PRELIMINARY POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

MTS Clean Transit Advancement Campus

4586 Federal Boulevard,
San Diego CA, 92102

Prepared for:

HELIX Environmental Planning Inc.

7578 El Cajon Boulevard
La Mesa, CA 91942

Prepared by:

NASLAND ENGINEERING

Cory Schrack, PE
4740 Ruffner Street
San Diego, CA 92111
(858) 292-7770

October 4, 2022

APPENDIX

B STORMWATER REQUIREMENTS CHECKLIST

Metropolitan Transit System
1225 Imperial Avenue, Suite 1000
San Diego, CA 92101

Stormwater Requirements Checklist

Construction Requirements

1. Will the project create a land disturbance that is greater than or equal to 1 acre?

☑ Yes; Stormwater Pollution Prevention Plan (SWPPP) is required. Skip question 2, go to Post Construction Requirements

☐ No; go to next question

2. Will the project create a land disturbance of less than 1 acre?

☐ Yes; Water Pollution Control Plan (WPCP) is required. Go to Post Construction Requirements

Post Construction Requirements

1. Will the project create/replace ≥2,500 ft^2 impervious surface?

☑ Yes; go to next question

☐ No; project is exempt from Post Construction Requirements. Comply with Construction Requirements and sign and date the checklist.

2. Does the project create/replace ≥5,000 ft^2 impervious surface?

☑ Yes; this is a Regulated project. Comply with Construction Requirements, Regulated Project Requirements and sign and date the checklist.

☐ No; this is a Small Project. Go to question 3.

3. Is the project an interior remodel; routine maintenance or repair, i.e. roof replacement; pothole repair; exterior wall surface replacement; pavement grinding and resurfacing of existing roadway; bicycle lane or sidewalk built as part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas; impervious trail built to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; sidewalk, bicycle lane, or trail constructed with a permeable surface; or construction of a new sidewalk, pedestrian ramp, or bike lane on existing roadway?

☐ Yes; project is exempt from Post Construction Requirements. Comply with Construction Requirements and sign and date the checklist.

☐ No; this is a Small Project. Comply with Construction Requirements, Small Project Requirements and sign and date the checklist.

Small Project

- ☐ SWPPP or WPCP
- ☐ Submit a Post Construction Stormwater Management (PCSM) Plan to MTS that is prepared by a certified professional. Reference guidance in the MTS Post Construction Storm Water Management Manual. The PCSM Plan must include the following:
  - ☐ Site Assessment
  - ☐ Source Control Measures
  - ☐ At least one Site Design Measure
  - ☐ Stormwater Runoff Calculations
  - ☐ Water efficient landscape irrigation design, if applicable, per the MTS Landscape Design and Maintenance Plan

Regulated Project

- ☑ SWPPP or WPCP
- ☑ Submit a Post Construction Stormwater Management (PCSM) Plan to MTS that is prepared by a certified professional. Reference guidance in the MTS Post Construction Storm Water Management Manual. The PCSM Plan must include the following:
  - ☐ Site Assessment
  - ☐ Source Control Measures
  - ☐ Site Design Measures
  - ☐ Stormwater Runoff Calculations
  - ☐ Treatment Measures
  - ☐ Operations & Maintenance Plan
  - ☐ Water efficient landscape irrigation design, if applicable, per the MTS Landscape Design and Maintenance Plan

Metropolitan Transit System

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

Metropolitan Transit System

Signature **Date**

APPENDIX

D REGULATED PROJECT WORKSHEETS AND CHECKLISTS

BASIC PROJECT INFORMATION COVER SHEET

Project Name	MTS CLEAN TRANSIT ADVANCEMENT CAMPUS
Project Location [Street Address if available, or intersection and/or APN]	**4586 Federal Boulevard, San Diego CA 92102** **APN:541-611-31-00, 541-611-34-00, 541-611-35-00, 541-611-04-00, 541-611-27-00**
Owner or Developer Information Name of Owner or Developer Title, if applicable Company or Affiliation Address Telephone Number Email Address	**San Diego Metropolitan Transit System** **(619) 557-4555**
Licensed Professional Certification Name of Owner or Developer Title, if applicable Company or Affiliation Address Telephone Number Email Address	**Cory Schrack** **Nasland Engineering** **4740 Ruffner Street** **San Diego, 92111** **(858)-292-7770**
[Licensed geotechnical engineer, professional civil engineer, or professional geologist] *Stamp and Signature*	

SITE ASSESSMENT WORKSHEET

Project Type
[Examples: Routine Maintenance, Roads, Parking Lot, New Development, Redevelopment, Small Project]

Redevelopment Project

Project Description

The proposed project consists of demolition of existing buildings, the construction of a new bus maintenance and charging facility, the construction of retaining walls, and electric vehicle charging lot. The proposed new bus division would entail the construction of a new bus maintenance facility building, charging facilities, bus wash facilities, equipment lift facilities, storage facilities, bus parking facilities, administration and operations office buildings, employee parking, lighting improvements, security and camera improvements, stormwater improvements, utility relocations, and landscaping and irrigation improvements. The maintenance facility would include maintenance support areas, 20 repair service bays, a body shop, a tire shop, bus wash and service areas, charging stations, storage areas, restrooms, and mechanical and electrical rooms.

GENERAL PROJECT SITE INFORMATION

Latitude:	32.721814	Longitude:	-117.096329
Total Project Area (ft^2)	526,640	Total Existing Impervious Area (ft^2)	463,960
New Impervious Area (ft^2)	18,228	Replaced Impervious Area (ft^2)	463,960
Post-Project Impervious Area (ft^2)	482,188		
Receiving Water(s)	Chollas Creek and San Diego Bay		

Describe location(s) of discharge from the project site

There are three points of discharge two storm drain inlets located on Federal Bvld that discharge to the street gutter and discharge to Chollas Creek. The third discharge location is an on-site inlet that gets discharged to an outfall structure at the adjacent canyon to the northwest and into Chollas Creek. All three discharge points discharge to Chollas Creek and eventually reach the San Diego Bay.

Describe Environmentally Sensitive Areas, if applicable and watershed.

The San Diego Bay, Chollas Creek, and adjacent canyon are environmentally sensitive areas applicable to this project.

Pollutants of Concern

Post-Project Land Use Type(s): Industrial and operations maintenance facility

Describe expected pollutant-generating activities

Pre-Project: onsite storm drain inlets, interior floor drains and elevator shaft sump pumps, interior parking garage, lansdscape/outdoor pesticide use, outdoor storage of equipment or materials, vehicle and equipment cleaning, loading docks, ,miscellaneous drain or wash water, plazas, sidewalks, and parking lots.

Post-Project

Identify pollutants of concern

Trash and Debris, Oil and Grease, Pesticides, Fertilizers: inorganic and organic; sediment/silt; Cleaning Products: Acids and detergents; add Chollas Creek POC for applicable TMDLs

SOURCE CONTROL MEASURES CHECKLIST

Describe source control measures to be implemented for each potential pollutant generating activity or source present at the project site. If a potential pollutant generating activity or source is not present at the site, indicate it as "N/A"

Interior floor drains
keep internal floor drains plugged.
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources
Keep internal floor drains plugged if they drain to the storm water drainage system
Unauthorized non-storm water discharges
Designate areas for vehicle washing and equipment that drain to a sanitary sewer and connect to a treatment control before connecting to sanitary sewer.
Accidental spills or leaks
Develop procedures to prevent/mitigate spills to storm drain systems.
Transit vehicle cleaning
Designated areas for vehicle washing that drain to a sanitary sewer and connect to a treatment control before connecting to sanitary sewer.
Vehicle and equipment repair and maintenance
Designate indoor areas for equipment repair and maintenance, design appropriate drainage for wastewater generated, and connect to a treatment control.
Outdoor storage of equipment or materials
Designed such that containers are on paved, impervious surfaces are as far from (or at a lower elevation than) storm drain inlets and drainage ditches.
Indoor and structural pest control
Install physical barriers for pest control. For example, subterranean termites cannot tunnel through sand barriers. Sand barriers can be designed into crawl spaces under pier and beam foundations and against retaining walls. Metal flashing and metal plates can also be used as a barrier between piers and beams of structures such as decks.
Fire sprinkler test water
Prevent discharge of water from fire sprinkler system maintenance activities to the storm drain system during testing.
Parking/Storage Area Maintenance
Regular cleaning prior to the onset of the wet season.
Ponds, decorative fountains, and other water features
N/A
Landscape/outdoor pesticide use
Integrated pest management techniques per MTS Landscape Design and Maintenance Plan.
Fuel dispensing areas
N/A

SOURCE CONTROL MEASURES CHECKLIST

Describe source control measures to be implemented for each potential pollutant generating activity or source present at the project site. If a potential pollutant generating activity or source is not present at the site, indicate it as "N/A"

Loading docks
Covered docks and drainage designed to preclude urban run-on and runoff.
Refuse areas
Provide enclosures, containment structures, and impervious pavement to mitigate spills.
Industrial processes
For outdoor processing areas (e.g. painting or coating, sanding, degreasing) design shall include enclosures, secondary containment structures, dead-end sumps, and conveyance to treatment facilities in accordance with conditions established by the local wastewater treatment agency.

DRAINAGE MANAGEMENT AREA (DMA) WORKSHEET AND NARRATIVE DESCRIPTION

In addition to a map or diagram that displays the DMAs, Regulated Projects shall complete this worksheet and submit it with the Post-Construction Stormwater Management Plan.

DMA No.	Area (ft^2)	Existing Impervious Area (ft^2)	Post-Project Impervious Area (ft^2)	DMA SDV (ft^3)	SDMcredit (ft^3)	ADJUSTED DMA SDV (ft^3)
DMA 1	104,980	104,980	104,980	3,447	1,513	3,447
DMA 2	184,258	184,258	178,458	6,050	6,134	6,050
DMA 3	237,402	198,804	198,750	9,740	9,763	9,740

Drainage Management Area Narrative Description:

The project site is considered to be 3 DMAs each of them draining to separate BMPs. DMA 1 is 104,980 SF and drains to BMP 1. DMA 2 is 184,258 SF and drains to BMP 2. Lastly, DMA 3 is 237,402 SF and drains to BMP 3. Once treated onsite the runoff from BMP 1 will drain to an existing curb inlet on Federal Blvd. Runoff from BMP 2 also discharges to another curb inlet downstream of the DMA on Federal Blvd. Runoff from BMP 3 will discharge to an existing grate inlet and travel through an existing storm drain pipe and eventually discharge to Chollas Creek.

The MTS post construction storm water management manual states that bioretention facilities are the primary option when choosing stormwater treatment measures. After site design measures are identified for low impact development compliance, the remaining runoff from impervious DMAs must be directed to a bioretention facility. If biorientation is considered infeasible, then different stormwater treatment measures may be proposed such as: Drain inlet insert, detention basin, gravity separators, infiltration basin, infiltration trench/dry well, media/sand filter, sidewalk planter/flow-through planter, stormwater filter, tree-well filter/tree wells, vegetated buffer/filter strip, and vegetated swales.

Site design measures were chosen for conceptual design phase and such recommendations should be re-evaluated for final design. Site designs were implemented in order to reduce the amount of runoff and satisfy the required criteria on the Stormwater Treatment Measure Worksheet. The site design measures that could potentially be implemented are porous pavement, downspout disconnection, impervious area disconnection, and vegetated swales.

Hydromodification has to be accounted for in the sizing of stormwater treatment devices since the project location is not exempt. Therefore, the use of biofiltration should be the main choice when choosing a pollutant treatment control since it can also be modified to comply with hydromodification criteria stated in the MS4 permit. Modified biofiltration facilities are vegetated on the surface and use an under drain that is perforated to comply with the drain time of 96 hours for hydromodification; it then discharges to the downstream conveyance system. Three points of compliance are required because the project is comprised by three DMA areas and because the site is subject to hydromodification management requirements. These points of compliance should be located downstream of the project, approximately on the southwest of both DMA 1 and 2 where they will connect to an existing storm drain system via a curb inlet. The third point of compliance should be on the northwest side of DMA 3 were runoff discharges to an existing grate inlet and discharges down to Chollas Creek via storm drain pipe.

Calculations for BMP sizing and hydromodification were determined using the County of San Diego BMP Sizing Spreadsheet V3.1. Worksheets with calculations are provided in this report. Another option for stormwater treatment is the Linear Modular Wetland System (MWS). The MWS can also be sized for hydromodification. MWS uses a smaller footprint and treats more surface area, which can be beneficial when project area is small. A MWS fact sheet is included in this report. Preliminary sizing of the MWS was determined using the Volume Based Sizing of the table provided by Bio-Clean. Sizing is based on DMA's design capture volumes (DCV) and max draw down time of 96 hours, which is the max time allowed for hydromodification. A MWS-L-4-6 which its area is 4' x 6' is appropriate to treat storm water for DMA 1. DMA 2 will need a MWS L-4-8 and DMA 3 will need a MWS L-4-8 to treat stormwater runoff from the site. For an extensive analysis of the feasibility of MWS, coordination with BioClean is necessary.

MWS Sizing calculations:

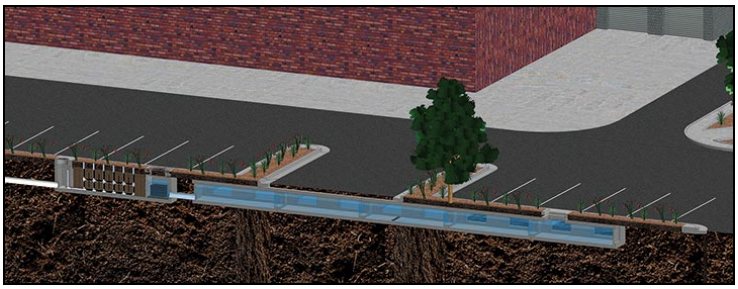
96 HOURS MAX DRAIN TIME /24 HOURS =4 (Treatment capacity is based on 24 hours, therefore DCV is divided by 4)

DMA 1 DCV= 5,250 CU.FT/4 TO GET 24-HR DRAW DOWN = 1,312.5 CU.FT/. USE ---> MWS L-4-6

DMA 2 DCV= 9,000 CU.FT/4 TO GET 24-HR DRAW DOWN = 2,250 CU.FT. USE ---> MWS L-4-8

DMA 3 DCV= 10,015 CU.FT/4 TO GET 24-HR DRAW DOWN = 2,504 CU.FT. USE ---> MWS L-4-8

Modular Wetland System BMP Option

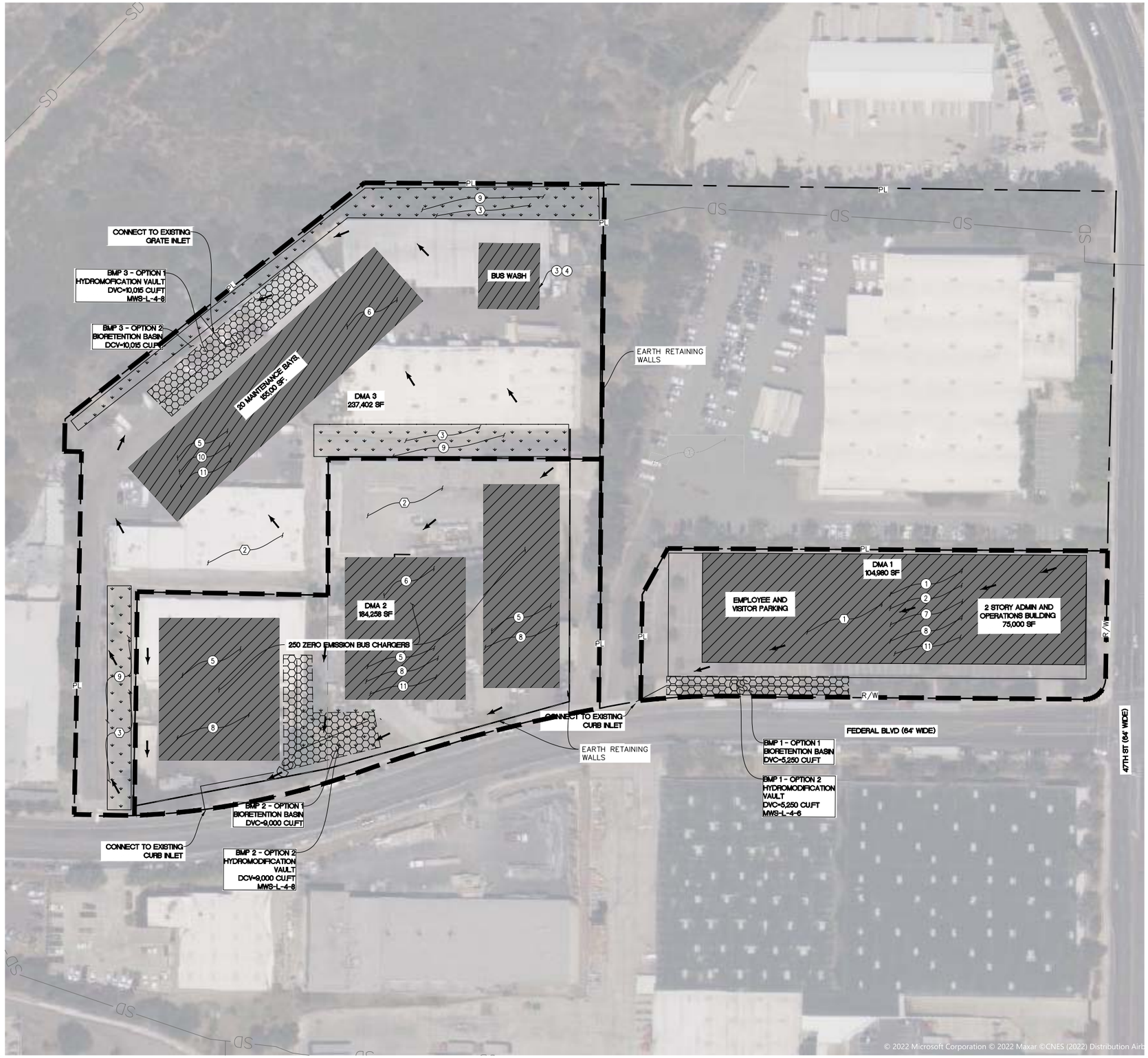


Volume Based Sizing

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.

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-6-8	3191	6382
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145
MWS-L-8-20	12560	25120
MWS-L-8-24	15108	30216

DMA 1 DCV= 5,250 CU.FT/4 24-HR DRAW DOWN= 1,312.5 CU.FT. USE ---> MWS L-4-6
DMA 2 DCV= 8,015 CU.FT/4 24-HR DRAW DOWN= 2,250 CU.FT. USE ---> MWS L-4-8
DMA 3 DCV= 10,327 CU.FT/4 24-HR DRAW DOWN= 2,504 CU.FT. USE ---> MWS L-4-8



LEGEND

- BASIN BOUNDARY
- FLOW DIRECTION
- PROPERTY LINE
- PROPOSED IMPERVIOUS AREA
- PROPOSED PERVIOUS AREA
- TREATMENT CONTROL

SOURCE CONTROL

1. INTERIOR FLOOR DRAINS.
2. DRAIN OR WASH WATER FROM BOILER DRAIN LINES, CONDENSATE DRAIN LINES, ROOFTOP EQUIPMENT, DRAINAGE SUMPS.
3. UNAUTHORIZED NON-STORMWATER DISCHARGE.
4. TRANSIT VEHICLE CLEANING.
5. VEHICLE AND EQUIPMENT REPAIR AND MAINTENACE,
6. OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS.
7. FIRE SPRINKLER TEST WATER.
8. PARKING/STORAGE AREA MAINTENANCE.
9. LANSCAPE/OUTDOOR PESTICIDE USE.
10. LOADING DOCKS.
11. REFUSE AREAS.

SITE DESIGN MEASURES

1. ROOFTOP AND IMPERVIOUS AREA DISCONNECTION.
2. POROUS PAVEMENT
3. VEGETATED SWALE.

EXISTING CONDITIONS:

TOTAL SITE AREA: 526,640 SF
PERVIOUS AREA: 62,680 SF (12%)
IMPERVIOUS AREA: 462,960 SF (88%)

PROPOSED CONDITIONS:

TOTAL SITE AREA: 526,640 SF
PERVIOUS AREA: 44,452 SF (8%)
IMPERVIOUS AREA: 482,188 SF (92%)

60 0 60 120 180 240

SCALE 1" = 60'

PROJECT SITE PLAN

MTS CLEAN TRANSIT ADVANCEMENT CAMPUS

Nasland
Civil Engineering
Surveying
Land Planning
T (858) 292-7770
4740 Ruffner Street
San Diego, CA 92111
nasland.com

DMA 1

SITE DESIGN MEASURES WORKSHEET

Regulated Projects are required to implement site design measures and quantify the stormwater runoff volume credit using the SWRCB Post-Construction Calculator. The Post-Construction Calculator is provided in Appendix D.

For the proposed project, identify the following information

Proposed Site Design Measure	**Stormwater Runoff Volume Credit (ft^3)**
· Stream setbacks and buffers	N/A
· Soil quality improvement and maintenance	N/A
· Tree planting and preservation	N/A
· Rooftop and impervious area disconnection	1,513 cu.ft
· Porous pavement	N/A
· Vegetated Swale	N/A
· Rain barrels and cisterns	N/A
Total Stormwater Runoff Volume Credit (SDM_{credit})	1,513 cu.ft

A printout of the Post-Construction Calculator results must be submitted with the Project Post Construction Stormwater Management Plan.

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

0.58

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

Project Information	
Project Name:	MTS Clean Transit Advacement Campus
Waste Discharge Identification (WDID):	Optional
Date:	7/27/2022
Sub Drainage Area Name (from map):	BASIN 1

Runoff Calculations		
(Step 2) Indicate the Soil Type (dropdown menu to right):	Group D Soils	Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.
(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	Open Space: grass cover <50%	
(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	A mix of lawn, grass, pasture and trees covering less than 50% of the open space	

Runoff Curve Numbers	
Existing Pervious Runoff Curve Number	98
Proposed Development Pervious Runoff Curve Number	98

	Complete Either: Sq Ft	Complete Either: Acres	Acres
(Step 5) Total Project Site Area:		12.09	12.09
(Step 6) Sub-watershed Area:		2.41	2.41
Percent of total project :	20%		

Design Storm		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	0.58	in
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	0.04	In
P used for calculations (in) (the greater of the above two criteria)	0.58	In

^Available at www.cabmphandbooks.com

(Step 7) Sub-watershed Conditions	Complete Either: Sq Ft	Complete Either: Acres	Calculated Acres
Sub-watershed Area (acres)			2.41
Existing Rooftop Impervious Coverage	0	0	0.00
Existing Non-Rooftop Impervious Coverage	104980	0	2.41
Proposed Rooftop Impervious Coverage	75000	0	1.72
Proposed Non-Rooftop Impervious Coverage	29980	0	0.69

Credits	Acres	Square Feet
Porous Pavement	0.00	0
Tree Planting	0.00	0
Downspout Disconnection	0.43	18,731
Impervious Area Disconnection	0.48	20,909
Green Roof	0.00	0
Stream Buffer	0.00	0
Vegetated Swales	0.00	0
Subtotal	0.91	39,640
Subtotal Runoff Volume Reduction Credit	1513 Cu. Ft.	

Pre-Project Runoff Volume (cu ft)	3,447	Cu.Ft.
Project-Related Runoff Volume Increase w/o credits (cu ft)	0	Cu.Ft.
Project-Related Volume Increase with Credits (cu ft)	0	Cu.Ft.

You have achieved your minimum requirements

(Step 9) Impervious Volume Reduction Credits	Volume (cubic feet)
Rain Barrels/Cisterns	0 Cu. Ft.
Soil Quality	0 Cu. Ft.
Subtotal Runoff Volume Reduction	0 Cu. Ft.
Total Runoff Volume Reduction Credit	1,513 Cu. Ft.

Downspout Disconnection Credit Worksheet

Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria					
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?				○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?				○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?				○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?				○ Yes	◉ No
Percentage of existing	0.00	Acres	of rooftop surface has disconnected downspouts		
Percentage of the proposed	1.72	Acres	of rooftop surface has disconnected downspouts	50	
				Return to Calculator	

Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	(●) Yes ( ) No
Is the impervious area to any one discharge location less than 5,000 square feet?	(●) Yes ( ) No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	(●) Yes ( ) No

Percentage of existing	2.41	Acres non-rooftop surface area disconnected	
Percentage of the proposed	0.69	Acres non-rooftop surface area disconnected	70

Return to Calculator

DMA 2

SITE DESIGN MEASURES WORKSHEET

Regulated Projects are required to implement site design measures and quantify the stormwater runoff volume credit using the SWRCB Post-Construction Calculator. The Post-Construction Calculator is provided in Appendix D.

For the proposed project, identify the following information

Proposed Site Design Measure	**Stormwater Runoff Volume Credit (ft^3)**
· Stream setbacks and buffers	N/A
· Soil quality improvement and maintenance	N/A
· Tree planting and preservation	N/A
· Rooftop and impervious area disconnection	N/A
· Porous pavement	5,320 cu.ft
· Vegetated Swale	815 cu.ft
· Rain barrels and cisterns	N/A
Total Stormwater Runoff Volume Credit (SDM_{credit})	6,134 cu.ft

A printout of the Post-Construction Calculator results must be submitted with the Project Post Construction Stormwater Management Plan.

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

0.58

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

Project Information

Project Name:	***MTS Clean Transit Advacement Campus***
Waste Discharge Identification (WDID):	***Optional***
Date:	***7/27/2022***
Sub Drainage Area Name (from map):	***BASIN 2***

Runoff Curve Numbers

Existing Pervious Runoff Curve Number	**97**
Proposed Development Pervious Runoff Curve Number	**98**

Design Storm

Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.58**	**in**
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.06**	**In**
P used for calculations (in) (the greater of the above two criteria)	**0.58**	**In**
^Available at www.cabmphandbooks.com		

Pre-Project Runoff Volume (cu ft)	**5,908**	**Cu.Ft.**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**6,050**	**Cu.Ft.**
Project-Related Volume Increase with Credits (cu ft)	**-84**	**Cu.Ft.**

You have achieved your minimum requirements

Runoff Calculations

(Step 2) Indicate the Soil Type (dropdown menu to right): ***Group D Soils*** — **Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.**

(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right): ***Open Space: grass cover <50%***

(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right): ***A mix of lawn, grass, pasture and trees covering less than 50% of the open space***

	Complete Either Sq Ft	Acres	Acres
(Step 5) Total Project Site Area:		12.09	12.09
(Step 6) Sub-watershed Area:		4.23	4.23
Percent of total project :		35%	

(Step 7) Sub-watershed Conditions

	Complete Either Sq Ft	Acres	Calculated Acres
Sub-watershed Area (acres)			4.23
Existing Rooftop Impervious Coverage	47155	0	1.08
Existing Non-Rooftop Impervious Coverage	113021	0	2.59
Proposed Rooftop Impervious Coverage	0	0	0.00
Proposed Non-Rooftop Impervious Coverage	178458	0	4.10

Credits	Acres	Square Feet
Porous Pavement	3.20	139,392
Tree Planting	0.00	0
Downspout Disconnection	0.00	0
Impervious Area Disconnection		
Green Roof	0.00	0
Stream Buffer	0.00	0
Vegetated Swales	0.49	21,344
Subtotal	3.69	160,736
Subtotal Runoff Volume Reduction Credit	6134 Cu. Ft.	

(Step 9) Impervious Volume Reduction Credits

	Volume (cubic feet)
Rain Barrels/Cisterns	0 Cu. Ft.
Soil Quality	0 Cu. Ft.
Subtotal Runoff Volume Reduction	0 Cu. Ft.
Total Runoff Volume Reduction Credit	6,134 Cu. Ft.

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt		
		In SqFt.	In Acres	Equivalent Acres
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80		4.00	3.20
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

Return to Calculator

**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	(●) Yes ( ) No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	(●) Yes ( ) No

Percentage of existing	3.67	Acres of impervious area draining to a vegetated swale	
Percentage of the proposed	4.10	Acres of impervious area draining to a vegetated swale	12.00 %

Return to Calculator

DMA 3

SITE DESIGN MEASURES WORKSHEET

Regulated Projects are required to implement site design measures and quantify the stormwater runoff volume credit using the SWRCB Post-Construction Calculator. The Post-Construction Calculator is provided in Appendix D.

For the proposed project, identify the following information

Proposed Site Design Measure	**Stormwater Runoff Volume Credit (ft^3)**
· Stream setbacks and buffers	N/A
· Soil quality improvement and maintenance	N/A
· Tree planting and preservation	N/A
· Rooftop and impervious area disconnection	3,293 cu.ft
· Porous pavement	3,737 cu.ft
· Vegetated Swale	2733 cu.ft
· Rain barrels and cisterns	N/A
Total Stormwater Runoff Volume Credit (SDM_{credit})	9,763 cu.ft

A printout of the Post-Construction Calculator results must be submitted with the Project Post Construction Stormwater Management Plan.

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

0.58

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

Project Information	
Project Name:	MTS Clean Transit Advacement Campus
Waste Discharge Identification (WDID):	Optional
Date:	7/27/2022
Sub Drainage Area Name (from map):	BASIN 3

Runoff Calculations	
(Step 2) Indicate the Soil Type (dropdown menu to right):	Group D Soils — Very low infiltration. Clay loam, silty clay loam, sandy clay, silty clay, or clay. Infiltration rate 0 to 0.05 inch/hr when wet.
(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):	Open Space: grass cover <50%
(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):	A mix of lawn, grass, pasture and trees covering less than 50% of the open space

Runoff Curve Numbers	
Existing Pervious Runoff Curve Number	97
Proposed Development Pervious Runoff Curve Number	91

	Complete Either: Sq Ft	Complete Either: Acres	Acres
(Step 5) Total Project Site Area:		12.09	12.09
(Step 6) Sub-watershed Area:		5.45	5.45
Percent of total project :	45%		

Design Storm		
Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	0.58	in
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	0.06	In
P used for calculations (in) (the greater of the above two criteria)	0.58	In
^Available at www.cabmphandbooks.com		

(Step 7) Sub-watershed Conditions	Complete Either: Sq Ft	Complete Either: Acres	Calculated Acres
Sub-watershed Area (acres)			5.45
Existing Rooftop Impervious Coverage	56759	0	1.30
Existing Non-Rooftop Impervious Coverage	142045	0	3.26
Proposed Rooftop Impervious Coverage	15500	0	0.36
Proposed Non-Rooftop Impervious Coverage	82402	0	1.89

Credits	Acres	Square Feet
Porous Pavement	1.60	69,696
Tree Planting	0.00	0
Downspout Disconnection	0.09	3,920
Impervious Area Disconnection	1.32	57,499
Green Roof	0.00	0
Stream Buffer	0.00	0
Vegetated Swales	1.17	50,965
Subtotal	4.18	182,081
Subtotal Runoff Volume Reduction Credit	9763 Cu. Ft.	

Pre-Project Runoff Volume (cu ft)	7,570	Cu.Ft.
Project-Related Runoff Volume Increase w/o credits (cu ft)	9,740	Cu.Ft.
Project-Related Volume Increase with Credits (cu ft)	-23	Cu.Ft.

You have achieved your minimum requirements

(Step 9) Impervious Volume Reduction Credits	Volume (cubic feet)
Rain Barrels/Cisterns	0 Cu. Ft.
Soil Quality	0 Cu. Ft.
Subtotal Runoff Volume Reduction	0 Cu. Ft.
Total Runoff Volume Reduction Credit	9,763 Cu. Ft.

Downspout Disconnection Credit Worksheet

Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria					
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?				○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?				○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?				○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?				○ Yes	◉ No
Percentage of existing	1.30	Acres	of rooftop surface has disconnected downspouts		
Percentage of the proposed	0.36	Acres	of rooftop surface has disconnected downspouts	50	
				Return to Calculator	

Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	(●) Yes ( ) No
Is the impervious area to any one discharge location less than 5,000 square feet?	(●) Yes ( ) No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	(●) Yes ( ) No

Percentage of existing	3.26	Acres non-rooftop surface area disconnected	0
Percentage of the proposed	1.89	Acres non-rooftop surface area disconnected	70

Return to Calculator

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt		
		In SqFt.	In Acres	Equivalent Acres
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80		2.00	1.60
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

Return to Calculator

**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	(●) Yes ( ) No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	(●) Yes ( ) No

Percentage of existing	4.56	Acres of impervious area draining to a vegetated swale	0.00
Percentage of the proposed	2.25	Acres of impervious area draining to a vegetated swale	52.00 %

Return to Calculator

STORMWATER TREATMENT MEASURE (STM) WORKSHEET AND NARRATIVE DESCRIPTIO

Complete this worksheet describing how the remaining runoff is being managed for each DMA in which proposed site design measures did not fully manage the SDV. It the Total Stormwater Runoff Volume for the DMA equals or exceeds the Adjusted DMA SDV, then design for stormwater management is complete. If the Total Stormwater Runoff Volume for the DMA is less that the Adjusted DMA SDV, redesign site measures and stormwater control treatment measures until the entire SDV for the DMA is achieved. Complete this series of calculatios for each DMA.

DMA No.	ADJUSTED DMA SDV (ft^3)	DRAINS TO (BIORETENTION OR STM)	BIORETENTION OR STM SDV (ft^3)	ADJUSTED DMA SDV (ft^3)	STM SDV (ft^3)	TOTAL STORMWATER RUNOFF VOLUME MANAGED (ft^3)
DMA 1	3,447	BIORETENTION	5,250	N/A	N/A	3,447
DMA 2	6,050	BIORETENTION	9,000	N/A	N/A	6,050
DMA 3	9,740	BIORETENTION	10,150	N/A	N/A	9,740
				N/A	N/A	

Stormwater Treatment Measure Narrative Description
Describe and provide justification for any variations to the bioretention facility for the site-specific conditions.

N/A

Describe and provide justification if an alternative stormwater treatment measure is proposed in lieu of bioretention.

Modular wetland system could be implemented in place of a bioretention facility if there is space limitation. This kind of system can also be modified for hydromodification which is necessary for this project.

Describe and provide justification for any exceptions to the requirments for bioretention. Identify and describe the proposed biotreatment or media filter system that will be used in lieu of bioretention.

N/A

OPERATIONS & MAINTENANCE MANUAL

BASIC PROJECT INFORMATION COVER SHEET

Project Name	
Project Location [Street Address if available, or intersection and/or APN]	4586 Federal Boulevard, San Diego CA, 92102 APN:541-611-31-00,541-611-34-00,541-611-35-00, 541-611-04-00, 541-611-27-00
Owner/Operator Information Name of Owner Person(s) responsible for operating/maintaining stormwater treatment measures Company or Affiliation Address Telephone Number Email Address	Metropolitan Transit System 1255 Imperial Avenue Suite 1000 San Diego, CA 92101 (619) 557-4555
Describe method of funding on-going maintenance and operation of stormwater treatment measures	
Funded by the Metropolitan Transit System.	
Stormwater Treatment Measure	
Measure Type: Installation Date: Design Specifications	Bioretention basin on DMA 1 Installation Date:TBD Design specifications should follow the Post Construction Stormwater Management Manual
Measure Type: Installation Date: Design Specifications	Bioretention basin on DMA 2 Installation Date:TBD Design specifications should follow the Post Construction Stormwater Management Manual
Measure Type: Installation Date: Design Specifications	Bioretention basin on DMA 3 Installation Date:TBD Design specifications should follow the Post Construction Stormwater Management Manual

Attach additional sheets if needed.

OPERATIONS & MAINTENANCE MANUAL

BASIC PROJECT INFORMATION COVER SHEET

Project Name	
Project Location [Street Address if available, or intersection and/or APN]	4586 Federal Boulevard, San Diego CA, 92102 APN:541-611-31-00,541-611-34-00,541-611-35-00, 541-611-04-00, 541-611-27-00
Owner/Operator Information Name of Owner Person(s) responsible for operating/maintaining stormwater treatment measures Company or Affiliation Address Telephone Number Email Address	Metropolitan Transit System 1255 Imperial Avenue Suite 1000 San Diego, CA 92101 (619) 557-4555
Describe method of funding on-going maintenance and operation of stormwater treatment measures	
Funded by the Metropolitan Transit System.	
Stormwater Treatment Measure	
Measure Type: Installation Date: Design Specifications	Modular Wetland System on DMA 1 Installation Date:TBD Design specifications should be according to Bio Clean Environmental.
Measure Type: Installation Date: Design Specifications	Modular Wetland System on DMA 2 Installation Date:TBD Design specifications should be according to Bio Clean Environmental.
Measure Type: Installation Date: Design Specifications	Modular Wetland System on DMA 3 Installation Date:TBD Design specifications should be according to Bio Clean Environmental.

Attach additional sheets if needed.

Preliminary Operation and Maintenance Plan

MTS Clean Transit Advancement Campus

4586 Federal Boulevard,
San Diego CA, 92102

Prepared for:

HELIX Environmental Planning Inc.

7578 El Cajon Boulevard
La Mesa, CA 91942

Prepared by:

NASLAND ENGINEERING

Cory Schrack, PE
4740 Ruffner Street
San Diego, CA 92111
(858) 292-7770

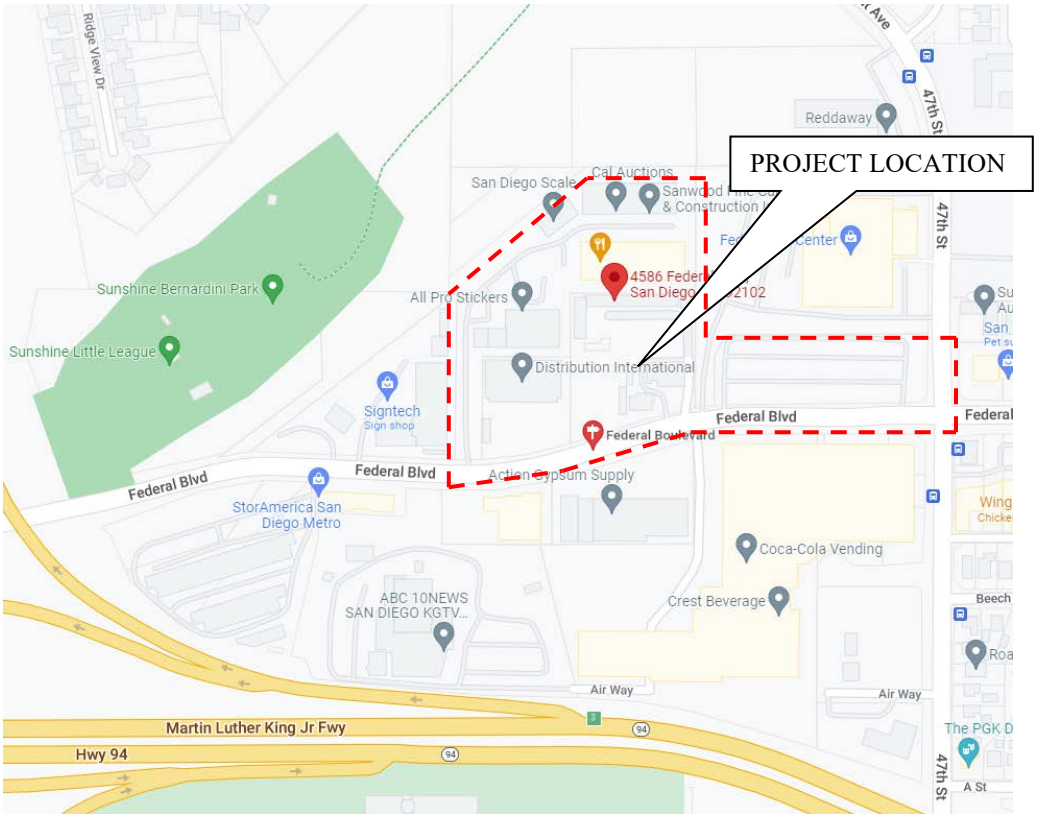
October 4, 2022

Table of Contents

1.0 OPERATION AND MAINTENANCE PLAN

This Operation and Maintenance (O&M) Plan should be used as a reference for property owners and managers for properly operating and maintaining onsite stormwater systems. Stormwater systems that are properly operated and maintained not only function better and provide better stormwater treatment, but also reduce maintenance costs and liability problems. This O&M Plan provides guidance for inspecting the stormwater systems, performing maintenance on the systems and properly disposing of wastes derived from the systems' maintenance and cleaning activities. It is the property owner's responsibility to retain the inspection and maintenance records for at least 5 years.

2.0 VICINITY MAP



Map data ©2021 Google

3.0 PROJECT DESCRIPTION

The proposed project consists of demolition of existing buildings, the construction of a new bus maintenance and charging facility, the construction of retaining walls, and electric vehicle charging lot. The proposed new bus division would entail the construction of a new bus maintenance facility building, charging facilities, bus wash facilities, equipment lift facilities, storage facilities, bus parking facilities, administration and operations office buildings, employee parking, lighting improvements, security and camera improvements, stormwater improvements, utility relocations, and landscaping and irrigation improvements. The maintenance facility would include maintenance support areas, 20 repair service bays, a body shop, a tire shop, bus wash and service areas, charging stations, storage areas, restrooms, and mechanical and electrical rooms.

4.0 STORMWATER SYSTEM DESCRIPTION

The storm drainage calculations and design for the proposed improvements are intended to meet the requirements of the MS4 Permitting program compliance and implementation Post Construction Stormwater Management Manual.

The stormwater facility is designed to store and treat runoff from a 50-year storm event, and to pretreat the water quality volume defined as the 85th percentile storm event. Treatment volume and flow requirements for the stormwater facility were designed using the Post Construction Stormwater Calculator policy requirements. The calculated treatment volume will be used to determine the size and type of treatment facility for this project.

The water quality of stormwater runoff for this project will be addressed through both source control measures and treatment of stormwater runoff. Applicable source control BMPs are debris collection and roof runoff. The primary method of water quality treatment for this project will be through the use of a bioretention basin or the use of modular wetland system. Refer to Appendix B for calculations and sizing of stormwater treatment structures.

The proposed conditions encompass approximately 12.09 acres on 5 existing parcels surrounding 4586 Federal Boulevard. The proposed improvements include the construction of new administration building, new storage areas, and asphalt concrete resurfacing. The proposed site is divided into three basins. Basin 1 is approximately 2.41 acres and discharge from the roofs of the proposed administration building and parking structure will discharge to the existing gutter on Federal Boulevard after being treated on site. Flow will eventually reach the curb inlet on the west and eventually discharge into the Chollas Creek. Basin 2 is approximately 4.23 acres, discharge from the charging stations will sheet flow to the curb inlet on Federal Boulevard after being treated on site. Basin 3 is approximately 5.45 acres and includes the 20 maintenance bays, operations building, and bus washing stations. Discharge from roofs and asphalt from the site will sheet flow in general to northwest side to the existing grate inlet. Discharge will travel through a storm drain pipe and discharge into Chollas Creek after being treated on site. In general, the proposed conditions will discharge west downstream to Chollas Creek after being treated on site.

Appendix A – Maintenance Agreement Map and **Appendix B – Stormwater Design Tools and Resources**, for additional information.

5.0 STORMWATER INSPECTION AND MAINTENANCE ACTIVITIES

Frequent, thorough and consistent inspections are important to the successful operation and maintenance of a stormwater system. Inspections reveal the operational status of the system, identify needed routine and non-routine maintenance actions and provide the information to update the O&M plan. Routine maintenance is the maintenance an individual performs on a stormwater system to ensure that the stormwater system is functioning as designed and that the system aesthetics are well maintained, while non-routine maintenance is the maintenance an individual performs as a result of a catastrophic event, such as a hazardous chemical spill or inclement weather. It is recommended to inspect stormwater systems after construction, at least twice a year (before and after the summer months) and after any rainstorm event that produces more than 0.5 inches of rainfall. Inspections may need to be done more frequently if seasons are wetter than usual.

The type and frequency of maintenance for a specific stormwater system is determined by inspection results and the maintenance schedule. Routine maintenance should be performed in accordance with system design information and safety procedures. In addition to routine maintenance, the stormwater system may require non-

routine maintenance. If illegal dumping into the system, accidental spills, or massive sediment and debris inflows occurs, it will be necessary to perform non-routine maintenance.

If there is an accidental spill, isolate the spill to keep it from reaching water bodies and groundwater. Check the stormwater system flow control points, such as grates, valves, orifices, and outlet pipes, to see if those points are closed to help isolate the spill. Purchase spill kits to keep onsite and place them in areas that are easily accessible by maintenance personnel. If the spill consists of flammable or hazardous materials, call the City of San Diego Fire Department at 911 for assistance. If the spill contains hazardous materials, it may also be preferable to contact Cal OES Warning Center (800) 852-7550 and the Certified Unified Program Agency (CUPA) or 911.
A qualified environmental consultant who specializes in spill containment, cleanup and disposal should also be contacted; these consultants may be found by searching on the internet for "environmental services".

The owner or operator should keep adequate records on the operation, inspection and maintenance of the stormwater system. Record keeping provides a useful record of past operation and maintenance practices and also provides the owner or operator documentation that the stormwater system has been properly operated and maintained. Information that can be included in records includes the O&M plan, maintenance documentation, stormwater system photos, invoice for materials or work contracted, copies of permits, and laboratory analysis results which characterize clean-out wastes.

Most stormwater system wastes consist of trash, leaves, grass, and sediment and should be considered non-hazardous waste. Non-hazardous sediment and debris can be routinely disposed of at the local landfill, in accordance with state and local solid waste regulations. If using a waste disposal service other than normal garbage disposal, provide the waste hauler with documentation that the facility's stormwater system sediment is not hazardous waste. Any questions concerning the disposal of sediment with solid waste and stormwater system maintenance waste should be directed towards the Metropolitan Transit System Environmental Health and Safety (EHS). Stormwater system maintenance wastes must be disposed at an authorized solid waste facility. Hazardous sediment or liquid in the facility's stormwater system must be disposed of as hazardous waste in accordance with local, state and federal regulations.

Minimum Operation & Maintenance Procedures

Description	Quantity	Inspection Frequency	Maintenance Frequency	Maintenance Method
Bioretention Basins/ Modular Wetland System	3	Before and after rainy season and after 0.5-inch rain events	As Needed	Remove Trash & Debris, Weeding, check for standing water, vegetative health. See Maintenance Form for more activities.
Vegetated Swale	n/a	Annually or after a major precipitation event	As Needed	Sediment removal, trash removal, vegetation repair, erosion repair. See Maintenance Form for more activities.
Porous Pavement	n/a	Annually or after a major precipitation event	Biannually	Clean inlet structures leading to pavement, Vacuuming, washing porous pavement. See Maintenance Form for more activities.

In addition to the procedures listed above and, in the Appendices, the following post-construction maintenance practices must be maintained for the life of the project:

- Stabilization: All planted slopes and other vegetated areas shall be inspected prior to October 1st of each year and after major rainfall events (more than 0.5 inches) and repair and replanted as needed.
- Structural Practices: Gutters, roof drains, inlets, cleanouts and storm drains shall be inspected prior to October 1st of each year and after major rainfall events (more than 0.5 inches). Repairs and replacements shall be made as needed and recorded in the inspection and maintenance log in perpetuity.
- Operation and Maintenance Funding: Stormwater facility management measures are the responsibility of the developer until the transfer of respective sites to home builders, individual owners, homeowners' associations or local agencies. At that time the new owners shall assume responsibility for their respective portions of the development.
-

See **Appendix C –** and **Appendix D – Inspection Form**, for additional information.

6.0 SOURCE CONTROL BEST MANAGEMENT PRACTICES (BMPS)

Land development generally alters the natural conditions of the land by removing vegetative cover, compacting soil, and/or placement of concrete, asphalt, or other impervious surfaces. These impervious surfaces facilitate transportation of urban pollutants in stormwater runoff (such as pesticides, petroleum hydrocarbons, heavy metals, and pathogens) that are otherwise not generally found in high concentrations in the runoff from the natural environment. Pollutants that accumulate on impervious surfaces and actively landscaped pervious surfaces may contribute to elevated levels of pollutants in runoff relative to the natural condition.

In order to mitigate this source control BMPs must be implemented to address specific sources of pollutants. Source control BMPs avoid and reduce pollutants in stormwater runoff. Everyday activities, such as recycling, trash disposal and irrigation, generate pollutants that have the potential to drain to the stormwater system. Source control BMPs are defined as an activity that reduces the potential for stormwater runoff to come into contact with pollutants. Activities include an administrative action, design of a structural facility, usage of alternative materials, and operation, maintenance and inspection of an area. Where applicable and feasible, all development projects are required to implement source control BMPs.

This project will implement all source control BMPs that are applicable to the development. Both structural and nonstructural controls and practices for pollution prevention and non-stormwater storm drain uses will be implemented. The controls and practices applicable to this development are general stormwater pollution prevention controls and practices, properly cleaning and outdoor maintenance controls and practices, and stormwater system operations and maintenance. See the MTS Post Construction Stormwater Management Manual for a full list of source control BMPs.

- Non-Stormwater Discharges
- Spill Prevention, Control and Cleanup
- Vehicle and Equipment Cleaning
- Vehicle and Equipment Repair
- Outdoor Storage and Raw Materials
- Building and Grounds and Maintenance
- Parking/ Storage Area Maintenance
- Parking/Storage Area Maintenance
- Fountain and Pool Maintenance
- Landscape Maintenance

- Fueling Areas
- Maintenance Bays and Docks
- Trash Storage Areas
- Outdoor Processing Areas

See **Appendix C –** for additional information.

7.0 SAFETY INFORMATION

The individual inspecting or maintaining the stormwater system should always consider safety as the first priority. The inspector should have the proper safety equipment (heavy duty gloves, steel-toed boots, first aid kits, etc.) and training before conducting any inspections, and all work should be done in accordance with current OSHA regulations. If the stormwater system inspection reveals a safety problem, then it may be necessary to modify site activities to reduce or eliminate the safety risk. The following is a list of safety precautions an individual should be aware of when inspecting or maintaining stormwater systems:

- Never enter a confined space unless possessing proper Occupational Health and Safety Administration (OSHA) training. Never enter pipes or conduits without another individual present. If the structural strength of a pipe or conduit is questionable, then do not enter the pipe or conduit at all.
- Check the ventilation in the stormwater system before using any type of ignitable materials. Some stormwater systems may be sealed and have poor ventilation, posing a safety risk to the inspector if the vapor comes in contact with an open flame. Also, be sure to allow the stormwater system to vent for a period of time if a peculiar odor is present.
- Wear gloves if any mechanical parts or structural components are going to be handled. Wearing gloves not only reduces the risk of getting cuts and abrasions, but also reduces the exposure of pollutants to the skin.
- Lift manhole covers or other structural covers (trash racks, access covers, etc.) carefully. These items can be very heavy and slippery if wet. Also, learn the correct way to lift heavy items to avoid back injury.
- Check the water depth of the system before stepping in the water. The water may be deeper than originally thought or there may be steep slopes below the water line.
- Be aware that nails, broken glass, or other sharp debris may be in the stormwater system and can cause injury. Wearing the proper safety clothing will reduce the safety risk associated with coming in contact with these objects.
- Check for poison ivy, poison oak, or other poisonous plants when inspecting ponds or other large stormwater systems. Inform the individual who will perform maintenance on the system that these plants are present.
- Look where walking. Rodent holes may be present around ponds or constructed wetlands. Some holes may be partially covered and not easily seen at first glance.
- Operate equipment safely and in accordance with manufacturer's specifications. Equipment operators should be aware of site personnel at all times to avoid causing injury to others.
- Contact utility companies prior to excavating a site.
- Underground utility wires may be present. Cover or clearly mark excavated areas that cannot be filled in at the end of the day to alert site employees of the potential risk. Also, be aware of overhead electrical wires that could come in contact with maintenance equipment.
- Identify where to dispose of removed sediment or wastes prior to cleaning the stormwater system. Use shovels, trowels, or a high-suction vacuum to remove wastes. Do not clean out sediment or waste with bare hands; it may be hazardous. Place the sediment or waste in an area.
- Take caution when mowing detention ponds, retention ponds, or other stormwater systems that, by

design, have steep slopes.

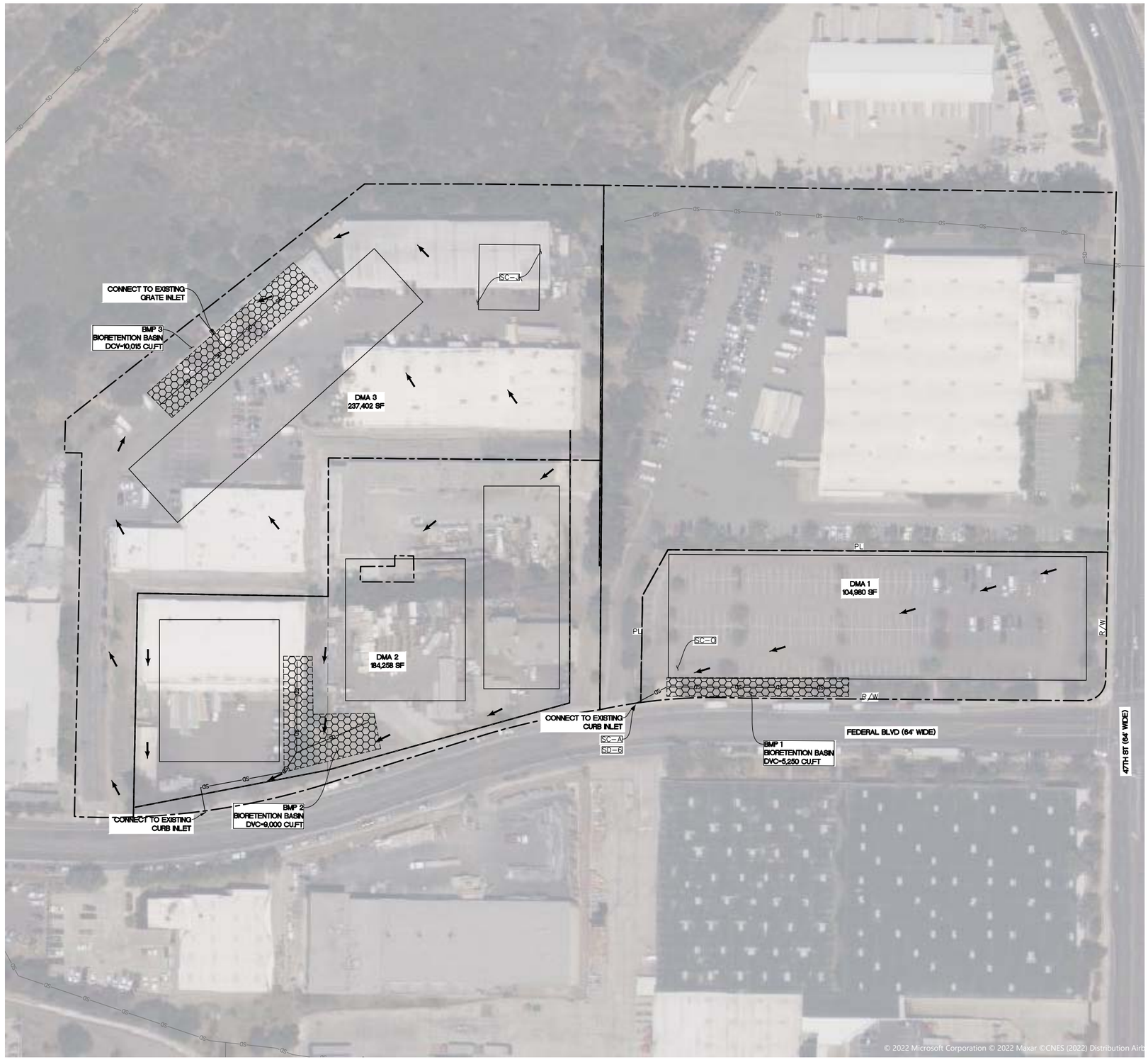
8.0 CONCLUSION

This O&M Plan is intended to provide the owner or operator with information on how to properly operate, inspect, and maintain the stormwater system. Stormwater systems that are properly operated and maintained function better, provide better stormwater treatment, and reduce maintenance costs and liability problems. The O&M plan provides guidance for conducting facility and stormwater system inspections, maintaining stormwater structural controls, appropriate safety procedures, and properly disposing of maintenance wastes.

APPENDICES

APPENDIX A – MAINTENANCE AGREEMENT MAP

BIORETENTION BASIN OPTION



LEGEND

IMPROVEMENT	SYMBOL
BASIN LIMITS	
TREATMENT CONTROL MAINTAINED BY MTS	
FLOW ARROW	

60 0 60 120 180 240

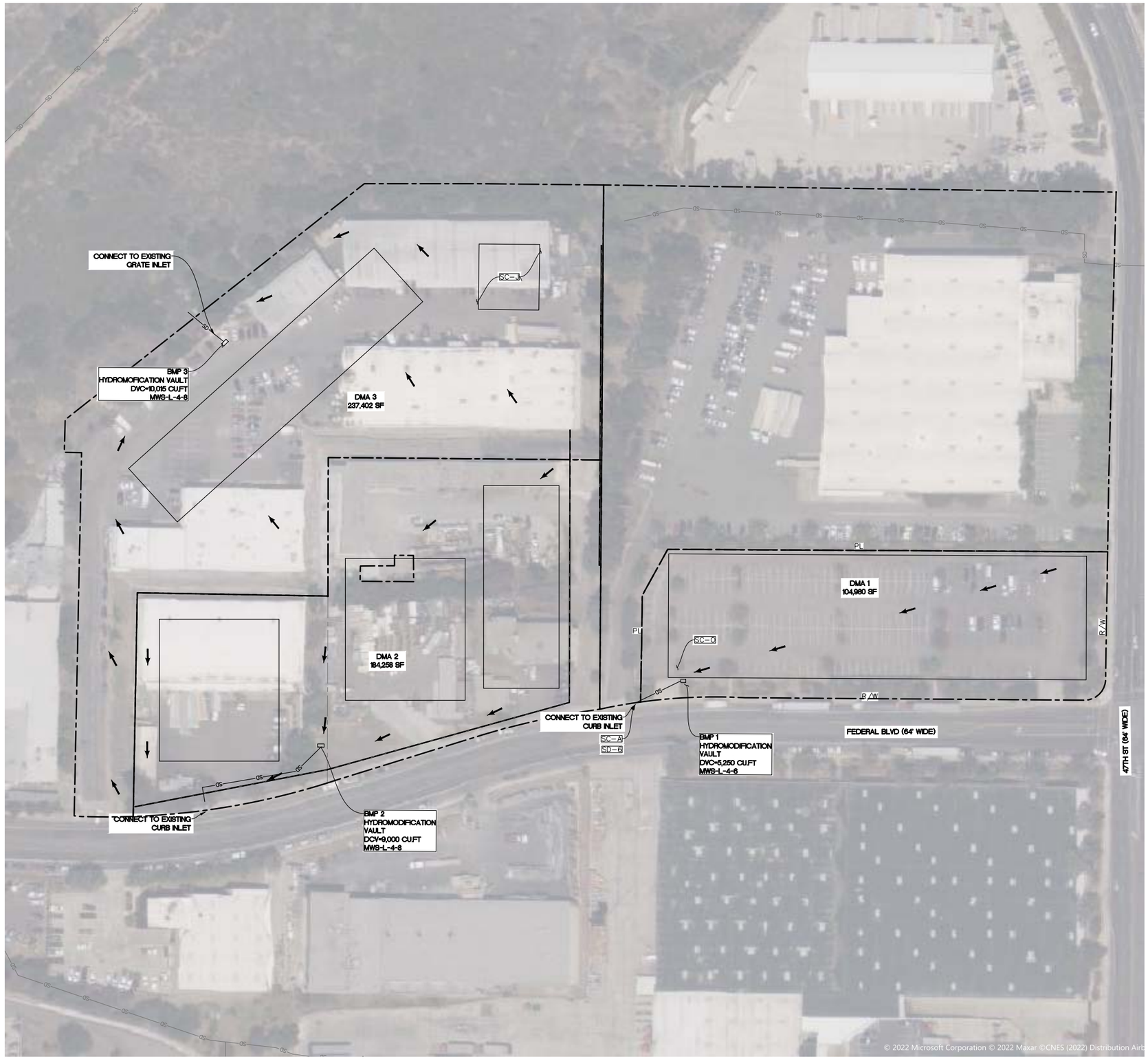
SCALE 1" = 60'

MAINTENANCE AGREEMENT MAP

MTS CLEAN TRANSIT
ADVANCEMENT CAMPUS

Nasland
Civil Engineering
Surveying
Land Planning
T (858) 292-7770
4740 Sutton Street
San Diego, CA 92111
nasland.com

MODULAR WETLAND SYSTEM OPTION



LEGEND

IMPROVEMENT	SYMBOL
BASIN LIMITS	
TREATMENT CONTROL MAINTAINED BY MTS	
FLOW ARROW	

60 0 60 120 180 240

SCALE 1" = 60'

MAINTENANCE AGREEMENT MAP

MTS CLEAN TRANSIT ADVANCEMENT CAMPUS

Nasland
Civil Engineering
Surveying
Land Planning
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nasland.com

APPENDIX B – STORMWATER DESIGN TOOLS AND RESOURCES

BMP Sizing Spreadsheet V3.1

Project Name:	MTS Clean Transit Advancement Campus
Project Applicant:	Metropolitan Transit System
Jurisdiction:	
Parcel (APN):	541-611-27-00,541-611-34-00,541-611-31-00,541-611-35-00,541-611-04-00
Hydrologic Unit:	Pueblo San Diego
Rain Gauge:	Lindbergh
Total Project Area (sf):	526,640
Channel Susceptibility:	High

BMP Sizing Spreadsheet V3.1			
Project Name:	ITS Clean Transit Advancement Campu	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	-611-34-00,541-611-31-00,541-611-3	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 1	BMP Type:	Biofiltration
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.025

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
imp paving	104,980	D	Moderate	Concrete	1.0	0.05	5249
permeable	0	D	Moderate	Landscape	0.1	0.05	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	104,980					Minimum BMP Size	5249
						Proposed BMP Size*	5250

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manual,

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	5 Clean Transit Advancement Cam	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	611-34-00,541-611-31-00,541-611	Low Flow Threshold:	0.1Q2
BMP Name	BMP 1	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Lindbergh	D	Moderate	0.437	2.410	0.105	**1.50**
permeable	Lindbergh	D	Moderate	0.437	0.000	0.000	**0.00**

3.75	**0.105**	**1.50**	**1.38**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.029	**0.031**	**0.44**	**0.750**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	50.5

BMP Sizing Spreadsheet V3.1			
Project Name:	S Clean Transit Advancement Cam	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	611-34-00,541-611-31-00,541-611-	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 2	BMP Type:	Biofiltration
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.025

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
imp paving	178,458	D	Moderate	Concrete	1.0	0.05	8923
permeable	5,800	D	Moderate	Landscape	0.1	0.05	29
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	184,258					Minimum BMP Size	8952
						Proposed BMP Size*	9000

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
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BMP Sizing Spreadsheet V3.1			
Project Name:	5 Clean Transit Advancement Cam	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	611-34-00,541-611-31-00,541-611	Low Flow Threshold:	0.1Q2
BMP Name	BMP 2	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Lindbergh	D	Moderate	0.437	4.097	0.179	**2.55**
permeable	Lindbergh	D	Moderate	0.437	0.133	0.006	**0.08**

3.75	**0.185**	**2.64**	**1.83**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.029	**0.031**	**0.44**	**0.750**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	86.7

BMP Sizing Spreadsheet V3.1			
Project Name:	S Clean Transit Advancement Cam	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	611-34-00,541-611-31-00,541-611-	Low Flow Threshold:	0.1Q2
BMP Name:	BMP 3	BMP Type:	Biofiltration
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	0.025

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Surface Area	Surface Area (SF)
imp paving	198,750	D	Moderate	Concrete	1.0	0.05	9938
permeable	38,652	D	Moderate	Landscape	0.1	0.05	193
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	237,402					Minimum BMP Size	10131
						Proposed BMP Size*	10150

* Assumes standard configuration

Surface Ponding Depth	12.00	in
Bioretention Soil Media Depth	18.00	in
Filter Coarse	6.00	in
Gravel Storage Layer Depth	12	in
Underdrain Offset	3.0	in

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	5 Clean Transit Advancement Cam	Hydrologic Unit:	Pueblo San Diego
Project Applicant:	Metropolitan Transit System	Rain Gauge:	Lindbergh
Jurisdiction:	0	Total Project Area:	526,640
Parcel (APN):	611-34-00,541-611-31-00,541-611	Low Flow Threshold:	0.1Q2
BMP Name	BMP 3	BMP Type:	Biofiltration

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
imp paving	Lindbergh	D	Moderate	0.437	4.563	0.199	**2.84**
permeable	Lindbergh	D	Moderate	0.437	0.887	0.039	**0.55**

3.75	**0.238**	**3.40**	**2.08**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

0.051	**0.055**	**0.79**	**1.000**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	55.0

Table G.2-3: Sizing Factors for Hydromodification Flow Control Infiltration BMPs Designed Using Sizing Factor Method				
Lower Flow Threshold	Soil Group	Slope	Rain Gauge	A
0.1Q2	A	Flat	Lindbergh	0.055
0.1Q2	A	Moderate	Lindbergh	0.055
0.1Q2	A	Steep	Lindbergh	0.055
0.1Q2	B	Flat	Lindbergh	0.045
0.1Q2	B	Moderate	Lindbergh	0.045
0.1Q2	B	Steep	Lindbergh	0.045
0.1Q2	C	Flat	Lindbergh	0.035
0.1Q2	C	Moderate	Lindbergh	0.035
0.1Q2	C	Steep	Lindbergh	0.035
0.1Q2	D	Flat	Lindbergh	0.03
0.1Q2	D	Moderate	Lindbergh	0.03
0.1Q2	D	Steep	Lindbergh	0.03
0.1Q2	A	Flat	Oceanside	0.06
0.1Q2	A	Moderate	Oceanside	0.06
0.1Q2	A	Steep	Oceanside	0.06
0.1Q2	B	Flat	Oceanside	0.05
0.1Q2	B	Moderate	Oceanside	0.05
0.1Q2	B	Steep	Oceanside	0.05
0.1Q2	C	Flat	Oceanside	0.05
0.1Q2	C	Moderate	Oceanside	0.05
0.1Q2	C	Steep	Oceanside	0.045
0.1Q2	D	Flat	Oceanside	0.035
0.1Q2	D	Moderate	Oceanside	0.035
0.1Q2	D	Steep	Oceanside	0.035
0.1Q2	A	Flat	Lake Wohlford	0.085
0.1Q2	A	Moderate	Lake Wohlford	0.085
0.1Q2	A	Steep	Lake Wohlford	0.085
0.1Q2	B	Flat	Lake Wohlford	0.07
0.1Q2	B	Moderate	Lake Wohlford	0.07
0.1Q2	B	Steep	Lake Wohlford	0.07
0.1Q2	C	Flat	Lake Wohlford	0.055
0.1Q2	C	Moderate	Lake Wohlford	0.055
0.1Q2	C	Steep	Lake Wohlford	0.055
0.1Q2	D	Flat	Lake Wohlford	0.04
0.1Q2	D	Moderate	Lake Wohlford	0.04
0.1Q2	D	Steep	Lake Wohlford	0.04

Table G.2-4: Sizing Factors for Hydromodification Flow Control Biofiltration with Partial Retention Designed Using Sizing Factor Method					
Lower Flow Threshold	Soil Group	Slope	below low orifice inv(	Rain Gauge	A
0.1Q2	A	Flat	18	Lindbergh	0.08
0.1Q2	A	Moderate	18	Lindbergh	0.08
0.1Q2	A	Steep	18	Lindbergh	0.08
0.1Q2	B	Flat	18	Lindbergh	0.065
0.1Q2	B	Moderate	18	Lindbergh	0.065
0.1Q2	B	Steep	18	Lindbergh	0.06
0.1Q2	C	Flat	6	Lindbergh	0.05
0.1Q2	C	Moderate	6	Lindbergh	0.05
0.1Q2	C	Steep	6	Lindbergh	0.05
0.1Q2	D	Flat	3	Lindbergh	0.05
0.1Q2	D	Moderate	3	Lindbergh	0.05
0.1Q2	D	Steep	3	Lindbergh	0.05
0.1Q2	A	Flat	18	Oceanside	0.08
0.1Q2	A	Moderate	18	Oceanside	0.075
0.1Q2	A	Steep	18	Oceanside	0.075
0.1Q2	B	Flat	18	Oceanside	0.07
0.1Q2	B	Moderate	18	Oceanside	0.07
0.1Q2	B	Steep	18	Oceanside	0.07
0.1Q2	C	Flat	6	Oceanside	0.07
0.1Q2	C	Moderate	6	Oceanside	0.07
0.1Q2	C	Steep	6	Oceanside	0.07
0.1Q2	D	Flat	3	Oceanside	0.07
0.1Q2	D	Moderate	3	Oceanside	0.07
0.1Q2	D	Steep	3	Oceanside	0.07
0.1Q2	A	Flat	18	Lake Wohlford	0.11
0.1Q2	A	Moderate	18	Lake Wohlford	0.11
0.1Q2	A	Steep	18	Lake Wohlford	0.105
0.1Q2	B	Flat	18	Lake Wohlford	0.09
0.1Q2	B	Moderate	18	Lake Wohlford	0.085
0.1Q2	B	Steep	18	Lake Wohlford	0.085
0.1Q2	C	Flat	6	Lake Wohlford	0.065
0.1Q2	C	Moderate	6	Lake Wohlford	0.065
0.1Q2	C	Steep	6	Lake Wohlford	0.065
0.1Q2	D	Flat	3	Lake Wohlford	0.06
0.1Q2	D	Moderate	3	Lake Wohlford	0.06
0.1Q2	D	Steep	3	Lake Wohlford	0.06

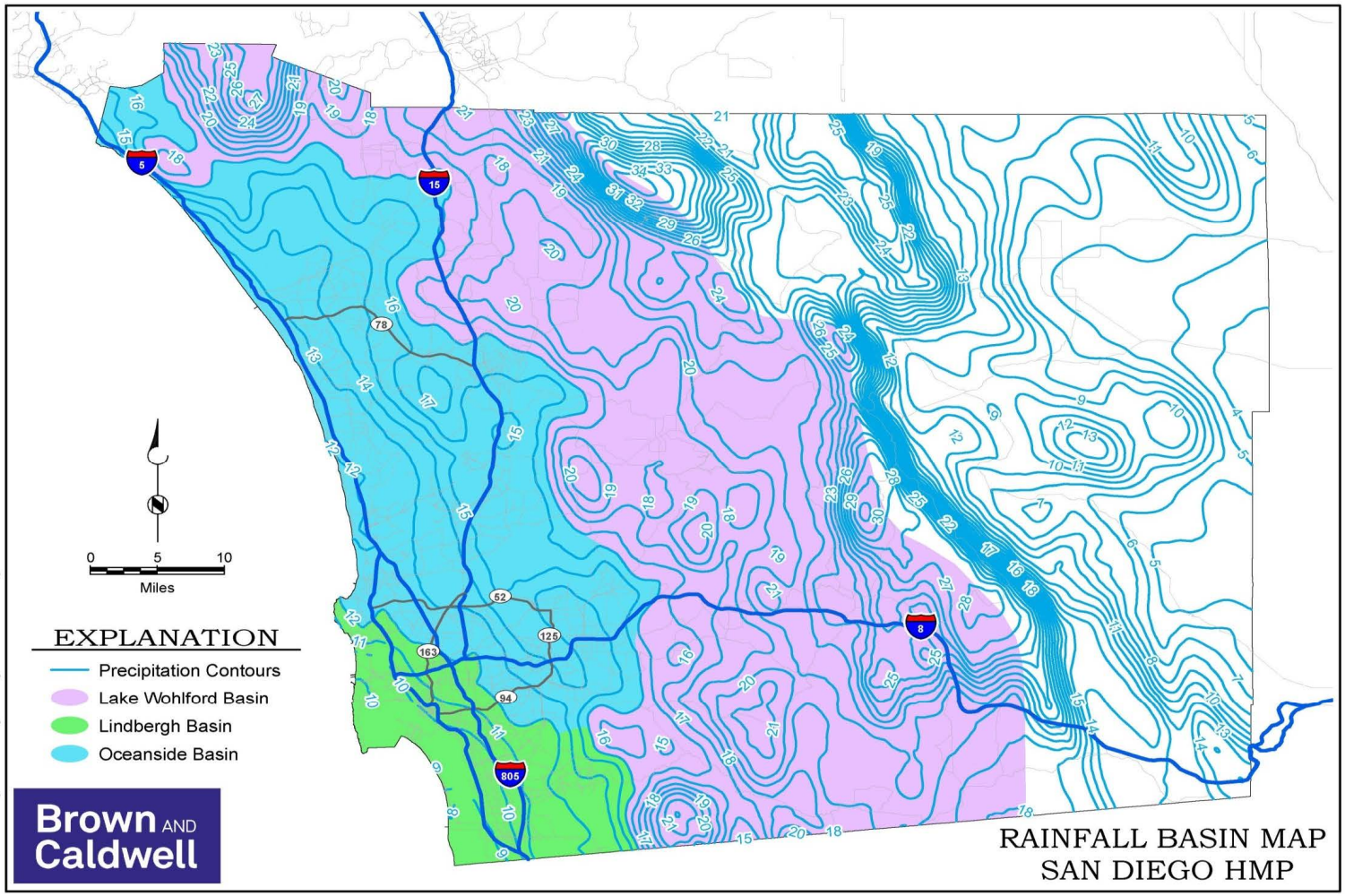
Table G.2-5: Sizing Factors for Hydromodification Flow Control Biofiltration BMPs Designed Using Sizing Factor Method				
Lower Flow Threshold	Soil Group	Slope	Rain Gauge	A
0.1Q2	A	Flat	Lindbergh	0.32
0.1Q2	A	Moderate	Lindbergh	0.3
0.1Q2	A	Steep	Lindbergh	0.285
0.1Q2	B	Flat	Lindbergh	0.105

0.1Q2	B	Moderate	Lindbergh	0.1
0.1Q2	B	Steep	Lindbergh	0.095
0.1Q2	C	Flat	Lindbergh	0.055
0.1Q2	C	Moderate	Lindbergh	0.05
0.1Q2	C	Steep	Lindbergh	0.05
0.1Q2	D	Flat	Lindbergh	0.05
0.1Q2	D	Moderate	Lindbergh	0.05
0.1Q2	D	Steep	Lindbergh	0.05
0.1Q2	A	Flat	Oceanside	0.15
0.1Q2	A	Moderate	Oceanside	0.14
0.1Q2	A	Steep	Oceanside	0.135
0.1Q2	B	Flat	Oceanside	0.085
0.1Q2	B	Moderate	Oceanside	0.085
0.1Q2	B	Steep	Oceanside	0.085
0.1Q2	C	Flat	Oceanside	0.075
0.1Q2	C	Moderate	Oceanside	0.075
0.1Q2	C	Steep	Oceanside	0.075
0.1Q2	D	Flat	Oceanside	0.07
0.1Q2	D	Moderate	Oceanside	0.07
0.1Q2	D	Steep	Oceanside	0.07
0.1Q2	A	Flat	Lake Wohlford	0.285
0.1Q2	A	Moderate	Lake Wohlford	0.275
0.1Q2	A	Steep	Lake Wohlford	0.27
0.1Q2	B	Flat	Lake Wohlford	0.15
0.1Q2	B	Moderate	Lake Wohlford	0.145
0.1Q2	B	Steep	Lake Wohlford	0.145
0.1Q2	C	Flat	Lake Wohlford	0.07
0.1Q2	C	Moderate	Lake Wohlford	0.07
0.1Q2	C	Steep	Lake Wohlford	0.07
0.1Q2	D	Flat	Lake Wohlford	0.06
0.1Q2	D	Moderate	Lake Wohlford	0.06
0.1Q2	D	Steep	Lake Wohlford	0.06

Table G.2-6: Sizing Factors for Hydromodification Flow Control Cistern Facilities Designed Using Sizing Factor Method

Lower Flow Threshold	Soil Group	Slope	Rain Gauge	V
0.1Q2	A	Flat	Lindbergh	0.54
0.1Q2	A	Moderate	Lindbergh	0.51
0.1Q2	A	Steep	Lindbergh	0.49
0.1Q2	B	Flat	Lindbergh	0.19
0.1Q2	B	Moderate	Lindbergh	0.18
0.1Q2	B	Steep	Lindbergh	0.18
0.1Q2	C	Flat	Lindbergh	0.11
0.1Q2	C	Moderate	Lindbergh	0.11
0.1Q2	C	Steep	Lindbergh	0.11
0.1Q2	D	Flat	Lindbergh	0.09
0.1Q2	D	Moderate	Lindbergh	0.09

0.1Q2	D	Steep	Lindbergh	0.09
0.1Q2	A	Flat	Oceanside	0.26
0.1Q2	A	Moderate	Oceanside	0.25
0.1Q2	A	Steep	Oceanside	0.25
0.1Q2	B	Flat	Oceanside	0.16
0.1Q2	B	Moderate	Oceanside	0.16
0.1Q2	B	Steep	Oceanside	0.16
0.1Q2	C	Flat	Oceanside	0.14
0.1Q2	C	Moderate	Oceanside	0.14
0.1Q2	C	Steep	Oceanside	0.14
0.1Q2	D	Flat	Oceanside	0.12
0.1Q2	D	Moderate	Oceanside	0.12
0.1Q2	D	Steep	Oceanside	0.12
0.1Q2	A	Flat	Lake Wohlford	0.53
0.1Q2	A	Moderate	Lake Wohlford	0.49
0.1Q2	A	Steep	Lake Wohlford	0.49
0.1Q2	B	Flat	Lake Wohlford	0.28
0.1Q2	B	Moderate	Lake Wohlford	0.28
0.1Q2	B	Steep	Lake Wohlford	0.28
0.1Q2	C	Flat	Lake Wohlford	0.14
0.1Q2	C	Moderate	Lake Wohlford	0.14
0.1Q2	C	Steep	Lake Wohlford	0.14
0.1Q2	D	Flat	Lake Wohlford	0.12
0.1Q2	D	Moderate	Lake Wohlford	0.12
0.1Q2	D	Steep	Lake Wohlford	0.12


0
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Miles
EXPLANATION
Precipitation Contours
Lake Wohlford Basin
Lindbergh Basin
Oceanside Basin
Brown AND Caldwell
RAINFALL BASIN MAP
SAN DIEGO HMP
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E.14 INF-2 Bioretention

Photo Credit: Ventura County Technical Guidance Document

MS4 Permit Category

Retention

Manual Category

Infiltration

Applicable Performance Standard

Pollutant Control
Flow Control

Primary Benefits

Volume Reduction
Treatment
Peak Flow Attenuation

Description

Bioretention (bioretention without underdrain) facilities are vegetated surface water systems that filter water through vegetation and soil, or engineered media prior to infiltrating into native soils. These facilities are designed to infiltrate the full DCV. Bioretention facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. They can be constructed in ground or partially aboveground, such as planter boxes with open bottoms (no impermeable liner at the bottom) to allow infiltration. Treatment is achieved through filtration, sedimentation, sorption, infiltration, biochemical processes and plant uptake.

Typical bioretention without underdrain components include:

- Inflow distribution mechanisms (e.g. perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the optional aggregate storage layer
- Optional aggregate storage layer for additional infiltration storage
- Uncompacted native soils at the bottom of the facility
- Overflow structure

E.18 BF-1 Biofiltration

Location: 43rd Street and Logan Avenue, San Diego, California

MS4 Permit Category
Biofiltration
Manual Category
Biofiltration
Applicable Performance Standard
Pollutant Control Flow Control
Primary Benefits
Treatment Volume Reduction (Incidental) Peak Flow Attenuation (Optional)

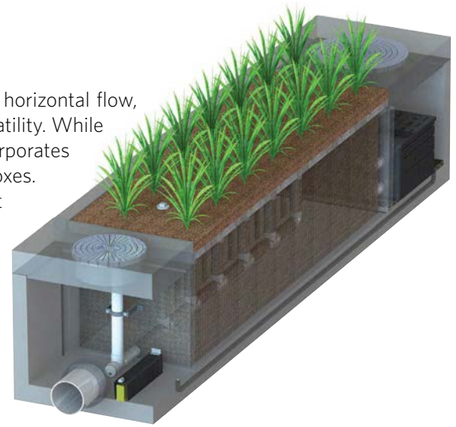
Description

Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer (aka choking layer) consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Modular Wetlands® Linear



The Modular Wetlands® Linear is the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter boxes. Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

Advantages

- Horizontal flow biofiltration
- Greater filter surface area
- Pretreatment chamber
- Patented perimeter void area
- Flow control
- No depressed planter area
- Auto drain down means no mosquito vector

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 cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots. Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the Modular Wetlands Linear.

Performance

The Modular Wetlands Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. The Modular Wetlands Linear is field-tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes.

66% Removal of Dissolved Zinc

69% Removal of Total Zinc

38% Removal of Dissolved Copper

64% Removal of Total Phosphorus

85% Removal of TSS

45% Removal of Nitrogen

50% Removal of Total Copper

95% Removal of Motor Oil

67% Removal of Ortho Phosphorus

100% Removal of Trash

Approvals

The Modular Wetlands Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious agencies in the world. The following is an abbreviated list highlighting various approvals, certifications, and verifications.

Washington State Department of Ecology TAPE Approval

The Modular Wetlands Linear (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.

California Water Resources Control Board, Full Capture Certification

The Modular Wetlands Linear is the first biofiltration system to receive certification as a full capture trash treatment control device.

Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the Modular Wetlands Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.

Maryland Department of the Environment, Approved ESD

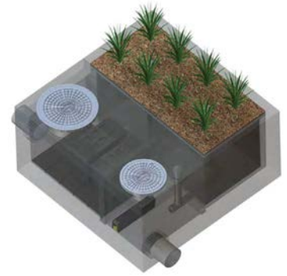
Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance

MASTEP Evaluation
Rhode Island Department of Environmental Management

Texas Commission on Environmental Quality (TCEQ)
Atlanta Regional Commission

BIOFILTRATION PRODUCTS

Modular Wetlands® Linear



Operation

The Modular Wetlands® Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

❶ Pretreatment

Separation

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

Pre-Filter Boxes

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

❷ Biofiltration

Horizontal Flow

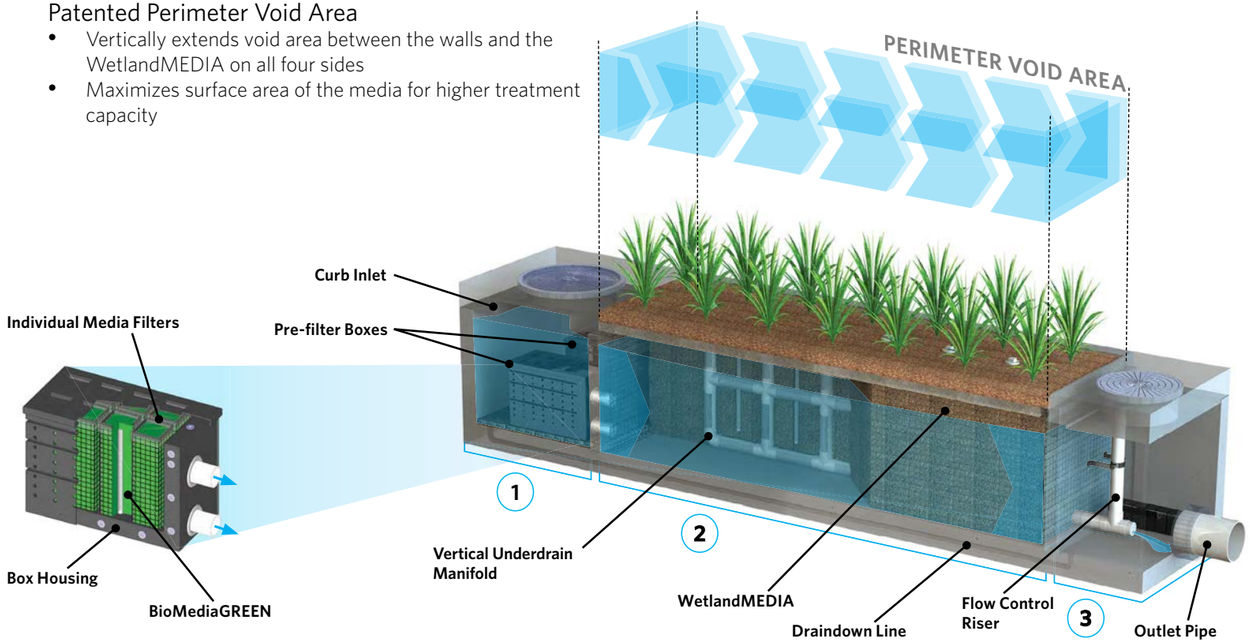
- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

WetlandMEDIA™

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

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



❸ Discharge

Flow Control

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

Draindown Filter

- The drain down is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

Modular Wetlands® Linear

Specifications

Flow-Based Designs

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

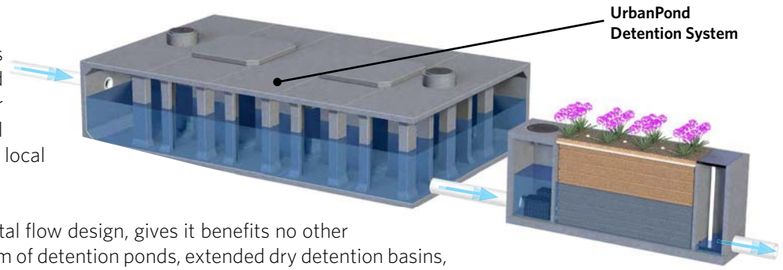
Model #	Dimensions	WetlandMEDIA Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
MWS-L-4-4	4'x4'	23	0.052
MWS-L-4-6	4'x6'	32	0.073
MWS-L-4-8	4'x8'	50	0.115
MWS-L-4-13	4'x13'	63	0.144
MWS-L-4-15	4'x15'	76	0.175
MWS-L-4-17	4'x17'	90	0.206
MWS-L-4-19	4'x19'	103	0.237

Model #	Dimensions	WetlandMEDIA Surface Area (sq.ft.)	Treatment Flow Rate (cfs)
MWS-L-4-21	4'x21'	117	0.268
MWS-L-6-8	6'x8'	64	0.147
MWS-L-8-8	8'x8'	100	0.230
MWS-L-8-12	8'x12'	151	0.346
MWS-L-8-16	8'x16'	201	0.462
MWS-L-8-20	8'x20'	252	0.577
MWS-L-8-24	8'x24'	302	0.693

Modular Wetlands Linear with UrbanPond Prestorage

Volume-Based Designs

In the example above, the Modular Wetlands Linear is installed downstream of the UrbanPond storage system. The Modular Wetlands Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements.

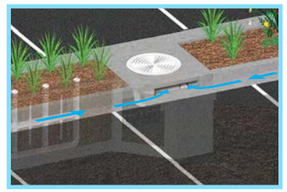


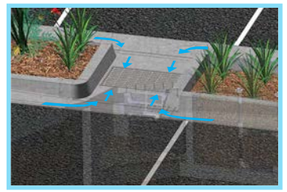
The Modular Wetlands Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.

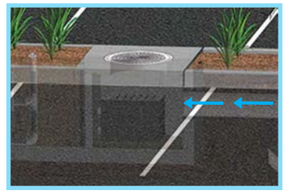
Modular Wetlands® Linear

Configurations

The Modular Wetlands® 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 storm drain design.


Curb Type


Grate Type


Vault Type


Downspout Type

Curb Type

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways 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 system's pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to ensure 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 pretreatment chamber, meaning the Modular Wetlands® 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 rooftop 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.

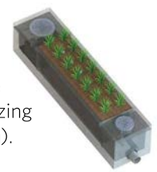
Orientations

Side-by-Side

The Side-by-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side.

End-to-End

The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension).



Bypass

Internal Bypass Weir

The Side-by-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass.

External Diversion Weir Structure

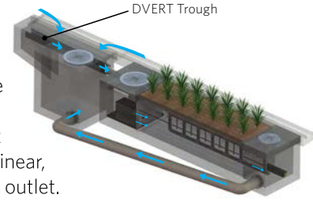
This traditional offline diversion method can be used with the Modular Wetlands Linear in scenarios where runoff is being piped to the system.

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 Modular Wetlands and into the standard inlet downstream.

Dvert Low-Flow Diversion

A simple diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands Linear, and then back to the catch basin outlet.



APPENDIX C – Post Construction Storm Water Management Manual Table 3-1. Source Control Measures

Table 3-1. Source Control Measures

BMP ID No./Name	Source/Activity	Description
SC-10 Non-Stormwater Discharges	Interior floor drains	Keep internal floor drains plugged if they drain to the storm water drainage system
	Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	Discharge to the storm drain system, provided that the flow path to the storm drain inlet has been swept of debris, the water is dechlorinated and the water has a pH between 6 and 9.
	Unauthorized non-storm water discharges	Ensure that project plans include appropriately designed areas for washing of transit vehicles and equipment. Unauthorized non-stormwater discharges such as wash water should be conveyed to a sanitary sewer, recycling system or other alternative.
SC-11 Spill Prevention, Control and Cleanup	Accidental spills or leaks	Develop procedures to prevent/mitigate spills to storm drain systems.
SC-21 Vehicle and Equipment Cleaning	Transit vehicle cleaning	Design should incorporate the installation of sumps or drain lines to collect wash water for ultimate conveyance to the sanitary sewer, a holding tank, a process treatment system or an enclosed recycling system.
SC-22 Vehicle and Equipment Repair	Vehicle and equipment repair and maintenance	Design indoor areas for vehicle and equipment repair and maintenance. Provide a centralized location for all liquid cleaning such that solvents and residues stay in one area. Design drainage such that wastewater generated is conveyed to an appropriate treatment control that is connected to a blind sump.
SC-33 Outdoor Storage of Raw Materials	Outdoor storage of equipment or materials	Design outdoor storage areas to contain drainage rather than infiltrate it. Design options include enclosures, secondary containment and impervious surfaces.

BMP ID No./Name	Source/Activity	Description
SC-41 Building & Grounds Maintenance	Indoor and structural pest control	Install physical barriers for pest control. For example, subterranean termites cannot tunnel through sand barriers. Sand barriers can be designed into crawl spaces under pier and beam foundations and against retaining walls. Metal flashing and metal plates can also be used as a barrier between piers and beams of structures such as decks.
	Fire sprinkler test water	Fire sprinkler systems may contain corrosion inhibitors, fire supresants or antifreeze. Prevent discharge of water from fire sprinkler system maintenance activities to the storm drain system during testing.
SC-43 Parking/Storage Area Maintenance	Maintenance	Conduct regular cleaning by sweeping or vacuuming parking areas prior to the onset of the wet season.
SC-72 Fountain & Pool Maintenance	Ponds, decorative fountains, and other water features	Consider using a vendor to collect all decorative fountain water for offsite disposal. If not possible, never discharge water to a street or storm drain. Instead, discharge to the sanitary sewer if permitted to do so.
SC-73 Landscape Maintenance	Landscape/outdoor pesticide use	Incorporate integrated pest management techniques to the maximum extent practicable. See MTS Landscape Design and Maintenance Plan.
SD-30 Fueling Areas	Fuel dispensing areas	Fuel dispensing area design must comply with Building and Fire Codes and current local agency ordinances and zoning requirements as well as provide protection of water quality. Project plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, containment and leak prevention.
SD-31 Maintenance Bays & Docks	Loading docks	Loading dock areas should be covered or drainage should be designed to preclude urban run-on and runoff. Direct connections into storm drains from depressed loading docks are prohibited.
SD-32 Trash Storage Areas	Refuse areas	Incorporate preventative measures into design such as enclosures, containment structures, and impervious pavements to mitigate spills.
SD-36 Outdoor Processing Areas	Industrial processes	For outdoor processing areas (e.g. painting or coating, sanding, degreasing) design shall include enclosures, secondary containment structures, dead-end sumps, and conveyance to treatment facilities in accordance with conditions established by the local wastewater treatment agency.

Source : CASQA Stormwater BMP Handbook for New Development and Redevelopment and CASQA Municipal BMP Handbook.

APPENDIX D – INSPECTION AND MAINTENANCE FORM

BIORETENTION BASIN
INSPECTION FORM

Date:_____ Time:_____

Location Name:_____ Inspector:_____

Location Address:_____ _____

Weather: _____

Date of Last Rainfall:_____ Amount:_____ Inches

Reason for Inspection: Routine Re-inspection After 0.5" Rainfall Event
(Circle One)

INSPECTION SCORING - For each facility inspection item, insert one of the following scores:

Include a comment for items scored as "3" or "4"

N/A - Not Applicable
0 = No deficiencies identified
1 = Monitor (potential for future problem)
2 = Routine maintenance required and completed
3 = Schedule a Repair Activity
4 =Immediate repair necessary

FEATURES

1.) Main Basin

____Sediment Accumulation
____ Dead/Diseased Vegetation
____Weeds
____Overgrown Brush or Tree Growth
____Standing Water/Boggy Areas
____Contamination (evidence of oil, gasoline, etc.)
____Mulch Layer
____Erosion from irrigation flow
____Erosion from concentrated stormwater flow
____ Proper Vegetation Cover
____Trash Accumulation

3.) Side Slopes

____ Dead/Diseased Vegetation
____Weeds
____Overgrown Brush or Tree Growth
____Proper Vegetation Cover
____Erosion Present

4.) Inflow Points

____Rip Rap Displaced/Rundown or Pipe Damage
____Erosion Present/Outfall Undercut
____Sediment Accumulation

5.) Underdrain System

____Standing water/Not draining
____Evidence of clogged system

6.) Structural

____Inlet Obstructed
____Outlet Obstructed
____Inlet Damaged
____Outlet Damaged

7.) Irrigation

____General Vegetation Condition
____Bare Spots
____Broken sprinkler heads

8.) Miscellaneous

____Encroachment
____Burrowing Animals/Pests
____Other Vectors (mosquitos: adult or larvae)

Inspection Summary / Additional Comments:_____

OVERALL FACILITY RATING (Circle One)
0 = No Deficiencies Identified
1 = Monitor (potential for future problem exists)
2 = Routine Maintenance Required
3 = Schedule a Repair Activity
4 = Immediate Repair Necessary

This Inspection Form shall be filed with the MTS Environmental Health & Safety Specialist

BIORETENTION BASIN
INSPECTION FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

2: Routine Maintenance Required
____Bare Spots (if mulch has been displaced, rake in aditional or replace if available onsite; if not, then re-code as 3)
____Brush or Tree Growth (determine if pruning is required; if this cannot be performed during maintenance visit, then re-code as 3)
____Burrowing Animals/Pests (backfill burrow with soil; if not possible, re-code as 3)
____ Dead/Diseased Vegetation (if dead vegetation cannot be removed during routine maintenance visit, then re-code as 3)
____Erosion Present (damage or rills on slope; if repair with simple tools is not possible, then re-code as 3)
____Evidence of clogged drainage system (if removal of vegetation or sediment does not eliminate issue, then re-code as 3)
____General Grass Condition (check color: yellow or brown; is fertilizer required or has area been over-watered. If solution cannot be determined then re-code as 3)
____Grass Height (maintain 2-6 inches) (if mowing cannot be implemented during maintenance visit, then re-code as 3)
____Illegal Dumping (if materials cannot be transferred onto a MTS maintenance vehicle for disposal at a MTS facility, then re-code as 3 or re-code as 4 if materials may be a hazardous waste)
____Proper Vegetation Cover (add new landscaping if erosion was observed or canopy was damaged; if this cannot be completed, re-code as 3)
____Rip Rap Displaced/Rundown or Pipe Damage (if rip rap cannot be re-established, then re-code as 3)
____Sediment Accumulation (use brooms or shovels for immediate removal; re-code as 3 if heavy equipment is required, or as a 4 if there is a potential water quality impact due to offiste discharge)
____Standing Water/Boggy Areas (check drain pipes for any debris and remove; if no debris, then return within 24 hours)
____Trash Accumulation (remove trash duriing maintenance response; if trash cannot be removed, re-code as 3; if trash presents a potential water quality impact due to offsite discharge, code as 4)

3 = Schedule a Repair Activity
____Bare Spots (schedule repair with MTS landscape vendor)
____Broken sprinkler heads (if MTS Maintenance cannot repair, then schedule repair with MTS landscape vendor)
____Brush or Tree Growth (if pruning is required, schedule repair with MTS landscape vendor)
____Burrowing Animals/Pests (manage burrow or schedule animal control vendor)
____ Dead/Diseased Vegetation (request removal by MTS landscape vendor)
____Encroachment (e.g. homeless shelters onsite; check internally with MTS for appropriate response)
____Erosion Present (damage or rills on slope; schedule repair activity with MTS landscape vendor)
____Evidence of clogged drainage system (MTS maintenance should evalaute)
____General Grass Condition (request response from MTS landscape vendor)
____Grass Height (maintain 2-6 inches) (request response from MTS landscape vendor)
____Illegal Dumping (if heavy equipment is required to remove material offsite for disposal at a MTS facility)
____ Proper Vegetation Cover (request response from MTS landscape vendor)
____Rip Rap Displaced/Rundown or Pipe Damage (request MTS Maintenance response; if new material is required, schedule repair with MTS landscape vendor)
____Sediment Accumulation (request MTS Maintenance to remove sediment)
____Standing Water/Boggy Areas (if drainage system is not clogged with sediment, trash or debris, then have Maintenance determine type of repair required)
____Trash Accumulation (MTS Maintenance shall remove trash within 2 business days of inspection)
____Weeds (schedule weed removal with MTS landscape vendor)

4 =Immediate repair necessary - ***On page 1, reference the date and person notified for any of the following items***
____Illegal Dumping (if material appears to be a hazardous waste, contact MTS EHS)
____Sediment Accumulation (if sediment accumulation presents a potential water quality impact due to an offsite discharge, contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Standing Water/Boggy Areas (if standing water is observed for >/= 96 hours, then contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Trash Accumulation (if amount of trash presents a potential water quality impact due to an offsite discharge, contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Mosquitos Present (Contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)

BIORETENTION BASIN MAINTENANCE FORM

Location Name:_____ Completion Date/Time:_____

Location Address:_____ Inspector:_____

Maintenance Category: Routine Restoration Rehabilitation
(Circle all that apply)

MAINTENANCE ACTIVITIES PERFORMED

ROUTINE WORK

____ VEGETATION MGMT: RE-SEED; REMOVE DEAD/DISEASED; TRIM
____ TRASH/DEBRIS REMOVAL
____ INLET/OUTLET STRUCTURE: CLEAR BLOCKAGE; REPAIR; REPLACE
____ WEED CONTROL
____ REMOVE ACCUMULATED WATER
____ REPLENISH MULCH

RESTORATION WORK

____ SEDIMENT REMOVAL
____ MAIN BASIN

____ STANDING WATER >96 HRS
____ ADJUST IRRIGATION
____ REMOVE OBSTRUCTION
____ REPLACE COMPACTED SOILS

____ EROSION REPAIR
____ INFLOW POINT
____ SIDE SLOPE
____ ADJUST IRRIGATION
____ INSTALL ADDITIONAL BMP

____ MOSQUITOS PRESENT
____ REMOVE STANDING WATER
____ CONSULT WITH MTS SITE MANAGER

____ MULCH LAYER
____ REMOVE DECOMPOSED FRACTION
____ ADD FRESH MULCH TO A DEPTH OF 3"

REHABILITATION WORK

____ SEDIMENT REMOVAL (DREDGING)
____ MAIN BASIN

____ EROSION REPAIR
____ INFLOW POINT
____ SIDE SLOPE
____ INSTALL ADDITIONAL BMP

____ STRUCTURAL REPAIR
____ INLET
____ OUTLET
____ WEIR

____ REVEGETATION
____ MAIN BASIN
____ SIDE SLOPE

ESTIMATED TOTAL LABOR HOURS:_____

EQUIPMENT/MATERIAL USED:_____

_____

_____

COMMENTS/ADDITIONAL INFO:_____

_____

This Maintenance Activity Form shall be filed with the MTS Environmental Health & Safety Specialist

BIORETENTION BASIN
MAINTENANCE FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

BIOFILTRATION SWALE
INSPECTION FORM

Date:_____ Time:_____

Location Name:_____ Inspector:_____

Location Address:_____ _____

Weather: _____

Date of Last Rainfall:_____ Amount:_____ Inches

Reason for Inspection: Routine Re-inspection After 0.5" Rainfall Event
(Circle One)

INSPECTION SCORING - For each facility inspection item, insert one of the following scores:

Include a comment for items scored as "3" or "4"

N/A - Not Applicable
0 = No deficiencies identified
1 = Monitor (potential for future problem)
2 = Routine maintenance required and completed
3 = Schedule a Repair Activity
4 =Immediate repair necessary

FEATURES

1.) Grass Swale Bottom & Side Slopes
____Sediment Accumulation
____ Dead/Diseased Vegetation
____Weeds
____Brush or Tree Growth
____ Proper Vegetation Cover
____Erosion Present
____Standing Water/Boggy Areas
____Trash Accumulation
____Grass Height (maintain 2-6 inches)

2.) Grass Buffer
____Sediment Accumulation
____ Dead/Diseased Vegetation
____Weeds
____Brush or Tree Growth
____Proper Vegetation Cover
____Erosion Present
____Standing Water/Boggy Areas
____Trash Accumulation
____Grass Height (maintain 2-6 inches)

3.) Inflow Points
____Rip Rap Displaced/Rundown or Pipe Damage
____Erosion Present/Outfall Undercut
____Sediment Accumulation

4.) Underdrain System
____Standing water/Not draining
____Evidence of clogged drainage system

5.) Grade Control
____Erosion Present
____Structural Damage

6.) Level Spreader
____Erosion Present
____Structural Damage
____Unlevel/Uneven Distribution of flow

7.) Irrigation
____General Grass Condition
____Bare Spots
____Broken sprinkler heads

8.) Miscellaneous
____Encroachment
____Burrowing Animals/Pests
____Illegal Dumping
____Other

Inspection Summary / Additional Comments:_____

OVERALL FACILITY RATING (Circle One)
0 = No Deficiencies Identified
1 = Monitor (potential for future problem exists)
2 = Routine Maintenance Required
3 = Schedule a Repair Activity
4 = Immediate Repair Necessary

This Inspection Form shall be filed with the MTS Environmental Health & Safety (EHS) Specialist

BIOFILTRATION SWALE
INSPECTION FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

2: Routine Maintenance Required
____Bare Spots (if mulch has been displaced, rake in aditional or replace if available onsite; if not, then re-code as 3)
____Brush or Tree Growth (determine if pruning is required; if this cannot be performed during maintenance visit, then re-code as 3)
____Burrowing Animals/Pests (backfill burrow with soil; if not possible, re-code as 3)
____ Dead/Diseased Vegetation (if dead vegetation cannot be removed during routine maintenance visit, then re-code as 3)
____Erosion Present (damage or rills on slope; if repair with simple tools is not possible, then re-code as 3)
____Evidence of clogged drainage system (if removal of vegetation or sediment does not eliminate issue, then re-code as 3)
____General Grass Condition (check color: yellow or brown; is fertilizer required or has area been over-watered. If solution cannot be determined then re-code as 3)
____Grass Height (maintain 2-6 inches) (if mowing cannot be implemented during maintenance visit, then re-code as 3)
____Illegal Dumping (if materials cannot be transferred onto a MTS maintenance vehicle for disposal at a MTS facility, then re-code as 3 or re-code as 4 if materials may be a hazardous waste)
____Proper Vegetation Cover (add new landscaping if erosion was observed or canopy was damaged; if this cannot be completed, re-code as 3)
____Rip Rap Displaced/Rundown or Pipe Damage (if rip rap cannot be re-established, then re-code as 3)
____Sediment Accumulation (use brooms or shovels for immediate removal; re-code as 3 if heavy equipment is required, or as a 4 if there is a potential water quality impact due to offiste discharge)
____Standing Water/Boggy Areas (check drain pipes for any debris and remove; if no debris, then return within 24 hours)
____Trash Accumulation (remove trash duriing maintenance response; if trash cannot be removed, re-code as 3; if trash presents a potential water quality impact due to offsite discharge, code as 4)

3 = Schedule a Repair Activity
____Bare Spots (schedule repair with MTS landscape vendor)
____Broken sprinkler heads (if MTS Maintenance cannot repair, then schedule repair with MTS landscape vendor)
____Brush or Tree Growth (if pruning is required, schedule repair with MTS landscape vendor)
____Burrowing Animals/Pests (manage burrow or schedule animal control vendor)
____ Dead/Diseased Vegetation (request removal by MTS landscape vendor)
____Encroachment (e.g. homeless shelters onsite; check internally with MTS for appropriate response)
____Erosion Present (damage or rills on slope; schedule repair activity with MTS landscape vendor)
____Evidence of clogged drainage system (MTS maintenance should evalaute)
____General Grass Condition (request response from MTS landscape vendor)
____Grass Height (maintain 2-6 inches) (request response from MTS landscape vendor)
____Illegal Dumping (if heavy equipment is required to remove material offsite for disposal at a MTS facility)
____ Proper Vegetation Cover (request response from MTS landscape vendor)
____Rip Rap Displaced/Rundown or Pipe Damage (request MTS Maintenance response; if new material is required, schedule repair with MTS landscape vendor)
____Sediment Accumulation (request MTS Maintenance to remove sediment)
____Standing Water/Boggy Areas (if drainage system is not clogged with sediment, trash or debris, then have Maintenance determine type of repair required)
____Trash Accumulation (MTS Maintenance shall remove trash within 2 business days of inspection)
____Weeds (schedule weed removal with MTS landscape vendor)

4 =Immediate repair necessary - ***On page 1, reference the date and person notified for any of the following items***
____Illegal Dumping (if material appears to be a hazardous waste, contact MTS EHS)
____Sediment Accumulation (if sediment accumulation presents a potential water quality impact due to an offsite discharge, contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Standing Water/Boggy Areas (if standing water is observed for >/= 96 hours, then contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Trash Accumulation (if amount of trash presents a potential water quality impact due to an offsite discharge, contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)
____Mosquitos Present (Contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)

BIOFILTRATION SWALE MAINTENANCE FORM

Location Name:_____ Completion Date/Time:_____

Location Address:_____ Inspector:_____

Maintenance Category: Routine Restoration Rehabilitation
(Circle all that apply)

MAINTENANCE ACTIVITIES PERFORMED

ROUTINE WORK

____ MOWING
____ TRASH/DEBRIS REMOVAL
____ OUTLET WORKS CLEANING (TRASH RACK/WELL SCREEN)
____ WEED CONTROL
____ REMOVE ACCUMULATED WATER

RESTORATION WORK

____ SEDIMENT REMOVAL
- ____ INFLOW POINT
- ____ SWALE BOTTOM
- ____ SIDE SLOPE
- ____ BUFFER STRIP

____ EROSION REPAIR
- ____ INFLOW POINT
- ____ SWALE BOTTOM
- ____ SIDE SLOPE
- ____ BUFFER STRIP
- ____ GRADE CONTROL/LEVEL SPREADER

____ REVEGETATION
- ____ SWALE BOTTOM
- ____ SIDE SLOPE
- ____ BUFFER STRIP

REHABILITATION WORK

____ SEDIMENT REMOVAL (DREDGING)
- ____ SWALE BOTTOM
- ____ INFLOW POINT

____ EROSION REPAIR
- ____ INFLOW POINT
- ____ SWALE BOTTOM
- ____ SIDE SLOPE
- ____ BUFFER STRIP

____ STRUCTURAL REPAIR
- ____ INFLOW
- ____ UNDERDRAIN
- ____ LEVEL SPREADER

OTHER_____
_____
_____
_____
_____
_____

ESTIMATED TOTAL LABOR HOURS:_____

EQUIPMENT/MATERIAL USED:_____

_____

_____

COMMENTS/ADDITIONAL INFO:_____

_____

This Maintenance Activity Form shall be filed with the MTS Environmental Health & Safety Specialist

BIOFILTRATION SWALE
MAINTENANCE FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

MODULAR WETLANDS SYSTEM
INSPECTION REPORT

Date:_____ Time:_____

Location Name:_____ Inspector:_____

Location Address:_____ _____

Weather: _____

Date of Last Rainfall:_____ Amount:_____ Inches

Reason for Inspection: Routine Re-inspection After 0.5" Rainfall Event
(Circle One)

Modular Wetland System (MWS) Type (Curb, Grate or UG Vault): _____

Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments:**
Damage to manhole cover/grate or cannot be opened using normal lifting pressure?			
Damage to discharge chamber 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 or outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of an illicit discharge or excessive oil, grease, or other vehicle fluids entering and clogging the unit?			
Is there standing water in inappropriate areas during dry weather?			
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 the pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in the 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 there evidence that the vegetation is alive and healthy (if applicable)? Please note Vegetation Information below.			
Is there a septic or foul odor detected from inside the system?			

Recommended Maintenance:	
Cleaning needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Vegetation Information:	
Damaged Vegetation	
Vegettion Replacement	
Vegetation Trimming	

This Inspection Form shall be filed with the MTS Health and Safety Specialist

MODULAR WETLANDS SYSTEM
INSPECTION REPORT
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

MODULAR WETLANDS SYSTEM
MAINTENANCE REPORT

Date:_____ Time:_____

Location Name:_____ Inspector:_____

Location Address:_____ _____

Weather: _____

Date of Last Rainfall:_____ Amount:_____ Inches:_____

Reason for Maintenance: Routine Follow-up After 0.5" Rainfall Event
(Circle One)

Modular Wetland System (MWS) Type (Curb, Grate or UG Vault): _____
Size (22', 14' or etc.):

Location	Maintenance Item	Percent Accumulation				Media Condition 25/50/75/100 (Change @75%)	Operational (Yes, No) (If No, why?)
		Trash	Foliage	Sediment	Debris		
	CATCH BASIN						
	SEDIMENTATION BASIN						
	Media Filter Condition	**Maintenance Performed:**					
	Plant Condition	**Maintenance Performed:**					
	Drain Down Media Condition	**Maintenance Performed:**					
	Discharge Chamber Condition	**Maintenance Performed:**					
	Drain Down Pipe Condition	**Maintenance Performed:**					
	Inlet and Outlet Pipe Condition	**Maintenance Performed:**					

Comments:

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MODULAR WETLANDS SYSTEM
MAINTENANCE REPORT
PHOTOGRAPHS

Photo 1:	**Photo 2:**
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PERMEABLE PAVEMENT
INSPECTION FORM

Date:_____ Time:_____

Location Name:_____ Inspector:_____

Location Address:_____ _____

Weather: _____

Date of Last Rainfall:_____ Amount:_____ Inches

Reason for Inspection: Routine Re-inspection After 0.5" Rainfall Event
(Circle One)

INSPECTION SCORING - For each facility inspection item, insert one of the following scores:

Include a comment for items scored as "3" or "4"

N/A - Not Applicable
0 = No deficiencies identified
1 = Monitor (potential for future problem)
2 = Routine maintenance required and completed
3 = Schedule a Repair Activity
4 =Immediate repair necessary

FEATURES

1.) Surface Aggregate

____Sediment Accumulation
____Vegetation Debris
____Erosion Present
____Standing Water
____Trash Accumulation

2.) Miscellaneous

____Burrowing Animals
____Holes in ground near parking stalls
____Erosion sources nearby

Inspection Summary / Additional Comments:_____

OVERALL FACILITY RATING (Circle One)
0 = No Deficiencies Identified
1 = Monitor (potential for future problem exists)
2 = Routine Maintenance Required
3 = Schedule a Repair Activity
4 = Immediate Repair Necessary

This Inspection Form shall be filed with the MTS Environmental Health & Safety Specialist

PERMEABLE PAVEMENT
INSPECTION FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**

2: Routine Maintenance Required

____Bare Spots (if mulch has been displaced, rake in aditional or replace if available onsite; if not, then re-code as 3)
____Brush or Tree Growth (determine if pruning is required; if this cannot be performed during maintenance visit, then re-code as 3)
____Burrowing Animals/Pests (backfill burrow with soil; if not possible, re-code as 3)
____ Dead/Diseased Vegetation (if dead vegetation cannot be removed during routine maintenance visit, then re-code as 3)
____Erosion Present (damage or rills on slope; if repair with simple tools is not possible, then re-code as 3)
____Evidence of clogged drainage system (if removal of vegetation or sediment does not eliminate issue, then re-code as 3)
____General Grass Condition (check color: yellow or brown; is fertilizer required or has area been over-watered. If solution cannot be determined then re-code as 3)
____Grass Height (maintain 2-6 inches) (if mowing cannot be implemented during maintenance visit, then re-code as 3)
____Illegal Dumping (if materials cannot be transferred onto a MTS maintenance vehicle for disposal at a MTS facility, then re-code as 3 or re-code as 4 if materials may be a hazardous waste)
____Proper Vegetation Cover (add new landscaping if erosion was observed or canopy was damaged; if this cannot be completed, re-code as 3)
____Rip Rap Displaced/Rundown or Pipe Damage (if rip rap cannot be re-established, then re-code as 3)
____Sediment Accumulation (use brooms or shovels for immediate removal; re-code as 3 if heavy equipment is required, or as a 4 if there is a potential water quality impact due to offiste discharge)
____Standing Water/Boggy Areas (check drain pipes for any debris and remove; if no debris, then return within 24 hours)
____Trash Accumulation (remove trash duriing maintenance response; if trash cannot be removed, re-code as 3; if trash presents a potential water quality impact due to offsite discharge, code as 4)

3 = Schedule a Repair Activity

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____Broken sprinkler heads (if MTS Maintenance cannot repair, then schedule repair with MTS landscape vendor)
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____Trash Accumulation (MTS Maintenance shall remove trash within 2 business days of inspection)
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4 =Immediate repair necessary - ***On page 1, reference the date and person notified for any of the following items***

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____Mosquitos Present (Contact contact MOW for right of way and the MTS Maintenance Supervisor for stations and landscape areas)

PERMEABLE PAVEMENT
MAINTENANCE FORM

Location Name:_____ Completion Date/Time:_____

Location Address:_____ Inspector:_____

Maintenance Category: Routine Restoration Rehabilitation
(Circle all that apply)

MAINTENANCE ACTIVITIES PERFORMED

ROUTINE WORK

____ TRASH/DEBRIS REMOVAL
____ REMOVE ACCUMULATED SEDIMENT

RESTORATION WORK

____ REDUCED INFILTRATION
- ____ Vacuum aggregate
- ____ Remove aggregate
- ____ Replace old aggregate

____ EROSION REPAIR
- ____ Fill and compact holes
- ____ Control erosion sources

OTHER_____
_____
_____
_____
_____
_____

ESTIMATED TOTAL LABOR HOURS:_____

EQUIPMENT/MATERIAL USED: _____

_____

_____

COMMENTS/ADDITIONAL INFO:_____

_____

This Maintenance Activity Form shall be filed with the MTS EHS

PERMEABLE PAVEMENT
MAINTENANCE FORM
PHOTOGRAPHS

Photo 1:	**Photo 2:**
Photo 3:	**Photo 4:**