

DATE 9/18/2013
 PROJECT EL CERRITO URBAN GREENERY
 TITLE POLLUTANT REMOVAL SUMMARY
 PREPARED CTANG, MFU
 CHECKED JLEYS



POLLUTANT REMOVAL SUMMARY

COST OF POLLUTANT REMOVAL BY BMP TYPE (DOLLAR/LB)													
GENERAL			COST BY WEIGHT (dollar/lb)										
LAND USE	UNIT COST OF BMP (dollar/sf)	BMP TYPE	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
RESIDENTIAL	35	Soft Edge Bioretention (RG)	0.06	63.00		6.38		38.75			93.14	242.24	43.21
RESIDENTIAL	100	Hard Edge Bioretention (RG)	0.16	180.01		18.24		110.70			266.10	692.12	123.47
MIXED	35	Soft Edge Bioretention (RG)	0.08	91.75		9.42		51.11			117.65	296.07	37.88
MIXED	100	Hard Edge Bioretention (RG)	0.24	262.14		26.91		146.02			336.13	845.93	108.24
MIXED	50	Detention Basin / Forebay	0.75	585.53		No Data		189.01			680.87	3131.03	618.30
MIXED	12	Porous Pavement	0.47	237.32		37.41		No Data			385.94	2325.04	219.20
MIXED	10	Self-Treating Landscape	0.31	79.11		16.15		37.28			182.50	770.54	135.10
MIXED	70	Wetland Basin	0.02	7.09		No Data		1.93			15.57	73.01	8.59

POLLUTANTS REMOVED PER UNIT BMP AREA (LB/100SF)													
GENERAL			QUANTITY BENEFIT (lb/100sf)										
LAND USE	ANNUAL RUNOFF TREATED (gal/100sf)	BMP TYPE	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
RESIDENTIAL	9,559	Soft Edge Bioretention (RG)	6.274	0.006		0.055		0.009			0.004	0.001	0.008
RESIDENTIAL	9,559	Hard Edge Bioretention (RG)	6.274	0.006		0.055		0.009			0.004	0.001	0.008
MIXED	9,559	Soft Edge Bioretention (RG)	4.162	0.004		0.037		0.007			0.003	0.001	0.009
MIXED	9,559	Hard Edge Bioretention (RG)	4.162	0.004		0.037		0.007			0.003	0.001	0.009
MIXED	1,247	Detention Basin / Forebay	0.670	0.001		No Data		0.003			0.001	0.000	0.001
MIXED	576	Porous Pavement	0.257	0.001		0.003		No Data			0.000	0.000	0.001
MIXED	576	Self-Treating Landscape	0.322	0.001		0.006		0.003			0.001	0.000	0.001
MIXED	117,017	Wetland Basin	36.371	0.099		No Data		0.363			0.045	0.010	0.081

100 Note: Porous Pavement and Self-Treating Landscapes only treat the rainfall that falls directly on them.

SUMMARY OF POLLUTANTS REMOVED ANNUALLY AT STUDIED LOCATIONS (LB/YR)

POLLUTANTS REMOVED ANNUALLY BY LOCATION													
GENERAL			POLLUTANTS REMOVED (lb/yr)										
LAND USE	LOCATION	BMP TYPE	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
Residential	1 - OHLONE	Forebay	2,010	0.003				0.008			0.002	0.000	0.002
Mixed	1 - OHLONE	Bioretention (RG)	5.07	0.00		0.05		0.01			0.00	0.00	0.01
Mixed	4-CENTRAL PARK	Forebay	5.72	0.02		0.04		0.02			0.01	0.00	0.01
Mixed	5-CREEKSIDE PARK	Wetland	2,624.51	7.13				26.21			3.24	0.69	5.88
Residential	11-LEXINGTON	Bioretention (RG)	64.63	0.06		0.56		0.09			0.04	0.01	0.08
Residential	11-KEARNEY	Bioretention (RG)	64.63	0.06		0.56		0.09			0.04	0.01	0.08
Residential	12-ASHBURY	Bioretention (RG)	77.30	0.07		0.68		0.11			0.05	0.02	0.10

CONVERSION FACTOR (FROM %) 0.01

SUMMARY OF RUNOFF RETAINED PER TREE

ASSUMPTIONS	
AVG CANOPY DIA (ft)	15
RUNOFF RETAINED	2% REDUCTION FOR 5% OF INCREASED CANOPY AREA
EXISTING TREES (EA) ¹	4,625
ANNUAL RAINFALL TREE ²	0.251

¹ REFLECTS TOTAL NUMBER OF EXISTING TREES IN CITY OF EL CERRITO. FROM PG 27 OF EL CERRITO URBAN FOREST MANAGEMENT PLAN FOUND HERE: <http://co-elcerrito.civicplus.com/DocumentCenter/Home/View/893>

² ASSUMING 2 INCHES MAX PONDING AT TREE SURROUNDING

RUNOFF REDUCTION BY TREES PLANTED							
EXISTING CONDITION			PROPOSED TREE PLANTING BENEFIT				
AVG CANOPY AREA (sf)	TOTAL CANOPY AREA (sf)	ANNUAL RUNOFF DEPTH (ft)	TOTAL VOL RUNOFF (gal/yr)	5% CANOPY AREA (SF)	NO OF TREES PER 5% CANOPY AREA INC (EA)	VOL OF RUNOFF REDUCED PER 5% INC (gal/yr)	VOL OF RUNOFF REDUCED PER TREE PLANTED (gal/yr)
177	817,305	0.25	1,536,491	40,865	231	30,730	133

REFERENCE TABLES

BMP COST		
BMP	UNIT COST (\$)	UNIT
Forebay	50	SF
Hard Edge Bioretention (RG)	100	SF
Soft Edge Bioretention (RG)	35	SF
Porous Pavement	12	SF
Self-Treating Landscape	10	SF
Wetland	70	SF

INFORMATION OBTAINED FROM HUNTERS POINT MASTER PLAN COST/BENEFIT CRITERIA

POLLUTANT LOADING (lb/gal)											
	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
RESIDENTIAL	0.0008429	0.0000032	0.0000012	0.0000159		0.0000061	0.0000835	0.0006092	0.0000012	0.0000003	0.0000011
MIXED	0.0005591	0.0000022	0.0000005	0.0000107		0.0000047	0.0000651	0.0005425	0.0000010	0.0000002	0.0000013

BMP DATABASE SUMMARY - POLLUTANTS REMOVED BY BMP (%)													
LAND USE	LOCATION	BMP TYPE	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
-	-	Bioretention (RG)	77.9	18.2		36.2		15.4			32.7	54.9	75.2
-	-	Bioswale	37.3	34.0		13.9		16.7			48.6	39.4	36.7
-	-	Detention Basin / Forebay	63.8	21.4		outlier		34.5			49.0	46.5	57.6
-	-	Media Filter	83.5	50.0		40.6		outlier			83.9	46.3	76.8
-	-	Porous Pavement	79.8	40.0		51.8		outlier			56.7	39.8	74.0
-	-	Self-Treating Landscape ¹	100.0	100.0		100.0		100.0			100.0	100.0	100.0
-	-	Wetland Basin	55.6	38.5		outlier		66.7			40.4	36.4	54.2

¹ Self-Treating Areas do not allow run off during a water quality event; therefore removal efficiencies are 100%

BMP DATABASE SUMMARY - POLLUTANT INTAKE QUANTITY AT STUDIED LOCATIONS (lb/yr)													
LAND USE	LOCATION	BMP TYPE	TSS	TP	Soluble Phosphorus	TKN	Ammonia	Nitrate + Nitrite	BOD	COD	Lead	Copper	Zinc
Residential	1 - OHLONE	Forebay	3.15	0.012		0.059		0.023			0.004	0.001	0.004
Mixed	1- OHLONE	Bioretention (RG)	6.51	0.03		0.13		0.05			0.01	0.00	0.01
Mixed	4-CENTRAL PARK	Stream	15.34	0.06		0.29		0.13			0.03	0.01	0.04
Mixed	5-CREEKSIDE PARK	Wetland	4,721.3	19		91		39			8	2	11
Residential	11-LEXINGTON	Bioretention (RG)	83.00	0.31		1.56		0.60			0.12	0.03	0.11
Residential	11-KEARNEY	Bioretention (RG)	83.00	0.31		1.56		0.60			0.12	0.03	0.11
Residential	12-ASHBURY	Bioretention (RG)	99.27	0.38		1.87		0.72			0.14	0.03	0.13

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 TITLE BMP SIZING
 PREPARED CTANG, MFU

Appendix F

GENERAL

GENERAL ASSUMPTIONS		
VOLUME BASED CALCULATION	6.0%	Of impervious area
ADDITIONAL AREA FOR TRANSITION BUFFER	5.0%	Of BMP area
RG WITH TRANSITION BUFFER (ASSUME 1' EACH SIDE)	8.0	feet
RG WIDTH BOTTOM	2.0	feet
HRT	7.0	days
CF to Gal	7.48	
AC TO SF	43,560	

*Sediment Forebay Volume = 0.1 inches * impervious acreage*

FOREBAY ASSUMPTIONS		
TYPE	VALUE	COMMENTS
% IMPERVIOUS	60%	
.1 INCH	8.33E-03	
AC-FT TO CF	43560	

TREE ASSUMPTIONS		
TYPE	VALUE	COMMENTS
CANOPY SIZE	10	FT
TREE PIT	20.25	4.5'x4.5'
STORM WATER RUN-OFF	5% CANOPY = 2% RUNOFF RETAINED	

RAINGARDENS

RUNOFF - RAINGARDEN								
BMP TYPE	LOCATION	WATERSHED AREA (SF)	BMP AREA (SF)	BMP AREA W/ TRANSITION (SF)	REQUIRED LENGTH (LF)	ANNUAL RAIN DEPTH (FT)	ANNUAL RUNOFF TREATED (CF)	ANNUAL RUNOFF TREATED (GAL/YR)
RAINGARDEN	12 ASHBURY	20,534	1,232	1,294	216	0.77	15,744	117,774
RAINGARDEN (AREA/EA - THERE ARE 2 TOTAL)	11 FAIRMONT & LEXINGTON	8,584	515	541	90	0.77	6,582	49,234
RAINGARDEN (PER RG - THERE ARE 2 TOTAL)	11 FAIRMONT & KEARNEY	8,584	515	541	90	0.77	6,582	49,234
RAINGARDEN	1 OHLONE & GLADYS/BLAKE	33,852	2,031	2,133	355	0.77	25,956	194,161

WETLAND

RUNOFF - WETLAND								
BMP TYPE	LOCATION	AREA (SF)	DEPTH (LF)	VOLUME (CF)	HRT (D)	Q (CF/D)	ANNUAL RUNOFF TREATED (CF)	ANNUAL RUNOFF TREATED (GAL/YR)
WETLAND	5 CREEKSIDE PARK	7,216	3	21,648	7	3093	1,128,789	8,443,925

FOREBAY

RUNOFF - FOREBAY								
BMP TYPE	LOCATION	LENGTH (LF)	WIDTH (LF)	DEPTH (LF)	VOLUME (AC-FT)	WATERSHED AREA (SF)	ANNUAL RAINFALL (FT)	ANNUAL RUNOFF TREATED (GAL/YR)
FOREBAY	1 SCHMIDT	10	10	3	0.007	60,000	0.01	3,740
FOREBAY	4 CENTRAL PARK	100	11	2	0.051	440,000	0.01	27,429

*sized Forebay using the following criteria:

*Sediment Forebay Volume = 0.1 inches * impervious acreage*