

# **U.C. COOPERATIVE EXTENSION**

## **~ CENTRAL COAST CONSERVATION PRACTICES ~**

### **ESTIMATED COSTS & POTENTIAL BENEFITS FOR NON-ENGINEERED GRASSED WATERWAYS 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 non-engineered grassed waterways. Non-engineered grassed waterways are essentially agricultural drainage ditches that have been seeded or planted to a variety of different plant species to help minimize the degradation of banks, filter surface water runoff, and reduce erosion, while assisting in the protection of downstream water quality. As an alternative, some farmers and landowners may enlist the services of USDA's Natural Resources Conservation Service (NRCS), a local Resource Conservation District (RCD), or a consulting or engineering firm to design and install engineered waterways. Engineered waterways have prescribed slopes and capacity to handle flows of large storm events.

Costs for the installation and annual operation and maintenance for the non-engineered grassed waterways 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.

## U.C. COOPERATIVE EXTENSION

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.

### PRACTICE COSTS

**Installation (Planting & Establishment).** For the representative scenario studied here, costs are included to establish 1,000 linear feet (10 foot width; 4 foot depth) of an existing non-engineered grassed waterway. To prepare the site for planting, the waterway is cleaned, and then planted with an 'erosion control' seeding mix. It is then irrigated up to insure good stand establishment and growth. Associated costs are located on Tables 1, 2 and 3. As an alternative to the above operations, growers may use perennial 'plug' plants and/or allow resident vegetation to germinate and grow at the site. Costs would vary accordingly.

**Annual Operation & Maintenance.** Each year operation and maintenance costs are incurred as a part of this conservation practice. Maintenance costs include hand mowing or weeding existing ditches each year. In addition, the waterway is cleaned to insure proper function during the rainy season. Associated costs are located on Tables 1 and 2. Alternatively, some growers spot-spray with an herbicide to limit weed growth. Also, waterways may not require cleaning on an annual basis.

**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 this study, no specialized fees or costs for non-engineered grassed waterways are assumed. However, if grassed waterways do have an engineered component requiring more specialized operations, charges for consultants and/or permits should be included as a cost.

### POTENTIAL BENEFITS & DRAWBACKS OF PRACTICE

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

**Benefits.** Growers report some savings in labor and equipment use during the rainy winter months when waterways are planted to grasses. This is to account for a decrease in flood and other erosion control measures. These are considered short-term benefits, which are estimated at \$275 for the representative scenario studied here. Non-engineered grassed waterways may help stabilize drainage-ditch banks, slow irrigation and surface water runoff, filter sediment, and reduce erosion. This may ultimately assist with the protection of downstream water quality. Preventing or minimizing downstream impacts and/or property damage may reduce conflicts with neighbors and exposure to legal and regulatory actions. Because only non-productive land is used to accommodate grassed waterways in this study, no loss of revenue or income is assumed.

**Drawbacks.** Grassed agricultural waterways may trap eroded sediment from upstream, which in turn may increase cleaning and maintenance costs. If not regularly cleaned, ditches may flood and cause crop and/or other property damage on-farm. These drawbacks can be minimized with appropriate planning and

## U.C. COOPERATIVE EXTENSION

maintenance of waterways. When used alone, this conservation practice may not be sufficient to protect farms from flooding during seasons with heavy rains and increased surface water runoff.

### ACKNOWLEDGEMENTS

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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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## U.C. COOPERATIVE EXTENSION

Table 1. Non-Engineered Grassed Waterways (1,000 Linear Feet) - 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
Clean Waterway & Smooth Banks	\$0	\$550	\$1,320				
Plant Erosion Control Mix	\$0	\$41	\$58				
Set Up Sprinklers & Irrigate	\$0	\$54	\$98				
<i>(1a) Installation - Subtotal</i>	<i>\$0</i>	<i>\$645</i>	<i>\$1,476</i>				
<i>Annual Operation &amp; Maint. (Years 2-5):</i>							
Mow Vegetation (Hand)	\$27	\$54	\$107				
Clean Waterway	\$0	\$275	\$660				
<i>(1b) Ann. Oper. &amp; Maint. Costs - Subtotal</i>	<i>\$27</i>	<i>\$329</i>	<i>\$767</i>				
<i>Interest on Operating Capital @ 7.4%</i>	<i>\$1</i>	<i>\$6</i>	<i>\$7</i>				
<b><i>(1c) Costs - Subtotal</i></b>	<b><i>\$28</i></b>	<b><i>\$980</i></b>	<b><i>\$2,250</i></b>	<b><i>(5) Additional Returns - Subtotal</i></b>	<b><i>\$0</i></b>	<b><i>\$0</i></b>	<b><i>\$0</i></b>
<b>REDUCED RETURNS PER UNIT</b>	<b>LOW</b>	<b>REP</b>	<b>HIGH</b>	<b>REDUCED COSTS PER UNIT</b>	<b>LOW</b>	<b>REP</b>	<b>HIGH</b>
None	\$0	\$0	\$0	Labor & Equip. Use for Prevention & Repairs (Associated with Flood Control & Storm Events)	\$0	\$275	\$660
<b><i>(2) Reduced Returns - Subtotal</i></b>	<b><i>\$0</i></b>	<b><i>\$0</i></b>	<b><i>\$0</i></b>	<b><i>(6) Reduced Costs - Subtotal</i></b>	<b><i>\$0</i></b>	<b><i>\$275</i></b>	<b><i>\$660</i></b>
<b>COSTS &amp; REDUCED RETURNS</b>	<b>LOW</b>	<b>REP</b>	<b>HIGH</b>	<b>ADD. RETURNS &amp; REDUCED COSTS</b>	<b>LOW</b>	<b>REP</b>	<b>HIGH</b>
<b><i>(3) Total Per Unit Year 1 (1c+2)</i></b>	<b><i>\$28</i></b>	<b><i>\$980</i></b>	<b><i>\$2,250</i></b>	<b><i>(7) Total Per Unit Year 1 (5+6)</i></b>	<b><i>\$0</i></b>	<b><i>\$275</i></b>	<b><i>\$660</i></b>
<b><i>(4) Total Per Unit Per Year - Years 2-5 (1b+2)</i></b>	<b><i>\$27</i></b>	<b><i>\$329</i></b>	<b><i>\$767</i></b>	<b><i>(8) Total Per Unit Per Year - Years 2-5 (5+6)</i></b>	<b><i>\$0</i></b>	<b><i>\$275</i></b>	<b><i>\$660</i></b>
<b>NET CHANGE IN INCOME PER UNIT (1,000 Linear Feet) YEAR 1 (7-3)</b>					-\$28	-\$705	-\$1,590
<b>NET CHANGE IN INCOME PER UNIT (1,000 Linear Feet) PER YEAR - YEARS 2-5 (8-4)</b>					-\$27	-\$54	-\$107
<b>NET CHANGE IN INCOME PER LINEAR FOOT YEAR 1</b>					***	-\$1	-\$2
<b>NET CHANGE IN INCOME PER LINEAR FOOT YEARS 2-5</b>					***	***	***

\* Unit = 1,000 linear feet.

\*\* Rep = Representative cost.

\*\*\* Net change in income is negligible when represented on a linear foot basis.

## U.C. COOPERATIVE EXTENSION

Table 2. Detail of Representative Installation, Operation & Maintenance Costs<sup>†</sup>  
Non-Engineered Grassed Waterways (1,000 Linear Feet) – Central Coast 2003

Operation	Non-Mach Labor		Machine Labor		Custom Work		Material Cost (\$/1,000 LF) <sup>‡</sup>	Total Cost (\$/1,000 LF) <sup>¶</sup>	Your Cost (\$/1,000 LF)
	Hrs/ 1,000 LF	Cost/ 1,000 LF	Hrs/ 1,000 LF	Cost/ 1,000 LF	Hrs/ 1,000 LF	Cost/ 1,000 LF			
<i>Installation (Year 1):</i>									
Clean Waterway					10	550		550	
Plant Erosion Control Mix	1.50	20	.25	5			17 <sup>§</sup>	41	
Set Up Sprinklers & Irrigate	.6	8	.25	5			40	54	
<i>Subtotal</i>		28		10		550	57	645	
<i>Annual Operation &amp; Maint. (Years 2-5):</i>									
Mow Vegetation (Hand)	4.0	54						54	
Clean Waterway					5	275		275	
<i>Subtotal</i>		54				275	0	329	
<i>Interest on Operating Capital @ 7.4%</i>								6	
<i>Total Costs Per Unit – Year 1</i>							57	980	
<i>Total Costs Per Unit Per Year – Yrs 2-5</i>							0	329	
<i>Total Costs Per Linear Foot – Year 1</i>							**	1	
<i>Total Costs Per Linear Foot – Yrs 2-5</i>							0	**	

<sup>†</sup> Costs are per 1,000 linear feet.

<sup>‡</sup> Detail of material costs located in Table 3. Representative Material Costs.

<sup>¶</sup> May not sum due to rounding.

<sup>§</sup> Includes fuel, lube and repairs.

\*\* Cost is negligible when represented on a linear foot basis.

## U.C. COOPERATIVE EXTENSION

Table 3. Detail of Representative Material Costs<sup>†</sup>  
 Non-Engineered Grassed Waterways (1,000 Linear Feet) – Central Coast 2003

Material	Quantity/ 1,000 LF	Unit	Cost/ Unit	Material Cost (\$/1,000 LF)	Your Cost (\$/1,000 LF)
<i>Installation (Year 1):</i>					
Seed – Erosion Control Mix	9	pound	1.60	14	
Water – Irrigation	3	ac inches	13.40	40	
Fuel, Lube & Repairs	1	1,000 LF	35.00	3	
<i>Subtotal</i>				<i>57</i>	
<i>Annual Operation &amp; Maintenance (Years 2-5):</i>					
None					
<i>Subtotal</i>					
<i>Total Material Costs Per Unit – Year 1</i>				<i>57</i>	
<i>Total Material Costs Per Unit Per Year – Yrs 2-5</i>				<i>0</i>	
<i>Total Material Costs Per Linear Foot – Year 1</i>				<i>**</i>	
<i>Total Material Costs Per Linear Foot – Yrs 2-5</i>				<i>0</i>	

<sup>†</sup> Costs are per 1,000 linear feet.

\*\* Cost is negligible when represented on a linear foot basis.