

Quality of Life Funding Strategy  
San Diego River "Pilot" Watershed Cost Estimate - Full Structural Approach

**BUCKET #1 - Permit Required & Nonstructural BMPs**  
San Diego River "Pilot" Watershed - Full Structural Approach

Permit required programs only with costing based on typical existing Agency budgets.

MODIFIED FOR EACH WATERSHED	County of SD	City of SD	City of La Mesa	City of El Cajon	City of Santee	City of Poway*
Agency Size Class	Lrg	Lrg	Sm	Med	Med	Med
Agency Area in Watershed (acre)	207,281	46,796	3,032	9,282	10,577	587
Agency Developed Area (acre)	46,210	25,990	2,975	8,752	5,707	0
Agency Urban Area (acre)	41,540	25,990	2,975	8,752	5,706	0
Agency Agricultural Area (acre)	4,670	0	0	0	1	0

\* Poway is 100% undeveloped. Implementation costs for this agency were not included in this analysis.

Bucket #1 BMP (1)	Typ. Cost Sm (\$/Watershed)	Typ. Cost Med (\$/Watershed)	Typ. Cost Lrg (\$/Watershed)	Total Cost for Watershed	% of 1-year Total	Total Cost (Millions)
Watershed/Program Administration (2)	\$100,000	\$150,000	\$350,000	\$1,250,000	26.1%	\$1.25
Permit Fees (2)	\$4,667	\$6,000	\$8,571	\$39,810	0.8%	\$0.04
Outreach	\$10,000	\$60,000	\$300,000	\$790,000	16.5%	\$0.79
Permit/Compliance Monitoring	\$40,000	\$80,000	\$520,000	\$1,320,000	27.6%	\$1.32
Inspections / Enforcement	\$30,000	\$120,000	\$500,000	\$1,390,000	29.0%	\$1.39
<b>Watershed Total for ONE year of Program Implementation</b>				<b>\$4,789,810</b>	<b>100.0%</b>	<b>\$4.79</b>
Annual Program Growth (set to match standard inflation rate)				3.00%		3.00%

40-year Watershed Program = \$361,157,672 **\$361**

**Bucket #1 - Total Cost / Watershed Sq. Mi. (millions) = \$0.83**

Total Cost per Developed Sq. Mi. (millions) = \$2.58

Total Cost per Urban Sq. Mi. (millions) = \$2.72

Total Cost per Ag Sq. Mi. (millions) = \$49.49

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

(1) Program costs were scaled according to agency "size." Size was determined based on budget, area, and population per square mile. Small agencies had budgets of less than \$1M and jurisdiction over 10 square miles or fewer. Large agencies had budgets greater than or equal to \$30M and jurisdiction over more than 300 square miles. Medium were all agencies between small and large.

(2) Permit Fees are from agency budgets from the 2008/2009 JURMP annual reports, classified by agency size. Annual permit fees were divided by an assumed number of watersheds for the agency size to translate the values to a Watershed level. The typical permit fee for small agencies was divided by 1.5 watersheds; Medium agency fee by 2.5 watersheds; Large agency fee by 7 watersheds.

**BUCKET #2 - Structural BMPs**  
San Diego River "Pilot" Watershed - Full Structural Approach

Structural BMPs applied to treat 100% of the developed area in the watershed. This Bucket treats 100% of agricultural lands.

	Acres	Sq Miles	% Watershed
San Diego River Watershed	277,554	433.7	
TOTAL DEVELOPED AREA	89,633	140.1	32.29%
Urban Area	84,963	132.8	30.61%
Agriculture Area	4,670	7.3	1.68%

Bucket #2 BMP	Tributary Area (Acres)	Typ. 40-yr Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Permit Compliance Street Sweeping and Catchment Cleaning (1)	No Treatment Credit.	Variable by Agency Size	Annual	-	-	\$108
Aggressive Street Sweeping	1% watershed	Variable by Agency Size	Annual	850	1.0%	\$188
Aggressive Catchment Cleaning	1% watershed	Variable by Agency Size	Annual	850	1.0%	\$127
River / Creek / Beach Clean Ups	0.5% watershed	Variable by Agency Size	Annual	425	0.5%	\$7
Rain Barrels - Filtration	0.15	\$28,953	2,000	300	0.3%	\$58
Rain Barrels - Water Harvesting	0.05	\$25,280	2,000	100	0.1%	\$51
Large Harvesting Project (or similar)	10.0	\$1,807,767	230	2,300	2.6%	\$416
Rain Barrels - Cistern with Sedimentation	1.0	\$19,141	3,000	3,000	3.4%	\$57
Annual Hydroseeding / Mulching	1.0	\$159,020	200	200	0.2%	\$32
Low Flow Irrigation (Drip line or similar)	1.0	\$12,139	1,000	1,000	1.1%	\$12
Annual Silt Fence	1.0	\$85,000	200	200	0.2%	\$17
Erosion / Agriculture Type 1: Integrated solutions	3.0	\$81,881	100	300	0.3%	\$8
Erosion/Agriculture Type 2: Structural Controls	1.5	\$160,000	500	750	0.8%	\$80
Green Roof	0.10	\$304,483	40	4	0.0%	\$12
Green Mall	3.0	\$414,869	2,100	6,300	7.1%	\$871
Pervious Concrete - Infiltration	0.5	\$105,231	600	318	0.4%	\$63
Bioretention System (2)	0.90	\$228,883	4,200	3,780	4.3%	\$961
Green Lot (singular)	2.0	\$437,484	2,500	5,000	5.6%	\$1,094
Pervious Concrete - Filtration	1.0	\$354,810	3,000	3,000	3.4%	\$1,064
Permeable AC - Filtration	1.5	\$121,457	2,200	3,300	3.7%	\$267
Medium Infiltration Basin (3)	5.0	\$739,400	400	2,000	2.3%	\$296
Extended Dry Pond (3)	18.8	\$1,253,579	260	4,892	5.5%	\$326
Integrated Community BMPs (GreenStreet and outfall retrofits in mesa above canyons, Parks, etc)	38.0	\$1,541,162	300	11,400	12.9%	\$462
Treatment Train (single neighborhood)	3.5	\$346,547	2,200	7,700	8.7%	\$762
<b>Subtotal</b>				<b>57,968</b>	<b>65.4%</b>	<b>\$7,339</b>

Watershed Total = 57,968 **\$7,339**

Urban Area Treated = 52,518 59.2%

Agricultural Area Treated = 5,450 6.1%

**Bucket #2 - Total Cost per Watershed Sq. Mi. (millions) = \$16.9**

Total Cost per Developed Sq. Mi. (millions) = \$52.4

Total Cost per Urban Sq. Mi. (millions) = \$55.3

Total Cost per Ag Sq. Mi. (millions) = \$1,005.7

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

Typical Cost per Acre for Land = \$2,600,000

(1) Small jurisdictions: \$200 K / 1.5 watersheds (\$150K street sweeping + \$50K catchment cleaning). Medium jurisdictions: \$800K / 2.5 watersheds (\$600K + \$200K)

Large jurisdictions: \$4.0M / 7 watersheds.

(2) Need to acquire land for 80% of BMPs (footprint=0.05 ac).

(3) Need to acquire land for 90% of BMPs (footprint=0.02 ac/1 ac tributary)

**BUCKET #3 - Restoration & Treatment BMPs**

**San Diego River "Pilot" Watershed - Full Structural Approach**

Structural BMPs applied to treat 100% of the developed are in the watershed. No restoration projects have been included.

Bucket #3 BMP	Tributary Area (Acres)	Typ. Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Dry Weather/Low Storm Flow Creek Diversion with Wetland/Basin	1,500	\$6,000,000	8	12,000	13.5%	\$48
Large Integrated Sustainable Canyon/Restoration Project	93	\$30,254,994	40	3,720	4.2%	\$1,210
Large Scale Multi-Drainage Area/Multiple Neighborhood Treatment Train (with Stormwater Reuse) (1)	300	\$19,279,294	50	15,000	16.9%	\$964
<b>Total</b>				<b>30,720</b>	<b>34.6%</b>	<b>\$2,222</b>
<b>WMA Total =</b>				<b>30,720</b>	<b>34.6%</b>	<b>\$2,222</b>

**Bucket #3 - Total Cost per Watershed Sq. Mi. (millions) = \$5.12**

Total Cost per Developed Sq. Mi. (millions) = \$15.87

Total Cost per Urban Sq. Mi. (millions) = \$16.74

Total Cost per Ag Sq. Mi. (millions) = \$304.51

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL	
RUNOFF REDUCTION	
AGRICULTURE/ EROSION CONTROL	
LOW IMPACT DEVELOPMENT	
TREATMENT	

CALCULATION FOOTNOTES:

(1) Land acquisition assumptions used for Bucket #2. (i.e. Need to acquire land for 25% of BMPs with a footprint~0.05 ac/1 ac tributary).

**San Diego River "Pilot" Watershed - Full Structural Approach**

<b>Bucket #1 Total Watershed Cost (millions) =</b>	<b>\$361.16</b>	89,633	Acres of Developed Land in Watershed
<b>Bucket #2 Total Watershed Cost (millions) =</b>	<b>\$7,339.4</b>	88,688	Acres Treated by STRUCTURAL BMPs
<b>Bucket #3 Total Watershed Cost (millions) =</b>	<b>\$2,222.16</b>		

**40-YR TOTAL WATERSHED COST (millions) = \$9,923**

\$22.88 Millions / Watershed sq mile  
 \$70.85 Millions / Developed sq mile

Quality of Life Funding Strategy  
San Diego River "Pilot" Watershed Cost Estimate - Integrated Approach

**BUCKET #1 - Permit Required & Nonstructural BMPs**  
San Diego River "Pilot" Watershed - Integrated Approach

Permit required programs, plus enhanced non-structural solutions and special studies. Enhanced non-structural programs reduces the total acreage to be treated with structural BMPs.

MODIFY FOR EACH WATERSHED	County of SD	City of SD	City of La Mesa	City of El Cajon	City of Santee	City of Poway*	
Agency Size Class	Urg	Urg	Sm	Med	Med	Med	
Agency Area in Watershed (acre)	207,354	46,774	3,027	9,243	10,575	581	Total Acres to be Treated
Agency Developed Area (acre)	46,210	25,990	2,975	8,752	5,707	0	40,335
Agency Urban Area (acre)	41,540	25,990	2,975	8,752	5,706	0	38,233
Agency Agricultural Area (acre)	4,670	0	0	0	1	0	2,102
							94.79%
							5.21%

\* Poway is 100% undeveloped. Implementation costs for this agency were not included in this analysis.

Bucket #1 BMP (1)	Typ. Cost Sm (\$/Watershed)	Typ. Cost Med (\$/Watershed)	Typ. Cost Lrg (\$/Watershed)	Total Cost for Watershed	% of 1-year Total	Total Cost (Millions)
Watershed/Program Administration (2)	\$100,000	\$150,000	\$350,000	\$1,100,000	5.2%	\$1.10
Permit Fees (2)	\$4,667	\$6,000	\$8,771	\$33,810	0.2%	\$0.03
Outreach	\$10,000	\$60,000	\$300,000	\$730,000	3.4%	\$0.73
Permit/Compliance Monitoring	\$40,000	\$80,000	\$520,000	\$1,240,000	5.8%	\$1.24
Inspections / Enforcement	\$30,000	\$120,000	\$500,000	\$1,270,000	6.0%	\$1.27
Code Modification/Legislation	\$50,000	\$100,000	\$350,000	\$950,000	4.5%	\$0.95
Master Planning (pre TMDL) (3)	\$100,000	\$500,000	\$750,000	\$2,600,000	12.2%	\$2.60
Agriculture Education & BMP Cost Sharing Program (4)	-	-	\$39,678	\$39,678	0.2%	\$0.04
Targeted Outreach/CBSM	\$20,000	\$120,000	\$800,000	\$1,860,000	8.7%	\$1.86
Special Studies (5)	\$25,000	\$75,000	\$1,500,000	\$3,175,000	14.9%	\$3.18
Targeted Enforcement	\$45,000	\$180,000	\$800,000	\$2,005,000	9.4%	\$2.01
BMP Assessment Studies (6)	-	-	-	\$1,927,477	9.1%	\$1.93
Non-Structural Source Controls	\$300,000	\$700,000	\$1,330,000	\$4,360,000	20.5%	\$4.36
<b>Watershed Total for ONE year of Program Implementation</b>				<b>\$21,290,964</b>	<b>100.0%</b>	<b>\$21.29</b>
Annual Program Growth (set at 1.5 times the standard inflation rate)				4.50%		4.50%
				<b>Total 40-year Watershed Program = \$1,431,213,984</b>		<b>\$1,431</b>

**Bucket #1 - Total Cost / Watershed Sq. Mi. (millions) = \$3.30**

Total Cost per Developed Sq. Mi. (millions) = \$10.22  
Total Cost per Urban Sq. Mi. (millions) = \$10.78  
Total Cost per Ag Sq. Mi. (millions) = \$196.12

**COLOR CODING FOR TARGETED SOURCE**  
SOURCE CONTROL  
RUNOFF REDUCTION  
AGRICULTURE/ EROSION CONTROL  
LOW IMPACT DEVELOPMENT  
TREATMENT

**CALCULATION FOOTNOTES:**  
(1) Program costs were scaled according to agency "size." Size was determined based on budget, area, and population per square mile. Small agencies had budgets of less than \$3M and jurisdiction over 10 square miles or fewer. Large agencies had budgets greater than or equal to \$30M and jurisdiction over more than 300 square miles. Medium were all agencies between small and large.  
(2) Permit Fees are from agency budgets from the 2008/2009 JURMP annual reports, classified by agency size. Annual permit fees were divided by an assumed number of watersheds for the agency size to translate the values to a Watershed level. The typical permit fee for small agencies was divided by 1.5 watersheds; Medium agency fee by 2.5 watersheds; Large agency fee by 7 watersheds.  
(3) Assumes this cost is applied to two (2) of the 40-year program (i.e. 10% of overall timeline).  
(4) Assumes a single program has been administered by the County. Given the limited agricultural land in this watershed, no additional regional funding as assumed.  
(5) Assumes special studies will only be necessary for 10 years of the 40-year program.  
(6) Equal to 25% of total cost of implementing one pilot project of major Structural BMPs listed in Buckets #2. The cost of BMP Assessment Studies is only applicable to initial pilot studies. This cost was only applied for the first year of the 40-year program.

**BUCKET #2 - Structural BMPs**  
San Diego River "Pilot" Watershed - Integrated Approach

Structural BMPs applied to treat 45% of the developed area in the watershed. Additional Bucket 2 BMPs have been implemented in favor of regional structural BMPs from Bucket 3.

	Acres	Sq Miles	% Watershed	Acres To Be Treated	Sq Miles To Be Treated
San Diego River Watershed	277,554	433.7	-	-	-
TOTAL DEVELOPED AREA	89,633	140.1	32.29%	40,335	63.0
Urban Area	84,963	132.8	30.61%	38,233	59.7
Agriculture Area	4,670	7.3	1.68%	2,102	3.3

Bucket #2 BMP	Assumed Tributary Area (Acres)	Assumed Cost (\$)	Assumed \$/Acre/40yrs	Actual Project, Cost Validation	Final Tributary Area (Acres)	Final Cost (\$)	Final \$/Acre/40yrs	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Permit Compliance Street Sweeping and Catchment Cleaning (1)	No Treatment Credit.	-	-	-	No Treatment Credit.	Variable by Agency Size	-	Annual	-	-	\$108
Aggressive Street Sweeping	2% watershed	\$2.5M / yr	-	-	2% watershed	Sm: \$250K/yr Med: \$500K/yr Lrg: \$2.5M/yr	-	Annual	765	1.9%	\$250
Aggressive Catchment Cleaning	2% watershed	\$2.0M / yr	-	-	2% watershed	Sm: \$200K/yr Med: \$100K/yr Lrg: \$2.0M/yr	-	Annual	765	1.9%	\$169
River / Creek / Beach Clean Ups	1% watershed	\$100 K / yr	-	-	1% watershed	Sm: \$15K/yr Med: \$75K/yr Lrg: \$100K/yr	-	Annual	382	0.9%	\$15
Rain Barrels - Filtration	0.11	\$21,132	\$184,102	\$19.6K - \$22.7K/ building / yr	0.15	\$28,953	\$193,020	900	135	0.3%	\$26
Rain Barrels - Water Harvesting (2)	0.11	\$18,660	\$162,566	\$3,600 - \$4,500/ system / yr	0.05	\$25,280	\$505,600	500	25	0.1%	\$13
Large Harvesting Project (or similar)	10.0	\$2,000,000	\$200,000	\$2,000 - \$10,000/ system	10.0	\$1,807,267	\$180,727	100	1,000	2.5%	\$181
Rain Barrels - Cistern with Sedimentation	1.0	\$25,000	\$25,000	\$2,000 - \$10,000/ system	1.0	\$19,141	\$19,141	860	860	2.1%	\$16
Annual Hydroseeding / Mulching	1.0	\$100,000	\$100,000	\$2,000 - \$6,000	1.0	\$159,020	\$159,020	80	80	0.2%	\$13
Low Flow Irrigation (Drip line or similar)	1.0	\$25,000	\$25,000	\$820 - \$3,200	1.0	\$12,139	\$12,139	600	600	1.5%	\$7
Annual Silt Fence	1.0	\$75,000	\$75,000	-	1.0	\$85,000	\$85,000	80	80	0.2%	\$7
Erosion / Agriculture Type 1: Integrated solutions	2.0	\$100,000	\$50,000	\$3,841/ 3 - 5 ac/yr	3.0	\$81,881	\$27,294	60	180	0.4%	\$5
Erosion/Agriculture Type 2: Structural Controls	3.0	\$500,000	\$166,667	\$149K / 1.3 acres	1.5	\$160,000	\$106,667	200	300	0.7%	\$32
Green Roof (3)	0.07	\$105,900	\$1,537,668	\$327K - \$481K/ 0.11 ac	0.10	\$304,483	\$3,044,833	20	2	0.0%	\$6
Green Mall	0.6	\$186,278	\$315,725	\$116K/ 0.6ac - \$200K / 1.7ac	3.0	\$414,869	\$138,290	800	2,400	5.9%	\$332
Previous Concrete - Infiltration	0.53	\$105,231	\$198,256	-	0.53	\$105,231	\$198,256	100	53	0.1%	\$11
Bioretentation System (4)	0.75	\$100,687	\$134,249	-	0.90	\$228,883	\$254,315	1,600	1,440	3.6%	\$366
Green Lot (singular)	2.0	\$437,484	\$218,742	\$283,656	2.0	\$437,484	\$218,742	1,200	2,400	5.9%	\$525
Previous Concrete - Filtration	1.5	\$157,674	\$105,116	\$123K/ 0.3ac - \$566K / 2.0ac	1.0	\$354,810	\$354,810	400	400	1.0%	\$142
Permeable AC - Filtration	1.5	\$121,457	\$80,972	-	1.5	\$121,457	\$80,972	400	600	1.5%	\$49
Medium Infiltration Basin (5)	5.5	\$448,200	\$81,491	\$171K / 5.5 ac - \$800K / 1.4 ac, not incl. land	5.0	\$739,400	\$147,880	120	600	1.5%	\$89
Extended Dry Pond (3)	18.8	\$1,253,579	\$66,626	-	18.8	\$1,253,579	\$66,626	100	1,882	4.7%	\$125
Integrated Community BMPs (GreenStreet and outfall retrofits in mesa above canyons, Parks, etc)	38.0	\$1,541,162	\$40,557	\$1,481,162	38.0	\$1,541,162	\$40,557	200	7,600	18.8%	\$308
Treatment Train (single neighborhood)	5.0	\$211,419	\$42,284	\$181K/ 5ac - \$488/0.9ac	3.5	\$346,547	\$99,013	1,000	3,500	8.7%	\$347
Subtotal									<b>26,048</b>	<b>64.5%</b>	<b>\$3,140</b>

**Watershed Total = 26,048**  
**Urban Area Treated = 23,948**  
**Agricultural Area Treated = 2,100**

**Bucket #2 - Total Cost per Watershed Square Mile (millions) = \$7.2**

Total Cost per Developed Sq. Mi. (millions) = \$22.42  
Total Cost per Urban Sq. Mi. (millions) = \$23.65  
Total Cost per Ag Sq. Mi. (millions) = \$430.24

**COLOR CODING FOR TARGETED SOURCE**  
SOURCE CONTROL  
RUNOFF REDUCTION  
AGRICULTURE/ EROSION CONTROL  
LOW IMPACT DEVELOPMENT  
TREATMENT

**CALCULATION FOOTNOTES:**  
Typical Cost per Acre for Land = \$2,600,000  
(1) Small jurisdictions: \$200 K / 1.5 watersheds (\$150K street sweeping + \$50K catchment cleaning). Medium jurisdictions: \$800K / 2.5 watersheds (\$600K + \$200K). Large jurisdictions: \$4.0M / 7 watersheds.  
(2) Final cost assumes eight Rain Barrel systems placed at 4 downspouts around a building.  
(3) Project and final costs assume a 10,000 square foot roof area.  
(4) Need to acquire land for 80% of BMPs (footprint=0.05 ac).  
(5) Need to acquire land for 90% of BMPs (footprint=0.02 ac/1 ac tributary)



Quality of Life Funding Strategy

Pueblo Watershed Cost Estimate - Scaled from the "Pilot" Watershed Adaptive Management Cost Estimate

BUCKET #1 - Permit Required & Nonstructural BMPs

Pueblo Watershed - Scaled Cost

Permit required programs, plus enhanced non-structural solutions and special studies. Doubled the amount of urban outreach and enforcement activities to accommodate for the increased urbanized areas.

MODIFY FOR EACH WATERSHED	County of SD	City of SD	City of Lemon Grove	City of La Mesa	National City	
Agency Size Class	Lrg	Lrg	Sml	Sml	Sml	
Agency Area in Watershed (acre)	121	30,118	2,119	1,687	3,475	Total Acres to be Treated
Agency Developed Area (acre)	113	26,913	2,060	1,604	3,301	15,236
Agency Urban Area (acre)	113	26,898	2,060	1,604	3,301	15,289
Agency Agricultural Area (acre)	0	14	0	0	0	7

Bucket #1 BMP (1)	Typ. Cost Sml (\$/Watershed)	Typ. Cost Med (\$/Watershed)	Typ. Cost Lrg (\$/Watershed)	Total Cost for Watershed	% of 1-year Total	Total Cost (Millions)
Watershed/Program Administration	\$33,333	\$50,000	\$116,667	\$333,333	4.2%	\$0.33
Permit Fees	\$1,556	\$2,000	\$2,857	\$10,381	0.1%	\$0.01
Outreach	\$3,333	\$20,000	\$100,000	\$210,000	2.6%	\$0.21
Permit/Compliance Monitoring	\$13,333	\$26,667	\$173,333	\$386,667	4.9%	\$0.39
Inspections / Enforcement	\$10,000	\$40,000	\$166,667	\$363,333	4.6%	\$0.36
Code Modification/Legislation (2)	\$16,667	\$33,333	\$116,667	\$425,000	5.4%	\$0.43
Master Planning (pre TMDL) (3)	\$33,333	\$166,667	\$250,000	\$600,000	7.6%	\$0.60
Agriculture Education & BMP Cost Sharing Program (4)	-	-	\$41,601	\$41,601	0.5%	\$0.04
Targeted Outreach/CBSM (2)	\$6,667	\$40,000	\$266,667	\$830,000	10.5%	\$0.83
Special Studies (5)	\$8,333	\$25,000	\$500,000	\$1,025,000	12.9%	\$1.03
Targeted Enforcement (2)	\$15,000	\$60,000	\$266,667	\$867,500	10.9%	\$0.87
BMP Assessment Studies (6)	-	-	-	\$1,063,979	13.4%	\$1.06
Non-Structural Source Controls (2)	\$100,000	\$333,333	\$443,333	\$1,780,000	22.4%	\$1.78
Watershed Total for ONE year of Program Implementation				\$7,936,694	100.0%	\$7.94
Annual Program Growth (set at 1.5 times the standard inflation rate)				4.50%		4.50%
40-year Watershed Program =				\$550,228,257		\$550

**Bucket #1 - Total Cost / Watershed Sq. Mi. (millions) = \$9.41**  
 Total Cost per Developed Sq. Mi. (millions) = \$10.38  
 Total Cost per Urban Sq. Mi. (millions) = \$10.39  
 Total Cost per Ag Sq. Mi. (millions) = \$23,815

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

- Watershed costs were scaled from the Pilot Watershed values based on developed area. The Pueblo Watershed is approximately a third of the area of the San Diego River "Pilot" Watershed. The typical cost values for each agency size was multiplied by 1/3.
- Due to increased urban areas relative to the pilot watershed, this annual watershed cost was multiplied by 1.5. (i.e. The relative importance of this activity increased.)
- Assumes this cost is applied to two (2) of the 40-year program (i.e. 10% of overall timeline).
- While agricultural land uses are limited in the Pueblo Watershed, agriculture across the Class represented approximately 10% of the Regional total land area. This program was included for scaling to other watersheds in the Pueblo Class.
- Assumes special studies will only be necessary for 10 years of the 40-year program.
- Equal to 25% of total cost of implementing one pilot project of major Structural BMPs listed in Buckets #2. The cost of BMP Assessment Studies is only applicable to initial pilot studies. This cost was only applied for the first year of the 40-year program.

BUCKET #2 - Structural BMPs

Pueblo Watershed - Scaled Cost

Structural BMPs applied to treat 45% of the developed area in the watershed. Additional Bucket 2 BMPs have been implemented (significantly favoring urban BMPs).

	Total Acres	Total Sq Miles	% Watershed	Acres To Be Treated	Sq Miles To Be Treated
Pueblo Watershed	37,438	58.5	-	-	-
TOTAL DEVELOPED AREA	39,913	53.0	90.58%	15,261	24
Urban Area	33,899	53.0	90.55%	15,254	24
Agriculture Area	15	2.3E-02	0.04%	7	0

Bucket #2 BMP	Additional Cost Valuations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Permit Compliance Street Sweeping and Catchment Cleaning (1)	-	No Treatment Credit.	Variable by Agency Size	Annual	-	-	\$54
Aggressive Street Sweeping	-	3.5% watershed	Sml: \$250K/yr Med: \$500K/yr Lrg: \$2.5M/yr	Annual	534	3.5%	\$500
Aggressive Catchment Cleaning (2)	-	2% watershed	Sml: \$20K/yr Med: \$100K/yr Lrg: \$2.0M/yr	Annual	305	2.0%	\$338
River / Creek / Beach Clean Ups (2)	-	1% watershed	Sml: \$15K/yr Med: \$75K/yr Lrg: \$100K/yr	Annual	153	1.0%	\$29
Rain Barrels - Filtration	-	0.15	\$28,953	600	90	0.6%	\$17
Rain Barrels - Water Harvesting	-	0.05	\$25,280	100	5	0.0%	\$3
Large Harvesting Project (or similar)	-	10.0	\$1,807,167	40	40	2.6%	\$73
Rain Barrels - Cistern with Sedimentation	-	1.0	\$19,141	40	40	0.3%	\$1
Annual Hydroseeding / Mulching	-	1.0	\$159,020	0	0	0.0%	\$0
Low Flow Irrigation (Drip line or similar)	-	1.0	\$12,139	200	200	1.3%	\$2
Annual Silt Fence	-	1.0	\$85,000	0	0	0.0%	\$0
Erosion / Agriculture Type 1: Integrated solutions	-	3.0	\$81,881	0	0	0.0%	\$0
Erosion/Agriculture Type 2: Structural Controls	-	1.5	\$160,000	80	120	0.8%	\$13
Green Roof	-	0.10	\$304,483	40	4	0.0%	\$12
Green Mail	-	3.0	\$414,869	400	1,200	7.9%	\$166
Pervious Concrete - Infiltration	-	0.5	\$105,231	20	11	0.1%	\$2
Bioretention System (3)	-	0.90	\$228,883	500	450	2.9%	\$114
Green Lot (similar)	-	2.0	\$457,484	520	1,040	6.8%	\$227
Pervious Concrete - Filtration	-	1.0	\$354,810	120	120	0.8%	\$43
Permeable AC - Filtration	-	1.5	\$121,457	140	210	1.4%	\$17
Medium Infiltration Basin (3)	-	7.0	\$1,429,767	8	56	0.4%	\$11
Extended Dry Pond (3) (4)	-	18.8	\$1,253,579	8	151	1.0%	\$10
Integrated Community BMPs (GreenStreet and outfall retrofits in mesa above canyons, Parks, etc)	-	38.0	\$1,541,162	100	3,800	24.9%	\$154
Treatment Train (single neighborhood)	-	3.5	\$346,547	300	1,050	6.9%	\$104
Subtotal					9,938	65.1%	\$1,890

Watershed Total = 9,938  
 Urban Area Treated = 9,578  
 Agricultural Area Treated = 360  
**Bucket #2 - Total Cost per Watershed Square Mile (millions) = \$32.31**  
 Total Cost per Developed Sq. Mi. (millions) = \$35.67  
 Total Cost per Urban Sq. Mi. (millions) = \$35.68  
 Total Cost per Ag Sq. Mi. (millions) = \$81,806

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

- Typical Cost per Acre for Land = \$2,600,000
- Based on urban land area relative to the pilot watershed, this cost and area treated was reduced 50%.
- Given that trash has been identified as a priority pollutant of concern in the Chollas Creek Dissolved Metals TMDL Implementation Plan (2009), the effort to manage trash (i.e. cost) was doubled, but the credited treatment area for catchment cleaning and clean-up projects remained constant.
- Cost includes land acquisition.
- Infiltration type BMPs are more costly in highly urbanized area where land area is typically limited to existing grassy areas (i.e. recreation parks). Based on project values for the Chollas Creek Subwatershed, this cost was increased. The final cost per acre increased approximately 40% relative to the original pilot watershed.

**BUCKET #3 - Restoration & Treatment BMPs**  
**Pueblo Watershed - Scaled Cost**

Structural BMPs applied to treat 45% of the developed area in the watershed. Fewer regional structural BMPs in favor of restoration and Bucket 2 structural BMPs.

Municipalities	Length River (ft)	Length Channelized (ft)	% River Length Channelized	Notes
County of SD	823	299	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
City of SD	101,471	36,877	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
City of Lemon Grove	2,012	731	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
City of La Mesa	0	-	-	-
National City	3,757	1,365	36.34%	Applied the % channelized for the City of
<b>Major Tributaries in Pueblo Watershed</b>	<b>108,063</b>	<b>39,273</b>	<b>-</b>	<b>-</b>

Bucket #3 BMP	Additional Cost Validations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Channel Restoration (1) (2)	-	0.16	\$1,524	3,927	628	4.1%	\$6
Habitat / Wetlands Restoration (1) (3)	-	1	\$17,016	700	700	4.6%	\$45
Dry Weather/Low Storm Flow Creek Diversion with Wetland/Basin	-	1,500	\$6,000,000	0.45	675	4.4%	\$3
Large Integrated Sustainable Canyon/Restoration Project	-	93	\$30,254,994	10	930	6.1%	\$303
Large Scale Multi-Drainage Area/Multiple Neighborhood Treatment Train (with Stormwater Reuse) (3)	-	300	\$19,279,294	8	2,400	15.7%	\$154
<b>Subtotal</b>					<b>5,333</b>	<b>34.9%</b>	<b>\$510</b>

**Watershed Total = 5,333**

**Area Restored = 1,328**

**COLOR CODING FOR TARGETED SOURCE**

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

**Bucket #3 -Total Cost per Watershed Square Mile (millions) = \$8.72**

Total Cost per Developed Sq. Mi. (millions) = \$9.63

Total Cost per Urban Sq. Mi. (millions) = \$9.63

Total Cost per Ag Sq. Mi. (millions) = \$22,080

**CALCULATION FOOTNOTES:**

(1) While restoration improves water quality for areas beyond the restored area, this pollutant load reduction is conservatively set to equal to the restored area.

(2) Cost in terms of linear foot of channel, stream, or wetland. The quantity restored is equal to 10% of the total modified length.

(3) Cost includes land acquisition.

**Pueblo Watershed - Scaled Cost**

<b>Bucket #1 Total Watershed Cost (millions) = \$550.23</b>				
<b>Bucket #2 Total Watershed Cost (millions) = \$1,890.1</b>			Total Area Developed = 33,913	square miles 53.0
<b>Bucket #3 Total Watershed Cost (millions) = \$510.14</b>			45% of Developed Area = 15,261	23.8
<b>40-YR TOTAL WATERSHED COST (millions) = \$2,950</b>			Total Area Treated = 15,271	23.9
	\$50.44	Millions / Watershed sq mile	STRUCTURAL BMPs = 13,943	21.8
	\$55.68	Millions / Developed sq mile	RESTORATION = 1,328	2.1

Quality of Life Funding Strategy

San Luis Rey Watershed Cost Estimate - Scaled from the "Pilot" Watershed Adaptive Management Cost Estimate

BUCKET #1 - Permit Required & Nonstructural BMPs

San Luis Rey Watershed - Scaled Cost

Permit required programs, plus enhanced non-structural solutions and special studies. Enhanced agricultural program relative to the pilot watershed.

MODIFY FOR EACH WATERSHED	County of SD	City of Vista	City of Oceanside	City of Escondido*	
Agency Size Class	Lrg	Med	Med	Med	
Agency Area in Watershed (acre)	341,774	745	16,024	51	Total Acres to be Treated
Agency Developed Area (acre)	121,155	493	12,323	0	60,287
Agency Urban Area (acre)	74,525	477	9,102	0	37,847
Agency Agricultural Area (acre)	46,635	15	3,221	0	22,442

\* Escondido is 100% undeveloped. Implementation costs for this agency were not included in this analysis.

Bucket #1 BMP (1)	Typ. Cost Sm (\$/Watershed)	Typ. Cost Med (\$/Watershed)	Typ. Cost Lrg (\$/Watershed)	Total Cost for Watershed (6)	% of 1-year Total	Total Cost (Millions)
Watershed/Program Administration	\$150,000	\$225,000	\$525,000	\$975,000	5.3%	\$0.98
Permit Fees	\$7,000	\$9,000	\$12,857	\$30,857	0.2%	\$0.03
Outreach	\$15,000	\$90,000	\$450,000	\$630,000	3.4%	\$0.63
Permit/Compliance Monitoring	\$60,000	\$120,000	\$780,000	\$1,020,000	5.6%	\$1.02
Inspections / Enforcement	\$45,000	\$180,000	\$750,000	\$1,110,000	6.1%	\$1.11
Code Modification/Legislation	\$75,000	\$150,000	\$525,000	\$825,000	4.5%	\$0.83
Master Planning (pre TMDL) (2)	\$150,000	\$750,000	\$1,125,000	\$2,625,000	14.3%	\$2.63
Agriculture Education & BMP Cost Sharing Program (3)	-	-	\$233,189	\$466,378	2.5%	\$0.47
Targeted Outreach/CBSM	\$30,000	\$180,000	\$1,200,000	\$1,560,000	8.5%	\$1.56
Special Studies (4)	\$37,500	\$112,500	\$2,250,000	\$2,475,000	13.5%	\$2.48
Targeted Enforcement	\$67,500	\$270,000	\$1,200,000	\$1,740,000	9.5%	\$1.74
BMP Assessment Studies (5)	\$45,000	\$180,000	\$750,000	\$1,020,000	5.6%	\$1.02
Non-Structural Source Controls	\$450,000	\$1,050,000	\$1,995,000	\$4,095,000	22.3%	\$4.10
<b>Watershed Total for ONE year of Program Implementation</b>				<b>\$18,323,633</b>	<b>100.0%</b>	<b>\$18.32</b>
Annual Program Growth (set at 1.5 times the standard inflation rate)				4.50%		4.50%
				<b>40-year Watershed Program = \$1,306,682,478</b>		<b>\$1.307</b>

**Bucket #1 - Total Cost / Watershed Sq. Mi. (millions) = \$2.33**

**Total Cost per Developed Sq. Mi. (millions) = \$6.24**  
**Total Cost per Urban Sq. Mi. (millions) = \$9.94**  
**Total Cost per Ag Sq. Mi. (millions) = \$16.77**

**COLOR CODING FOR TARGETED SOURCE**  
 SOURCE CONTROL  
 RUNOFF REDUCTION  
 AGRICULTURE/ EROSION CONTROL  
 LOW IMPACT DEVELOPMENT  
 TREATMENT

**CALCULATION FOOTNOTES:**  
 (1) Watershed costs were scaled from the Pilot Watershed values based on developed area. The San Luis Rey Watershed is approximately a 1.5 time larger than the San Diego River "Pilot" Watershed. Therefore, the typical cost values for each agency size were multiplied by 1.5.  
 (2) Assumes this cost is applied to two (2) of the 40-year program (i.e. 10% of overall timeline).  
 (3) Assumes a single program has been administered by the County (watershed specific value). Assumes the budget was doubled due to regional contributions from the Cities of Vista and Oceanside.  
 (4) Assumes special studies will only be necessary for 10 years of the 40-year program.  
 (5) Equal to 25% of total cost of implementing one pilot project of major Structural BMPs listed in Buckets #2. The cost of BMP Assessment Studies is only applicable to initial pilot studies. This cost was only applied for the first year of the 40-year program.

BUCKET #2 - Structural BMPs

San Luis Rey Watershed - Scaled Cost

Structural BMPs applied to treat 45% of the developed area in the watershed. Additional Bucket 2 BMPs have been implemented (favoring agricultural BMPs).

	Total Acres	Total Sq Miles	% Watershed	Acres To Be Treated	Sq Miles To Be Treated
San Luis Rey Watershed	358,599	560.3	-	-	-
TOTAL DEVELOPED AREA	133,976	209.3	37.36%	60,289	94
Urban Area	84,104	131.4	23.45%	37,847	59
Agriculture Area	49,872	77.9	13.91%	22,442	35

Bucket #2 BMP	Additional Cost Validations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Permit Compliance Street Sweeping and Catchment Cleaning	-	No Treatment Credit	Variable by Agency Size	Annual	-	-	\$108
Aggressive Street Sweeping (1)	-	1% watershed	Sm: \$250K/yr Med: \$500K/yr Lrg: \$2.5M/yr	Annual	378	0.6%	\$125
Aggressive Catchment Cleaning (1)	-	1% watershed	Sm: \$20K/yr Med: \$100K/yr Lrg: \$2.0M/yr	Annual	378	0.6%	\$84
River / Creek / Beach Clean Ups (1)	-	0.5% watershed	Sm: \$15K/yr Med: \$75K/yr Lrg: \$100K/yr	Annual	189	0.3%	\$7
Rain Barrels - Filtration	-	0.15	\$28,953	600	90	0.1%	\$17
Rain Barrels - Water Harvesting	-	0.05	\$25,280	400	20	0.0%	\$10
Large Harvesting Project (or similar)	-	10.0	\$1,807,767	100	1,000	1.7%	\$181
Rain Barrels - Cistern with Sedimentation	-	1.0	\$19,141	8,000	8,000	13.3%	\$153
Annual Hydroseeding / Mulching	-	1.0	\$159,000	600	600	1.0%	\$95
Low Flow Irrigation (Drip line or similar)	-	1.0	\$12,139	7,000	7,000	11.6%	\$85
Annual Silt Fence	-	1.0	\$85,000	1,000	1,000	1.7%	\$85
Erosion / Agriculture Type 1: Integrated solutions	-	3.0	\$81,881	700	2,100	3.5%	\$57
Erosion/Agriculture Type 2: Structural Controls	-	1.5	\$160,000	2,800	4,200	7.0%	\$448
Green Roof	-	0.10	\$304,483	10	1	0.0%	\$3
Green Mall	-	3.0	\$414,869	250	750	1.2%	\$104
Permeable Concrete - Infiltration	-	0.5	\$105,231	0	0	0.0%	\$0
Bioretention System (1)	-	0.90	\$228,883	2,250	2,025	3.4%	\$515
Green Lot (similar)	-	2.0	\$437,484	400	800	1.3%	\$175
Permeable Concrete - Filtration	-	1.0	\$354,810	150	150	0.2%	\$53
Permeable AC - Filtration	-	1.5	\$121,457	200	300	0.5%	\$24
Medium Infiltration Basin (1)	-	5.0	\$739,400	640	3,200	5.3%	\$473
Extended Dry Pond (1)	-	18.8	\$1,253,579	245	4,610	7.6%	\$307
Integrated Community BMPs (Green Street and outfall retrofits in mesa above canyons, Parks, etc)	-	38.0	\$1,541,162	50	1,900	3.2%	\$77
Treatment Train (single neighborhood)	-	3.5	\$346,547	800	2,800	4.6%	\$277
<b>Subtotal</b>					<b>41,492</b>	<b>68.8%</b>	<b>\$3,465</b>

**Watershed Total = 41,492**  
**Urban Area Treated = 18,592**  
**Agricultural Area Treated = 22,900**

**Bucket #2 - Total Cost per Watershed Square Mile (millions) = \$6.2**

**Total Cost per Developed Sq. Mi. (millions) = \$16.55**  
**Total Cost per Urban Sq. Mi. (millions) = \$26.37**  
**Total Cost per Ag Sq. Mi. (millions) = \$44.47**

**COLOR CODING FOR TARGETED SOURCE**  
 SOURCE CONTROL  
 RUNOFF REDUCTION  
 AGRICULTURE/ EROSION CONTROL  
 LOW IMPACT DEVELOPMENT  
 TREATMENT

**CALCULATION FOOTNOTES:**  
 Typical Cost per Acre for Land = \$2,600,000  
 (1) Trash is not a significant constituent of concern, compared with more urbanized watersheds, including the pilot watershed. This cost and treated area was reduced by half.  
 (2) Cost includes land acquisition.

**BUCKET #3 - Restoration & Treatment BMPs**  
**San Luis Rey Watershed - Scaled Cost**

Structural BMPs applied to treat 45% of the developed area in the watershed. Fewer regional structural BMPs in favor of restoration and Bucket 2 structural BMPs.

Municipalities	Length River (ft)	Length Channelized (ft)	% River Length Channelized	Notes
County of SD	1,269,014	46,119	3.63%	Given the large open space/ undeveloped area, only applied 5% of the channelized % for the City of SD calculated for the pilot watershed.
City of Vista	0	-	-	-
City of Oceanside	80,373	29,210	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
<b>San Diego Rivers (major tributaries)</b>	<b>1,349,387</b>	<b>75,329</b>		-

Bucket #3 BMP	Additional Cost Validations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Channel Restoration (1) (2)	-	0.16	\$1,524	11,299	1,808	3.0%	\$17
Habitat / Wetlands Restoration (1) (3)	-	1	\$18,870	1,200	2,000	3.3%	\$116
Dry Weather/Low Storm Flow Creek Diversion with Wetland/Basin	-	1,500	\$6,000,000	5	7,500	12.4%	\$30
Large Integrated Sustainable Canyon/Restoration Project	-	93	\$30,254,994	16	1,488	2.5%	\$484
Large Scale Multi-Drainage Area/Multiple Neighborhood Treatment Train (with Stormwater Reuse) (3)	-	300	\$19,279,294	20	6,000	10.0%	\$386
<b>Subtotal</b>					<b>18,796</b>	<b>31.2%</b>	<b>\$1,033</b>

**Watershed Total = 18,796**  
**Area Restored = 3,808**

**COLOR CODING FOR TARGETED SOURCE**

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

**Bucket #3 -Total Cost per Watershed Square Mile (millions) = \$1.84**

*Total Cost per Developed Sq. Mi. (millions) = \$4.94*  
*Total Cost per Urban Sq. Mi. (millions) = \$7.86*  
*Total Cost per Ag Sq. Mi. (millions) = \$13.26*

**CALCULATION FOOTNOTES:**

- (1) While restoration improves water quality for areas beyond the restored area, this pollutant load reduction is conservatively set to equal to the restored area.
- (2) Cost in terms of linear foot of channel, stream, or wetland. The quantity restored is equal to 15% of the total modified length.
- (3) Cost includes land acquisition.

**San Luis Rey Watershed - Scaled Cost**

<b>Bucket #1 Total Watershed Cost (millions) = \$1,306.68</b>			
<b>Bucket #2 Total Watershed Cost (millions) = \$3,465.3</b>			
<b>Bucket #3 Total Watershed Cost (millions) = \$1,033.13</b>			
<b>40-YR TOTAL WATERSHED COST (millions) = \$5,805</b>			
\$10.36	Millions / Watershed sq mile	Total Area Developed =	133,976 acres / 209.3 square miles
\$27.73	Millions / Developed sq mile	45% of Developed Area =	60,289
		Total Area Treated =	60,288
		STRUCTURAL BMPs =	56,480
		RESTORATION =	3,808
			94.2
			88.2
			5.9

Quality of Life Funding Strategy

Tijuana Watershed Cost Estimate - Scaled from the "Pilot" Watershed Adaptive Management Cost Estimate

BUCKET #1 - Permit Required & Nonstructural BMPs

Tijuana Watershed - Scaled Cost

Permit required programs, plus enhanced non-structural solutions and special studies. Raised the enhanced agriculture non-structural program due to the high agricultural area relative to the pilot watershed (i.e. 17% by area versus 5% by area). Reduced the enhanced programs by 50% due to the smaller urbanized area relative to the pilot watershed.

MODIFY FOR EACH WATERSHED	County of SD	City of SD	City of Imperial Beach	
Agency Size Class	Lrg	Lrg	Sml	
Agency Area in Watershed (acre)	283,134	13,979	2,117	Total Acres to be Treated
Agency Developed Area (acre)	37,871	6,675	1,079	20,531
Agency Urban Area (acre)	30,667	5,991	1,079	16,981
Agency Agricultural Area (acre)	7,204	684	0	3,550
				82.71%
				17.29%

Bucket #1 BMP (1)	Typ. Cost Sml (\$/Watershed)	Typ. Cost Med (\$/Watershed)	Typ. Cost Lrg (\$/Watershed)	Total Cost for Watershed	% of 1-year Total	Total Cost (Millions)
Watershed/Program Administration	\$50,000	\$75,000	\$175,000	\$400,000	4.5%	\$0.40
Permit Fees	\$2,333	\$3,000	\$4,286	\$10,905	0.1%	\$0.01
Outreach	\$5,000	\$30,000	\$150,000	\$305,000	3.4%	\$0.31
Permit/Compliance Monitoring	\$20,000	\$40,000	\$260,000	\$540,000	6.1%	\$0.54
Inspections / Enforcement	\$15,000	\$60,000	\$250,000	\$515,000	5.8%	\$0.52
Code Modification/Aggulation	\$25,000	\$50,000	\$175,000	\$375,000	4.2%	\$0.38
Master Planning (pre TMDL) (2)	\$50,000	\$250,000	\$375,000	\$800,000	9.0%	\$0.80
Agriculture Education & BMP Cost Sharing Program (3)	-	-	\$38,981	\$42,879	0.5%	\$0.04
Targeted Outreach/CBSM	\$10,000	\$60,000	\$400,000	\$810,000	9.1%	\$0.81
Special Studies (4)	\$12,500	\$37,500	\$750,000	\$1,512,500	17.1%	\$1.51
Targeted Enforcement	\$22,500	\$90,000	\$400,000	\$822,500	9.3%	\$0.82
BMP Assessment Studies (5)	\$150,000	\$350,000	\$665,000	\$1,240,481	14.0%	\$1.24
Non-Structural Source Controls	\$150,000	\$350,000	\$665,000	\$1,480,000	16.7%	\$1.48
Watershed Total for ONE year of Program Implementation				\$8,854,265	100.0%	\$8.85
Annual Program Growth (set at 1.5 times the standard inflation rate)				4.50%		4.50%
				40-year Watershed Program =		\$561,158,445
						\$561

Bucket #1 - Total Cost / Watershed Sq. Mi. (millions) = \$1.20  
 Total Cost per Developed Sq. Mi. (millions) = \$7.87  
 Total Cost per Urban Sq. Mi. (millions) = \$9.52  
 Total Cost per Ag Sq. Mi. (millions) = \$45.53

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

- (1) Watershed costs were scaled from the Pilot Watershed values based on developed area. The Tijuana Watershed is approximately a half of the area of the San Diego River "Pilot" Watershed. Therefore, the typical cost values for each agency size were halved.
- (2) Assumes this cost is applied to two (2) of the 40-year program (i.e. 10% of overall timeline).
- (3) Assumes a single program has been administered by the County (watershed specific value). Assumes an additional 10% of the program cost was provided by the City.
- (4) Assumes special studies will only be necessary for 10 years of the 40-year program.
- (5) Equal to 25% of total cost of implementing one pilot project of major Structural BMPs listed in Buckets #2. The cost of BMP Assessment Studies is only applicable to initial pilot studies. This cost was only applied for the first year of the 40-year program.

BUCKET #2 - Structural BMPs

Tijuana Watershed - Scaled Cost

Structural BMPs applied to treat 45% of the developed area in the watershed. Additional Bucket 2 BMPs have been implemented (favoring agricultural BMPs).

	Total Acres	Total Sq Miles	% Watershed	Acres To Be Treated	Sq Miles To Be Treated
Tijuana Watershed	299,229	467.5	-	-	-
TOTAL DEVELOPED AREA	45,624	71.3	15.25%	20,531	32
Urban Area	37,736	59.0	12.61%	16,981	27
Agriculture Area	7,888	12.3	2.64%	3,550	6

Bucket #2 BMP	Additional Cost Validations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Permit Compliance Street Sweeping and Catchment Cleaning (1)	-	No Treatment Credit.	Variable by Agency Size	Annual	-	-	\$54
Aggressive Street Sweeping	-	2% watershed	Sml: \$250K/yr Med: \$500K/yr Lrg: \$2.5M/yr	Annual	340	1.7%	\$250
Aggressive Catchment Cleaning	-	2% watershed	Sml: \$20K/yr Med: \$100K/yr Lrg: \$2.0M/yr	Annual	340	1.7%	\$169
River / Creek / Beach Clean Ups	-	2% watershed	Sml: \$15K/yr Med: \$75K/yr Lrg: \$100K/yr	Annual	340	1.7%	\$29
Rain Barrels - Filtration	-	0.15	\$28,953	550	83	0.4%	\$16
Rain Barrels - Water Harvesting	-	0.05	\$25,280	250	13	0.1%	\$6
Large Harvesting Project (or similar)	-	10.0	\$1,807,767	60	600	2.9%	\$108
Rain Barrels - Cistern with Sedimentation	-	1.0	\$19,141	750	750	3.6%	\$14
Annual Hydroseeding / Mulching	-	1.0	\$159,020	40	40	0.2%	\$6
Low Flow Irrigation (Drip line or similar)	-	1.0	\$12,139	1,750	1,750	8.5%	\$21
Annual Silt Fence	-	1.0	\$85,000	40	40	0.2%	\$3
Erosion / Agriculture Type 1: Integrated solutions	-	3.0	\$81,881	75	225	1.1%	\$6
Erosion/Agriculture Type 2: Structural Controls	-	1.5	\$160,000	500	750	3.6%	\$80
Green Roof	-	0.10	\$304,483	10	1	0.0%	\$3
Green Mall	-	3.0	\$414,869	250	750	3.6%	\$104
Permeable Concrete - Infiltration	-	0.5	\$105,231	20	11	0.1%	\$2
Bioretention System (2)	-	0.90	\$228,883	700	630	3.1%	\$160
Green Lot (singular)	-	2.0	\$437,484	300	600	2.9%	\$131
Permeable Concrete - Filtration	-	1.0	\$354,810	120	120	0.6%	\$43
Permeable AC - Filtration	-	1.5	\$121,457	150	225	1.1%	\$18
Medium Infiltration Basin (2)	-	5.0	\$739,400	80	400	1.9%	\$59
Extended Dry Pond (2)	-	18.8	\$1,253,579	55	1,035	5.0%	\$69
Integrated Community BMPs (GreenStreet and outfall retrofits in mesa above canyons, Parks, etc)	-	38.0	\$1,541,162	60	2,280	11.1%	\$92
Treatment Train (single neighborhood)	-	3.5	\$346,547	580	2,030	9.9%	\$201
Subtotal					13,350	64.9%	\$1,647

Watershed Total = 13,350 \$1,647  
 Urban Area Treated = 9,795  
 Agricultural Area Treated = 3,555

Bucket #2 - Total Cost per Watershed Square Mile (millions) = \$3.5  
 Total Cost per Developed Sq. Mi. (millions) = \$23.1  
 Total Cost per Urban Sq. Mi. (millions) = \$27.9  
 Total Cost per Ag Sq. Mi. (millions) = \$133.6

COLOR CODING FOR TARGETED SOURCE

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

CALCULATION FOOTNOTES:

- (1) Typical Cost per Acre for Land = \$2,600,000
- (1) Based on urban land area relative to the pilot watershed, this cost and area treated was reduced 50%.
- (2) Cost includes land acquisition.

**BUCKET #3 - Restoration & Treatment BMPs**  
**Tijuana Watershed - Scaled Cost**

Structural BMPs applied to treat 45% of the developed area in the watershed. Fewer regional structural BMPs in favor of restoration and Bucket 2 structural BMPs.

Municipalities	Length River (ft)	Length Channelized (ft)	% River Length Channelized	Notes
County of SD	840,083	76,327	9.09%	Given the large open space/ undeveloped area, only applied 25% of the channelized % for the City of SD calculated for the pilot watershed.
City of SD	26,250	9,540	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
City of Imperial Beach	5,393	1,960	36.34%	Applied the % channelized for the City of SD calculated for the pilot watershed.
<b>Major tributaries in Tijuana</b>	<b>871,726</b>	<b>87,827</b>		-

Bucket #3 BMP	Additional Cost Validations (\$)	Final Tributary Area (acres)	Final Cost (\$)	Quantity	Total Tributary Area (Acres)	BMPs by Type (% Total)	Total Cost (Millions)
Channel Restoration (1) (2)	-	0.16	\$1,524	8,783	1,405	6.8%	\$13
Habitat / Wetlands Restoration (1) (3)	-	1	\$18,870	2,000	2,000	9.7%	\$131
Dry Weather/Low Storm Flow Creek Diversion with Wetland/Basin	-	1,500	\$6,000,000	1.25	1,875	9.1%	\$8
Large Integrated Sustainable Canyon/Restoration Project	-	93	\$30,254,994	8	744	3.6%	\$242
Large Scale Multi-Drainage Area/Multiple Neighborhood Treatment Train (with Stormwater Reuse) (3)	-	300	\$19,279,294	4	1,200	5.8%	\$77
<b>Subtotal</b>					<b>7,224</b>	<b>35.1%</b>	<b>\$471</b>

**Watershed Total = 7,224**  
**Area Restored = 3,405**

**COLOR CODING FOR TARGETED SOURCE**

SOURCE CONTROL
RUNOFF REDUCTION
AGRICULTURE/ EROSION CONTROL
LOW IMPACT DEVELOPMENT
TREATMENT

**Bucket #3 - Total Cost per Watershed Square Mile (millions) = \$1.01**

*Total Cost per Developed Sq. Mi. (millions) = \$6.61*  
*Total Cost per Urban Sq. Mi. (millions) = \$7.99*  
*Total Cost per Ag Sq. Mi. (millions) = \$38.25*

**CALCULATION FOOTNOTES:**

- (1) While restoration improves water quality for areas beyond the restored area, this pollutant load reduction is conservatively set to equal to the restored area.
- (2) Cost in terms of linear foot of channel, stream, or wetland. The quantity restored is equal to 10% of the total modified length.
- (3) Cost includes land acquisition.

**Tijuana Watershed - Scaled Cost**

<b>Bucket #1 Total Watershed Cost (millions) = \$561.16</b>			
<b>Bucket #2 Total Watershed Cost (millions) = \$1,646.7</b>			
<b>Bucket #3 Total Watershed Cost (millions) = \$471.38</b>			
<b>40-YR TOTAL WATERSHED COST (millions) = \$2,679</b>			
\$5.73	Millions / Watershed sq mile	Total Area Developed =	45,624
\$37.58	Millions / Developed sq mile	45% of Developed Area =	20,531
		Total Area Treated =	20,575
		STRUCTURAL BMPs =	17,169
		RESTORATION =	3,405
		sq miles	71.3
			32.1
			32.1
			26.8
			5.3