

U.C. COOPERATIVE EXTENSION

~ CENTRAL COAST CONSERVATION PRACTICES ~

ESTIMATED COSTS & POTENTIAL BENEFITS FOR A NON-ENGINEERED WATER/SEDIMENT CONTROL BASIN 2003

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INTRODUCTION & GENERAL DESCRIPTION

This study is intended as an estimate or guide, which can be helpful in evaluating management decisions related to the installation, operation and maintenance of a non-engineered water/sediment control basin. Water/sediment control basins are a type of conservation practice used to mitigate soil erosion to maintain and protect downstream water quality by slowing surface water runoff and trapping the accompanying sediment. Basins differ by design and capacity and may include more than one holding area on the same farm or ranch. Accordingly, associated costs will also differ. For example, engineered basins are generally higher in cost than non-engineered basins. However, engineered basins may have a longer lifespan than non-engineered basins and require less maintenance on a yearly basis.

Costs for the installation and annual operation and maintenance of the water/sediment control basin in this study are estimated for low, representative and high cost scenarios in Table 1. More detailed information for the representative cost scenario is included in Table 2 (installation, operation and maintenance) and Table 3 (materials). In-kind contributions from federal and other local assistance programs may be available to offset direct expenses borne by the farmers and ranchers adopting this conservation practice. Land ownership and rental rates are specific to each operation and therefore are not included in the analysis. Estimated costs given for labor, materials, and custom or contract services are based on current figures. The costs and practices contained in this study may not be applicable to all situations or used every year. Individual farmers and ranchers should therefore use this study as a template and make adjustments to more accurately reflect their own situations. The use of trade names does not constitute an endorsement or a recommendation by the University of California nor is criticism of similar products implied.

The following is a description of general assumptions pertaining to the conservation practice analyzed in this study. The operations are those currently used by farmers and ranchers within six counties on the Central Coast of California: San Mateo, Santa Cruz, Santa Clara, San Benito, Monterey and San Luis Obispo.

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PRACTICE COSTS

Installation. This study assumes one holding area (basin) that is 1,600 square feet in size with a depth of four feet for a total capacity of 237 cubic yards. Costs for constructing a water/sediment control basin include preparing the site by configuring and clearing the site, removing soil and compacting the basin and surrounding berm. Pipes, couplers and risers are then installed and sandbags are used to channel and check water. The perimeter of the basin is planted to cereal rye to further minimize runoff and erosion. Cereal rye is assumed to be planted in the fall to take advantage of seasonal rains for growth and development. Therefore, no cost for irrigation water is included in this study. Associated costs to plant and maintain cereal rye is included on Tables 1, 2, and 3. Alternatively, some farmers plant perennial grasses or allow resident vegetation to germinate and grow on basin perimeters. In the case of resident vegetation, no planting or irrigation costs would apply.

Annual Operation & Maintenance. Each year operation and maintenance costs are incurred as a part of this conservation practice. Maintenance costs are often associated with storm events, which increase the potential for water runoff and soil movement. For the representative scenario studied here, costs are included to remove sediment from the basin and redistribute onto adjacent fields three times per year. These costs may be reduced by constructing deeper basins, which generally require less frequent cleaning, or by using other practices on surrounding fields and roads. To manage the vegetation on perimeter strips in this study, farmers mow grasses once per year in the spring and spot spray weeds and unwanted vegetation with a contact herbicide twice per year. Associated costs are included on Tables 1, 2, and 3. Some growers report the need for ground squirrel control, which will increase the maintenance costs shown on Tables 1 and 2. Yearly maintenance operations will vary depending on the specific site, type of vegetation grown on or near basin perimeters, and on rainfall and storm events.

Additional Fees & Expenses. When using conservation practices additional fees and expenses are sometimes incurred for consultants, permits or other charges that are specific to a particular practice. For the non-engineered water/sediment control basin assumed in this study, no costs for consultants or permit fees are included. However, individual situations will vary and therefore fees may apply.

POTENTIAL BENEFITS & DRAWBACKS OF PRACTICE

Farmers, ranchers and landowners should evaluate each conservation practice for potential benefits and drawbacks with respect to their overall operation. This may include risk and any effects on equipment, labor and capital.

Benefits. Water/sediment control basins are used for their erosion control and runoff detention features, and also to assist with downstream water quality protection. This is achieved by capturing sediment on-farm where it can be reused, rather than allowing unchecked sediment flow to move off-farm and/or downstream. Water/sediment basins can also reduce runoff rates and thereby minimize erosion of downstream channels and reduce flooding.

Growers report a savings in labor and equipment use with a decrease in flood and other erosion control measures. These are considered short-term benefits, which are estimated at \$650 for the representative scenario studied here. However, cost savings can vary substantially depending on season, rainfall amounts, and number of storm events. Potential long-term benefits include a reduction in the loss of productive topsoil. Because of the difficulty in measuring, thus valuing such losses, no cash savings for

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long-term benefits are included in this study. In addition, preventing or minimizing downstream impacts and/or property damage may reduce conflicts with neighbors and exposure to legal and regulatory actions.

Drawbacks. To accommodate the non-engineered water/sediment control basin studied here .1 acre of income-generating land is taken out of production. Using strawberries as an example, and assuming a yield of 5,500 trays per acre with price of \$7.04 per tray, per acre returns above total costs to strawberry farmers are estimated at \$5,701 per acre (<http://coststudies.ucdavis.edu>). Therefore, for the representative scenario studied here, reduced returns are estimated at \$570 (.1 x \$5,701) and shown on Table 1.

Loss in income will vary depending on the amount of land taken out of production, crop grown, and yield and price per acre. In some cases, sediment basins are not constructed on revenue-generating cropland. Accordingly, no loss in revenue would be included. Individual growers may refer to the website shown above to view cost of production studies and calculate potential revenue losses associated with various crops. Alternatively, contact your local UCCE office for assistance with this information.

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ADDITIONAL INFORMATION

For additional information about the calculations used in this report, call Laura Tourte, UCCE Santa Cruz County (831) 763-8040. Additional information about the practice itself may be accessed via the internet through UCCE at <http://waterquality.ucanr.org> and NRCS at <http://www.nrcs.usda.gov/technical>.

Copies of this study may be requested through local UCCE, NRCS, and Resource Conservation District (RCD) offices in the six counties listed above. Additional publications with estimated costs and potential benefits for various other conservation practices are also available through Central Coast UCCE, NRCS, and RCD offices. They may also be accessed on the internet at <http://cesantacruz.ucdavis.edu>.

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Table 1. Non-Engineered Water/Sediment Control Basin (237 Cubic Yards) - Partial Budget - Central Coast - 2003

COSTS PER UNIT*	ESTIMATED COSTS			ADDITIONAL RETURNS PER UNIT	POTENTIAL BENEFITS		
	LOW	REP**	HIGH		LOW	REP	HIGH
<i>Installation (Year 1):</i>				None	\$0	\$0	\$0
Layout & Mark Site	\$41	\$41	\$41				
Clear Site	\$9	\$9	\$9				
Excavate & Compact Basins	\$220	\$440	\$880				
Install Pipes, Couplers, Riser	\$1,065	\$1,431	\$2,055				
Channel/Check Water-Sandbags	\$0	\$57	\$154				
Plant Cover at Installation	\$0	\$45	\$77				
<i>(1a) Installation - Subtotal</i>	<i>\$1,335</i>	<i>\$2,023</i>	<i>\$3,216</i>				
<i>Annual Operation & Maint. (Years 2-5):</i>							
Remove & Redistribute Sediment	\$330	\$1,320	\$2,310				
Mow Basin Perimeter	\$0	\$12	\$54				
Spot Spray-Herbicide	\$9	\$13	\$31				
Plant Annual Cover	\$0	\$45	\$77				
Channel/Check Water-Sandbags	\$0	\$57	\$154				
<i>(1b) Ann. Oper. & Maint. Costs - Subtotal</i>	<i>\$339</i>	<i>\$1,447</i>	<i>\$2,626</i>				
<i>Interest on Operating Capital @ 7.4%</i>	<i>\$9</i>	<i>\$21</i>	<i>\$35</i>				
<i>(1c) Costs - Subtotal</i>	<i>\$1,683</i>	<i>\$3,491</i>	<i>\$5,877</i>	<i>(5) Additional Returns - Subtotal</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
REDUCED RETURNS PER UNIT	LOW	REP	HIGH	REDUCED COSTS PER UNIT	LOW	REP	HIGH
Strawberry Acreage Removed (.1 Ac)	\$15	\$570	\$1,125	Labor & Equip. Use for Prevention & Repairs (Associated with Flood Control & Storm Events)	\$0	\$650	\$1,950
<i>(2) Reduced Returns - Subtotal</i>	<i>\$15</i>	<i>\$570</i>	<i>\$1,125</i>	<i>(6) Reduced Costs - Subtotal</i>	<i>\$0</i>	<i>\$650</i>	<i>\$1,950</i>
COSTS & REDUCED RETURNS	LOW	REP	HIGH	ADD. RETURNS & REDUCED COSTS	LOW	REP	HIGH
<i>(3) Totals Per Unit Year 1 (1c+2)</i>	<i>\$1,698</i>	<i>\$4,061</i>	<i>\$7,002</i>	<i>(7) Totals Per Unit Year 1 (5+6)</i>	<i>\$0</i>	<i>\$650</i>	<i>\$1,950</i>
<i>(4) Totals Per Unit Per Year - Years 2-5 (1b+2)</i>	<i>\$354</i>	<i>\$2,017</i>	<i>\$3,751</i>	<i>(8) Totals Per Unit Per Year - Years 2-5 (5+6)</i>	<i>\$0</i>	<i>\$650</i>	<i>\$1,950</i>
NET CHANGE IN INCOME PER UNIT (Basin = 237 cubic yards) YEAR 1 (7-3)					-\$1,698	-\$3,411	-\$5,052
NET CHANGE IN INCOME PER UNIT (Basin = 237 cubic yards) PER YEAR - YEARS 2-5 (8-4)					-\$354	-\$1,367	-\$1,801
NET CHANGE IN INCOME PER CUBIC YARD YEAR 1					-\$7	-\$14	-\$21
NET CHANGE IN INCOME PER CUBIC YARD YEARS 2-5					-\$1	-\$6	-\$8

* Unit = Basin = 237 cubic yards; 1,600 square foot area with a 4 foot depth.

** Rep = Representative cost.

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Table 2. Detail of Representative Installation, Operation & Maintenance Costs[†]
Non-Engineered Water/Sediment Control Basin (237 Cubic Feet) – Central Coast 2003

Operation	Non-Mach Labor		Machine Labor		Custom Work		Material Cost (\$/Basin) [‡]	Total Cost (\$/Basin) [¶]	Your Cost (\$/Basin)
	Hrs/ Basin	Cost/ Basin	Hrs/ Basin	Cost/ Basin	Hrs/ Basin	Cost/ Basin			
<i>Installation (Year 1):</i>									
Layout & Mark Site	1	13					28	41	
Clear Site			.3	6			3 [§]	9	
Excavate & Compact Basins					8	440		440	
Install Pipe, Couplers, Riser	50	670					761	1,431	
Channel/Check Water-Sandbags	2	27					30	57	
Plant Cover at Installation	3	40					5	45	
<i>Subtotal</i>		750		6		440	827	2,023	
<i>Annual Operation & Maint. (Years 2-5):</i>									
Remove & Redistribute Sediment 3X					24	1,320		1,320	
Mow Basin Perimeter 1X			.3	6			6 [§]	12	
Spot Spray Herbicide 2X			.4	8			5	13	
Plant Annual Cover	3	40					5	45	
Channel/Check Water-Sandbags	2	27					30	57	
<i>Subtotal</i>		67		14		1,320	46	1,447	
<i>Interest on Operating Capital @ 7.4%</i>								21	
<i>Total Costs Per Unit – Year 1</i>							873	3,491	
<i>Total Costs Per Unit Per Year – Yrs 2-5</i>							46	1,447	
<i>Total Costs Per Cubic Yard – Year 1</i>							4	15	
<i>Total Costs Per Cubic Yard – Yrs 2-5</i>							**	6	

[†] Costs are per 237 cubic yards or 1,600 square foot basin; 4 foot depth.

[‡] Detail of material costs located in Table 3. Representative Material Costs.

[¶] May not sum due to rounding.

[§] Fuel, lube and repairs.

** Cost is negligible when represented on a cubic yard basis.

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Table 3. Detail of Representative Material Costs[†]
Non-Engineered Water/Sediment Control Basin (237 Cubic Yards) – Central Coast 2003

Material	Quantity/ Basin	Unit	Cost/ Unit	Material Cost (\$/Basin)	Your Cost (\$/Basin)
<i>Installation (Year 1):</i>					
Marker Flags	1	hundred	6.50	7	
Tape Measure (100 Yd)	1	each	21.00	21	
Pipe (15" Diameter-ADS)	45	linear feet	11.00	495	
Couplers (15" Diameter-ADS)	3	each	22.00	66	
Riser	1	Each	200.00	200	
Sandbags (Channel/Check Water)	100	each	.30	30	
Seed at Installation – Cereal Rye	15	pound	.32	5	
Fuel, Lube, Repairs				3	
<i>Subtotal</i>				<i>827</i>	
<i>Annual Operation & Maintenance (Years 2-5):</i>					
Herbicide – Roundup	1	pint	4.50	5	
Seed – Cereal Rye	15	pound	.32	5	
Sandbags (Channel/Check Water)	100	each	.30	30	
Fuel, Lube, Repairs	1	basin	6.00	6	
<i>Subtotal</i>				<i>46</i>	
<i>Total Material Costs Per Unit – Year 1</i>				<i>873</i>	
<i>Total Material Costs Per Unit Per Year – Yrs 2-5</i>				<i>46</i>	
<i>Total Material Costs Per Cubic Yard – Year 1</i>				<i>4</i>	
<i>Total Material Costs Per Cubic Yard – Yrs 2-5</i>				<i>**</i>	

[†] Costs are per 237 cubic yards or 1,600 square foot basin, 4 foot depth.

** Cost is negligible when represented on a cubic yard basis.