K.2.1 Green Streets Performance Standard

This section builds on text from Section 1.4.3 providing more detailed guidance on compliance with the performance standard for Green Street PDP Exempt projects (herein referred to as Green Street projects).

Green Street projects must provide stormwater treatment for the volume of runoff associated with the project's net increase in impervious area. Compliance with this standard may be demonstrated at the project-scale, meaning there is no obligation to treat runoff from each discrete segment of new impervious area. Green Street projects are encouraged to achieve compliance through treatment of runoff from any combination of land uses including existing/proposed surfaces, onsite/offsite surfaces, pervious/impervious surfaces. As summarized below, Green Street compliance can be demonstrated through determination of the following 1) Required Treatment Volume, 2) Provided Treatment Volume, and 3) Comparison of Required and Provided Treatment.

1) REQUIRED TREATMENT VOLUME

Project proponent must calculate a single water quality runoff volume associated with the net increase in impervious area across the entire project site. This calculation should exclude runoff volumes associated with existing/replaced impervious areas within the project footprint, as treatment is not mandated for these areas. Supporting exhibits delineating new impervious areas, existing/replaced impervious areas, and removed impervious areas must be provided as needed to support this determination.

2) PROVIDED TREATMENT VOLUME

Project proponent must calculate the total volume of stormwater runoff treated through site design elements and/or structural BMPs proposed by the project. Completion of this step requires consideration of all surfaces draining to proposed treatment elements (existing/proposed, onsite/offsite, pervious/impervious areas draining to BMPs).

Project proponent must provide treatment through use of "Conventional" treatment elements where feasible but may also be permitted to use "Alternative" treatment elements upon demonstration of infeasibility.

> Conventional Treatment Elements: Elements that utilize conventional retention and/or biofiltration designs that are consistent with the County BMPDM[1]. Use of these elements may achieve Green Street compliance and are eligible to generate alternative compliance credits if implemented sufficiently. [*Examples: tree wells, dispersion areas, biofiltration basins (lined or unlined),*

[1] Minimum retention requirements waived for Green Streets.

bioretention basins, infiltration basins (vegetated or non-vegetated), pervious pavements without impermeable liners.]

Alternative Treatment Elements: Elements that provide filtration for anticipated pollutants at medium to high efficacy and provide significant pore storage capacity. Use of these elements may achieve Green Street compliance but are typically not eligible[2] to generate alternative compliance credits. [*Examples: vegetated swales, non-vegetated filtration BMPs (sand filters, biofiltration soil media, pervious pavements with impermeable liners and underdrains), detention basins, wet ponds, proprietary filtration devices with significant pore storage capacity.]*

Treatment Elements lacking significant pore storage such as filter fabrics, debris racks, filter baskets, CDS units, hydrodynamic separators or similar devices may not be classified as either of the two categories above.

3) COMPARISON OF REQUIRED AND PROVIDED TREATMENT

Project proponent must demonstrate that the provided treatment volume is greater than or equal to the required treatment volume. This may be demonstrated at the project-scale, meaning there is no obligation to demonstrate treatment for each discrete segment of new impervious area. The pages that follow present a standard calculation template for demonstrating Green Street compliance as well as several calculation examples.

[2] If project proponent desires to bank credits through use of Alternative Treatment Elements, more detailed guidance outlined in the Regional Water Quality Equivalency must be referenced.

Table K.2-1 : Green Street Performance Standard Calculations

Item			Value	Description
Required Treatment Volume	1	Land Use of New Impervious Area	Transportation	*Per project drawings.*
	2	Net Increase in Impervious Area [3]	ft^2	*Per project drawings.*
	3	85th Percentile Rainfall Depth	in.	*Determine per BMPDM Appendix B.1.*
	4	Runoff Coefficient	0.90	*Value of 0.90 applies to new impervious areas.*
	5	Required Treatment Volume	ft^3	*(Line 2 x Line 3 x Line 4) / 12*
Provided Treatment Volume	6	Land Use of Treated Area[4]		*Per project drawings.*
	7	Land Use Factor[5]		*Determine per Note 5 below.*
	8	Conventional Treatment Volume[6]	ft^3	*Determine per Note 6 below.*
	9	Alternative Treatment Volume		*Determine per supplemental applicant calculations.*
	10	Final Treatment Volume	ft^3	*Line 7 x (Line 8 + Line 9)*
Result	11	Is Project Green Street Compliant?		*Compliant if Line 10 ≥ Line 5. Otherwise, non-compliant.*
	12	Optional Credit		*(Line 7 x Line 8) – Line 5*

[3] The Net Increase in Impervious Area should **not** reflect any work occurring within existing impervious areas.

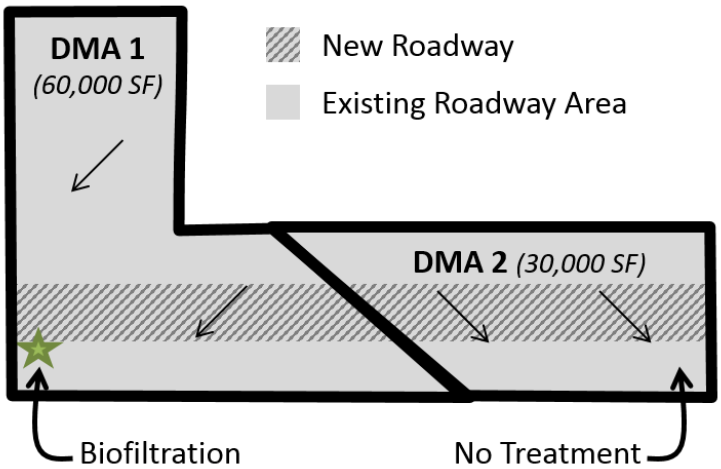
[4] Classify drainage area into following land use types (may use more than one) agriculture, commercial, education, industrial, multi-family residential, orchard, rural residential, single family residential, transportation, open space.

[5] If Land Uses from Lines 1 and 6 match, use a value of 1.0. Otherwise, refer to Regional Water Quality Equivalency Guidance for determination of appropriate Land Use Factor.

[6] Conventional Treatment Volume may be determined by subtracting the project's total "Deficit of Effectively Treated Stormwater" from the project's total Design Capture Volume. These values can be found in Version 2.0 of the County of San Diego Automated Control Worksheet on Line 48 of the BMP Performance Tab and Line 26 of the DCV Tab respectively.

Example 1: Green Street Compliance using **Conventional Treatment Elements**

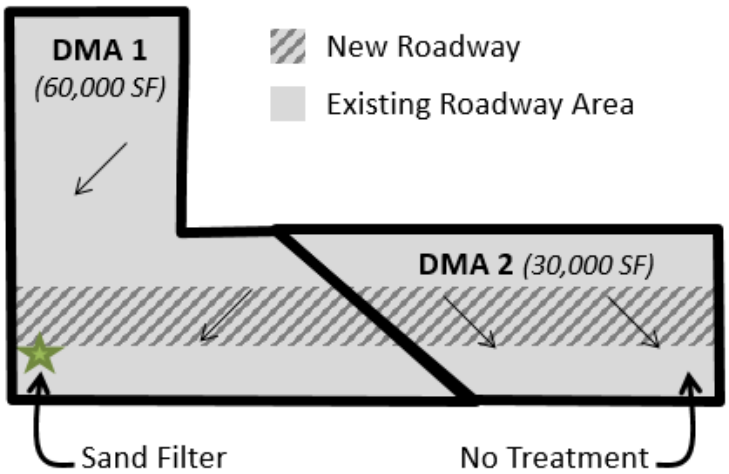
A green street project will create 20,000 SF of new impervious surface through the addition of a center turn lane on an existing road that currently has a vegetated center divide. The project is divided into two Drainage Management Areas (DMAs) as shown below. DMA 1 consists of impervious roadway surfaces that drain westerly to a proposed biofiltration basin. DMA 2 consists of impervious roadway surfaces that sheet flow in an easterly direction and leave the site without treatment. The project applicant demonstrates compliance with the Green Street Performance Standard as presented below.



Item			Value
Required Treatment Volume	1	Land Use of New Impervious Area	Transportation
	2	Net Increase in Impervious Area	20,000 ft^2
	3	85th Percentile Rainfall Depth	0.70 in.
	4	Runoff Coefficient	0.90
	5	Required Treatment Volume *(See Excerpt 1 for calculations)*	1,050 ft^3
Provided Treatment Volume	6	Land Use of Treated Area	Transportation
	7	Land Use Factor	1.00
	8	Conventional Treatment Volume *(See Excerpt 2 for calculations)*	3,150 ft^3
	9	Alternative Treatment Volume	0 ft^3
	10	Final Treatment Volume	3,150 ft^3
Result	11	Is Project Green Street Compliant?	Compliant
	12	Optional Credit	2,100 ft^3

Example 2: Green Street Compliance using **Alternative Treatment Elements**

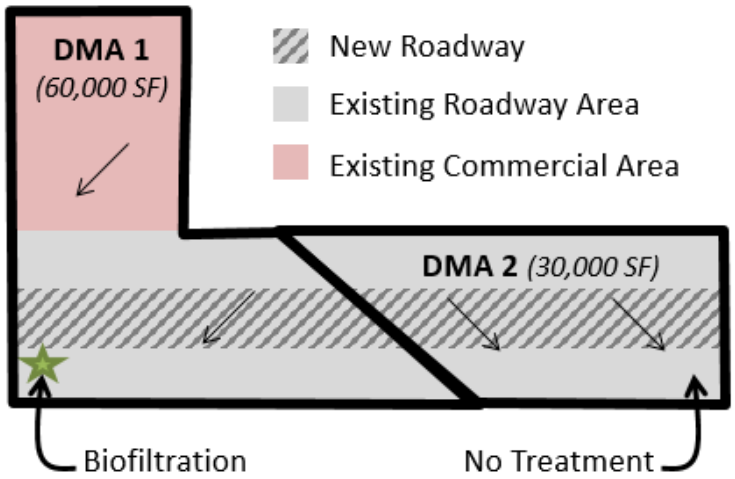
If the project described in the previous Example 1 implemented a sand filter instead of biofiltration, the project would demonstrate compliance with the Green Street Performance Standard as presented below.



Item			Value
Required Treatment Volume	1	Land Use of New Impervious Area	Transportation
	2	Net Increase in Impervious Area	20,000 ft^2
	3	85th Percentile Rainfall Depth	0.70 in.
	4	Runoff Coefficient	0.90
	5	Required Treatment Volume *(See Excerpt 1 for calculations)*	1,050 ft^3
Provided Treatment Volume	6	Land Use of Treated Area	Transportation
	7	Land Use Factor	1.00
	8	Conventional Treatment Volume	0 ft^3
	9	Alternative Treatment Volume *(Applicant Calculations)*	3,150 ft^3
	10	Final Treatment Volume	3,150 ft^3
Result	11	Is Project Green Street Compliant?	Compliant
	12	Optional Credit *(Alternative treatment not eligible)*	0 ft^3

Example 3: Green Street Compliance using Conventional Treatment Elements for **Offsite Run-on**

If the project described in Example 1 provided stormwater treatment for offsite run-on from an adjacent commercial area, the project would demonstrate compliance with the Green Street Performance Standard as presented below.



Item			Value
Required Treatment Volume	1	Land Use of New Impervious Area	Transportation
	2	Net Increase in Impervious Area	20,000 ft^2
	3	85th Percentile Rainfall Depth	0.70 in.
	4	Runoff Coefficient	0.90
	5	Required Treatment Volume *(See Excerpt 1 for calculations)*	1,050 ft^3
Provided Treatment Volume	6	Land Use of Treated Area	Transportation & Commercial
	7	Land Use Factor *(See Excerpt 3 for calculations)*	0.82
	8	Conventional Treatment Volume *(See Excerpt 2 for calculations)*	3,150 ft^3
	9	Alternative Treatment Volume	0 ft^3
	10	Final Treatment Volume	2,583 ft^3
Result	11	Is Project Green Street Compliant?	Compliant
	12	Optional Credit	1,533 ft^3

Excerpt 1 - Required Treatment Volume for New Impervious Surface of 20,000 SF

County of San Diego Automated Stormwater Pollutant Control Worksheet B.1 (Version 2.0)

Category	#	Description	*i*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	Perf Std	unitless
	2	85th Percentile 24-hr Storm Depth	0.70	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	20,000	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)		sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)		sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)		sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)		sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)		sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)		sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)		sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)		sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)		sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	18	Number of Tree Wells Proposed per SD-A		#
	19	Average Mature Tree Canopy Diameter		ft
	20	Number of Rain Barrels Proposed per SD-E		#
	21	Average Rain Barrel Size		gal
Initial Runoff Factor Calculation	22	Total Tributary Area	20,000	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	unitless
	26	Initial Design Capture Volume	1,050	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	sq-ft
	28	Total Pervious Dispersion Area	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	1,050	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	unitless
	36	Final Effective Tributary Area	18,000	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	1,050	cubic-feet

Excerpt 2- Summary of Stormwater Pollutant Control Calculations (Part 1 of 2)

County of San Diego Automated Stormwater Pollutant Control Worksheet B.1 (Version 2.0)

Category	#	Description	*ii*	Units
Standard Drainage Basin Inputs	1	Drainage Basin ID or Name	DMA 1	unitless
	2	85th Percentile 24-hr Storm Depth	0.70	inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	60,000	sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)		sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)		sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)		sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)		sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)		sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)		sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)		sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)		sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)		sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)		sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)		sq-ft
	18	Number of Tree Wells Proposed per SD-A		#
	19	Average Mature Tree Canopy Diameter		ft
	20	Number of Rain Barrels Proposed per SD-E		#
	21	Average Rain Barrel Size		gal
Initial Runoff Factor Calculation	22	Total Tributary Area	60,000	sq-ft
	23	Initial Runoff Factor for Standard Drainage Areas	0.90	unitless
	24	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	unitless
	25	Initial Weighted Runoff Factor	0.90	unitless
	26	Initial Design Capture Volume	3,150	cubic-feet
Dispersion Area Adjustments	27	Total Impervious Area Dispersed to Pervious Surface	0	sq-ft
	28	Total Pervious Dispersion Area	0	sq-ft
	29	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	ratio
	30	Adjustment Factor for Dispersed & Dispersion Areas	1.00	ratio
	31	Runoff Factor After Dispersion Techniques	0.90	unitless
	32	Design Capture Volume After Dispersion Techniques	3,150	cubic-feet
Tree & Barrel Adjustments	33	Total Tree Well Volume Reduction	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	cubic-feet
Results	35	Final Adjusted Runoff Factor	0.90	unitless
	36	Final Effective Tributary Area	54,000	sq-ft
	37	Initial Design Capture Volume Retained by Site Design Elements	0	cubic-feet
	38	Final Design Capture Volume Tributary to BMP	3,150	cubic-feet

Excerpt 2- Summary of Stormwater Pollutant Control Calculations (Part 2 of 2)

County of San Diego Automated Stormwater Pollutant Control Worksheet B.3 (Version 2.0)

Category	#	Description	ii	Units
BMP Inputs	1	Drainage Basin ID or Name	DMA 1	sq-ft
	2	Design Infiltration Rate Recommended	0.000	in/hr
	3	Design Capture Volume Tributary to BMP	3,150	cubic-feet
	4	Is BMP Vegetated or Unvegetated?	Vegetated	unitless
	5	Is BMP Impermeably Lined or Unlined?	Lined	unitless
	6	Does BMP Have an Underdrain?	Underdrain	unitless
	7	Does BMP Utilize Standard or Specialized Media?	Standard	unitless
	8	Provided Surface Area	1,620	sq-ft
	9	Provided Surface Ponding Depth	6	inches
	10	Provided Soil Media Thickness	21	inches
	11	Provided Gravel Thickness (Total Thickness)	14	inches
	12	Underdrain Offset	3	inches
	13	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	8.00	inches
	14	Specialized Soil Media Filtration Rate		in/hr
	15	Specialized Soil Media Pore Space for Retention		unitless
	16	Specialized Soil Media Pore Space for Biofiltration		unitless
	17	Specialized Gravel Media Pore Space		unitless
Retention Calculations	18	Volume Infiltrated Over 6 Hour Storm	0	cubic-feet
	19	Ponding Pore Space Available for Retention	0.00	unitless
	20	Soil Media Pore Space Available for Retention	0.05	unitless
	21	Gravel Pore Space Available for Retention (Above Underdrain)	0.00	unitless
	22	Gravel Pore Space Available for Retention (Below Underdrain)	0.40	unitless
	23	Effective Retention Depth	2.25	inches
	24	Fraction of DCV Retained (Independent of Drawdown Time)	0.10	ratio
	25	Calculated Retention Storage Drawdown Time	120	hours
	26	Efficacy of Retention Processes	0.12	ratio
	27	Volume Retained by BMP (Considering Drawdown Time)	381	cubic-feet
	28	Design Capture Volume Remaining for Biofiltration	2,769	cubic-feet
Biofiltration Calculations	29	Max Hydromod Flow Rate through Underdrain	2.8291	cfs
	30	Max Soil Filtration Rate Allowed by Underdrain Orifice	75.44	in/hr
	31	Soil Media Filtration Rate per Specifications	5.00	in/hr
	32	Soil Media Filtration Rate to be used for Sizing	5.00	in/hr
	33	Depth Biofiltered Over 6 Hour Storm	30.00	inches
	34	Ponding Pore Space Available for Biofiltration	1.00	unitless
	35	Soil Media Pore Space Available for Biofiltration	0.20	unitless
	36	Gravel Pore Space Available for Biofiltration (Above Underdrain)	0.40	unitless
	37	Effective Depth of Biofiltration Storage	14.60	inches
	38	Drawdown Time for Surface Ponding	1	hours
	39	Drawdown Time for Effective Biofiltration Depth	3	hours
	40	Total Depth Biofiltered	44.60	inches
	41	Option 1 - Biofilter 1.50 DCV: Target Volume	4,154	cubic-feet
	42	Option 1 - Provided Biofiltration Volume	4,154	cubic-feet
	43	Option 2 - Store 0.75 DCV: Target Volume	2,077	cubic-feet
	44	Option 2 - Provided Storage Volume	1,971	cubic-feet
	45	Portion of Biofiltration Performance Standard Satisfied	1.00	ratio
Result	46	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	yes/no
	47	Overall Portion of Performance Standard Satisfied (BMP Efficacy Factor)	1.00	ratio
	48	**Deficit of Effectively Treated Stormwater**	**0**	cubic-feet

Excerpt 3 – Determination of Land Use Factor for Example 2

Water Quality Equivalency Automated Land Use Factor Worksheets (Version 1.0)

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

Land Use Designation	ACP Tributary Characteristics		Reference Tributary Characteristics [2]		Relative Pollutant Concentrations by Land Use [3]						
	Area (Acres)	Runoff Factor [1]	Area (Acres)	Runoff Factor [1]	TSS	TP	TN	TCu	TPb	TZn	FC
Agriculture		0.10		0.10	0.45	1.00	1.00	1.00	1.00	0.59	1.00
Commercial	0.69	0.80		0.80	0.13	0.16	0.16	0.56	0.48	1.00	0.87
Education		0.50		0.50	0.13	0.20	0.11	0.14	0.25	0.39	0.13
Industrial		0.90		0.90	0.13	0.19	0.15	0.54	0.68	0.89	0.49
Multi Family Residential		0.60		0.60	0.10	0.13	0.13	0.14	0.15	0.29	0.27
Orchard		0.10		0.10	0.18	0.17	0.67	1.00	1.00	0.59	0.11
Rural Residential		0.30		0.30	1.00	0.51	0.14	0.10	0.71	0.13	0.19
Single Family Residential		0.40		0.40	0.13	0.20	0.15	0.27	0.43	0.35	0.63
Transportation	0.69	0.90	0.46	0.90	0.11	0.26	0.12	0.53	0.31	0.62	0.12
Vacant / Open Space		0.10		0.10	0.16	0.10	0.10	0.12	0.10	0.10	0.10
Water		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.38	-	0.46	-	-	-	-	-	-	-	-
	Relative Pollutant Concentration for ACP Tributary [4]				0.12	0.21	0.14	0.54	0.39	0.80	0.47
	Relative Pollutant Concentration for Reference Tributary [4]				0.11	0.26	0.12	0.53	0.31	0.62	0.12
	Watershed Management Area				San Diego River						
	Hydrologic Unit				San Diego (907.00)						
	Land Use Factor [5]				-	0.82	**1.16**	-	-	-	**3.94**