply?<br>See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☒Yes | PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6).<br>Go to Step 5. |
| | ☐No | Stop.<br>PDP structural BMPs required for pollutant control (Chapter 5) only.<br>Provide brief discussion of exemption to hydromodification control below. |
| Discussion / justification if hydromodification control requirements do <u>not</u> apply: | | |
| **Step 5:** Does protection of critical coarse sediment yield areas apply?<br>See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☐Yes | Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2).<br>Stop. |
| | ☒N/A | Management measures not required for protection of critical coarse sediment yield areas.<br>Provide brief discussion below.<br>Stop. |
| Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply:<br><br>There are no mapped potential critical coarse sediment yield areas on the property, as shown in Exhibit 2b. | | |

Project Name: **Hilltop and Euclid**

| Site Information Checklist For PDPs | Form I-3B |
|---|---|
| **Project Summary Information** | |
| Project Name | Hilltop and Euclid |
| Project Address | Hilltop and Euclid |
| Assessor's Parcel Number(s) (APN(s)) | 542-480-03, 09, 12, 14, 16, 18 & 20 |
| Permit Application Number | **560527** |
| Project Watershed | Select One:<br>☐San Dieguito<br>☐Penasquitos<br>☐Mission Bay<br>☐San Diego River<br>☒San Diego Bay<br>☐Tijuana River |
| Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX) | 908.22 |
| Parcel Area<br>(total area of Assessor's Parcel(s) associated with the project) | 8.5 Acres (370260 Square Feet) |
| Area to be Disturbed by the Project<br>(Project Area) | 9.108 Acres (69,129.7 Square Feet) |
| Project Proposed Impervious Area<br>(subset of Project Area) | 4.39 Acres (19,131 Square Feet) |
| Project Proposed Pervious Area<br>(subset of Project Area) | 2.23 Acres (97138 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 | There is minimal pre-project imperviousness. |

Project Name: **Hilltop and Euclid**

| Form I-3B Page 2 of 11 |
|---|
| **Description of Existing Site Condition** |
| Current Status of the Site (select all that apply):<br>☐ Existing development<br>☒ Previously graded but not built out<br>☒ Demolition completed without new construction<br>☐ Agricultural or other non-impervious use<br>☒ Vacant, undeveloped/natural<br><br>Description / Additional Information:<br><br>The site is mostly undeveloped with a channel traversing the site from north to south. The site was previously partially developed with single family dwellings on the eastern side of the project and in the southwest corner. The homes were demolished at some point (between 2006 to 2008) and had not been redeveloped. |
| Existing Land Cover Includes (select all that apply):<br>☒ Vegetative Cover<br>☒ Non-Vegetated Pervious Areas<br>☒ Impervious Areas<br><br>Description / Additional Information:<br><br>The site is mostly vegetated with portions of the existing driveways remaining from the recent demolition. |
| Underlying Soil belongs to Hydrologic Soil Group (select all that apply):<br>☐ NRCS Type A<br>☐ NRCS Type B<br>☐ NRCS Type C<br>☒ NRCS Type D |
| Approximate Depth to Groundwater (GW):<br>☐ GW Depth < 5 feet<br>☐ 5 feet < GW Depth < 10 feet<br>☐ 10 feet < GW Depth < 20 feet<br>☒ GW Depth > 20 feet |

Existing Natural Hydrologic Features (select all that apply):

☒ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒ None

Description / Additional Information:
A finger canyon traverses the site from north to south and conveys a large amount of runon from upstream areas through the site.

**Form I-3B Page 3 of 11**

**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. If runoff from offsite is conveyed through the site? If yes, quantification of 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 storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the 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.

*Description/ Additional Information:*

1. The existing drainage conveyance is mostly natural, with some urban conveyance features.
2. There is a large area of upstream runon that is conveyed through the site through the channel that bisects the site.
3. The site drains in a southerly direction towards the existing 36-inch culvert per 6983-B.
4. The site discharges to the south and eventually drains to Chollas Creek. The existing culvert will be replaced with a larger culvert.

Project Name: **Hilltop and Euclid**

| Form I-3B Page 4 of 11 |
|---|
| **Description of Proposed Site Development** |
| *Project Description / Proposed Land Use and/or Activities:*<br><br>The project is a mixed-use development at the gateway to the Chollas View neighborhood in South San Diego. The site is currently vacant, but portions were previously developed. Currently, Hilltop Drive does not connect to Euclid Avenue. The development proposes connecting Hilltop Drive to Euclid Avenue to increase access to Gompers Park and Millennial Tech Middle School. The development includes 113 units of affordable housing on the east side of the project, 47 for sale homes (including single-family and multifamily) on the west side of the project, and approximately 8,300 square feet of commercial space, a private park accessible to the public, and private walking trails accessible to the public along the existing arroyo. |
| *List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):*<br><br>The impervious features of the project consist of buildings, drive aisles, parking lots, recreation areas, patios, and concrete sidewalks. |
| *List/describe proposed pervious features of the project (e.g., landscape areas):*<br><br>The pervious features of the project consist of landscaping areas and undeveloped open space. |
| Does the project include grading and changes to site topography?<br>☒ Yes<br>☐ No<br><br>Description / Additional Information: |

Project Name: **Hilltop and Euclid**

**Form I-3B Page 5 of 11**

**Description of Proposed Site Drainage Patterns**

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

☒ 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 and 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 site will include re-grading and restoration of the channel that bisects the site. The site will include roof drains, area drains and gutters that will connect to an underground storm drain system on site. The onsite system will be separated into multiple drainage management areas (DMA). Most of the drainage improvements onsite will be private and will connect into the public storm drain system that will be built with the Hilltop drive extension. The drainage patterns will be maintained to drain all of the onsite and offsite flow to the new proposed culvert outlet south of Hilltop Drive.

**Form I-3B Page 6 of 11**

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
- ☐ Large Trash Generating Facilities
- ☐ Animal Facilities
- ☐ Plant Nurseries and Garden Centers
- ☐ Automotive-related Uses

Description / Additional Information:

The project will have features typical of a mixed-use development including landscaped areas, sidewalks, parking lots, refuse areas with the need for pesticides and pest control.

**Form I-3B Page 7 of 11**

**Identification and Narrative of Receiving Water**

*Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)*

The project discharges to the south to the existing channel that eventually drains to Chollas Creek. Chollas Creek flows westerly until entering the San Diego Bay.

*Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.*

- Industrial Services Supply: Includes use of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization
- Navigation: Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
- Contact Recreation: Includes use of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
- Non-Contact Recreation: Includes use of water for recreation involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- Commercial and Sport Fishing: Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
- Preservation of Biological Habitats of Special Significance: Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.
- Estuarine Habitat: Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
- Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e. g. , mammals, birds, reptiles, amphibians, invertebrates), or wildlife and food sources.
- Rare, Threatened, or Endangered Species: Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.
- Marine Habitat: Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds)

- Shellfish Harvesting: Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, sport purposes

*Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations.*

There are no ASBS receiving waters downstream of the project.

*Provide distance from project outfall location to impaired or sensitive receiving waters.*

The project is located approximately 1100 feet upstream of Chollas Creek, which is on the 303(d) list of impaired waterbodies for the following contaminants: Diazinon, indicator bacteria, Lead, Phosphorus, Nitrogen, trash, and Zinc.

*Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands*

**Form I-3B Page 8 of 11**

**Identification of Receiving Water Pollutants of Concern**

*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 |
|---|---|---|
| San Diego Bay | PCBs | From WQIP: Bacteria, Dissolved Copper, Lead, and Zinc |
| Chollas Creek | Copper, Diazinon, Indicator Bacteria, Lead, Phosphorous, TN, Trash, Zinc | From WQIP: Bacteria, Dissolved Copper, Lead, and Zinc |
| | | |

**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 anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) 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 | | | |

**Form I-3B Page 9 of 11**

**Hydromodification Management Requirements**

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- (●) 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):

**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, No critical coarse sediment yield areas to be protected based on WMAA maps

Discussion / Additional Information:

See Exhibit 2B in Attachment 2 for details.

Project Name: **Hilltop and Euclid**

| Form I-3B Page 10 of 11 |
|---|
| **Flow Control for Post-Project Runoff*** <br> ***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's HMP Exhibit.<br><br>POC 1 – Represents the area draining to the channel south of the site at the new Hilltop culvert outlet.<br>POC 2 – Represents the area draining to the channel near the middle of the project.<br>POC 3 – Represents the small onsite area draining to the channel near the northerly property line. |
| Has a geomorphic assessment been performed for the receiving channel(s)?<br>☐ No, the low flow threshold is 0.1Q2 (default low flow threshold)<br>☐ Yes, the result is the low flow threshold is 0.1Q2<br>☐ Yes, the result is the low flow threshold is 0.3Q2<br>☒ Yes, the result is the low flow threshold is 0.5Q2<br><br>If a geomorphic assessment has been performed, provide title, date, and preparer:<br><br>The geomorphic assessment was prepared by Chang Consultants. The preliminary estimate is a 0.5Q2 low flow threshold for the outlet.<br><br>Discussion / Additional Information: (optional) |

| Form I-3B Page 11 of 11 |
| --- |
| **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. |
| **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. |

Project Name: **Hilltop and Euclid**

| Source Control BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects) | Form I-4 |
|---|---|

**Project Identification**

Project Name: Hilltop And Euclid

Permit Application Number: **560527**

**Source Control BMPs**

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement source control BMPs shown in this checklist.

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 Model 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? | | |
|---|---|---|---|
| **SC-1** Prevention of Illicit Discharges into the MS4 | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-1 not implemented: | | | |
| **SC-2** Storm Drain Stenciling or Signage | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-2 not implemented: | | | |
| **SC-3** Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SC-3 not implemented:<br>No outdoor material storage areas planned. | | | |
| **SC-4** Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SC-4 not implemented:<br><br>No outdoor work areas planned. | | | |

Project Name: **Hilltop and Euclid**

| Form I-4 Page 2 of 2 | | | |
|---|---|---|---|
| **Source Control Requirement** | **Applied?** | | |
| **SC-5** Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SC-5 not implemented: | | | |
| **SC-6** Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below) | | | |
| On-site storm drain inlets | ☒ Yes | ☐ No | ☐ N/A |
| Interior floor drains and elevator shaft sump pumps | ☒ Yes | ☐ No | ☐ N/A |
| Interior parking garages | ☒ Yes | ☐ No | ☐ N/A |
| Need for future indoor & structural pest control | ☒ Yes | ☐ No | ☐ N/A |
| Landscape/Outdoor Pesticide Use | ☒ Yes | ☐ No | ☐ N/A |
| Pools, spas, ponds, decorative fountains, and other water features | ☐ Yes | ☐ No | ☒ N/A |
| Food service | ☒ Yes | ☐ No | ☐ N/A |
| Refuse areas | ☒ Yes | ☐ No | ☐ N/A |
| Industrial processes | ☐ Yes | ☐ No | ☒ N/A |
| Outdoor storage of equipment or materials | ☐ Yes | ☐ No | ☒ N/A |
| Vehicle/Equipment Repair and Maintenance | ☐ Yes | ☐ No | ☒ N/A |
| Fuel Dispensing Areas | ☐ Yes | ☐ No | ☒ N/A |
| Loading Docks | ☐ Yes | ☐ No | ☒ N/A |
| Fire Sprinkler Test Water | ☐ Yes | ☐ No | ☒ N/A |
| Miscellaneous Drain or Wash Water | ☐ Yes | ☐ No | ☒ N/A |
| Plazas, sidewalks, and parking lots | ☐ Yes | ☐ No | ☒ N/A |
| SC-6A: Large Trash Generating Facilities | ☐ Yes | ☐ No | ☒ N/A |
| SC-6B: Animal Facilities | ☐ Yes | ☐ No | ☒ N/A |
| SC-6C: Plant Nurseries and Garden Centers | ☐ Yes | ☐ No | ☒ N/A |
| SC-6D: Automotive-related Uses | ☐ Yes | ☐ No | ☒ N/A |
| Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above. | | | |

Project Name: **Hilltop and Euclid**

| Site Design BMP Checklist for All Development Projects (Standard Projects and Priority Development Projects) | Form I-5 |
|---|---|

**Project Identification**

Project Name: Hilltop And Euclid

Permit Application Number:

**Site Design BMPs**

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

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 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 site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

| Site Design Requirement | | Applied? | | |
|---|---|---|---|---|
| **SD-1** Maintain Natural Drainage Pathways and Hydrologic Features | | ☒Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-1 not implemented: | | | | |
| 1-1 | Are existing natural drainage pathways and hydrologic features mapped on the site map? | ☒Yes | ☐ No | ☐ N/A |
| 1-2 | Are street trees implemented? If yes, are they shown on the site map? | ☒Yes | ☐ No | ☐ N/A |
| 1-3 | Implemented street trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)? | ☒Yes | ☐ No | ☐ N/A |
| 1-4 | Is street tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E? | ☒Yes | ☐ No | ☐ N/A |
| **SD-2** Have natural areas, soils and vegetation been conserved? | | ☒Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-2 not implemented: | | | | |
| **SD-3** Minimize Impervious Area | | ☒Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-3 not implemented: | | | | |
| **SD-4** Minimize Soil Compaction | | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-4 not implemented: | | | | |
| **SD-5** Impervious Area Dispersion | | ☒ Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-5 not implemented: | | | | |

Project Name: **Hilltop and Euclid**

| Form I-5 Page 2 of 2 | | | | |
|---|---|---|---|---|
| **Site Design Requirement** | | **Applied?** | | |
| **SD-6** Runoff Collection | | ☐Yes | ☐ No | ☒ N/A |
| Discussion / justification if SD-6 not implemented: | | | | |
| 6a-1 | Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map? | ☐Yes | ☐ No | ☒ N/A |
| 6a-2 | Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E? | ☐Yes | ☐ No | ☒ N/A |
| 6b-1 | Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map? | ☐Yes | ☐ No | ☒ N/A |
| 6b-2 | Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E? | ☐Yes | ☐ No | ☒ N/A |
| SD-7 Landscaping with Native or Drought Tolerant Species | | ☒Yes | ☐ No | ☐ N/A |
| Discussion / justification if SD-7 not implemented: | | | | |
| **SD-8** Harvesting and Using Precipitation | | ☐ Yes | ☒ No | ☐ N/A |
| Discussion / justification if SD-8 not implemented:<br><br>Harvest & Reuse was not triggered by the Feasibility Screening Worksheet. | | | | |
| 8-1 | Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map? | ☐Yes | ☐ No | ☒ N/A |
| 8-2 | Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E? | ☐Yes | ☐ No | ☒ N/A |

Project Name: **Hilltop and Euclid**

| Summary of PDP Structural BMPs | Form I-6 (PDPs)<br>Model BMP Design Manual<br>[August 31, 2015] |
|---|---|
| **Project Identification** | |
| Project Name: : Hilltop And Euclid | |
| Permit Application Number: 560527 | |
| **PDP Structural BMPs** | |

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). 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 BMP Design 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 the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design 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 BMP Design 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.*

Overview

The stormwater management suite of BMPs on the project entails series of complementary practices to meet all stormwater performance requirements. These BMPs include utilized non-standard, non-proprietary biofiltration in a number of different forms to satisfy pollutant control requirements.

The project will rely primarily on two unlined underground storage vaults to provide the required flow attenuation for much of the site as well as some off site runon, while serving to infiltrate the necessary retention volume. One lined storage vault will be implemented for a small portion of the site where infiltration is infeasible and a WetlandMod has been implemented (near POC 3). The two unlined vaults have each been placed below a biofiltration basin sited where infiltration rates were determined highest to maximize attenuation and retention. Some additional ponding has been provided to contribute to hydromod flow attenuation with dead storage in underground vaults. The underground storages provide infiltration opportunities in concentrated areas where it is most feasible. Given the nature of this system consisting of BMPs set in series, volume retention requirements will be determined with SWMM by comparing pre/post conditions.

The project site is generally split in two sides as it is bisected by an ephemeral channel. This channel drains over 60 acres upstream and is significantly degraded with steep bank slopes and a maximum fall to the channel flowline of 10 feet or more. The proposed development will include market rate single-family homes and townhomes to the west of the Arroyo, with mixed-use commercial and residential to the east. The general grading of the site, in both existing and proposed conditions, has everything sloping south and towards the Arroyo with a significant drop in grade along the way of about 10 to 12 feet. Infiltration testing on the site suggested some infiltration is possible with results ranging from a few hundredths of an inch per hour to over 2 inches per hour. Given the variability of the site conditions,

the entire site is deemed to be suited for partial infiltration. However, as it is typically unwise to infiltrate near slope, further compounded given that development will abut the top of bank, we have developed a solution for managing stormwater on site that will maximize infiltration where there is the most potential without risk of destabilizing the slope. Therefore Basin C and Basin D will include underground dead storage that will also receive the outfall from upstream BMPs to provide hydromod attenuation and contribute to volume retention through dead storage in underground HMP vault. Therefore, on a project-level basis, the partial-infiltration condition is satisfied, even though some of the BMPs will be lined.

The project driveways and the street improvements along Hilltop will be managed with two separate Modular Wetland units. The improvements along Euclid will be addressed with green streets elements. See Appendix J1 in Attachment 1e for further information.

Integrated Basins For Hydromod and Retention

The basins are composed of both above and below ground storage as well as biofiltration media and other components in between. Both the underdrain outflow and the overflow are routed into the underground storage vault. The gravel is disconnected hydraulically from the storage vault with a liner and the underdrain will be capped with an orifice to restrict flow. This will have the effect of allowing both the above and below ground storage to fill up concurrently. High infiltration rate media will be used to allow water to quickly pass through to the underdrain connecting the upper and lower storages, making that the control at the bottom of the biofiltration gravel rather than above the media. This will also have the effect of allowing a larger load to clog to be used in the Alternative Minimum Sizing Factor Calculation.

DCV Reduction

The site will include dispersion areas throughout the single family portion of the western part of the project. These will be included as site design features to reduce the DCV and contribute to volume retention requirements. Composite C values have been developed as a part of the DCV calculation based on an assumed percentage of roof area that could reasonably be received onto a dispersion area. These values range from 10-30% of the roof areas with impervious to dispersion area ratios assumed based on the configurations of the homes and townhomes.

Hydromodification

Basin D and Basin C are integrated biofiltration/hydromodification BMPs with underground vault storage, open to the subsurface with dead storage for infiltration. Each underground vault storage takes the outflow from the other BMPs to increase the volume controlled, and potential for infiltration. Thereby, both pollutant and hydromodification control requirements are provided by arranging BMPs in series at multiple scales throughout the site and internally to the BMPs themselves, with the coupled biofiltration and hydromodification storage components.

Volume Retention

Volume retention requirements for this site will need to be demonstrated that they are met through continuous simulation modeling given as it is the hydromod storage components of the integrated Biofiltration BMPs that will be providing the bulk of the infiltration volume. The volume retention performance of this system is provided by a number of various factors, including the placement of one of the open storage volumes, under Basin C, within the area experiencing the greatest infiltration rates, as well as the fact that this volume, and that below Basin D, will have significant dead storage volumes

and be receiving treated runoff for infiltration from other upstream BMPs. Dispersion areas have been incorporated to provide, in concert with the dead storage underneath Basin C and D, the equivalent or greater average annual volume retention standard when compared to the average annual volume retention achieved by standard biofiltration on an average DMA basis. Refer to Attachment 1 for further information.

Project Name: **Hilltop and Euclid**

| Form I-6 Page 2 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 1 : Basin 'A' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☒ Biofiltration (BF-1)<br>☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☒ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | Affirmed Housing |
| Who will maintain this BMP into perpetuity? | Affirmed Housing |
| What is the funding mechanism for maintenance? | Revenue from project |

Project Name: **Hilltop and Euclid**

| Form I-6 Page 3 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 2: WETMOD 'B' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☒ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☒ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | Affirmed Housing |
| Who will maintain this BMP into perpetuity? | Affirmed Housing |
| What is the funding mechanism for maintenance? | Revenue from project |

Project Name: **Hilltop and Euclid**

| Form I-6 Page 4 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 3: BASIN 'C' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☒ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☒ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☒ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | Affirmed Housing |
| Who will maintain this BMP into perpetuity? | Affirmed Housing |
| What is the funding mechanism for maintenance? | Revenue from project |

Project Name: **Hilltop and Euclid**

| Form I-6 Page 4 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 4: BASIN 'D' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☒ Biofiltration (BF-1)<br>☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☒ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☒ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | Affirmed Housing |
| Who will maintain this BMP into perpetuity? | Affirmed Housing |
| What is the funding mechanism for maintenance? | Revenue from project |

Project Name: **Hilltop and Euclid**

| Form I-6 Page 4 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 5: Modular Wetland 'S1' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☒ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | Affirmed Housing |
| Who will maintain this BMP into perpetuity? | Affirmed Housing |
| What is the funding mechanism for maintenance? | Revenue from taxes |

Project Name: **Hilltop and Euclid**

| Form I-6 Page 4 of 4 |
|---|
| **Structural BMP Summary Information**<br>**(Copy this page as needed to provide information for each individual proposed structural BMP)** |
| Structural BMP ID No. 6: Modular Wetland 'S2' |
| Construction Plan Sheet No. |
| Type of structural BMP:<br>☐ Retention by harvest and use (HU-1)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☒ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ 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)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) |
| Purpose:<br>☒ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ 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 BMP Design Manual) | Project Design Consultants<br>619-235-6471 |
| Who will be the final owner of this BMP? | City of San Diego |
| Who will maintain this BMP into perpetuity? | City of San Diego |
| What is the funding mechanism for maintenance? | Revenue from taxes |

Project Name: **Hilltop and Euclid**

# ATTACHMENT 1

# BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Project Name: **Hilltop and Euclid**

**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| Attachment 1a | DMA Exhibit (Required)<br><br>See DMA Exhibit Checklist. | ☒ Included |
| Attachment 1b | Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)*<br><br>*Provide table in this Attachment OR on DMA Exhibit in Attachment 1a | ☒ Included on DMA Exhibit in Attachment 1a<br>☐ 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)<br><br>Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7. | ☒ Included<br>☐ Not included because the entire project will use infiltration BMPs |
| Attachment 1d | Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs)<br><br>Refer to Appendices C and D of the BMP Design Manual to complete Form I-8. | ☒ Included<br>☐ Not included because the entire project will use harvest and use BMPs |
| Attachment 1e | Pollutant Control BMP Design Worksheets / Calculations (Required)<br><br>Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations | ☒ Included |

Project Name: **Hilltop and Euclid**

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

The DMA 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 and impervious areas
- ☐ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed demolition
- ☐ 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)

Project Name: **Hilltop and Euclid**

# ATTACHMENT 1a-1b
# DMA Exhibit with Summary

## LEGEND:

- PROPERTY BOUNDARY
- DRAINAGE MANAGEMENT AREA (DMA)
- IMPERVIOUS AREA FLOWING TO ADJACENT DISPERSION AREA (TYP).
- UNDERGROUND DETENTION

| DMA SUMMARY | | |
|---|---|---|
| DMA ID | DMA TYPE | DRAINAGE AREA (Ac) |
| A | Drains to BASIN A | 0.68 |
| B | Drains to MWS B | 0.54 |
| C | Drains to BASIN C | 0.26 |
| D1 | Drains to BASIN A | 0.75 |
| D2 | Drains to BASIN D | 0.83 |
| SF | Drains to BASIN D | 5.12 |
| S1 | Drains to MWS S1 | 0.64 |
| S2 | Green Street | 0.22 |
| S3 | Green Street | 1.50 |

## BMP NOTES:

1. SITE DESIGN BMPS INCLUDE:
   - MINIMIZATION OF IMPERVIOUS FOOTPRINT
   - IMPERVIOUS DISPERSION
   - STREET TREES
2. SOURCE CONTROL BMPs FOR PROJECT INCLUDE:
   - INTEGRATED PEST MANAGEMENT PRINCIPLES
   - EFFICIENT LANDSCAPE AND IRRIGATION DESIGN
   - STORMWATER EDUCATION
   - BUILDING MANAGEMENT PRACTICES (MANAGEMENT OF FIRE SPRINKLER SYSTEM DISCHARGES, AIR CONDITIONING CONDENSATE DISCHARGES, AND THE USE OF NON-TOXIC ROOFING MATERIALS.)
3. THE TREATMENT BMPS SELECTED FOR THIS PROJECT ARE 1 LINED BIOFILTRATION, 1 WETLAND MOD, 2 BIOFILTRATION AREAS WITH HYDROMODICATION STORAGE AND 2 MODULAR WETLAND UNITS.
4. PROJECT WILL OUTLET TO AN EPHEMERAL CHANNEL WHICH CONFLUENCES WITH CHOLLAS CREEK IS SHORTLY OFFSITE AND THUS SUBJECT TO HYDROMODIFICATION REQUIREMENTS
5. THE NRCS SOIL SURVEY CLASSIFIES THE SITE SOILS AS HYDROLOGIC SOIL GROUP 'D'
6. GROUNDWATER WAS NOT ENCOUNTERED WITHIN 22' OF SURFACE

N

0 10 20 30 60 90

GRAPHICAL SCALE

WETMOD 'B'
WETLAND MOD W/UNDERGROUND STORAGE

DMA 'B'
0.54 Ac.
Drains to WETMOD 'B'

DMA 'A'
0.68 Ac.
Drains to BASIN 'A'

DMA 'SF'
5.02 Ac.
Drains to BASIN 'D'

DMA 'D1'
0.75 Ac.
Drains to BASIN 'A'

DMA C
0.26 Ac.
Drains to BASIN 'C'

DMA D2
0.83 Ac.
Drains to BASIN 'D'

BASIN 'C'
BIOFILTRATION W/ UNDERGROUND STORAGE

BASIN 'A'
LINED BIOFILTRATION
Drains to BASIN 'C' STORAGE

DMA 'S3'
1.48 Ac.
GREEN STREET

BASIN 'D'
BIOFILTRATION W/ UNDERGROUND ARCH CHAMBER

DMA 'S1'
0.64 Ac.
DRAINS TO MW 'S1'

MW 'S1'
MODULAR WETLAND

MW 'S2'
MODULAR WETLAND

DMA 'S2'
0.22 Ac. DRAINS TO MODULAR WETLAND

TYPICAL DISPERSION AREA 10-30% SEE ATTACHMENT 1E.

| | |
|---|---|
| SCALE: | 1"=30' |
| JOB #: | 4210 |
| CREATED: | 6/28/17 |

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
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619.234.0349 Fax

**CITY OF SAN DIEGO**

**HILLTOP AND EUCLID GATEWAY MIXED-USE**

*ATTACHMENT 1a-1b*
*DMA EXHIBIT*

Project Name: **Hilltop and Euclid**

# ATTACHMENT 1c
# Harvest and Use Feasibility Screening Checklist

| Harvest and Use Feasibility Checklist | Form I-7 |
|---|---|

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]

Landscape Irrigation:
Assume 95,396 SF of landscaping = 2.19 Ac.
Mod. Water Use:
1470 g/ac/36 hours x 2.19 Ac. = 3219 gallons (CF/7.48 gallons) = 430 CF

3. Calculate the DCV using worksheet B-2.1.
DCV = 8,363 (cubic feet)

| 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 ⇨ ⇩ 0.25DCV=2090 CF | ☒ 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. |

Is harvest and use feasible based on further evaluation?

☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☒ No, select alternate BMPs.

**Table B.3-1: Toilet and Urinal Water Usage per Resident or Employee**

| Land Use Type | Toilet User Unit of Normalization | Per Capita Use per Day | | Visitor Factor[4] | Water Efficiency Factor | Total Use per Resident or Employee |
|---|---|---|---|---|---|---|
| | | Toilet Flushing[1,2] | Urinals[3] | | | |
| Residential | Resident | 18.5 | NA | NA | 0.5 | 9.3 |
| Office | Employee (non-visitor) | 9.0 | 2.27 | 1.1 | 0.5 | 7 (avg) |
| Retail | Employee (non-visitor) | 9.0 | 2.11 | 1.4 | 0.5 | |
| Schools | Employee (non-student) | 6.7 | 3.5 | 6.4 | 0.5 | 33 |
| Various Industrial Uses (excludes process water) | Employee (non-visitor) | 9.0 | 2 | 1 | 0.5 | 5.5 |

[1]Based on American Waterworks Association Research Foundation, 1999. Residential End Uses of Water. Denver, CO: AWWARF

[2]Based on use of 3.45 gallons per flush and average number of per employee flushes per subsector, Table D-1 for MWD (Pacific Institute, 2003)

[3]Based on use of 1.6 gallons per flush, Table D-4 and average number of per employee flushes per subsector, Appendix D (Pacific Institute, 2003)

[4]Multiplied by the demand for toilet and urinal flushing for the project to account for visitors. Based on proportion of annual use allocated to visitors and others (includes students for schools; about 5 students per employee) for each subsector in Table D-1 and D-4 (Pacific Institute, 2003)

[5]Accounts for requirements to use ultra-low flush toilets in new development projects; assumed that requirements will reduce toilet and urinal flushing demand by half on average compared to literature estimates. Ultra low flush toilets are required in all new construction in California as of January 1, 1992. Ultra low flush toilets must use no more than 1.6 gallons per flush and Ultra low flush urinals must use no more than 1 gallon per flush. Note: If zero flush urinals are being used, adjust accordingly.

### B.3.2.2 General Requirements for Irrigation Demand Calculations

The following guidelines should be followed for computing harvested water demand from landscape irrigation:

- If reclaimed water is planned for use for landscape irrigation, then the demand for harvested storm water should be reduced by the amount of reclaimed water that is available during the wet season.
- Irrigation rates should be based on the irrigation demand exerted by the types of landscaping that are proposed for the project, with consideration for water conservation requirements.
- Irrigation rates should be estimated to reflect the average wet season rates (defined as November through April) accounting for the effect of storm events in offsetting harvested water demand. In the absence of a detailed demand study, it should be assumed that irrigation demand is not present during days with greater than 0.1 inches of rain and the subsequent 3-day period. This irrigation shutdown period is consistent with standard practice in land application of wastewater and is applicable to storm water to prevent irrigation from resulting in dry weather runoff. Based on a statistical analysis of San Diego County rainfall patterns, approximately 30 percent of wet season days would not have a demand for irrigation.

- If land application of storm water is proposed (irrigation in excess of agronomic demand), then this BMP must be considered to be an infiltration BMP and feasibility screening for infiltration must be conducted. In addition, it must be demonstrated that land application would not result in greater quantities of runoff as a result of saturated soils at the beginning of storm events. Agronomic demand refers to the rate at which plants use water.

The following sections describe methods that should be used to calculate harvested water irrigation demand. While these methods are simplified, they provide a reasonable estimate of potential harvested water demand that is appropriate for feasibility analysis and project planning. These methods may be replaced by a more rigorous project-specific analysis that meets the intent of the criteria above.

## Demand Calculation Method

This method is based on the San Diego Municipal Code Land Development Code Landscape Standards Appendix E which includes a formula for estimating a project's annual estimated total water use based on reference evaporation, plant factor, and irrigation efficiency.

For the purpose of calculating harvested water irrigation demand applicable to the sizing of harvest and use systems, the estimated total water use has been modified to reflect typical wet-season irrigation demand. This method assumes that the wet season is defined as November through April. This method further assumes that no irrigation water will be applied during days with precipitation totals greater than 0.1 inches or within the 3 days following such an event. Based on these assumptions and an analysis of Lake Wohlford, Lindbergh and Oceanside precipitation patterns, irrigation would not be applied during approximately 30 percent of days from November through April.

The following equation is used to calculate the Modified Estimated Total Water Usage.

**Equation B.3-1: Modified Estimated Total Water Usage**

$$\text{Modified ETWU} = ETo_{Wet} \times [[\Sigma(PF \times HA)/IE] + SLA] \times 0.015$$

where:

| | | |
|---|---|---|
| Modified ETWU | = | Estimated daily average water usage during wet season |
| $ETo_{Wet}$ | = | Average reference evapotranspiration from November through April (use 2.7 inches per month, using CIMS Zone 4 from Table G.1-1) |
| PF | = | Plant Factor |
| HA | = | Hydrozone Area (sq-ft); A section or zone of the landscaped area having plants with similar water needs. $\Sigma$(PF x HA) = The sum of PF x HA for each individual Hydrozone (accounts for different landscaping zones). |
| IE | = | Irrigation Efficiency (assume 90 percent for demand calculations) |
| SLA | = | Special Landscape Area (sq-ft); Areas used for active and passive recreation areas, areas solely dedicated to the production of fruits and vegetables, and areas irrigated with reclaimed water. |

**Table B.3-2: Planning Level Plant Factor Recommendations**

| Plant Water Use | Plant Factor | Also Includes |
|---|---|---|
| Low | < 0.1 – 0.2 | Artificial Turf |
| Moderate | 0.3 – 0.7 | |
| High | 0.8 and greater | Water features |
| Special Landscape Area | 1.0 | |

In this equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for the three days following a significant precipitation event:

0.015 = (1 mo/30 days)×(1 ft/12 in)×(7.48 gal/cu-ft)×(approximately 7 out of 10 days with irrigation demand from November through April)

## Planning Level Irrigation Demands

To simplify the planning process, the method described above has been used to develop daily average wet season demands for a one-acre irrigated area based on the plant/landscape type. These demand estimates can be used to calculate the drawdown of harvest and use systems for the purpose of LID BMP sizing calculations.

**Table B.3-3: Planning Level Irrigation Demand by Plant Factor and Landscape Type**

| General Landscape Type | 36-Hour Planning Level Irrigation Demand (gallons per irrigated acre per 36 hour period) |
|---|---|
| Hydrozone – Low Plant Water Use | 390 |
| Hydrozone – Moderate Plant Water Use | 1,470 |
| Hydrozone – High Plant Water Use | 2,640 |
| Special Landscape Area | 2,640 |

### B.3.2.3 Calculating Other Harvested Water Demands

Calculations of other harvested water demands should be based on the knowledge of land uses, industrial processes, and other factors that are project-specific. Demand should be calculated based on the following guidelines:

- Demand calculations should represent actual demand that is anticipated during the wet season (November through April).
- Sources of demand should only be included if they are reliably and consistently present during the wet season.
- Where demands are substantial but irregular, a more detailed analysis should be conducted based on a statistical analysis of anticipated demand and precipitation patterns.

Project Name: **Hilltop and Euclid**

# ATTACHMENT 1d
# Categorization of Infiltration Feasibility Condition

# PARTIAL INFILTRATION CONDITION

## Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

| Categorization of Infiltration Feasibility Condition | Worksheet C.4-1 |
|---|---|

**Part 1 - Full Infiltration Feasibility Screening Criteria**

**Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**

Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.

| Criteria | Screening Question | Yes | No |
|---|---|---|---|
| 1 | **Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | | X |

Provide basis:

*DMA C: After applying a minimum factor of safety (F) of F=2; the infiltration rates at locations P-5(0.03), P-11(0.1), and P-13(0.22) are less than 0.5 inches per hour and at location P-12(2.16) is greater than 0.5 inches per hour. Due to the variability of the rates observed, the reliable infiltration rate for DMA C is recommended to be less than 0.5 inches per hour.*

*DMA D: After applying a minimum factor of safety (F) of F=2; the infiltration rate at location P-16(0.02) is less than 0.5 inches per hour and at location P-7 (0.51) is greater than 0.5 inches per hour. Due to the variability of the rates observed, the reliable infiltration rate for DMA D is recommended to be less than 0.5 inches per hour.*

*Potential DMA Areas: After applying a minimum factor of safety (F) of F=2; the infiltration rates at locations P-4(0.03), P-5(0.03), P-11(0.1), P-14(0.04), P-8(0.08) and P-15(0.34) are less than 0.5 inches per hour and at location P-9(1.67) is greater than 0.5 inches per hour. Due to the variability of the rates observed, the reliable infiltration rate for the potential DMA areas is recommended to be less than 0.5 inches per hour*

| | | | |
|---|---|---|---|
| 2 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2. | | X |

Provide basis:

*C2.1 A geologic investigation was performed at the subject site.*
*C2.2 Settlement due to water infiltration is possible; however, this can be avoided by the implementation of impermeable liners.*
*C2.3 BMPs are not anticipated to be located near slopes on this site. Infiltration has the to potential to cause slope failures. BMPs are to be sited a minimum of 50 feet away from any slope.*
*C2.4 Infiltration can potentially damage subsurface and underground utilities. BMPs are to be sited a minimum of 10 feet away from all underground utilities.*
*C2.5 Stormwater infiltration can result in damaging ground water mounding during wet periods.*
*C2.6 BMPs are not anticipated to be located near foundations or retaining walls. Infiltration has the potential to increase lateral pressure and reduce soil strength which can impact foundations and retaining walls. BMPs are to be sited a minimum of 10 feet away from any foundations or retaining walls.*
*C2.7 Other Factors: The testing performed at locations P-5, P-7, P-9, P-10 and P-12 yielded infiltration rates that indicate a full infiltration condition. However, based upon the variability within each DMA, it is recommended that a partial infiltration condition be utilized for the DMA design.*

| Worksheet C.4-1 Page 2 of 4 | | | |
|---|---|---|---|
| Criteria | Screening Question | Yes | No |
| 3 | **Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3. | | |
| Provide basis:<br>*Water contamination was not evaluated by NOVA services.* | | | |
| 4 | **Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3. | | |
| Provide basis:<br>*The potential for water balance was not evaluated by NOVA services.* | | | |
| **Part 1 Result*** | If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration**<br><br>If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2 | *Proceed to Part 2* | |

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by County staff to substantiate findings.

**Worksheet C.4-1 Page 3 of 4**

**Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria**

**Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?**

| Criteria | Screening Question | Yes | No |
|---|---|---|---|
| 5 | **Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D. | X | |

Provide basis:

*DMA C: After applying a minimum factor of safety (F) of F=2; the infiltration rates at locations P-5(0.03), P-11(0.1), and P-13(0.22) are less than 0.5 inches per hour and at location P-12(2.16) is greater than 0.5 inches per hour. These rates indicate that the soil and geologic conditions allow for in filtration in an appreciable rate or volume.*

*DMA D: After applying a minimum factor of safety (F) of F=2; the infiltration rate at location P-16(0.02) is less than 0.5 inches per hour and at location P-7 (0.51) is greater than 0.5 inches per hour. These rates indicate that the soil and geologic conditions allow for in filtration in an appreciable rate or volume.*

*Potential DMA Areas: After applying a minimum factor of safety (F) of F=2; the infiltration rates at locations P-4(0.03), P-5(0.03), P-11(0.1), P-14(0.04), P-8(0.08) and P-15(0.34) are less than 0.5 inches per hour and at location P-9(1.67) is greater than 0.5 inches per hour. These rates indicate that the soil and geologic conditions allow for in filtration in an appreciable rate or volume.*

| | | | |
|---|---|---|---|
| 6 | **Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2. | X | |

Provide basis:

*C2.1 A geologic investigation was performed at the subject site.*
*C2.2 Settlement due to water infiltration is possible; however, this can be avoided by the implementation of impermeable liners.*
*C2.3 BMPs are not anticipated to be located near slopes on this site. Infiltration has the to potential to cause slope failures. BMPs are to be sited a minimum of 50 feet away from any slope.*
*C2.4 Infiltration can potentially damage subsurface and underground utilities. BMPs are to be sited a minimum of 10 feet away from all underground utilities.*
*C2.5 Stormwater infiltration can result in damaging ground water mounding during wet periods.*
*C2.6 BMPs are not anticipated to be located near foundations or retaining walls. Infiltration has the potential to increase lateral pressure and reduce soil strength which can impact foundations and retaining walls. BMPs are to be sited a minimum of 10 feet away from any foundations or retaining walls.*
*C2.7 Other Factors: The testing performed at locations P-5, P-7, P-9, P-10 and P-12 yielded infiltration rates that indicate a full infiltration condition. However, based upon the variability within each DMA, it is recommended that a partial infiltration condition be utilized for the DMA design.*

| Worksheet C.4-1 Page 4 of 4 | | | |
|---|---|---|---|
| Criteria | Screening Question | Yes | No |
| 7 | **Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3. | | |
| Provide basis:<br>*Water contamination was not evaluated by NOVA services.* | | | |
| 8 | **Can infiltration be allowed without violating downstream water rights?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3. | | |
| Provide basis:<br>*The potential for water balance was not evaluated by NOVA services.* | | | |
| **Part 2 Result*** | If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.**<br><br>If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.** | *Partial Infiltration* | |

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

Project Name: **Hilltop and Euclid**

# ATTACHMENT 1e
# Pollutant Control BMP Design Worksheets/Calculations

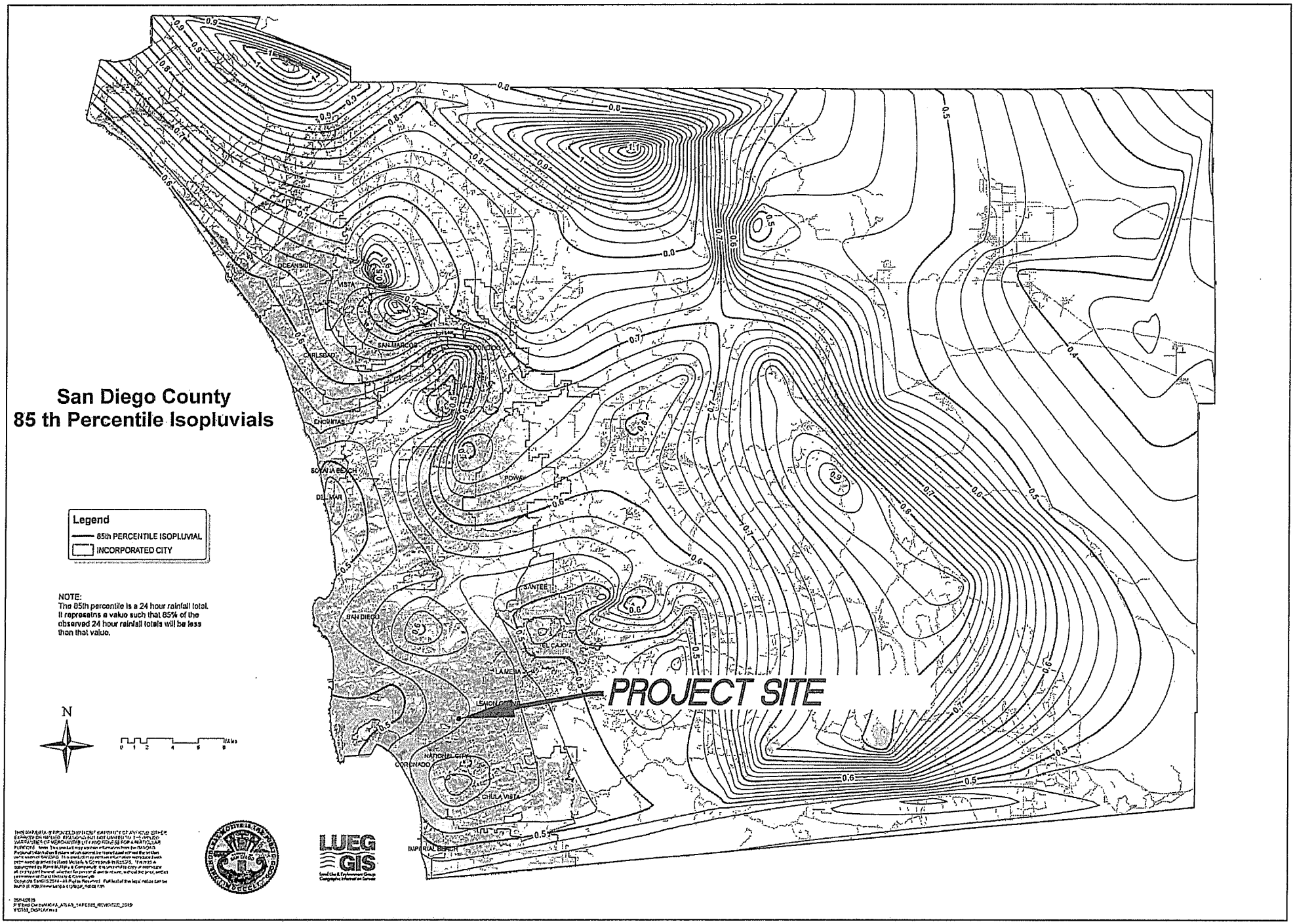



Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

ATTACHMENT 1B: Worksheet B.2-1: DCV

85th percentile 24-hr storm depth from Figure B.1.= 0.54 in

| DMA ID | BMP ID | BMP Drainage Area (ac) | Undispersed Impervious Area (ac) | Dispersed IA (ac) | Dispersion Area (ac) | DIA C[2] (Table B.2-1) | Amended Soils (ac) (C=0.1) | Engr. Perv. Surf. (ac) (C=0.3) | % Impervious | Composite C[1] | Design Capture Volume (DCV) (CF) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | Basin A | 0.68 | 0.379 | 0.132 | 0.10 | 0.00 | 0.169 | | 75.2% | 0.53 | 702 |
| D1 | Basin A | 0.75 | 0.728 | | | | 0.023 | | 97.0% | 0.88 | 1289 |
| | Totals for Basin A | 1.43 | 1.11 | 0.13 | 0.10 | 0.00 | 0.19 | | 86.6% | 0.71 | 1991 |
| B | Wetmod B | 0.54 | 0.497 | | | | 0.043 | 0.040 | 92.0% | 0.86 | 909 |
| C | Basin C | 0.26 | 0.247 | | | | 0.013 | | 95.0% | 0.86 | 438 |
| SF - Offsite | Basin D | 1.17 | 0.995 | | | | 0.176 | | 85.0% | 0.78 | 1789 |
| D2 | Basin D | 0.83 | 0.784 | | | | 0.046 | | 94.5% | 0.86 | 1392 |
| SF | Basin D | 3.85 | 1.807 | 0.289 | 0.10 | 0.25 | 1.754 | | 54.4% | 0.49 | 3673 |
| | Totals for Basin D | 5.85 | 3.59 | 0.29 | 0.10 | 0.25 | 1.80 | | 0.662 | 0.595 | 6820 |
| S1 | MW S1 | 0.64 | 0.48 | | | | 0.16 | | 75.0% | 0.70 | 879 |
| S2 | MW S2 | 0.22 | 0.16 | | | | 0.060 | | 72.7% | 0.68 | 294 |

Notes:

1) Equation for composite C factor = (0.9*Impervious Area + C*Pervious Area)/Total Area per BMP Design Manual.

C factors are from Table B.1-1 of City of San Diego BMP Design Manual.

2) Composite value calculated based on weighted average of C value per ratio of land coverages and dispersion credits calculated below in the Land Use Cover and Dispersion Credit Accounting worksheet

**Indivdual DMA Imperviousness and Dispersion Credit Accounting**[1]

| DMA ID | Subset | Sf/unit | # Units | Area (sf) | % IA Disp[2] | Disp IA (sf) | Ratio | Disp Area | C |
|---|---|---|---|---|---|---|---|---|---|
| SF | SF Detached - L | 1675 | 6 | 10050 | 30 | 3015 | 2:1 | 1508 | 0 |
| | SF Detached - SM | 1475 | 14 | 20650 | 20 | 4130 | 3:1 | 1377 | 0.23 |
| | Row home - L | 1096 | 14 | 15344 | 20 | 3068.8 | 4:1 | 767 | 0.36 |
| | Row home - SM | 915 | 13 | 11895 | 20 | 2379 | 4:1 | 595 | 0.36 |
| | **subtotal** | | | **91304** | | **12593** | | **4246** | **0.25** |
| | Road and sidewalk (sf) | - | - | 33365 | 0 | 0 | 0 | 0 | 0.95 |

1) Areas and C values developed here are used in worksheet B.2-1

2) Conservative estimate of feasible amount of roof drainage to disperse and yard area to receive, given typ. footprint of house and yard

| | | Impervious Area (sf) | Disp IA (sf) | Dispersion Area (sf) | Ratio |
|---|---|---|---|---|---|
| A | Bldg C West Roofs | 6860 | 5760 | 2080 | 1:1 |
| | Sidewalks | 4252 | | 2943 | 2:1 |
| | Common and pool | 2943 | - | - | - |
| B | Pavement | 17991 | - | - | - |
| | Building | 3650 | - | - | - |
| C | Pavement | 4359 | - | - | - |
| | Building | 6400 | - | - | - |
| D1 | Pavement | | - | - | - |
| | Building | 11000 | - | - | - |
| D2 | Pavement | 22055 | - | - | - |
| | Building | 12100 | - | - | - |
| S1 | Pavement | 20918 | - | - | - |
| S2 | Pavement | 4405 | - | - | - |

**Modular Wetland Sizing Calculations**

| DMA-ID | A (sf) | Impervious (sf) | %IMP | C | 1.5 x Q (cfs) | MWS Qdesign | MWS Model |
|---|---|---|---|---|---|---|---|
| B | 23522 | 21649 | 92% | 0.8363 | 0.135 | 0.144 | WetMOD 4x20 |
| S1 | 27878 | 20909 | 75% | 0.7000 | 0.134 | 0.147 | MWS-L-6-8 |
| S2 | 9583 | 6970 | 73% | 0.6818 | 0.045 | 0.052 | MWS-L-4-4 |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin D | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 259182 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.59 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 6881 | 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 | 24 | 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 | 9 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 51 | 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.) | 0.08 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 0.48 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 40.8 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 41.28 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 10322 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 3001 | 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] | 5161 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 1518 | 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.5-3) | 0.015 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 2294 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 2294 | sq. ft. |
| 23 | Provided BMP Footprint | 2,300 | sq. ft. |
| 24 | Is Line 23 > Line 22? | **Yes, Performance Standard is Met** | |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin D | |
| **Sizing Method for Volume Retention Criteria** | | **Worksheet B.5-2** | |
| 1 | Area draining to the BMP | 259182 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.59 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 6881 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Footprint of the BMP | 1918 | sq. ft. |
| 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 | Media retained pore space [50% of (FC-WP)] | 0.05 | in/in |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 24 | inches |
| 9 | Porosity of aggregate storage | 0.4 | in/in |
| **Volume Retention Requirement** | | | |
| 10 | Measured infiltration rate in the DMA | 0.8 | in/hr. |
| 11 | Factor of safety | 2 | |
| 12 | Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]<br>Note: This worksheet is not applicable if Line 12 < 0.01 in/hr. | 0.4 | in/hr. |
| 13 | Average annual volume reduction target (Figure B.5-2)<br>When Line 12 ≥0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62) | 40.0 | % |
| 14 | Fraction of DCV to be retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$ | 0.322 | |
| 15 | Target volume retention [Line 14 x Line 4] | 2216 | cu. ft. |
| **Evapotranspiration: Average Annual Volume Retention** | | | |
| 16 | Effective evapotranspiration depth [Line 6 x Line 7] | 0.9 | inches |
| 17 | Retained Pore Volume [(Line 16 x Line 5)/12] | 144 | cu. ft. |
| 18 | Fraction of DCV retained in pore spaces [Line 17/Line 4] | 0.02 | |
| 19 | Evapotranspiration average annual capture [ET nomographs in Figure B.5-5] | 1.7 | % |
| **Infiltration: Average Annual Volume Retention** | | | |
| 20 | Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12] | 24 | hours |
| 21 | Equivalent DCV fraction from evapotranspiration<br>(use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2 ) | 0.01 | |
| 22 | Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12] | 1534 | cu. ft. |
| 23 | Infiltration Storage Fraction of DCV [Line 22/Line 4] | 0.22 | |
| 24 | Total Equivalent Fraction of DCV [Line 21 + Line 23] | 0.23 | |
| 25 | Biofiltration BMP average annual capture<br>[use Line 24 and 20 in Figure B.4-1] | 35.69 | % |
| **Volume retention required from site design and other BMPs** | | | |
| 26 | Fraction of DCV retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$ | 0.279 | |
| 27 | Remaining target DCV retention [(Line 14 – Line 26) x Line 4]<br>Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard.<br>If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard | 296 | cu. ft. |

**Target Volume retention from site design and other BMPs = 296 cubic feet**

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin D (DMA SF) | |
| **Volume Retention From Amended Soils** | | **Worksheet B.5-6** | |
| 1 | Impervious area draining to the pervious area | 12593 | sq. ft. |
| 2 | Pervious area (must meet the requirements in SD-4 and SD-5 Fact Sheets) | 4246 | sq. ft. |
| 3 | Measured Infiltration Rate | 0.383333333 | in/hr. |
| 4 | Factor of Safety | 2 | |
| 5 | Reliable Infiltration Rate [Line 3/Line 4] | 0.191666667 | |
| 6 | Impervious area runoff factor | 0.9 | |
| 7 | Runoff factor of pervious area<br>Line 5 < 0.01 in/hr. = 0.9<br>0.01 ≤ Line 5 < 0.05 in/hr. = 0.30<br>0.05 ≤Line 5 < 0.15 in/hr. = 0.23<br>0.15 ≤Line 5 < 0.30 in/hr. = 0.14<br>Line 5 ≥ 0.30 in/hr. = 0.10 | 0.14 | |
| 8 | Area weighted runoff factor<br>[(Line 1 x Line 6 + Line 2 x Line 7)/(Line 1 + Line 2)] | 0.71 | |
| 9 | 85$^{th}$ Percentile 24-hour rainfall depth | 0.54 | inches |
| 10 | Dispersion Ratio [Line 1/Line 2]<br>Note: This worksheet is not applicable when Line 5 > 50 or Line 5 < 0.25 | 3 | |
| 11 | Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18") | 12 | inches |
| 12 | Post amendment runoff factor (Based on Figures B.5.6 to B.5.11) | 0.09 | |
| 13 | Volume retention due to dispersion and amendment<br>If Line 12 ≥Line 8 then Line 13 = 0; Else<br>[(Line 8 – Line 12) x (Line 1 + Line 2) x Line 9 x 1/12] | 470 | cu. ft. |

| The City of SAN DIEGO | Project Name | Hilltop |
|---|---|---|
| | BMP ID | (Basin D) Westside - Multi + Single Family |
| Alternative Minimum Footprint Sizing Factor | | Worksheet B.5-3 |

| | | | |
|---|---|---|---|
| 1 | Area draining to the BMP | 254826 | sq. ft. |
| 2 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.595 | |
| 3 | Load to Clog | 2 | lb/sq. ft. |
| 4 | Allowable Period to Accumulate Clogging Load ($T_L$) | 10 | years |

**Volume Weighted EMC Calculation**

| Land Use | Fraction of Total DCV | TSS EMC (mg/L) | Product |
|---|---|---|---|
| Single Family Residential | 0.36 | 123 | 44.28 |
| Commercial | | 128 | 0 |
| Industrial | | 125 | 0 |
| Education (Municipal) | | 132 | 0 |
| Transportation | | 78 | 0 |
| Multi-family Residential | 0.64 | 40 | 25.6 |
| Roof Runoff | | 14 | 0 |
| Low Traffic Areas | | 50 | 0 |
| Open Space | | 216 | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |

| | | | |
|---|---|---|---|
| 5 | Volume Weighted EMC (sum of all products) | 69.88 | mg/L |

**Sizing Factor for Clogging**

| | | | |
|---|---|---|---|
| 6 | Adjustment for pretreatment measures<br>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." | 0.25 | |
| 7 | Average Annual Precipitation [Provide documentation of the data source in the discussion box; SanGIS has a GIS layer for average annual precipitation] | 11 | inches |
| 8 | Calculate the Average Annual Runoff (Line 7 x Line 1/12) x Line2 | 138986 | cu-ft/yr |
| 9 | Calculate the Average Annual TSS Load<br>(Line 8 x 62.4 x Line 5 x (1 – Line 6))/$10^6$ | 455 | lb/yr |
| 10 | Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3 | 2273 | sq. ft. |
| 11 | Calculate the Minimum Footprint Sizing Factor for Clogging<br>[ Line 10/ (Line 1 x Line 2)] | 0.015 | |

**Discussion:**

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin A | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 62290.8 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.71 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 1990 | 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 | 24 | 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 | 26 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 3 | 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.) | 0.01 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 0.06 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 22.4 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 22.46 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 2985 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 1595 | 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] | 1493 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 800 | 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.5-3) | 0.014 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 619 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 800 | sq. ft. |
| 23 | Provided BMP Footprint | 822 | sq. ft. |
| 24 | Is Line 23 > Line 22? | **Yes, Performance Standard is Met** | |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin C | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 11325.6 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.86 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 438 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Surface ponding [6 inch minimum, 12 inch maximum] | 10 | 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 | 24 | 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 | 3 | 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.) | 0.03 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 0.18 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 22 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 22.18 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 657 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 356 | 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] | 329 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 179 | 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.5-3) | 0.014 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 136 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 179 | sq. ft. |
| 23 | Provided BMP Footprint | 638 | sq. ft. |
| 24 | Is Line 23 > Line 22? | **Yes, Performance Standard is Met** | |

| The City of SAN DIEGO | Project Name | Hilltop |
|---|---|---|
| | BMP ID | (Basin A+C) Eastside - Multi + Single Family |
| **Alternative Minimum Footprint Sizing Factor** | | **Worksheet B.5-3** |

| | | | |
|---|---|---|---|
| 1 | Area draining to the BMP | 254826 | sq. ft. |
| 2 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.595 | |
| 3 | Load to Clog | 2 | lb/sq. ft. |
| 4 | Allowable Period to Accumulate Clogging Load ($T_L$) | 10 | years |

**Volume Weighted EMC Calculation**

| Land Use | Fraction of Total DCV | TSS EMC (mg/L) | Product |
|---|---|---|---|
| Single Family Residential | 0.28 | 123 | 34.44 |
| Commercial | | 128 | 0 |
| Industrial | | 125 | 0 |
| Education (Municipal) | | 132 | 0 |
| Transportation | | 78 | 0 |
| Multi-family Residential | 0.72 | 40 | 28.8 |
| Roof Runoff | | 14 | 0 |
| Low Traffic Areas | | 50 | 0 |
| Open Space | | 216 | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |

| | | | |
|---|---|---|---|
| 5 | Volume Weighted EMC (sum of all products) | 63.24 | mg/L |

**Sizing Factor for Clogging**

| | | | |
|---|---|---|---|
| 6 | Adjustment for pretreatment measures<br>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." | 0.25 | |
| 7 | Average Annual Precipitation [Provide documentation of the data source in the discussion box; SanGIS has a GIS layer for average annual precipitation] | 11 | inches |
| 8 | Calculate the Average Annual Runoff (Line 7 x Line 1/12) x Line2 | 138986 | cu-ft/yr |
| 9 | Calculate the Average Annual TSS Load<br>(Line 8 x 62.4 x Line 5 x (1 – Line 6))/$10^6$ | 411 | lb/yr |
| 10 | Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3 | 2057 | sq. ft. |
| 11 | Calculate the Minimum Footprint Sizing Factor for Clogging<br>[ Line 10/ (Line 1 x Line 2)] | 0.014 | |

**Discussion:**

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin C | |
| **Sizing Method for Volume Retention Criteria** | | **Worksheet B.5-2** | |
| 1 | Area draining to the BMP | 11325.6 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.86 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 438 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Footprint of the BMP | 522 | sq. ft. |
| 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 | Media retained pore space [50% of (FC-WP)] | 0.05 | in/in |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 12 | inches |
| 9 | Porosity of aggregate storage | 0.4 | in/in |
| **Volume Retention Requirement** | | | |
| 10 | Measured infiltration rate in the DMA | 0.48 | in/hr. |
| 11 | Factor of safety | 2 | |
| 12 | Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]<br>Note: This worksheet is not applicable if Line 12 < 0.01 in/hr. | 0.24 | in/hr. |
| 13 | Average annual volume reduction target (Figure B.5-2)<br>When Line 12 ≥0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62) | 40.0 | % |
| 14 | Fraction of DCV to be retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$ | 0.322 | |
| 15 | Target volume retention [Line 14 x Line 4] | 141 | cu. ft. |
| **Evapotranspiration: Average Annual Volume Retention** | | | |
| 16 | Effective evapotranspiration depth [Line 6 x Line 7] | 0.9 | inches |
| 17 | Retained Pore Volume [(Line 16 x Line 5)/12] | 39 | cu. ft. |
| 18 | Fraction of DCV retained in pore spaces [Line 17/Line 4] | 0.09 | |
| 19 | Evapotranspiration average annual capture [ET nomographs in Figure B.5-5] | 6.6 | % |
| **Infiltration: Average Annual Volume Retention** | | | |
| 20 | Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12] | 20 | hours |
| 21 | Equivalent DCV fraction from evapotranspiration<br>(use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2 ) | 0.03 | |
| 22 | Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12] | 209 | cu. ft. |
| 23 | Infiltration Storage Fraction of DCV [Line 22/Line 4] | 0.48 | |
| 24 | Total Equivalent Fraction of DCV [Line 21 + Line 23] | 0.51 | |
| 25 | Biofiltration BMP average annual capture<br>[use Line 24 and 20 in Figure B.4-1] | 67.63 | % |
| **Volume retention required from site design and other BMPs** | | | |
| 26 | Fraction of DCV retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$ | 0.709 | |
| 27 | Remaining target DCV retention [(Line 14 – Line 26) x Line 4]<br>Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard.<br>If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard | -170 | cu. ft. |
| **Volume Retention Performance Standard is Met** | | | |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Wetmod B | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 23522.4 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.86 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 910 | 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 | 48 | 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 | 12 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 24 | 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.) | 1 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 6 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 36 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 42 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 1365 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 390 | 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] | 683 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 228 | 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.5-3) | 0.009 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 182 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 228 | sq. ft. |
| 23 | Provided BMP Footprint | 320 | sq. ft. |
| 24 | Is Line 23 > Line 22? | **Yes, Performance Standard is Met** | |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Wetmod B | |
| **Sizing Method for Volume Retention Criteria** | | **Worksheet B.5-2** | |
| 1 | Area draining to the BMP | 23522.4 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.86 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 910 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Footprint of the BMP | 160 | sq. ft. |
| 6 | Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations | 36 | inches |
| 7 | Media retained pore space [50% of (FC-WP)] | 0.05 | in/in |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 6 | inches |
| 9 | Porosity of aggregate storage | 0.4 | in/in |
| **Volume Retention Requirement** | | | |
| 10 | Measured infiltration rate in the DMA | 0.48 | in/hr. |
| 11 | Factor of safety | 2 | |
| 12 | Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11]<br>Note: This worksheet is not applicable if Line 12 < 0.01 in/hr. | 0.24 | in/hr. |
| 13 | Average annual volume reduction target (Figure B.5-2)<br>When Line 12 ≥0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62) | 40.0 | % |
| 14 | Fraction of DCV to be retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$ | 0.322 | |
| 15 | Target volume retention [Line 14 x Line 4] | 293 | cu. ft. |
| **Evapotranspiration: Average Annual Volume Retention** | | | |
| 16 | Effective evapotranspiration depth [Line 6 x Line 7] | 1.8 | inches |
| 17 | Retained Pore Volume [(Line 16 x Line 5)/12] | 24 | cu. ft. |
| 18 | Fraction of DCV retained in pore spaces [Line 17/Line 4] | 0.03 | |
| 19 | Evapotranspiration average annual capture [ET nomographs in Figure B.5-5] | 1.7 | % |
| **Infiltration: Average Annual Volume Retention** | | | |
| 20 | Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12] | 10 | hours |
| 21 | Equivalent DCV fraction from evapotranspiration<br>(use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2 ) | 0.00 | |
| 22 | Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12] | 32 | cu. ft. |
| 23 | Infiltration Storage Fraction of DCV [Line 22/Line 4] | 0.04 | |
| 24 | Total Equivalent Fraction of DCV [Line 21 + Line 23] | 0.04 | |
| 25 | Biofiltration BMP average annual capture<br>[use Line 24 and 20 in Figure B.4-1] | 25.76 | % |
| **Volume retention required from site design and other BMPs** | | | |
| 26 | Fraction of DCV retained (Figure B.5-3)<br>$0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$ | 0.192 | |
| 27 | Remaining target DCV retention [(Line 14 – Line 26) x Line 4]<br>Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard.<br>If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard | 118 | cu. ft. |

**Target Volume retention from site design and other BMPs = 118 cubic feet**

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Wetmod D1 | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 32670 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.86 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.54 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 1264 | 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 | 12 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 12 | 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.) | 1 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 6 | 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] | 31.2 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 1896 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 729 | 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] | 948 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 452 | 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.5-3) | 0.017 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 478 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 478 | sq. ft. |
| 23 | Provided BMP Footprint | 500 | sq. ft. |
| 24 | Is Line 23 > Line 22? | **Yes, Performance Standard is Met** | |

| The City of SAN DIEGO | Project Name | Hilltop | |
|---|---|---|---|
| | BMP ID | Basin A | |
| Volume Retention From Amended Soils | | Worksheet B.5-6 | |
| 1 | Impervious area draining to the pervious area | 5760 | sq. ft. |
| 2 | Pervious area (must meet the requirements in SD-4 and SD-5 Fact Sheets) | 2080 | sq. ft. |
| 3 | Measured Infiltration Rate | 0.05 | in/hr. |
| 4 | Factor of Safety | 2 | |
| 5 | Reliable Infitlration Rate [Line 3/Line 4] | 0.025 | |
| 6 | Impervious area runoff factor | 0.9 | |
| 7 | Runoff factor of pervious area<br>Line 5 < 0.01 in/hr. = 0.9<br>0.01 ≤ Line 5 < 0.05 in/hr. = 0.30<br>0.05 ≤Line 5 < 0.15 in/hr. = 0.23<br>0.15 ≤Line 5 < 0.30 in/hr. = 0.14<br>Line 5 ≥ 0.30 in/hr. = 0.10 | 0.3 | |
| 8 | Area weighted runoff factor<br>[(Line 1 x Line 6 + Line 2 x Line 7)/(Line 1 + Line 2)] | 0.74 | |
| 9 | 85$^{th}$ Percentile 24-hour rainfall depth | 0.54 | inches |
| 10 | Dispersion Ratio [Line 1/Line 2]<br>Note: This worksheet is not applicable when Line 5 > 50 or Line 5 < 0.25 | 2.8 | |
| 11 | Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18") | 12 | inches |
| 12 | Post amendment runoff factor (Based on Figures B.5.6 to B.5.11) | 0.37 | |
| 13 | Volume retention due to dispersion and amendment<br>If Line 12 ≥Line 8 then Line 13 = 0; Else<br>[(Line 8 – Line 12) x (Line 1 + Line 2) x Line 9 x 1/12] | 131 | cu. ft. |

| The City of SAN DIEGO | Project Name | Hilltop |
|---|---|---|
| | BMP ID | East side/multi-family |
| **Alternative Minimum Footprint Sizing Factor** | | **Worksheet B.5-3** |

| | | | |
|---|---|---|---|
| 1 | Area draining to the BMP | 62290.8 | sq. ft. |
| 2 | Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2) | 0.71 | |
| 3 | Load to Clog | 2 | lb/sq. ft. |
| 4 | Allowable Period to Accumulate Clogging Load ($T_L$) | 10 | 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) | | 132 | 0 |
| Transportation | 0.524475524 | 78 | 40.90909091 |
| Multi-family Residential | 0.475524476 | 40 | 19.02097902 |
| Roof Runoff | | 14 | 0 |
| Low Traffic Areas | | 50 | 0 |
| Open Space | | 216 | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |
| Other, specify: | | | 0 |

| | | | |
|---|---|---|---|
| 5 | Volume Weighted EMC (sum of all products) | 59.93006993 | mg/L |

**Sizing Factor for Clogging**

| | | | |
|---|---|---|---|
| 6 | Adjustment for pretreatment measures<br>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] | 11 | inches |
| 8 | Calculate the Average Annual Runoff (Line 7 x Line 1/12) x Line2 | 40541 | cu-ft/yr |
| 9 | Calculate the Average Annual TSS Load<br>(Line 8 x 62.4 x Line 5 x (1 – Line 6))/$10^6$ | 152 | lb/yr |
| 10 | Calculate the BMP Footprint Needed (Line 9 x Line 4)/Line 3 | 758 | sq. ft. |
| 11 | Calculate the Minimum Footprint Sizing Factor for Clogging<br>[ Line 10/ (Line 1 x Line 2)] | 0.017 | |

**Discussion:**

## ATTACHMENT 1e

*Volume Retention Requirement – Demonstration using Continuous Simulation Modeling*

Overview

The BMP system that has been designed to meet stormwater management requirements will consist of biofiltration in series with underground storage for hydromodification control. This set up is efficient because it limits the number of underground storage vaults and makes the most use of areas where infiltration is the highest. However, this set up is too complex to be represented by City spreadsheets for demonstrating volume retention requirements, therefore this had been done utilizing the SWMM models that were developed for demonstrating hydromodification control

Volume Retention

As the site is a partial-infiltration site, it is necessary to achieve a 40% average annual capture. To determine annual runoff from which to assess when this has been achieved, the proposed development model was duplicated and all the BMPs removed. This base model was run with the all the same parameters except the BMPs, and the total annual runoff was compared. The statistics tables generated below for average annual demonstrate that with the BMPs in place the system achieves a reduction of 94,986 cubic feet, i.e., 51.9% of average annual capture.

**Proposed Development (No BMPs)**

```
S U M M A R Y   S T A T I S T I C S
==================================

Object ............... System
Variable ............. Outflow  (CFS)
Event Period ......... Annual
Event Statistic ...... Total (ft3)
Event Threshold ...... Outflow > 0.0100  (CFS)
Event Threshold ...... Event Volume > 0.0000 (ft3)
Period of Record ..... 10/03/1970 to 05/25/2008

Number of Events ..... 38
Event Frequency*...... 1.000
Minimum Value ........ 5192.672
Maximum Value ........ 483824.375
Mean Value ........... 183058.335
Std. Deviation ....... 112234.900
Skewness Coeff. ...... 0.713

*Fraction of all years containing an event.
```

**Proposed Development with BMPs**

```
S U M M A R Y   S T A T I S T I C S
═══════════════════════════════════

Object ..............  System
Variable ............  Outflow  (CFS)
Event Period ........  Annual
Event Statistic .....  Total (ft3)
Event Threshold .....  Outflow > 0.0100  (CFS)
Event Threshold .....  Event Volume > 0.0000 (ft3)
Period of Record ....  10/03/1970 to 04/19/2008

Number of Events ....  38
Event Frequency*.....  1.000
Minimum Value .......  953.731
Maximum Value .......  255485.531
Mean Value ..........  88099.396
Std. Deviation ......  64953.324
Skewness Coeff. .....  0.699

*Fraction of all years containing an event.
```

*Table 1 - Summary of Annual Average Runoff with and without proposed BMP system*

| | Average Annual Runoff (CF) | 40% Target Capture (CF) |
|---|---|---|
| Proposed Development (no BMPs) | **183,085** | **73,234** |
| | | Volume Captured (Cf) |
| With BMPs | **88,099** | **94,986** |
| | | |
| Volume Retained (%) | 51.9% | |

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet **BASIN D**

| Factor of Safety and Design Infiltration Rate Worksheet (All PDPs) | | | Worksheet D.5-1.1 BMP Design Manual | | |
|---|---|---|---|---|---|
| Factor Category | | Factor Description | Assigned Weight (w) | Factor Value (v) | Product (p) p = wxv |
| A | Suitability Assessment | Soils assessment methods | 0.25 | 1 | 0.25 |
| | | Predominant soil texture | 0.25 | 3 | 0.75 |
| | | Site soil variability | 0.25 | 3 | 0.75 |
| | | Depth to groundwater/impervious layer | 0.25 | 1 | 0.25 |
| | | Suitability Assessment Safety Factor, $S_A=\Sigma p$ | | | 2 |
| B | Design | Level of pretreatment/expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy/resiliency | 0.25 | 1 | 0.25 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | Design Safety Factor, $S_B=\Sigma p$ | | | 1.25 |
| Combined Safety Factor, $S_{total} = S_A \times S_B$ | | | | | 2.50 |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test specific bias) | | | | | 1.6 |
| Design Infiltration Rate, in/hr. $K_{design} = K_{observed}/S_{total}$ | | | | | 0.64 |
| **Supporting Data** | | | | | |
| Briefly describe infiltration and provide reference to test forms: | | | | | |

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet **BASIN C**

| **Factor of Safety and Design Infiltration Rate Worksheet (All PDPs)** | | | **Worksheet D.5-1.1 BMP Design Manual** | | |
|---|---|---|---|---|---|
| Factor Category | | Factor Description | Assigned Weight (w) | Factor Value (v) | Product (p) p = wxv |
| A | Suitability Assessment | Soils assessment methods | 0.25 | 1 | 0.25 |
| | | Predominant soil texture | 0.25 | 3 | 0.75 |
| | | Site soil variability | 0.25 | 3 | 0.75 |
| | | Depth to groundwater/impervious layer | 0.25 | 1 | 0.25 |
| | | Suitability Assessment Safety Factor, $S_A=\Sigma p$ | | | 2 |
| B | Design | Level of pretreatment/expected sediment loads | 0.5 | 1 | 0.5 |
| | | Redundancy/resiliency | 0.25 | 1 | 0.25 |
| | | Compaction during construction | 0.25 | 2 | 0.5 |
| | | Design Safety Factor, $S_B=\Sigma p$ | | | 1.25 |
| Combined Safety Factor, $S_{total}$ = $S_A$ x $S_B$ | | | | | 2.50 |
| Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test specific bias) | | | | | 1.34 |
| Design Infiltration Rate, in/hr. $K_{design}$ = $K_{observed}/S_{total}$ | | | | | 0.54 |
| **Supporting Data** | | | | | |
| Briefly describe infiltration and provide reference to test forms: | | | | | |

## Onsite Proprietary Biofiltration BMP Checklist | Form I-10

A proprietary 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 proprietary biofiltration BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite alternative compliance program to meet its pollutant control obligations.

An applicant using a proprietary 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:**<br>What is the infiltration condition of the DMA?<br>Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.<br>Complete and attach Worksheet C.4-1: Categorization of Infiltration Feasibility Condition to support the feasibility determination. | ☐ Full Infiltration Condition | **Stop.** Proprietary biofiltration BMP is not allowed. |
| | ☒ Partial Infiltration Condition | Proprietary biofiltration BMP is only allowed, if 40% (average annual capture) volume reduction is achieved within the BMP or downstream of the BMP.<br>If the 40% volume reduction is achieved from within the BMP or downstream of the BMP **proceed to Criteria 2.**<br>If the 40% of the volume reduction is not achieved, proprietary biofiltration BMP is not allowed. **Stop.** |
| | ☐ No Infiltration Condition | Proprietary biofiltration BMP is allowed if one of the two criteria listed below are met:<br>☒ Documentation is provided to the satisfaction of the City Engineer that a larger footprint biofiltration BMP (i.e. minimum sizing factor calculated using worksheet B.5.2) is not feasible onsite; or<br>☐ Documentation is provided that volume reduction achieved by the larger footprint biofiltration BMP can be achieved through other measures (e.g., downstream site design BMPs, evapotranspiration from proprietary BMP, etc.)<br>If one of the two criteria listed above is met **proceed to Criteria 2.**<br>If neither criteria are met, proprietary biofiltration BMP is not allowed. **Stop.** |

## Onsite Proprietary Biofiltration BMP Checklist | Form I-10

**Provide basis for Criteria 1 and 3:**

Feasibility Analysis:
Summarize findings and attach Worksheet C.4-1 Refer to Attachment 1d for Worksheet C.4-1.

If Partial Infiltration Condition:
Provide documentation that 40% (average annual capture; or 0.375*DCV when using a 36-hour drawdown BMP) volume reduction is achieved within the BMP or downstream of the BMP. This could be achieved through downstream site design BMPs, downstream infiltration BMP, incidental retention by having an open bottom in the proprietary BMP or other similar measures.

If No Infiltration Condition:
Provide documentation that the alternative minimum sizing factor (attach Worksheet B.5-2) BMP is not feasible onsite or the volume reduction achieved by a non-proprietary BMP sized to the alternative minimum sizing factor can be achieved through downstream site design BMPs, downstream evapotranspiration BMPs, incidental evapotranspiration from the proprietary BMP or other similar measures.
The site is a "partial infiltration" site, with required annual retention achieved for the whole project site in total.

| Criteria | Answer | Progression |
|---|---|---|
| **Criteria 2:**<br>Is the proprietary biofiltration BMP sized to meet the performance standard from the MS4 Permit?<br>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 to size the proprietary BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP.<br>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)<br>**Proceed to Criteria 4.** |
| | ☐ Meets Volume based Criteria | Provide documentation that the proprietary 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.<br>**Proceed to Criteria 4.** |
| | ☐ Does not Meet either criteria | **Stop.** Proprietary biofiltration BMP is not allowed. |

| Onsite Proprietary 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).

Refer to Attachment 1e for standard BMP sheets provided by vendor.

| Criteria | Answer | Progression |
|---|---|---|
| Criteria 4:<br>Does the proprietary biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern?<br>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 proprietary BMP has an appropriate TAPE certification for the projects most significant pollutants of concern.<br>**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 proprietary biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2.<br>**Proceed to Criteria 5.** |
| | ☐ No | **Stop.** Proprietary 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 proprietary biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Refer to Attachment 1e for a letter from the vendor that is included before the TAPE certification for the MWS Linear System.

| Onsite Proprietary Biofiltration BMP Checklist | | Form I-10 |
|---|---|---|
| **Criteria** | **Answer** | **Progression** |
| **Criteria 5:**<br>Is the proprietary biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process?<br>Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. | ☒ Yes | Provide documentation that the proprietary biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance.<br>**Proceed to Criteria 6.** |
| | ☐ No | **Stop.** Proprietary biofiltration BMP is not allowed. |

**Provide basis for Criteria 5:**

Provide documentation that appropriate biological activity is supported by the proprietary biofiltration BMP to maintain treatment process.

The modular wetland systems (MWS) will be utilized for pollutant treatment control. These proprietary BMPs will have plants. Refer to the Criteria 5 Checklist from Appendix F and the MWS plant selection included in Attachment 1e. The landscape plans show the landscape architect's plant choice for the modular wetland units.

| Criteria | Answer | Progression |
|---|---|---|
| **Criteria 6:**<br>Is the proprietary biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP? | ☒ Yes | Provide documentation that the proprietary biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification.<br>**Proceed to Criteria 7.** |
| | ☐ No | **Stop.** Proprietary 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).

Refer to Attachment 1e for the wetland media loading rate shown on the BMP details. Per Appendix B of the City BMP Design Manual, a proposed BMP should meet the performance standard (per Appendix B.6.2.2) as certified through a third party field scale evaluation. The MWS performance standard was conducted by the Washington State Department of Ecology. Their results are provided in the TAPE certification. Refer to Attachment 1e.

| Onsite Proprietary Biofiltration BMP Checklist | | Form I-10 |
|---|---|---|
| **Criteria** | **Answer** | **Progression** |
| **Criteria 7:**<br>Is the proprietary biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)? | ☒ Yes, and the proprietary 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.<br>**Stop.** The proprietary 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.<br>**Stop.** Consult the City Engineer for a determination. |
| | ☐ No | **Stop.** Proprietary 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. Attachment 3A of the PDP SWQMP must include a statement that the proprietary BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Refer to attachment 3 for maintenance information.

| Onsite Proprietary Biofiltration BMP Checklist | Form I-10 |
|---|---|
| **Section 2: Verification (For City Use Only)** | |
| Is the proposed proprietary BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA? | ☐ Yes<br>☐ No, See explanation below |
| Explanation/reason if the proprietary BMP is not accepted by the City for onsite pollutant control compliance: | |

**ATTACHMENT 1e**

*Volume Retention Requirement – SWMM Demonstration*

Overview

The BMP system being designed to meet stormwater management requirements will consist of biofiltration in series with underground storage for hydromodification control. This set up is efficient because it limits the number of underground storage vaults and makes the most use of areas where infiltration is the highest. However, this set up is too complex to be represented by City spreadsheets for demonstrating volume retention requirements, therefore this had been done utilizing the SWMM models that were developed for demonstrating hydromodification control

Volume Retention

As the site is a partial-infiltration site, it is necessary to achieve a 40% average annual capture. To determine annual runoff from which to assess when this has been achieved, the proposed development model was duplicated and all the BMPs removed. The model was run with the all the same parameters except the BMPs and the total annual runoff was compared. The statistics tables generated below demonstrate that the BMPs achieved a reduction of 133,974 cfs outflows, i.e., 67.6% of average annual capture.

No BMP

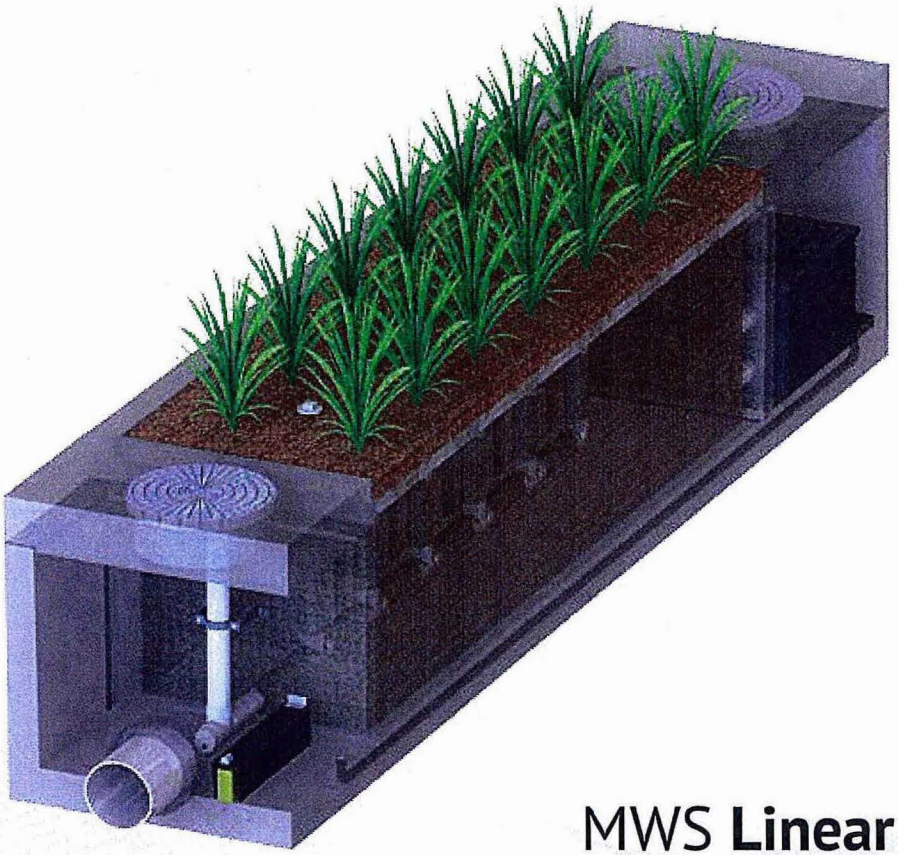
```
S U M M A R Y   S T A T I S T I C S
==================================

Object ..............  System
Variable ............  Outflow  (CFS)
Event Period ........  Annual
Event Statistic .....  Total (ft3)
Event Threshold .....  Outflow > 0.0000  (CFS)
Event Threshold .....  Event Volume > 0.0000 (ft3)
Period of Record ....  10/04/1970 to 05/25/2008

Number of Events ....  37
Event Frequency*.....  0.974
Minimum Value .......  598.770
Maximum Value .......  819541.813
Mean Value ..........  198283.796
Std. Deviation ......  186524.638
Skewness Coeff. .....  1.268

*Fraction of all years containing an event.
```

With BMP

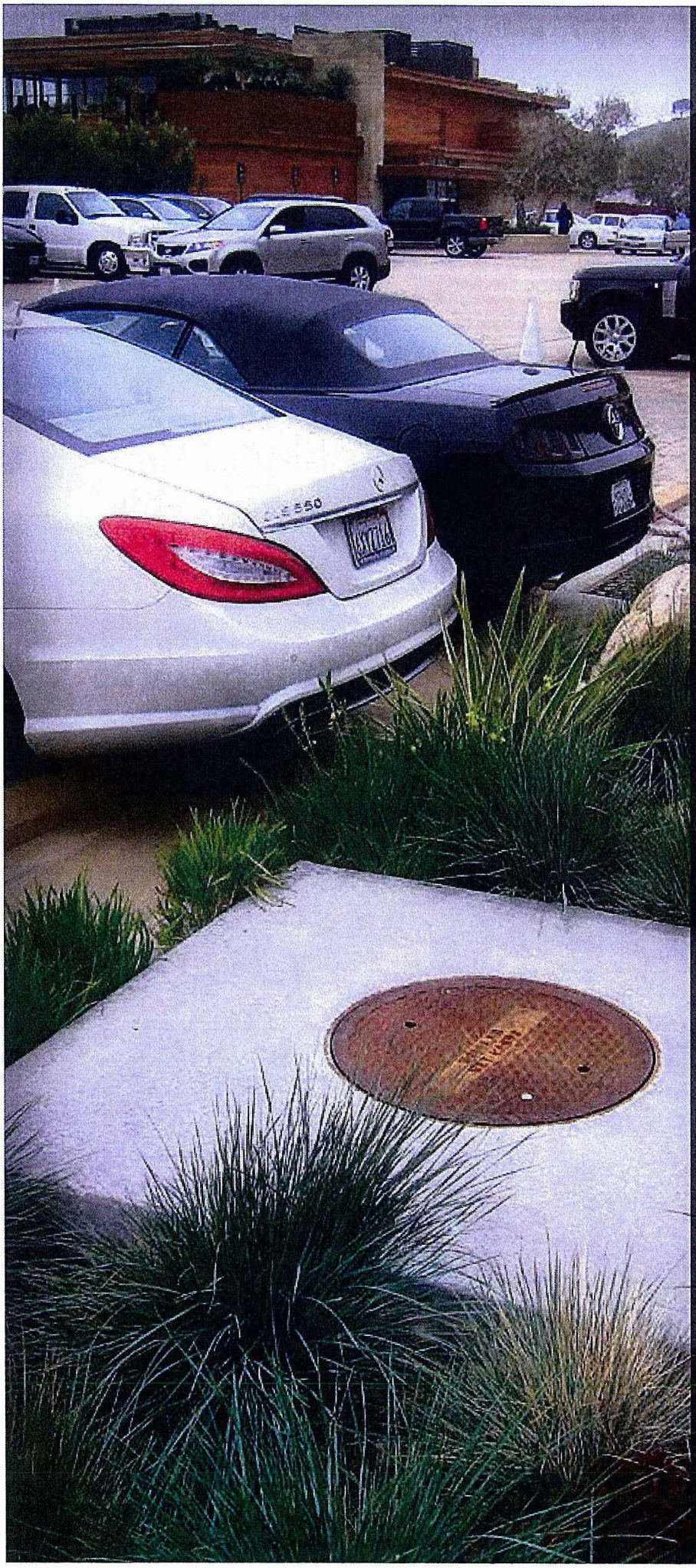
```
S U M M A R Y   S T A T I S T I C S
==================================

Object ..............  System
Variable ............  Outflow  (CFS)
Event Period ........  Annual
Event Statistic .....  Total (ft3)
Event Threshold .....  Outflow > 0.0000  (CFS)
Event Threshold .....  Event Volume > 0.0000 (ft3)
Period of Record ....  10/04/1970 to 05/25/2008

Number of Events ....  38
Event Frequency*.....  1.000
Minimum Value .......  1232.312
Maximum Value .......  223606.266
Mean Value ..........  64310.177
Std. Deviation ......  60550.783
Skewness Coeff. .....  1.179

*Fraction of all years containing an event.
```

MODULAR WETLANDS™

*Advanced **Stormwater** Biofiltration*



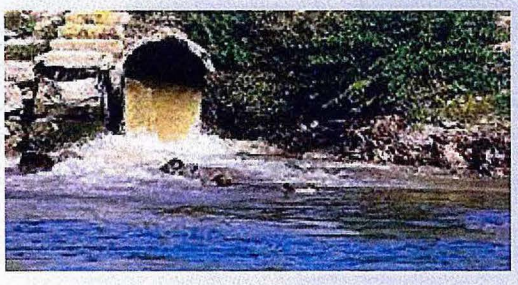
# MWS **Linear**



# Contents

# The Urban Impact

For hundreds of years natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as our cities grow and develop, these natural wetlands have perished under countless roads, rooftops, and parking lots.



# Plant A Wetland

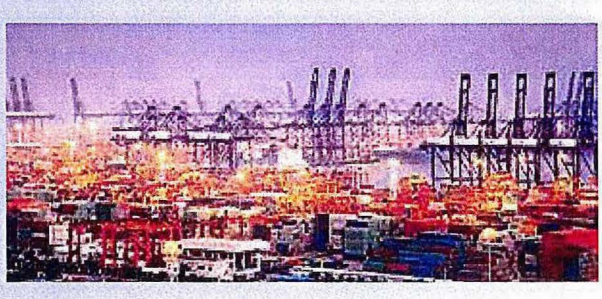
Without natural wetlands our cities are deprived of water purification, flood control, and land stability. Modular Wetlands and the MWS Linear re-establish nature's presence and rejuvenate water ways in urban areas.


# MWS Linear

The Modular Wetland System Linear represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint and higher treatment capacity. While most biofilters use little or no pre-treatment, the MWS Linear incorporates an advanced pre-treatment chamber that includes separation and pre-filter cartridges. In this chamber sediment and hydrocarbons are removed from runoff before it enters the biofiltration chamber, in turn reducing maintenance costs and improving performance.

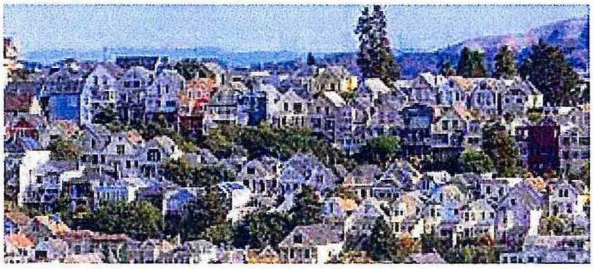
# Applications

The MWS Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



## Industrial

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA mandated effluent limits for dissolved metals and other pollutants.



## Residential

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.

## Streets

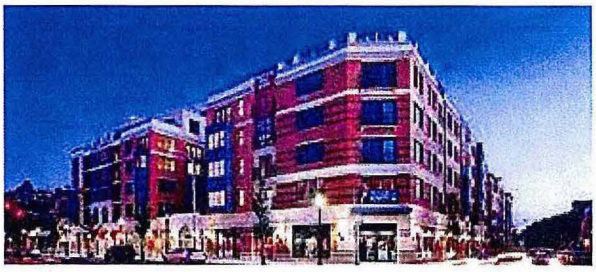
Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.

## Parking Lots

Parking lots are designed to maximize space and the MWS Linear's 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.

## Commercial

Compared to bioretention systems, the MWS Linear can treat far more area in less space - meeting treatment and volume control requirements.



## Mixed Use

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

**More applications** are available on our website: www.ModularWetlands.com/Applications

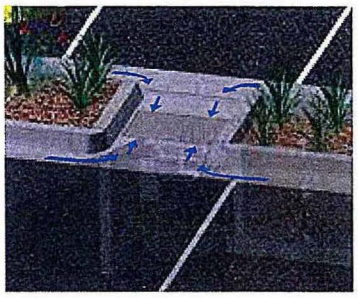
- Agriculture
- Reuse
- Low Impact Development
- Waste Water

# Configurations

The MWS Linear is the preferred biofiltration system of Civil Engineers across the country due to its versatile design. This highly versatile system has available "pipe-in" options on most models, along with built-in curb or grated inlets for simple integration into your stormdrain design.

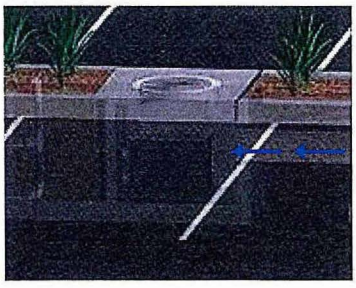
## Curb Type

The *Curb Type* configuration accepts sheet flow through a curb opening and is commonly used along road ways and parking lots. It can be used in sump or flow by conditions. Length of curb opening varies based on model and size.



## Grate Type

The *Grate Type* configuration offers the same features and benefits as the *Curb Type* but with a grated/drop inlet above the systems pre-treatment chamber. It has the added benefit of allowing for pedestrian access over the inlet. ADA compliant grates are available to assure easy and safe access. The *Grate Type* can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



## Vault Type

The system's patented horizontal flow biofilter is able to accept inflow pipes directly into the pre-treatment chamber, meaning the MWS Linear can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretention systems. Another benefit of the "pipe in" design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.

## Downspout Type

The *Downspout Type* is a variation of the *Vault Type* and is designed to accept a vertical downspout pipe from roof top and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

# Advantages & Operation

The MWS Linear is the most efficient and versatile biofiltration system on the market, and the only system with horizontal flow which improves performance, reduces footprint, and minimizes maintenance. Figure-1 and Figure-2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

**Featured Advantages**

- Horizontal Flow Biofiltration
- Greater Filter Surface Area
- Pre-Treatment Chamber
- Patented Perimeter Void Area
- Flow Control
- No Depressed Planter Area

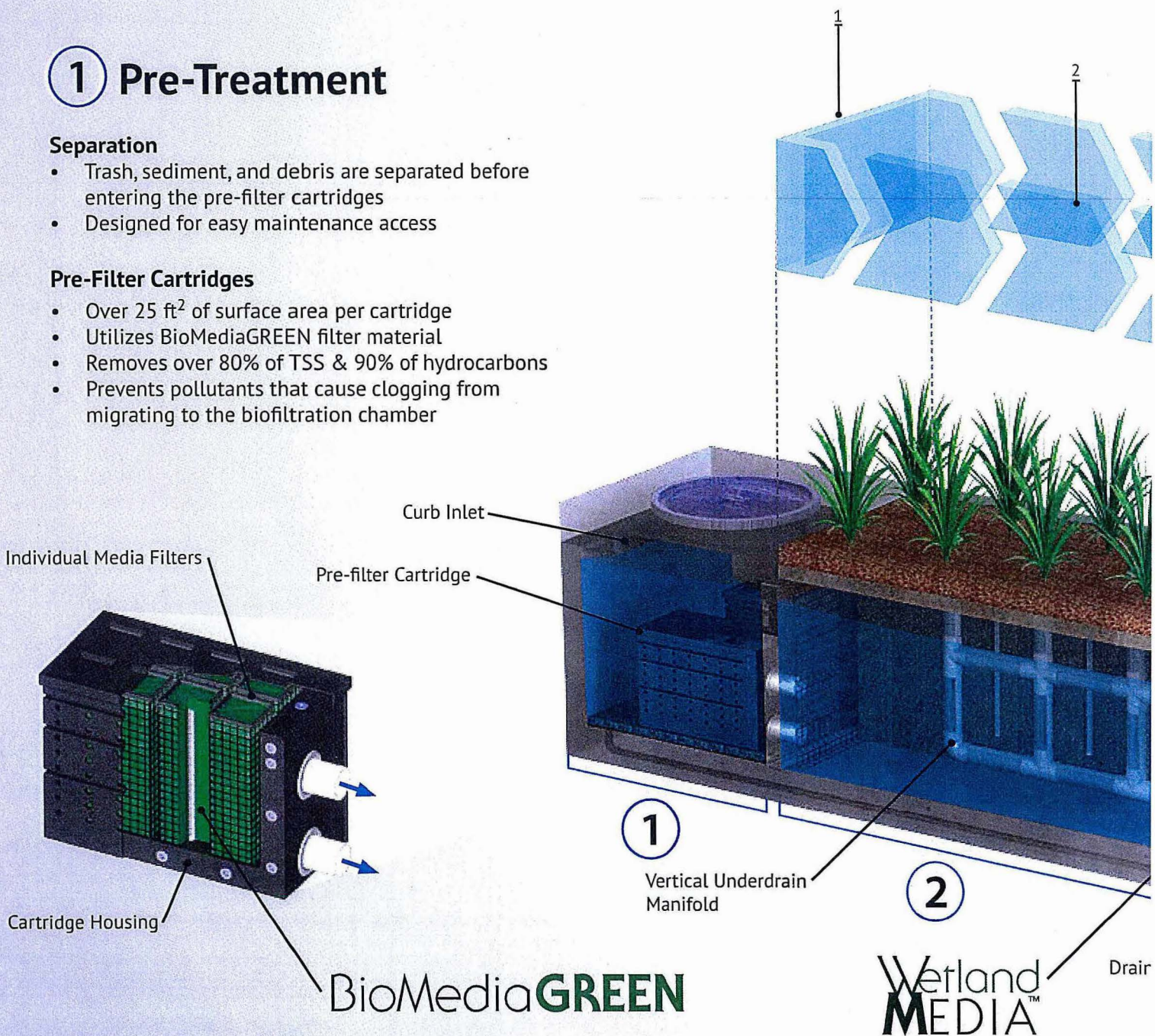
## 1 Pre-Treatment

**Separation**

- Trash, sediment, and debris are separated before entering the pre-filter cartridges
- Designed for easy maintenance access

**Pre-Filter Cartridges**

- Over 25 $ft^2$ of surface area per cartridge
- Utilizes BioMediaGREEN filter material
- Removes over 80% of TSS & 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber



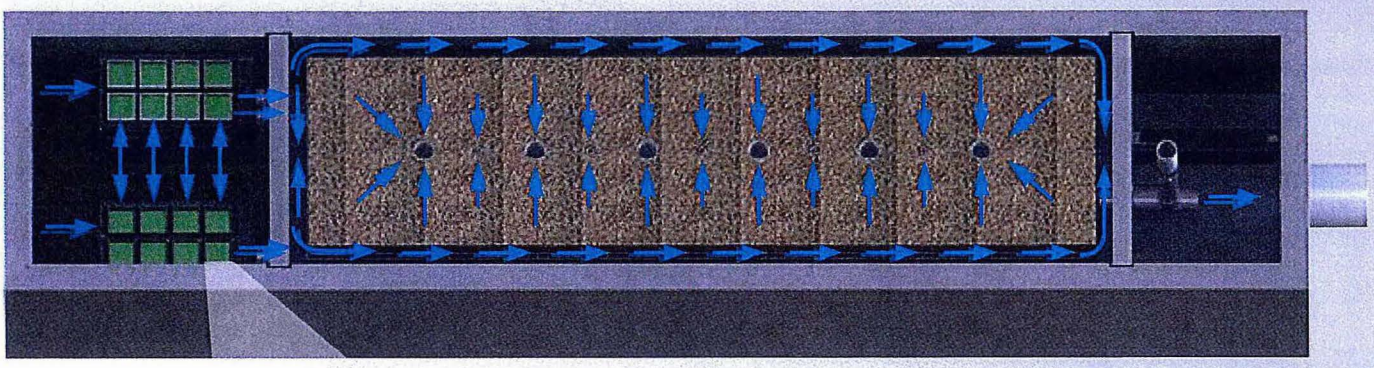
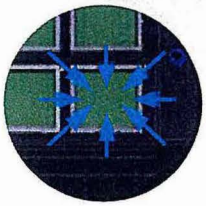


Fig. 2 - Top View

**2x to 3x More Surface Area** Than Traditional Downward Flow Bioretention Systems.



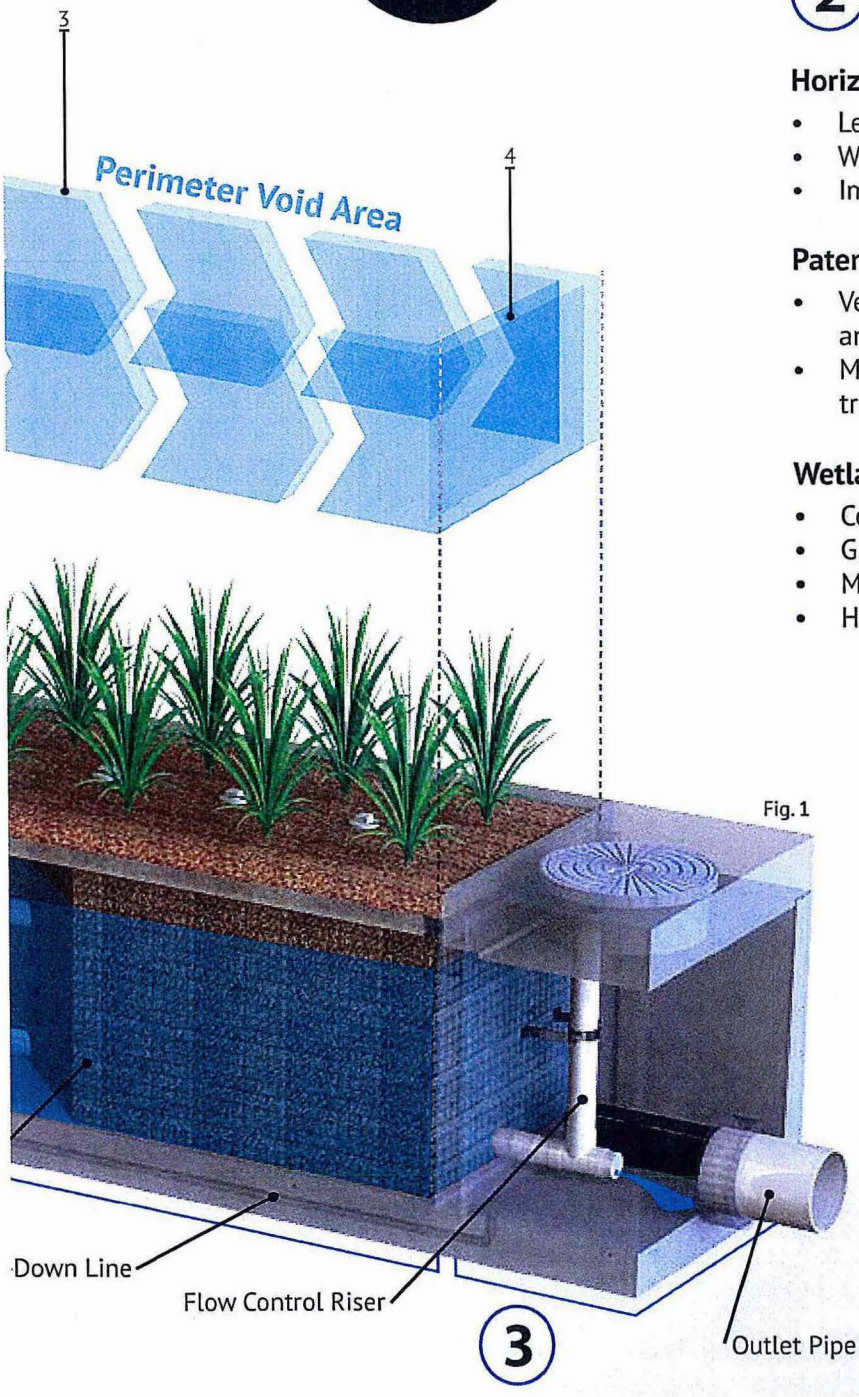



Fig. 1

## 2 Biofiltration

### Horizontal Flow

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

### Patented Perimeter Void Area

- Vertically extends void area between the walls and the WetlandMEDIA on all four sides.
- Maximizes surface area of the media for higher treatment capacity

### WetlandMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and light weight

## 3 Discharge

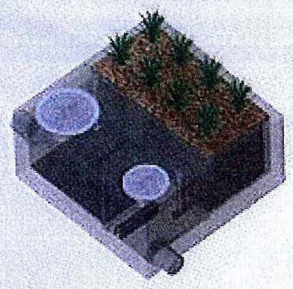
### Flow Control

- Orifice plate controls flow of water through WetlandMEDIA to a level lower than the media's capacity.
- Extends the life of the media and improves performance

### Drain-Down Filter

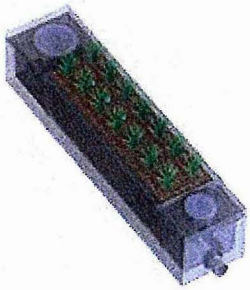
- The Drain-Down is an optional feature that completely drains the pre-treatment chamber
- Water that drains from the pre-treatment chamber between storm events will be treated

# Orientations



## Side-By-Side

The *Side-By-Side* orientation places the pre-treatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



## End-To-End

The *End-To-End* orientation places the pre-treatment and discharge chambers on opposite ends of the biofiltration chamber therefore minimizing the width of the system to 5 ft (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is bypass must be external.

# Bypass

## Internal Bypass Weir (Side-by-Side Only)

The *Side-By-Side* orientation places the pre-treatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system's treatment capacity, thus allowing bypass from the pre-treatment chamber directly to the discharge chamber.

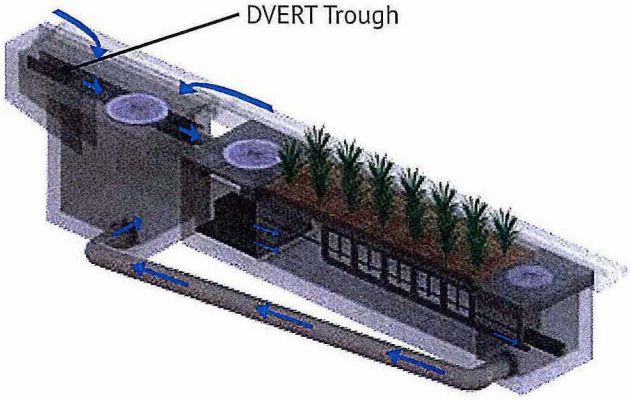
## External Diversion Weir Structure

This traditional offline diversion method can be used with the MWS Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

## Flow By Design

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

## DVERT Low Flow Diversion




This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the MWS Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allows the MWS Linear to be installed anywhere space is available.

# Performance

The MWS Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country. With it's advanced pre-treatment chamber and innovative horizontal flow biofilter, the system is able to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. With the same biological processes found in natural wetlands, the MWS Linear harnesses natures ability to process, transform, and remove even the most harmful pollutants.

# Approvals

The MWS Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation, and perhaps the world.

## Washington State TAPE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft$^2$ loading rate. The highest performing BMP on the market for all main pollutant categories.

| TSS | Total Phosphorus | Ortho Phosphorus | Nitrogen | Dissolved Zinc | Dissolved Copper | Total Zinc | Total Copper | Motor Oil |
|---|---|---|---|---|---|---|---|---|
| 85% | 64% | 67% | 45% | 66% | 38% | 69% | 50% | 95% |

## DEQ Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear, the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria.

## Maryland Department Of The Environment Approved

Granted ESD (Environmental Site Design) status for new construction, redevelopment and retrofitting when designed in accordance with the Design Manual.

## MASTEP Evaluation

The University of Massachusetts at Amherst – Water Resources Research Center, issued a technical evaluation report noting removal rates up to 84% TSS, 70% Total Phosphorus, 68.5% Total Zinc, and more.

## Rhode Island DEM Approved

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% Pathogens, 30% Total Phosphorus, and 30% Total Nitrogen.

# 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.

## Treatment Flow Sizing Table

| Model # | Dimensions | WetlandMedia Surface Area | Treatment Flow Rate (cfs) |
|---|---|---|---|
| MWS-L-4-4 | 4' x 4' | 23 $ft^2$ | 0.052 |
| MWS-L-4-6 | 4' x 6' | 32 $ft^2$ | 0.073 |
| MWS-L-4-8 | 4' x 8' | 50 $ft^2$ | 0.115 |
| MWS-L-4-13 | 4' x 13' | 63 $ft^2$ | 0.144 |
| MWS-L-4-15 | 4' x 15' | 76 $ft^2$ | 0.175 |
| MWS-L-4-17 | 4' x 17' | 90 $ft^2$ | 0.206 |
| MWS-L-4-19 | 4' x 19' | 103 $ft^2$ | 0.237 |
| MWS-L-4-21 | 4' x 21' | 117 $ft^2$ | 0.268 |
| MWS-L-8-8 | 8' x 8' | 100 $ft^2$ | 0.230 |
| MWS-L-8-12 | 8' x 12' | 151 $ft^2$ | 0.346 |
| MWS-L-8-16 | 8' x 16' | 201 $ft^2$ | 0.462 |

# Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal flow makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

## Treatment Volume Sizing Table

| Model # | Treatment Capacity (cu. ft.) @ 24-Hour Drain Down | Treatment Capacity (cu. ft.) @ 48-Hour Drain Down |
|---|---|---|
| MWS-L-4-4 | 1140 | 2280 |
| MWS-L-4-6 | 1600 | 3200 |
| MWS-L-4-8 | 2518 | 5036 |
| MWS-L-4-13 | 3131 | 6261 |
| MWS-L-4-15 | 3811 | 7623 |
| MWS-L-4-17 | 4492 | 8984 |
| MWS-L-4-19 | 5172 | 10345 |
| MWS-L-4-21 | 5853 | 11706 |
| MWS-L-8-8 | 5036 | 10072 |
| MWS-L-8-12 | 7554 | 15109 |
| MWS-L-8-16 | 10073 | 20145 |

# Installation

The MWS Linear is simple, easy to install, and has a space efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles pre-cast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians are available to supervise installations and provide technical support.


# Maintenance

Reduce your maintenance costs, man hours, and materials with the MWS Linear. Unlike other biofiltration systems that provide no pre-treatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pre-treatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pre-treatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pre-treatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter cartridges is required for long term operation and there is absolutely no need to replace expensive biofiltration media.

# Plant Selection

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the MWS Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more "contact time" so that pollutants are more successfully decomposed, volatilized and incorporated into the biomass of The MWS Linear's micro/macro flora and fauna.

A wide range of plants are suitable for use in the MWS Linear, but selections vary by location and climate. View suitable plants by selecting the list relative to your project location's hardy zone.

Please visit **www.ModularWetlands.com/Plants** for more information and various plant lists.

www.ModularWetlands.com | (855) 5MOD-WET | info@ModularWetlands.com

## Modular Wetland Sizing Calculations

| DMA-ID | A (sf) | Impervious (sf) | %IMP | C | 1.5 x Q (cfs) | MWS Qdesign | MWS Model |
|---|---|---|---|---|---|---|---|
| B | 23522 | 21649 | 92% | 0.8363 | 0.135 | 0.144 | WetMOD 4x20 |
| S1 | 27878 | 20909 | 75% | 0.7000 | 0.134 | 0.147 | MWS-L-6-8 |
| S2 | 9148 | 6970 | 76% | 0.7095 | 0.045 | 0.052 | MWS-L-4-4 |

| BMP Applicability and Selection for Green Street Exemption | Form J-1 |
|---|---|
| **Project Identification** | |
| Project Name: Hilltop | |
| Permit Application Number: 560527 | Date: 11/28/17 |
| **Project Characterization and Selection Synopsis** | |
| The purpose of this form is to guide the selection of BMPs, given project specific constraints to meet the Green Streets exemption as defined in Appendix J.2 of the BMP Design Manual. In order to qualify for a PDP exemption, the project must incorporate all applicable Green Street BMP elements described in Appendix J.2, based on the applicability guidance provided in Appendix J.2.<br><br>Complete the sections below providing detailed justification for each selection. | |
| **Step 1: Does this project include retrofitting or redevelopment of an existing alley, street, or roadway criteria?** Exemptions do not apply for projects that construct new alleys, streets, or roadways. See Appendix J for additional guidance on distinguishing between redevelopment of a street and new development.<br>☒ Yes ☐ No (if No is selected, the Green Street exemption is not applicable) | |
| Provide a brief overview of the project, key details, and site-specific opportunities and constraints:<br>The project includes the widening of Euclid Ave. Euclid Avenue widening is the portion of the project that fits within the green streets exemption. | |
| **Step 2: Complete the BMP-specific applicability checklists on the following pages and attach them to this form. Complete forms for all BMPs, including those that were used and those that were not used.** | |
| **Step 3: Summarize the BMP(s) that were selected through the guidance process (Select all that apply):** | |

| BMP Type | Applicable? | Used? | Summary of justification for Inclusion or Finding of Non-applicability |
|---|---|---|---|
| Vegetated Swales | ☐ | ☐ | Street trees have been chosen as the feature to be implemented based on the site constraints and the scale. Permeable surfaces are not viable because of the large amount of runon from streets that would be expected to include high sediment loads. Given the large width of the roadway, street trees will fit in well in terms of architectural scale where planters or rain gardens would contrastingly seem disproportionately sited. |
| Sidewalk Planters | ☐ | ☐ | |
| Curb Extensions | ☐ | ☐ | |
| Permeable Surfaces | ☐ | ☐ | |
| Green Gutters | ☐ | ☐ | |
| Rain Gardens | ☐ | ☐ | |
| Trees | ☒ | ☐ | |
| Other_____ | ☐ | ☐ | |

| Form J-1 Page 2 of 8: Vegetated Swale | | | |
|---|---|---|---|
| Brief Description: Vegetated Swales are shallow, open channels that are designed to remove storm water pollutants by physically straining/filtering runoff through vegetation in the channel. | | | |
| Site Type (Check all that apply): | Street Type | Rating[12] | Present in Project? |
| | Residential Streets | ◉ | ☐ |
| | Commercial Street/ Business District | ○ | ☐ |
| | Collector Street | ◉ | ☒ |
| | Arterial and Boulevard | ◉ | ☐ |
| | Alleys | ○ | ☐ |
| | Parking Areas | ◉ | ☐ |
| Key Opportunities for Vegetated Swales (Check all that apply): | Parkway strips | | ☐ |
| | Medians | | ☐ |
| | Long, mostly continuous space | | ☒ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Vegetated Swales | | |
| | Slope > 1% and <3% | | ☐ |
| | Conveying run-on to a site | | ☐ |
| | Infiltration is partially feasible or not feasible | | ☐ |
| | Long continuous segments available | | ☐ |
| | More parkway width | | ☐ |
| | Unfavorable Conditions for Vegetated Swales | | |
| | Available width is < 8 feet | | ☒ |
| | Frequent driveway interruption | | ☐ |
| | ROW width too limited | | ☒ |
| **Summary of Findings:** | | | |
| Were Vegetated Swales determined to be applicable as part of the Green Streets BMP plan? ☐ Yes ☒ No | If yes, were they used? ☐ Yes ☐ No | | |
| Provide discussion/justifications for selections and decisions above: The right of way widths preclude vegetated swales from being implemented. | | | |

12 ● High applicability within this category, however may still be limited by site-specific factors
◉ Generally applicable in this category; largely dependent on site-specific factors
○ Limited applicability within this category; may still be applicable in some cases; should be considered

**Form J-1 Page 3 of 8: Sidewalk Planters**

Brief Description: A planter imbedded in the sidewalk designed to manage storm water runoff from the adjacent roadway and sidewalk.

| | | | |
|---|---|---|---|
| Site Type (Check all that apply): | Street Type | Rating | Present in Project? |
| | Residential Streets | ◉ | ☐ |
| | Commercial Street/ Business District | ◉ | ☐ |
| | Collector Street | ● | ☒ |
| | Arterial and Boulevard | ● | ☐ |
| | Alleys | ○ | ☐ |
| | Parking Areas | ◉ | ☐ |
| Key Opportunities for Sidewalk Planters (Check all that apply): | Parkway strips | | ☐ |
| | Medians | | ☐ |
| | Between driveways | | ☐ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Sidewalk Planters | | |
| | Slope <4% | | ☐ |
| | Wide sidewalks | | ☒ |
| | More parkway width | | ☐ |
| | Unfavorable Conditions for Sidewalk Planters | | |
| | Conflicts with car egress | | ☐ |
| | ROW width too limited | | ☐ |

**Summary of Findings:**

| | |
|---|---|
| Were Sidewalk Planters determined to be applicable as part of the Green Streets BMP plan?<br>☐ Yes ☒ No | If yes, were they used?<br>☐ Yes ☐ No |

Provide discussion/justifications for selections and decisions above:

The limited parkway width precludes sidewalk planters from being implemented.

**Form J-1 Page 4 of 8: Curb Extensions**

Brief Description: Curb extensions expand the edge of the sidewalk into the roadway or parking area and allow storm water runoff to collect and infiltrate through a detention area of porous media.

| Site Type (Check all that apply): | Street Type | Rating | Present in Project? |
|---|---|---|---|
| | Residential Streets | ● | ☐ |
| | Commercial Street/ Business District | ● | ☐ |
| | Collector Street | ◉ | ☒ |
| | Arterial and Boulevard | ◉ | ☐ |
| | Alleys | ○ | ☐ |
| | Parking Areas | ◉ | ☐ |
| Key Opportunities for Curb Extensions (Check all that apply): | Intersections | | ☐ |
| | Parking area | | ☐ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Curb Extensions | | |
| | Slope <4% | | ☐ |
| | Traffic calming needed | | ☐ |
| | Unfavorable Conditions for Curb Extensions | | |
| | Conflicts with bike lanes | | ☐ |
| | Site distance issues at intersection | | ☒ |

**Summary of Findings:**

| Were Curb Extensions determined to be applicable as part of the Green Streets BMP plan? | If yes, were they used? |
|---|---|
| ☐ Yes ☒ No | ☐ Yes ☐ No |

Provide discussion/justifications for selections and decisions above:

Curb extensions can not be integrated with the street designs which are already set based on traffic design requirements.

**Form J-1 Page 5 of 8: Permeable Surfaces**

Brief Description: Permeable surfaces are pavement that allows for percolation through void spaces into subsurface layers.

| | | | |
|---|---|---|---|
| Site Type (Check all that apply): | Street Type | Rating | Present in Project? |
| | Residential Streets | ● | ☐ |
| | Commercial Street/ Business District | ● | ☐ |
| | Collector Street | ◉ | ☒ |
| | Arterial and Boulevard | ◉ | ☐ |
| | Alleys | ● | ☐ |
| | Parking Areas | ◉ | ☐ |
| Key Opportunities for Permeable Surfaces (Check all that apply): | Sidewalks | | ☐ |
| | Parking strips | | ☐ |
| | Shoulders | | ☐ |
| | Low traffic roadways | | ☐ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Permeable Surfaces | | |
| | Slope < 2-3% | | ☐ |
| | Conveying limited run-on to a site | | ☐ |
| | Low traffic area | | ☐ |
| | Unfavorable Conditions for Permeable Surfaces | | |
| | High traffic area | | ☒ |
| | Run-on has high sediment load | | ☒ |

**Summary of Findings:**

| | |
|---|---|
| Were Permeable Surfaces determined to be applicable as part of the Green Streets BMP plan? ☐ Yes ☒ No | If yes, were they used? ☐ Yes ☐ No |

Provide discussion/justifications for selections and decisions above:

Streets are taking significant areas of runon from major arterial streets which would be expected to have a high sediment load.

**Form J-1 Page 6 of 8: Green Gutters**

Brief Description: Green Gutters are shallow and narrow strips of landscaping in a typical curb and gutter location with a lower elevation than the street gutter elevation to allow capture of storm water from the sidewalk and street.

| | | | |
|---|---|---|---|
| Site Type (Check all that apply): | Street Type | Rating | Present in Project? |
| | Residential Streets | ○ | ☐ |
| | Commercial Street/ Business District | ◉ | ☐ |
| | Collector Street | ● | ☒ |
| | Arterial and Boulevard | ● | ☐ |
| | Alleys | ◉ | ☐ |
| | Parking Areas | ○ | ☐ |
| Key Opportunities for Green Gutters (Check all that apply): | Parkway strips | | ☐ |
| | Medians | | ☐ |
| | Long, mostly continuous space | | ☒ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Green Gutters | | |
| | Slope > 1% and <3% | | ☐ |
| | Conveying run-on to a site | | ☒ |
| | Infiltration is partially feasible or not feasible | | ☒ |
| | Long continuous segments available | | ☒ |
| | Narrower spaces (as little as 2 to 3 feet) | | ☐ |
| | Unfavorable Conditions for Green Gutters | | |
| | Frequent driveway interruption | | ☐ |
| | ROW width too limited | | ☐ |

**Summary of Findings:**

| | |
|---|---|
| Were Green Gutters determined to be applicable as part of the Green Streets BMP plan?<br>☐ Yes ☒ No | If yes, were they used?<br>☐ Yes ☐ No |

Provide discussion/justifications for selections and decisions above:

Green gutters can not be integrated with the street designs which are already set based on traffic design and planning needs and requirements.

**Form J-1 Page 7 of 8: Rain Gardens**

Brief Description: Rain Gardens are shallow detention basins with vegetation that temporarily store water to allow for infiltration of the stored volume.

| Site Type (Check all that apply): | Street Type | Rating | Present in Project? |
|---|---|---|---|
| | Residential Streets | ◉ | ☐ |
| | Commercial Street/ Business District | ◉ | ☐ |
| | Collector Street | ◉ | ☒ |
| | Arterial and Boulevard | ◉ | ☐ |
| | Alleys | ○ | ☐ |
| | Parking Areas | ● | ☐ |

| Key Opportunities for Rain Gardens (Check all that apply): | | |
|---|---|---|
| | Irregularly shaped areas in ROW | ☐ |
| | Broad and flat areas | ☒ |
| | Other (must justify below) | ☐ |

| Site-Specific Factors (Check all that apply): | | |
|---|---|---|
| | Favorable Conditions for Rain Gardens | |
| | Slope <2% | ☒ |
| | Infiltration is partially feasible or not feasible | ☒ |
| | Large area available | |
| | Unfavorable Conditions for Rain Gardens | |
| | Slope > 2% | ☐ |
| | ROW too limited | ☐ |

**Summary of Findings:**

| Were Rain Gardens determined to be applicable as part of the Green Streets BMP plan? | If yes, were they used? |
|---|---|
| ☐ Yes ☒ No | ☐ Yes ☐ No |

Provide discussion/justifications for selections and decisions above:

The limited parkways preclude rain gardens from being implemented.

| Form J-1 Page 8 of 8: Trees | | | |
|---|---|---|---|
| Brief Description: Trees planted in the sidewalk right-of-way provide rainfall interception and infiltration benefits and typically supplements other storm water management tools. | | | |
| Site Type (Check all that apply): | Street Type | Rating[1] | Present in Project? |
| | Residential Streets | ● | ☐ |
| | Commercial Street/ Business District | ◉ | ☐ |
| | Collector Street | ◉ | ☒ |
| | Arterial and Boulevard | ◉ | ☐ |
| | Alleys | ◉ | ☐ |
| | Parking Areas | ● | ☐ |
| Key Opportunities for Trees (Check all that apply): | Parkway strips | | ☐ |
| | Medians | | ☐ |
| | Irregularly shaped areas | | ☐ |
| | Extra ROW on back side of sidewalk | | ☒ |
| | Other (must justify below) | | ☐ |
| Site-Specific Factors (Check all that apply): | Favorable Conditions for Trees | | |
| | Located outside of clear zone | | ☐ |
| | Infiltration is feasible | | ☐ |
| | ROW not limiting | | |
| | Unfavorable Conditions for Trees | | |
| | Limited space for root growth | | ☐ |
| | Clear zone issues | | ☐ |
| **Summary of Findings:** | | | |
| Were Trees determined to be applicable as part of the Green Streets BMP plan? ☒ Yes ☐ No | | If yes, were they used? ☒ Yes ☐ No | |
| Provide discussion/justifications for selections and decisions above: Based on the requirements for Euclid Avenue, street trees can be incorporated while maintaining the street to sidewalk connection. Furthermore, street trees will fit in well in terms of the landscape requirements. | | | |

Project Name: **Hilltop and Euclid**

# ATTACHMENT 2
# BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

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

Project Name: **Hilltop and Euclid**

**Indicate which Items are Included:**

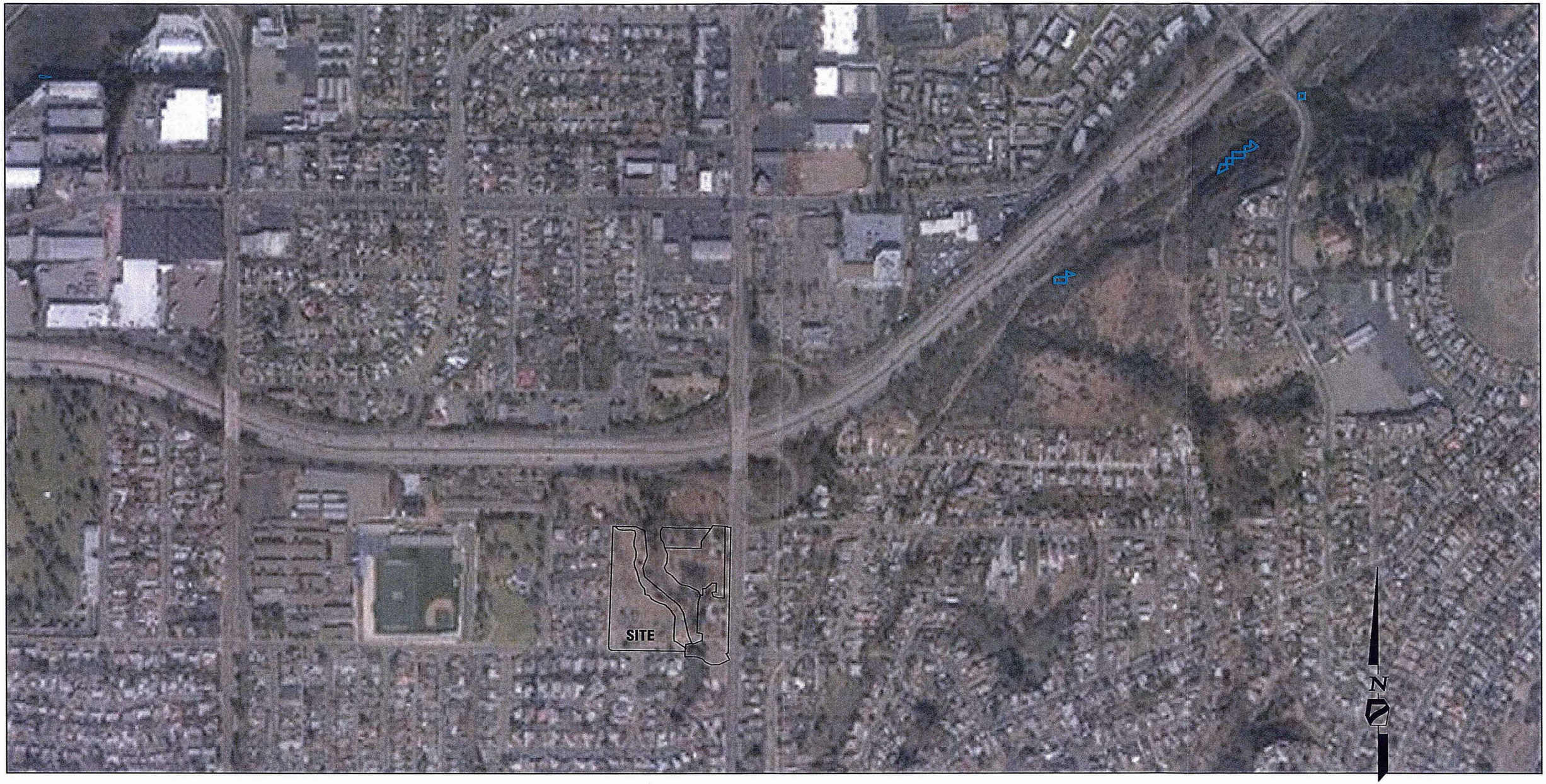
| Attachment Sequence | Contents | Checklist |
|---|---|---|
| Attachment 2a | Hydromodification Management Exhibit (Required) | ☒ Included<br>See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet. |
| Attachment 2b | Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional)<br><br>See Section 6.2 of the BMP Design Manual. | ☒ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required)<br>Optional analyses for Critical Coarse Sediment Yield Area Determination<br>☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite<br>☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment<br>☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite |
| Attachment 2c | Geomorphic Assessment of Receiving Channels (Optional)<br>See Section 6.3.4 of the BMP Design Manual. | ☐ Not performed<br>☐ Included<br>☒ Submitted as separate stand-alone document |
| Attachment 2d | Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required)<br>See Chapter 6 and Appendix G of the BMP Design Manual | ☐ Included<br>☒ Submitted as separate stand-alone document |
| Attachment 2e | Vector Control Plan (Required when structural BMPs will not drain in 96 hours) | ☐ Included<br>☒ Not required because BMPs will drain in less than 96 hours |

Project Name: **Hilltop and Euclid**

**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
☒ 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, and size/detail)




**LEGEND**

DRAINAGE AREA

ONSITE CCSYA (NONE)

WMAA CCSYA

| | |
|---|---|
| SCALE: | 1"=500' |
| JOB #: | 4210 |
| CREATED: | 9/19/17 |

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619.236.0471 Tel
619.234.0349 Fax

**CITY OF SAN DIEGO**

**HILLTOP**

**CCSYA MAP**
**EXHIBIT 2B**

Project Name: **Hilltop and Euclid**

# ATTACHMENT 3

# STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Project Name: **Hilltop and Euclid**

**Indicate which Items are Included behind this cover sheet:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| Attachment 3a | Structural BMP Maintenance Thresholds and Actions (Required) | ☒ Included<br><br>See Structural BMP Maintenance Information Checklist. |
| Attachment 3b | Draft Maintenance Agreement (when applicable) | ☐ Included<br>☒ Not Applicable |

Project Name: **Hilltop and Euclid**

**Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:**

**Preliminary Design / Planning / CEQA level submittal:**

- Attachment 3a must identify:

  ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

**Final Design level submittal:**

**Attachment 3a** must identify:

☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
☐ 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)
☐ When applicable, frequency of bioretention soil media replacement
☐ 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

**Attachment 3b:** For private entity operation and maintenance, Attachment 3b must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

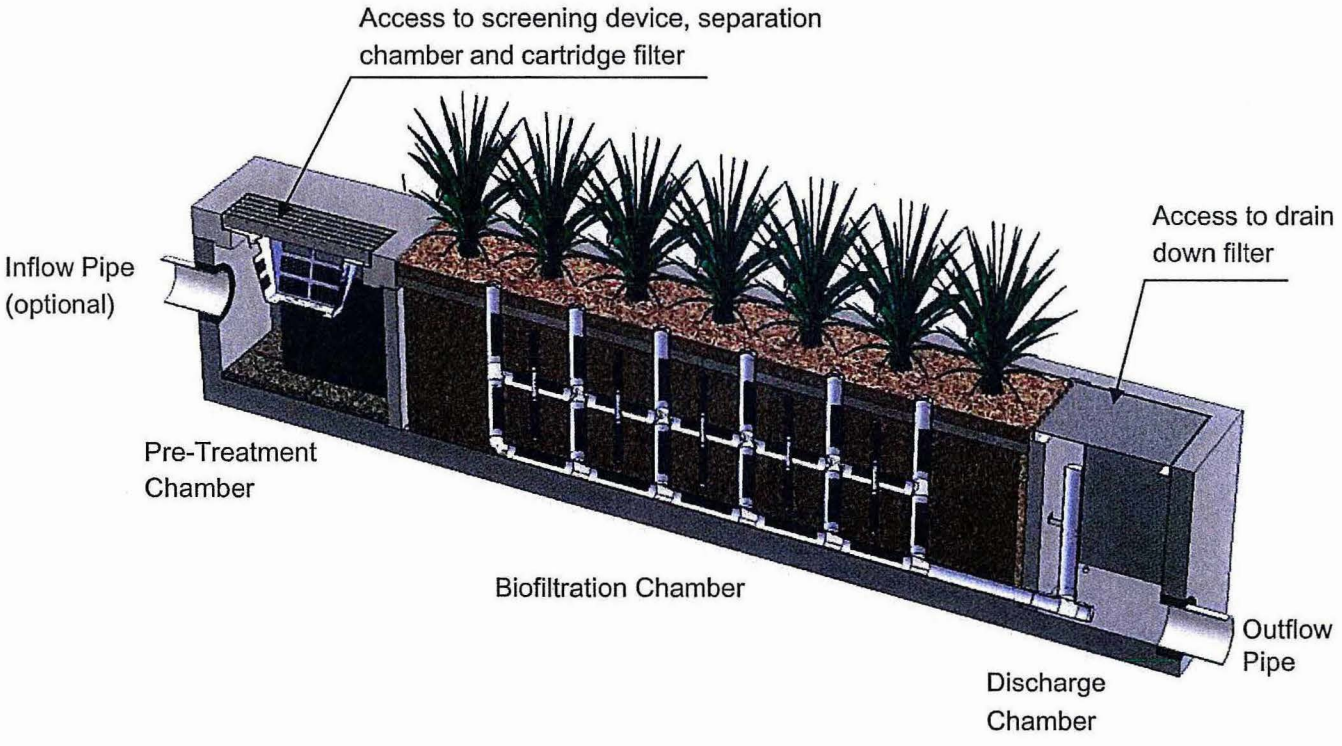
☐ Vicinity map
☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
☐ BMP and HMP location and dimensions
☐ BMP and HMP specifications/cross section/model
☐ Maintenance recommendations and frequency
☐ LID features such as (permeable paver and LS location, dim, SF).

# 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.

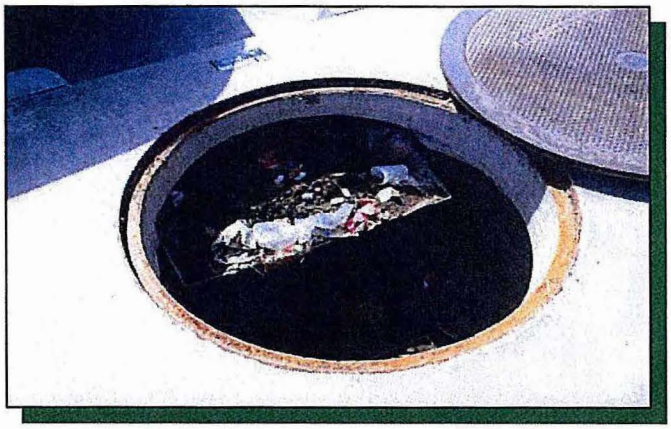
5. No fertilizer shall be used in the Biofiltration Chamber.

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

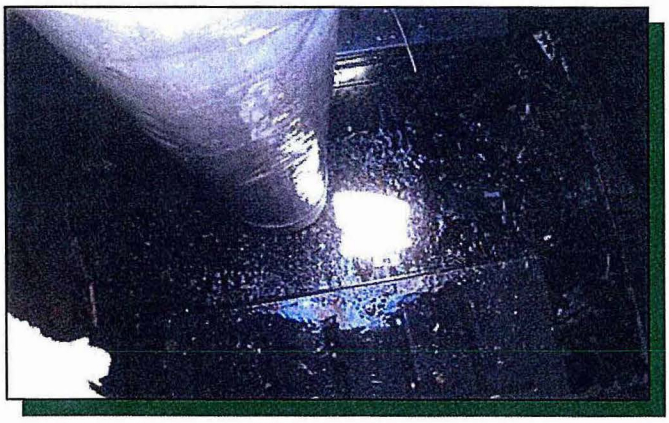
## Screening Device

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.



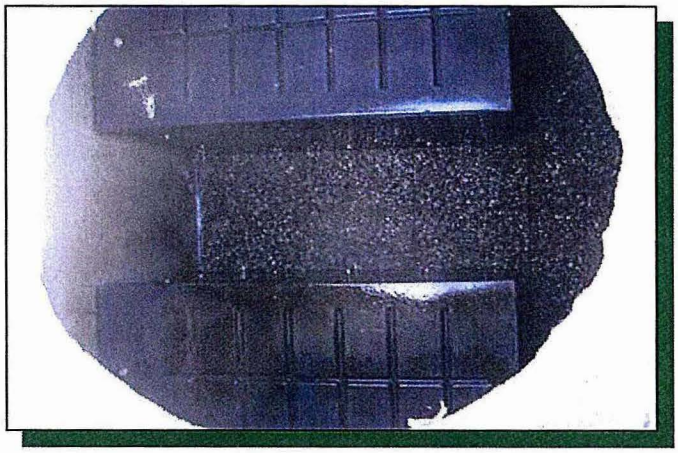
## Separation Chamber

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.



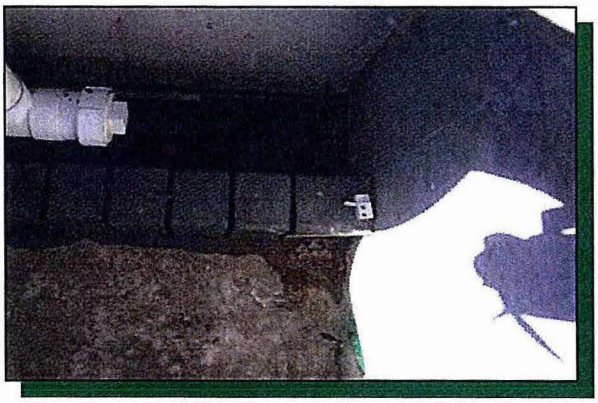
## Cartridge Filters

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

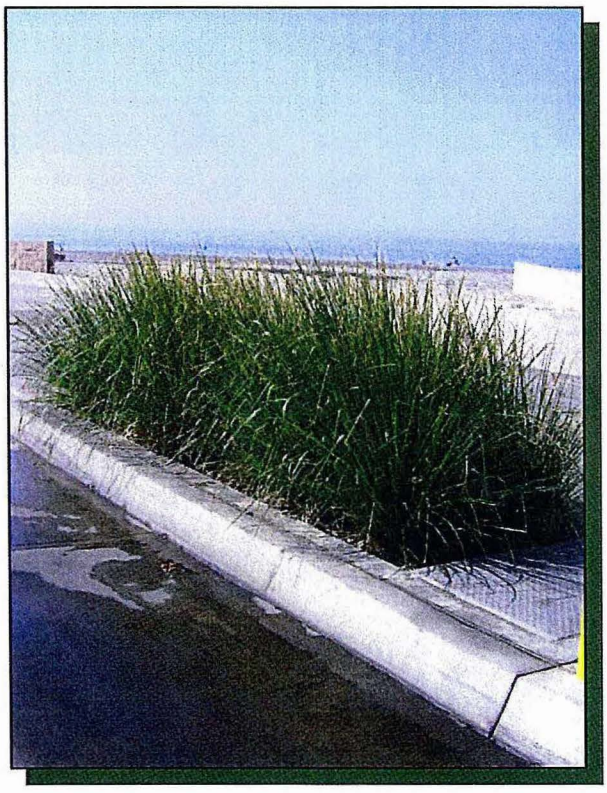
The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.



MODULAR WETLANDS

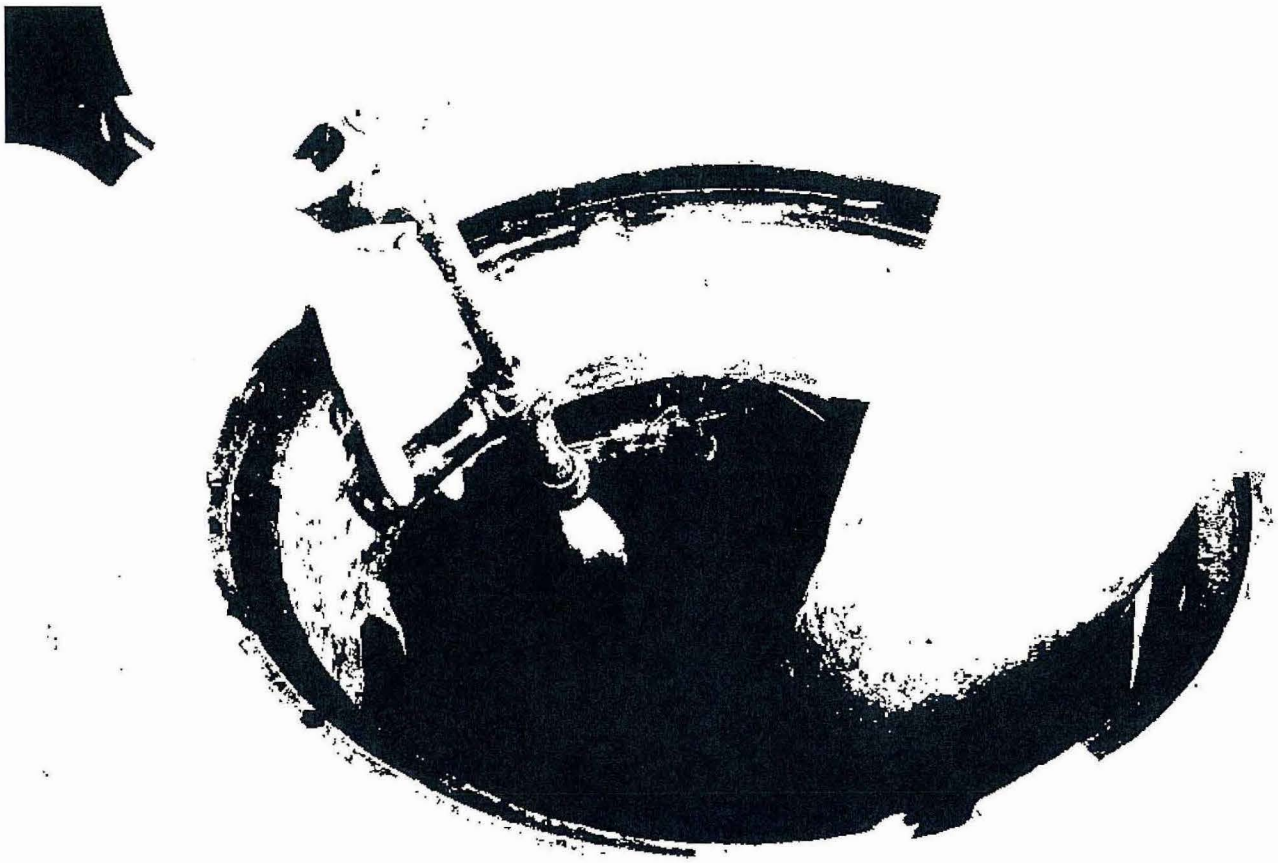
## Trim Vegetation

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.



MODULAR WETLANDS

# Inspection Form



**Modular Wetland System, Inc.**
**P. 760.433-7640**
**F. 760-433-3176**
**E. Info@modularwetlands.com**

**www.modularwetlands.com**

BIO CLEAN ENVIRONMENTAL SERVICES, INC.

# Inspection Report
# Modular Wetlands System

MODULAR WETLANDS

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

| For Office Use Only |
|---|
| (Reviewed By) |
| (Date) |
| Office personnel to complete section to the left. |

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

## 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

MODULAR WETLANDS

# 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:<br>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: **Hilltop and Euclid**

**THE CITY OF SAN DIEGO**
RECORDING REQUESTED BY:
**THE CITY OF SAN DIEGO**
AND WHEN RECORDED MAIL TO:

Click or tap here to enter text.
Click or tap here to enter text.
Click or tap here to enter text.

(THIS SPACE IS FOR THE RECORDER'S USE ONLY)

# STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

| APPROVAL NUMBER: | ASSESSOR'S PARCEL NUMBER: | PROJECT NUMBER: |
|---|---|---|
| Click or tap here to enter text. | Click or tap here to enter text. | Click or tap here to enter text. |

This agreement is made by and between the City of San Diego, a municipal corporation [City] and Click or tap here to enter text.

the owner or duly authorized representative of the owner [Property Owner] of property located at:
Click or tap here to enter text.

(PROPERTY ADDRESS)

and more particularly described as: Click or tap here to enter text.

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): Click or tap here to enter text.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): Click or tap here to enter text.

**Continued on Page 2**

Project Name: **Hilltop and Euclid**



NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):Click or tap here to enter text..

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)Click or tap here to enter text..

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):Click or tap here to enter text.

(Owner Signature)

Click or tap here to enter text.

(Print Name and Title)

Click or tap here to enter text.

(Company/Organization Name)

Click or tap to enter a date.

(Date)

**THE CITY OF SAN DIEGO**

APPROVED:

(City Control engineer Signature

(Print Name)

(Date)

**NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDMENTS PER CIVIL CODE SEC. 1180 ET.SEQ**

Project Name: **Hilltop and Euclid**

# ATTACHMENT 4
# COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

Project Name: **Hilltop and Euclid**

**Use this checklist to ensure the required information has been included on the plans:**

The plans must identify:

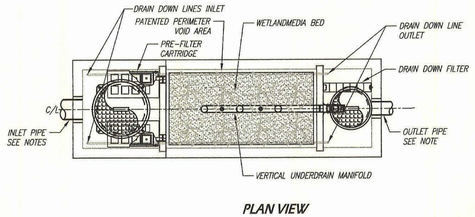
- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating 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 propritery BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

# HILLTOP AND EUCLID

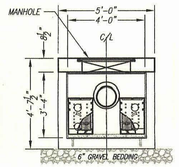
## VESTING TENTATIVE MAP NO. 1976638

## SITE DEVELOPMENT PERMIT NO. 1976637

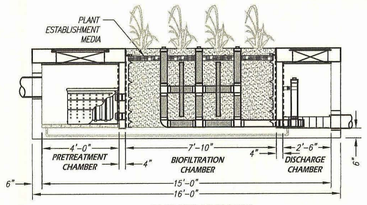
| SITE SPECIFIC DATA* | | | |
|---|---|---|---|
| PROJECT NAME | | | |
| PROJECT LOCATION | | | |
| STRUCTURE ID | | | |
| PERFORMANCE DATA | | | |
| TREATMENT VOLUME (CFS) | | | |
| TREATMENT HGL (FT) | | 3.4 | |
| BYPASS FLOW RATE (CFS) | | DEPENDANT ON PIPE SIZE | |
| PROJECT PARAMETERS | | | |
| PIPE DATA | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | | | |
| OUTLET PIPE 1 | | | |
| RIM ELEVATION | | | |
| SURFACE LOADING REQUIREMENT | | PARKWAY | |
| FRAME & COVER | PRETREATMENT | BIOFILTRATION | DISCHARGE |
| | 30 | OPEN MEDIA | 24 |
| WETLANDMEDIA VOLUME (CY) | | | |
| MEDIA DELIVERED | | | |
| ORIFICE SIZE (DIA) | | | |
| MAX PICK WEIGHT (LBS) | | | |
| NOTES: *PER ENGINEER OF RECORD | | | |



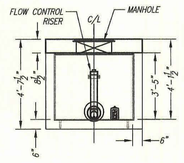

PLAN VIEW




LEFT END VIEW




ELEVATION VIEW




RIGHT END VIEW

### 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. 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).
4. INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR.
5. 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.
6. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

### 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.

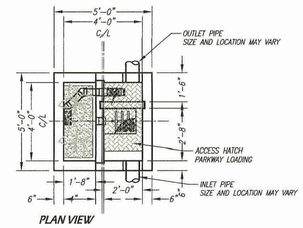
| MWS UNIT DESIGN DATA | |
|---|---|
| TREATMENT CAPACITY (CFS) | 0.175 |
| OPERATING HEAD (FT) | 3.4 |
| PRETREATMENT LOADING RATE (GPM/SF) | 2.0 |
| WETLAND LOADING RATE (GPM/SF) | 1.0 |



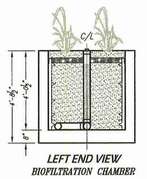
MODULAR WETLANDS

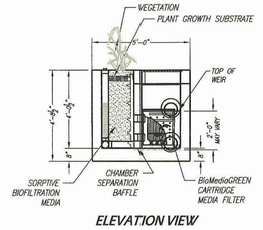
MWS-L-4-15-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

| SITE SPECIFIC DATA* | | | |
|---|---|---|---|
| PROJECT NAME | | | |
| PROJECT LOCATION | | | |
| STRUCTURE ID | | | |
| PERFORMANCE DATA | | | |
| TREATMENT FLOW (CFS) | | 0.051 | |
| TREATMENT HGL (FT) | | | |
| BYPASS FLOW RATE (CFS) | | DEPENDANT ON PIPE SIZE | |
| PROJECT PARAMETERS | | | |
| PIPE DATA | I.E. | MATERIAL | DIAMETER |
| INLET PIPE 1 | | PVC | 8" |
| OUTLET PIPE | -4.13 | PVC | 8" |
| RIM ELEVATION | 0.0 | | |
| SURFACE LOADING REQUIREMENT | | PARKWAY | |
| FRAME & COVER | PRETREATMENT | BIOFILTRATION | DISCHARGE |
| | 22"X40" | OPEN PLANTER | N/A |
| WETLANDMEDIA VOLUME (CY) | | 2.4 | |
| MEDIA DELIVERED | | TBD | |
| ORIFICE SIZE (DIA) | | TBD | |
| MAX PICK WEIGHT (LBS) | | TBD | |
| NOTES: *PER ENGINEER OF RECORD | | | |

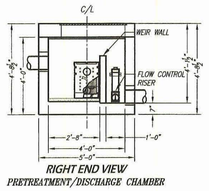



PLAN VIEW




ELEVATION VIEW




RIGHT END VIEW
PRETREATMENT/DISCHARGE CHAMBER

### 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. MANUFACTURER RECOMMENDS A MINIMUM 6"LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
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4. INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR.
5. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
6. 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.
7. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

### 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.

| MWS UNIT DESIGN DATA | |
|---|---|
| TREATMENT CAPACITY (CFS) | 0.052 |
| OPERATING HEAD (FT) | 3.4 |
| PRETREATMENT LOADING RATE (GPM/SF) | 1.8 |
| WETLAND LOADING RATE (GPM/SF) | 1.0 |



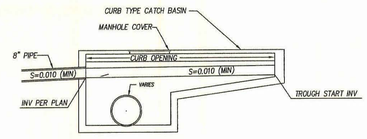
MODULAR WETLANDS

MWS-L-4-4-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

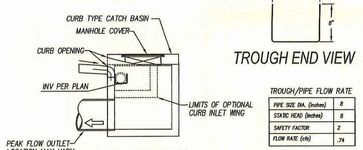
# DVERT™

## MODULAR WATER QUALITY DIVERSION WEIR SYSTEM

MODULAR WETLANDS™




PROFILE - CATCH BASIN

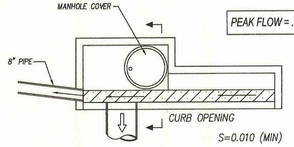



SECTION VIEW

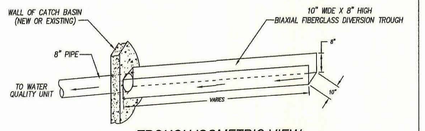



TROUGH END VIEW

| TROUGH/PIPE FLOW RATE | |
|---|---|
| PIPE SIZE DIA. (Inches) | 8 |
| STATIC HEAD (Inches) | 8 |
| SAFETY FACTOR | 2 |
| FLOW RATE (cfs) | .74 |




TOP VIEW - CATCH BASIN




TROUGH ISOMETRIC VIEW

DRAWINGS NOT TO SCALE

PATENT PENDING

INSTALLATION NOTES:

1. TROUGH TO BE CONNECTED TO CONCRETE BELOW CURB OPENING USING 1/2" x 1-1/2" 316 STAINLESS STEEL SPIKE MUSHROOM HEAD DRIVE ANCHORS SPACED 12" ON CENTER
2. USE DAP CONCRETE WATERTIGHT FILLER & SEALANT TO SEAL SEAM BETWEEN FIBERGLASS WEIR & CONCRETE WALL OF CATCH BASIN.

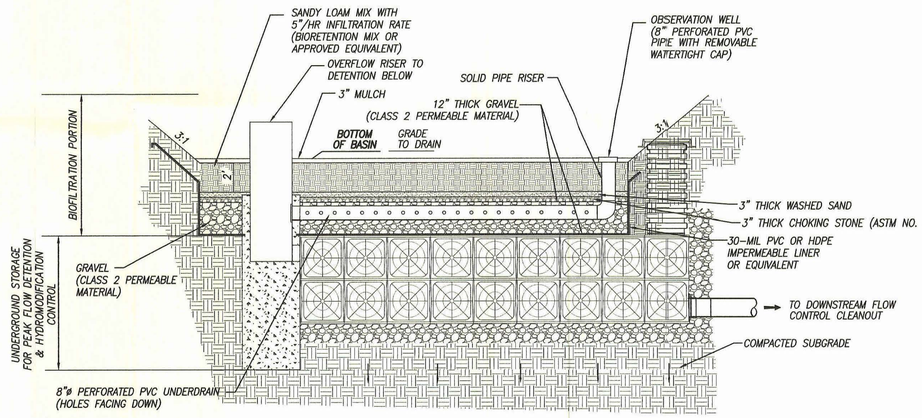
MODULAR WETLAND SYSTEMS INC.
P.O. BOX 869
COCHASSET, GA 92049
www.ModularWetlands.com



| | NAME | DATE |
|---|---|---|
| DRAWN | | |
| EDITED | | |
| COMMENTS: | | |

TITLE: DVERT SYSTEM

| SIZE | DWG. NO. | REV |
|---|---|---|
| | MWS-DVT-10-8 | |
| SCALE: NTS | UNITS = INCHES | SHEET 1 OF 1 |




DETAIL 'B': BIOFILTRATION BASIN

NOT TO SCALE



STUDIO E
ARCHITECTS
2258 First Avenue
San Diego California 92101
mail@studioearchitects.com
T 619.235.9262 F 619.235.0522

PROJECT DESIGN CONSULTANTS
Planning | Engineering | Survey
701 B Street, Suite 800
San Diego, CA 92101
619.235.6471 Tel
619.234.1349 Fax

Hilltop and Euclid
Hilltop and Euclid Gateway Mixed-Use

Project 16115

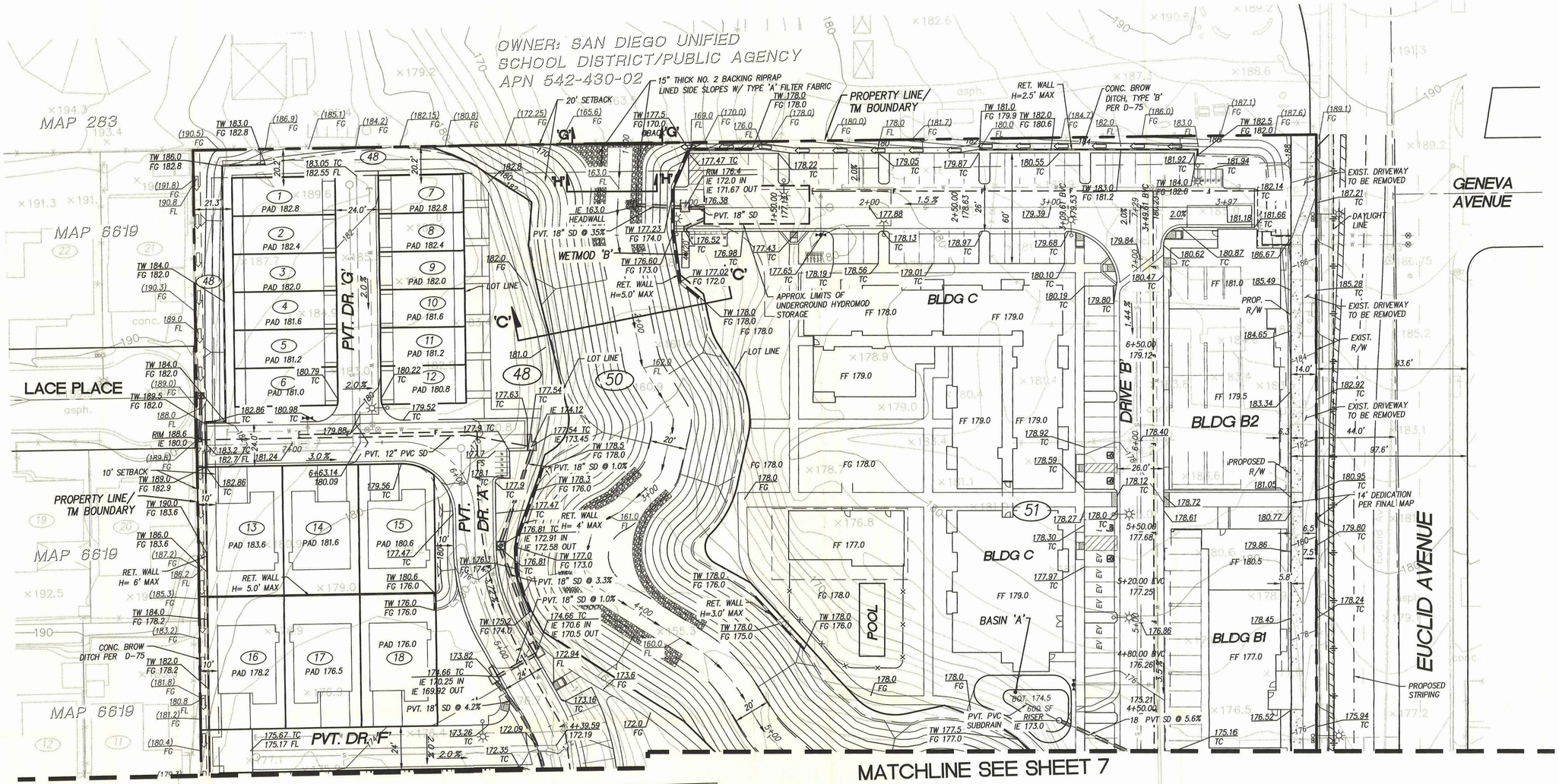
| | |
|---|---|
| 06/29/17 | COMPLETENESS |
| 07/20/17 | INITIAL SUBMITTAL |
| 09/21/17 | FULL SUBMITTAL |
| 11/29/17 | RESUBMITTAL #1 |

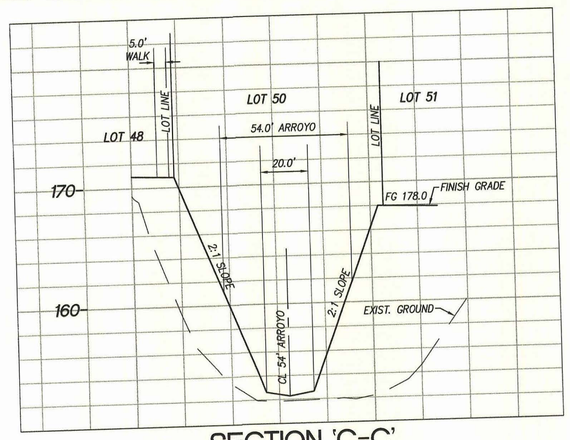
DETAILS AND NOTES

C-04

# HILLTOP AND EUCLID

## VESTING TENTATIVE MAP NO. 1976638
## SITE DEVELOPMENT PERMIT NO. 1976637




SECTION 'C-C'

SCALE: HORIZ. 1" = 30'
VERT. 1" = 6'

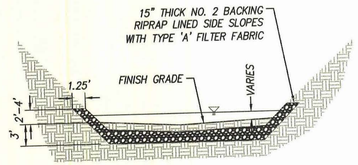
## NOTES:

BASIN 'A' – LINED BIOFILTRATION

WETMOD 'B' – WETLAND MOD W/ UNDERGROUND STORAGE

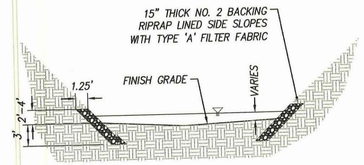
WETMOD 'D1' – BIOFILTRATION W/ UNDERGROUND ARCH CHAMBER

THE PROJECT WILL BE IMPLEMENTING GREEN STREET ELEMENTS FOR THE AREA AND CAN BE REFERENCED WITHIN THE SWOMP



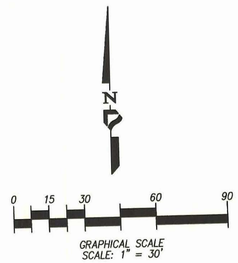

SECTION 'G-G'

NOT TO SCALE




SECTION 'H-H' (TYP.)

NOT TO SCALE




GRAPHICAL SCALE
SCALE: 1" = 30'


STUDIO E
ARCHITECTS
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San Diego California 92101
mail@studioearchitects.com
T 619.235.9262 F 619.235.0522

landLAB
landscape architecture • environmental design
702 Wrotten Drive
San Diego, California 92199
T: 858.483.7817
F: 858.531.9021

PROJECT DESIGN CONSULTANTS
Planning | Engineering | Survey


Hilltop and Euclid

Hilltop and Euclid Gateway Mixed-Use

Project 16115

| | |
|---|---|
| 06/29/17 | COMPLETENESS |
| 07/20/17 | INITIAL SUBMITTAL |
| 09/21/17 | FULL SUBMITTAL |
| 11/29/17 | RESUBMITTAL #1 |

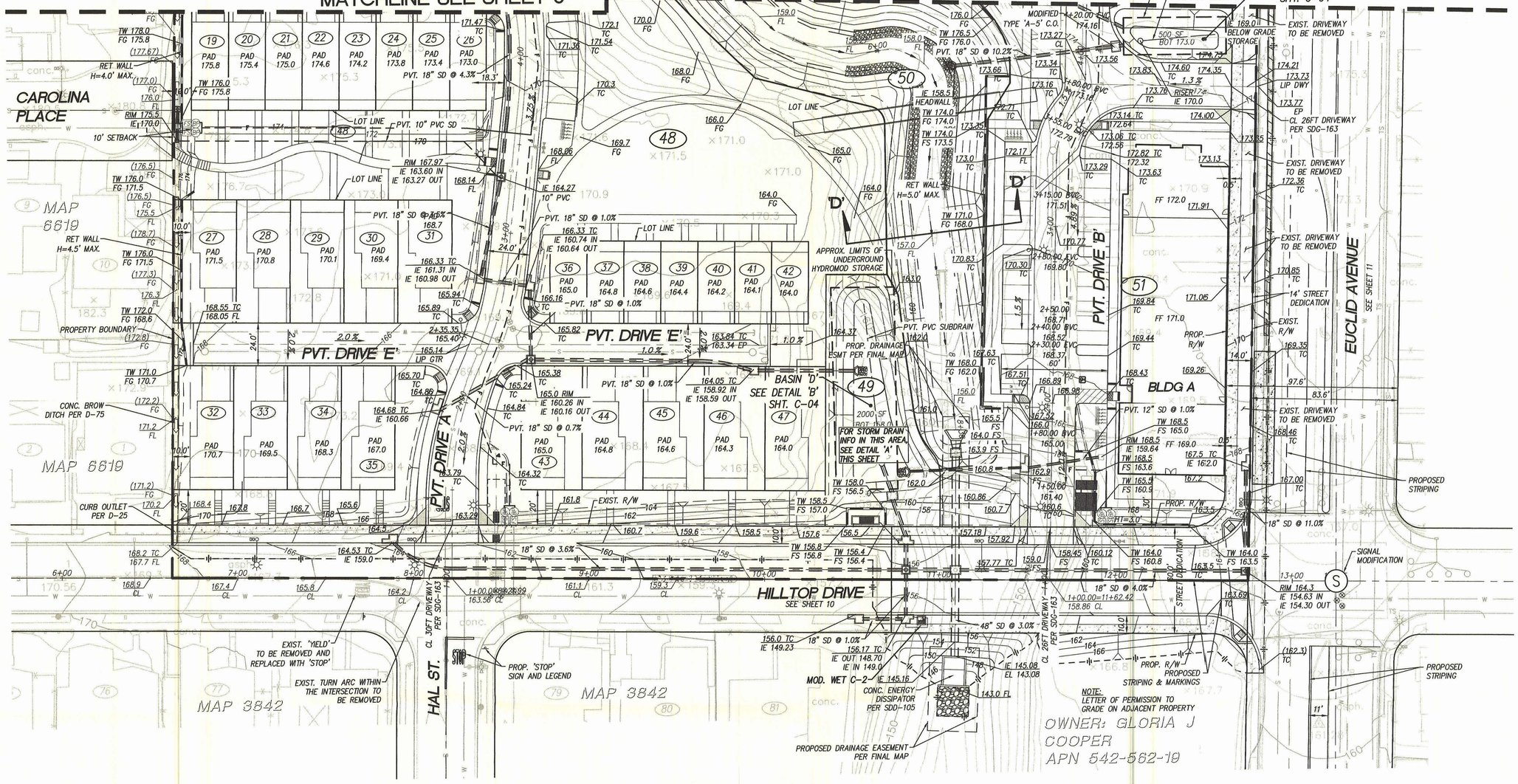
GRADING & DRAINAGE

C-06

# HILLTOP AND EUCLID

## VESTING TENTATIVE MAP NO. 1976638

## SITE DEVELOPMENT PERMIT NO. 1976637




## LEGEND:

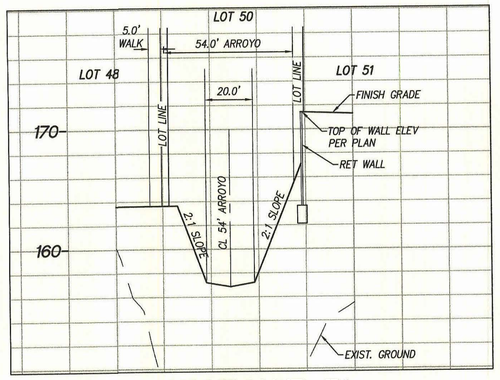
SIGHT VISIBILITY TRIANGLE PER MUNICIPAL CODE 113.0273

## NOTES:

BASIN 'C' – BIOFILTRATION W/ UNDERGROUND ARCH CHAMBER

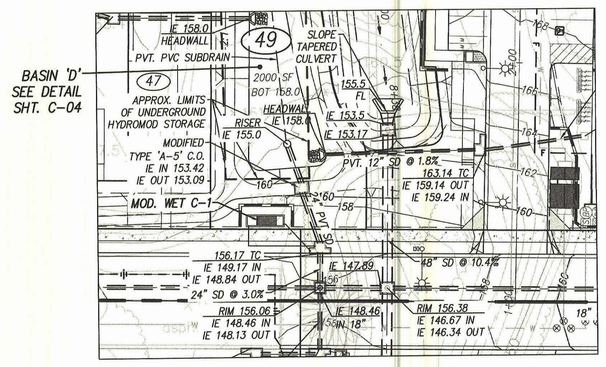
BASIN 'D' – BIOFILTRATION W/ UNDERGROUND ARCH CHAMBER

THE PROJECT WILL BE IMPLEMENTING GREEN STREET ELEMENTS FOR THE AREA AND CAN BE REFERENCED WITHIN THE SWQMP




## SECTION 'D-D'

SCALE: HORIZ. 1" = 30'; VERT. 1" = 6'




## DETAIL 'A'

SCALE: 1" = 30'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# Hilltop and Euclid

Hilltop and Euclid Gateway Mixed-Use

Project 16115

| | |
|---|---|
| 06/29/17 | COMPLETENESS |
| 07/20/17 | INITIAL SUBMITTAL |
| 09/21/17 | FULL SUBMITTAL |
| 11/29/17 | RESUBMITTAL #1 |

GRADING & DRAINAGE

C-07

Project Name: **Hilltop and Euclid**

# ATTACHMENT 5
# DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.


Verbatim
CD-R
700 MB Mo
52x speed vitesse
80 min
HILLTOP
DRAINAGE REPORT
1/18/18

Project Name: **Hilltop and Euclid**

# ATTACHMENT 6
# GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.