

Appendix J.
2017 Main Stem Erosion Repair Project
Feasibility Report, May 2016

Table J-1 Bassett Creek Feasibility Study alternatives cost estimates

Reach	Site	Alternative	Alternative Description	Construction Cost Estimate (1)	Construction Contingency (2)	Engineering (3)	Environ. Oversight (4)	Capital Cost Estimate (5)(6)	Estimated Life Span (years) (7)	Annual Maint. Est. (8)	Major Maint. Est. (9)	30-Year Future Worth Estimate (10)(11)	Annualized Cost (11)(12)	TP Loading		TSS Loading		Rec.?
														Load Reduction (lb/yr)	Cost/lb Reduced (13)	Load Reduction (lb/yr)	Cost/lb Reduced (13)	
Reach 1	Site 1	Alternative A	Abandon trail and move to higher elevation	\$ 41,270	\$ 12,380	\$ 12,380	\$ -	\$ 66,000	30	\$ 200	\$ 6,600	\$ 181,600	\$ 3,800	0.83	\$ 4,580	1,440	\$ 2.64	N
Reach 1	Site 1	Alternative B	Design trail for submergence at high flows	\$ 23,800	\$ 7,140	\$ 7,140	\$ -	\$ 38,100	30	\$ 280	\$ 19,050	\$ 140,200	\$ 2,900	0.83	\$ 3,490	1,440	\$ 2.01	Y
Reach 1	Site 2	Alternative A	Grade stream bank and vegetate	\$ 43,680	\$ 13,100	\$ 13,100	\$ 7,500	\$ 77,400	20	\$ 510	\$ 19,350	\$ 247,100	\$ 5,200	0.00	--	0	--	Y
Reach 1	Site 2	Alternative B	Install riprap toe protection	\$ 13,180	\$ 3,950	\$ 3,950	\$ -	\$ 21,100	30	\$ 160	\$ 10,550	\$ 77,900	\$ 1,600	0.00	--	0	--	N
Reach 1	Site 3	Alternative A	Extend riprap to tie into historic wall	\$ 9,170	\$ 2,750	\$ 2,750	\$ -	\$ 14,700	30	\$ 110	\$ 7,350	\$ 54,200	\$ 1,100	0.35	\$ 3,100	620	\$ 1.77	Y
Reach 1	Site 3	Alternative B	Install boulder or log vanes	\$ 9,600	\$ 2,880	\$ 2,880	\$ -	\$ 15,400	20	\$ 110	\$ 7,700	\$ 56,500	\$ 1,200	0.35	\$ 3,390	620	\$ 1.94	N
Reach 1	Site 4	Alternative A	Replace swale with catch basin, culvert & FES	\$ 13,670	\$ 4,100	\$ 4,100	\$ -	\$ 21,900	30	\$ 160	\$ 10,950	\$ 80,600	\$ 1,700	0.7	\$ 2,330	1,270	\$ 1.34	N
Reach 1	Site 4	Alternative B	Install boulder cross vane	\$ 6,200	\$ 1,860	\$ 1,860	\$ -	\$ 9,900	20	\$ 70	\$ 4,950	\$ 36,300	\$ 800	0.7	\$ 1,090	1,270	\$ 0.63	N
Reach 1	Site 4	Alternative C	Install riprap toe protection	\$ 19,030	\$ 5,710	\$ 5,710	\$ 4,500	\$ 35,000	30	\$ 230	\$ 17,500	\$ 127,600	\$ 2,700	0.7	\$ 3,690	1,270	\$ 2.13	Y
Reach 1	Site 5	Alternative A	Install boulder or log vanes	\$ 23,060	\$ 6,920	\$ 6,920	\$ -	\$ 36,900	20	\$ 270	\$ 18,450	\$ 135,800	\$ 2,900	5.8	\$ 500	10,110	\$ 0.29	N
Reach 1	Site 5	Alternative B	Install composite rock/wood bankfull bench	\$ 38,340	\$ 11,500	\$ 11,500	\$ -	\$ 61,300	20	\$ 450	\$ 15,330	\$ 197,900	\$ 4,200	5.8	\$ 720	10,110	\$ 0.42	N
Reach 1	Site 5	Alternative C	Install VRSS and riprap toe protection	\$ 27,400	\$ 8,220	\$ 8,220	\$ -	\$ 43,800	20	\$ 320	\$ 10,950	\$ 141,300	\$ 3,000	5.8	\$ 520	10,110	\$ 0.30	Y
Reach 2	Site 6	Alternative A	Grade stream bank and vegetate	\$ 181,860	\$ 54,560	\$ 54,560	\$ 15,000	\$ 306,000	30	\$ 860	\$ 30,600	\$ 838,900	\$ 17,600	6.1	\$ 2,890	10,590	\$ 1.66	N
Reach 2	Site 6	Alternative B	Install VRSS and riprap toe protection	\$ 203,180	\$ 60,950	\$ 60,950	\$ 12,000	\$ 337,100	20	\$ 2,390	\$ 84,280	\$ 1,084,100	\$ 22,800	6.1	\$ 3,740	10,590	\$ 2.15	Y
Reach 2	Site 6	Alternative C	Install boulder wall	\$ 212,510	\$ 63,750	\$ 63,750	\$ 7,500	\$ 347,500	30	\$ 2,500	\$ 173,750	\$ 1,276,300	\$ 26,800	6.1	\$ 4,400	10,590	\$ 2.53	N
Reach 2	Site 7	Alternative A	Install fieldstone riprap to create riffle-pool structure	\$ 85,090	\$ 25,530	\$ 25,530	\$ 7,500	\$ 143,700	20	\$ 1,000	\$ 35,930	\$ 461,300	\$ 9,700	0.00	--	0	--	N
Reach 2	Site 7	Alternative B	Install boulder and/or log vanes to create step-pool structure	\$ 70,630	\$ 21,190	\$ 21,190	\$ 7,500	\$ 120,500	20	\$ 830	\$ 60,250	\$ 440,800	\$ 9,300	0.00	--	0	--	Y
Reach 2	Site 8	Alternative A	Remove debris and stabilize top of bank	\$ 24,040	\$ 7,210	\$ 7,210	\$ -	\$ 38,500	20	\$ 290	\$ 9,630	\$ 124,600	\$ 2,600	0.00	--	0	--	Y
Reach 2	Site 8	Alternative B	Install buffer strip at top of bank	\$ 51,460	\$ 15,440	\$ 15,440	\$ -	\$ 82,300	20	\$ 630	\$ 20,580	\$ 266,900	\$ 5,600	0.00	--	0	--	N
Reach 2	Site 9	Alternative A	Grade stream bank and vegetate	\$ 78,580	\$ 23,570	\$ 23,570	\$ 7,500	\$ 133,200	30	\$ 370	\$ 13,320	\$ 365,000	\$ 7,700	1.89	\$ 4,070	3,290	\$ 2.34	N
Reach 2	Site 9	Alternative B	Install root wads	\$ 27,570	\$ 8,270	\$ 8,270	\$ -	\$ 44,100	20	\$ 320	\$ 11,030	\$ 142,100	\$ 3,000	1.89	\$ 1,580	3,290	\$ 0.91	N
Reach 2	Site 9	Alternative C	Install riprap toe protection	\$ 32,350	\$ 9,710	\$ 9,710	\$ 3,000	\$ 54,800	30	\$ 380	\$ 27,400	\$ 200,600	\$ 4,200	1.9	\$ 2,220	3,290	\$ 1.28	N
Reach 2	Site 9	Alternative D	Install willow stakes and live fascines	\$ 13,760	\$ 4,130	\$ 4,130	\$ -	\$ 22,000	20	\$ 160	\$ 5,500	\$ 70,900	\$ 1,500	1.9	\$ 790	3,290	\$ 0.46	Y
Reach 2	Site 10	Alternative A	Lower culvert	\$ 12,510	\$ 3,750	\$ 3,750	\$ -	\$ 20,000	30	\$ 150	\$ 10,000	\$ 73,700	\$ 1,500	0.5	\$ 3,230	810	\$ 1.85	N
Reach 2	Site 10	Alternative B	Shorten culvert and add riprap	\$ 2,980	\$ 890	\$ 890	\$ -	\$ 4,800	30	\$ 40	\$ 2,400	\$ 17,900	\$ 400	0.5	\$ 860	810	\$ 0.49	Y
Reach 2	Site 11	Alternative A	Lower culvert, add catch basin	\$ 15,370	\$ 4,610	\$ 4,610	\$ -	\$ 24,600	30	\$ 180	\$ 12,300	\$ 90,500	\$ 1,900	0.5	\$ 4,090	810	\$ 2.35	N
Reach 2	Site 11	Alternative B	Add riprap at existing culvert	\$ 3,170	\$ 950	\$ 950	\$ -	\$ 5,100	30	\$ 40	\$ 2,550	\$ 18,900	\$ 400	0.5	\$ 860	810	\$ 0.49	Y

Table J-1 Bassett Creek Feasibility Study alternatives cost estimates

Reach	Site	Alternative	Alternative Description	Construction Cost Estimate (1)	Construction Contingency (2)	Engineering (3)	Environ. Oversight (4)	Capital Cost Estimate (5)(6)	Estimated Life Span (years) (7)	Annual Maint. Est. (8)	Major Maint. Est. (9)	30-Year Future Worth Estimate (10)(11)	Annualized Cost (11)(12)	TP Loading		TSS Loading		Rec.?	
														Load Reduction (lb/yr)	Cost/lb Reduced (13)	Load Reduction (lb/yr)	Cost/lb Reduced (13)		
Reach 3	Site 12	Alternative A	Grade stream bank and vegetate	\$ 49,980	\$ 14,990	\$ 14,990	\$ 7,500	\$ 87,500	30	\$ 240	\$ 8,750	\$ 239,600	\$ 5,000	6.6	\$ 760	11,440	\$ 0.44	N	
Reach 3	Site 12	Alternative B	Install VRSS	\$ 94,390	\$ 28,320	\$ 28,320	\$ 7,500	\$ 158,500	20	\$ 1,110	\$ 39,630	\$ 509,100	\$ 10,700	6.6	\$ 1,630	11,440	\$ 0.94	N	
Reach 3	Site 12	Alternative C	Install riprap toe protection	\$ 41,980	\$ 12,590	\$ 12,590	\$ 4,500	\$ 71,700	30	\$ 500	\$ 35,850	\$ 262,500	\$ 5,500	6.6	\$ 840	11,440	\$ 0.48	Y	
Reach 3	Site 12	Alternative D	Install boulder cross vane	\$ 8,010	\$ 2,400	\$ 2,400	\$ -	\$ 12,800	20	\$ 100	\$ 6,400	\$ 47,400	\$ 1,000	6.6	\$ 150	11,440	\$ 0.09	Y	
Reach 3	Site 13	Alternative A	Grade stream bank and vegetate	\$ 51,730	\$ 15,520	\$ 15,520	\$ 7,500	\$ 90,300	30	\$ 240	\$ 9,030	\$ 246,900	\$ 5,200	3.2	\$ 1,630	5,550	\$ 0.94	N	
Reach 3	Site 13	Alternative B	Install root wads	\$ 35,760	\$ 10,730	\$ 10,730	\$ 3,000	\$ 60,200	20	\$ 420	\$ 15,050	\$ 193,300	\$ 4,100	3.2	\$ 1,290	5,550	\$ 0.74	N	
Reach 3	Site 13	Alternative C	Install riprap toe protection	\$ 53,540	\$ 16,060	\$ 16,060	\$ 4,500	\$ 90,200	30	\$ 630	\$ 45,100	\$ 330,300	\$ 6,900	3.2	\$ 2,160	5,550	\$ 1.24	N	
Reach 3	Site 13	Alternative D	Install willow stakes and live fascines	\$ 20,450	\$ 6,140	\$ 6,140	\$ 3,000	\$ 35,700	20	\$ 240	\$ 8,930	\$ 114,300	\$ 2,400	3.2	\$ 750	5,550	\$ 0.43	Y	
Reach 3	Site 14	Alternative A	Improve vegetation without grading	\$ 16,500	\$ 4,950	\$ 4,950	\$ -	\$ 26,400	10	\$ 410	\$ 6,600	\$ 120,400	\$ 2,500	1.4	\$ 1,810	2,410	\$ 1.04	Y	
Reach 3	Site 15	Alternative A	Clear trees and remove woody debris (14)	\$ -	\$ -	\$ -	\$ -	\$ -	20	\$ -	\$ -	\$ -	\$ -	0.0	--	0	--	Y	
Project-wide				Educational signage	\$ 2,500	\$ 750	\$ 750	\$ -	\$ 4,000	-	-	-	\$ 9,700	\$ 200	-	-	-	-	Y
				Environmental Planning and Reporting (15)	\$ -	\$ -	\$ -	\$ 44,000	\$ 44,000	-	-	-	\$ 106,800	\$ 2,200	-	-	-	-	-

Cost Summaries*

Lowest-cost feasible alternative at each site:	\$ 453,000	\$ 136,000	\$ 136,000	\$ 74,000	\$ 799,000		\$ 4,300		\$ 2,570,000	\$ 53,900	27.8	\$ 1,940	48,300	\$ 1.12
Recommended alternative at each site:	\$ 530,000	\$ 159,070	\$ 159,070	\$ 83,000	\$ 932,000		\$ 6,500		\$ 3,130,000	\$ 65,700	27.8	\$ 2,360	48,300	\$ 1.36
Highest-cost feasible alternative at each site:	\$ 773,000	\$ 232,000	\$ 232,000	\$ 94,000	\$ 1,330,000		\$ 8,100		\$ 4,340,000	\$ 91,100	27.8	\$ 3,280	48,300	\$ 1.89

* Costs may not sum due to rounding.

(1) A Class 4 screening-level opinion of probable cost, as defined by the American Association of Cost Engineers International (AACI International), has been prepared for these alternatives. The opinion of probable construction cost provided in this table is made based on Barr's experience and qualifications and represents our best judgment as experienced and qualified professionals familiar with the project. The cost opinion is based on project-related information available to Barr at this time and includes a conceptual-level design of the project.

(2) Assumed 30% contingency on construction costs.

(3) Assumed 30% of construction costs for design, permitting, and administration.

(4) See Table J-39 for assumptions. A portion of these costs may be eligible for reimbursement through an environmental grant program if a grant is pursued and successfully awarded.

(5) Includes estimated initial construction cost (with 30% contingency) and design, permitting, and administration costs (30% of construction cost).

(6) Many of the alternatives in this table are mutually exclusive. The total project cost will not be a sum of each of these alternatives, rather a sum of a unique combination of a portion of these alternatives.

(7) Estimated life span until significant maintenance is required.

(8) Assumed 50% of the initial establishment period maintenance for vegetation-only alternatives, 25% for all other alternatives. 2016 dollars.

(9) Assumed 50% of the original construction cost for hard armoring alternatives and 25% of the original construction cost for bioengineering alternatives. 2016 dollars.

(10) Future value of initial capital cost, annual maintenance cost, and major maintenance cost at end of expected life span.

(11) Assumes 3% inflation rate.

(12) Annualized 30-year future worth.

(13) Annualized cost divided by estimated annual pollution load reduction.

(14) Site 15 is considered a maintenance item rather than a stabilization measure and will be addressed separately by the City of Minneapolis. The total estimated cost is \$18,000.

(15) Costs to prepare contaminated soil management specifications, RAP and RAP implementation report; soil import or disposal characterization sampling, MPCA coordination and grant application assistance. See Table J-39 for assumptions. A portion of these costs may be eligible for reimbursement through an environmental grant program if a grant is pursued and successfully awarded.

Table J2: Preliminary Cost Estimate for Site 1, Alternative A

Abandon trail and move to higher elevation

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$3,752	\$3,750	10% of project cost
Erosion Control	LS	1	\$2,010	\$2,010	6% of primary item cost
Clearing and Grubbing	ACRE	0.2	\$7,000	\$1,290	
Select Tree Removal (>6")	EA	50	\$400	\$20,000	
Grading	SY	444	\$6	\$2,670	
Class V Aggregate	TON	74	\$50	\$3,700	
Topsoil Import	CY	74	\$33	\$2,440	
Plant Trees	EA	10	\$100	\$1,000	
Plant Shrubs	EA	20	\$50	\$1,000	
Seeding and Mulch	ACRE	0.1	\$8,000	\$730	
Erosion Control Blanket	SY	222	\$3	\$670	
Damage Repair	LS	1	\$670	\$670	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,340	\$1,340	4% of primary item cost
Total				\$ 41,270	
Contingency (30%)				\$ 12,380	
Subtotal				\$ 53,700	
Design, Permitting, and Administration (30%)				\$ 12,380	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 66,000	

30-yr and Annualized Cost analysis

Category:	General grading	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 200	10% of damage repair and maintenance
End of life span maintenance	\$ 6,600	10% of original project cost
Future Capital Cost	\$ 160,200	
Future annual maintenance	\$ 9,520	
Future end of life span cost	\$ 11,920	
Total Future Worth	\$ 181,600	
Annualized Cost	\$ 3,800	

Table J3: Preliminary Cost Estimate for Site 1, Alternative B

Design trail for submergence at high flows

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,164	\$2,160	10% of project cost
Control of Water	LS	1	\$746	\$750	4% of primary item cost
Erosion Control	LS	1	\$1,119	\$1,120	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$400	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Debris Removal	CY	23	\$10	\$230	
Grading	SY	278	\$6	\$1,670	
Furnish and Install Fieldstone Riprap	TON	97	\$100	\$9,720	
Geogrid Trail Stabilization	SY	111	\$20	\$2,220	
Topsoil Import	CY	23	\$33	\$760	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.03	\$8,000	\$230	
Erosion Control Blanket	SY	139	\$3	\$420	
Damage Repair	LS	1	\$373	\$370	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$746	\$750	4% of primary item cost
Total				\$ 23,800	
Contingency (30%)				\$ 7,140	
Subtotal				\$ 30,900	
Design, Permitting, and Administration (30%)				\$ 7,140	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 38,100	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 280	25% of damage repair and maintenance
End of life span maintenance	\$ 19,050	50% of original project cost
Future Capital Cost	\$ 92,500	
Future annual maintenance	\$ 13,320	
Future end of life span cost	\$ 34,410	
Total Future Worth	\$ 140,200	
Annualized Cost	\$ 2,900	

Table J4: Preliminary Cost Estimate for Site 2, Alternative A

Grade stream bank and vegetate

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$3,971	\$3,970	10% of project cost
Control of Water	LS	1	\$1,370	\$1,370	4% of primary item cost
Erosion Control	LS	1	\$2,054	\$2,050	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$840	
Select Tree Removal (>6")	EA	8	\$400	\$3,200	
Debris Removal	CY	97	\$10	\$970	
Grading	SY	583	\$6	\$3,500	
Excavation/Dispose of Contaminated Soil	CY	292	\$53	\$15,310	
Topsoil Import	CY	97	\$33	\$3,210	
Plant Trees	EA	20	\$100	\$2,000	
Plant Shrubs	EA	50	\$50	\$2,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$960	
Erosion Control Blanket	SY	583	\$3	\$1,750	
Damage Repair	LS	1	\$685	\$680	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,370	\$1,370	4% of primary item cost
Total				\$ 43,680	5 days @ \$1,500/day
Contingency (30%)				\$ 13,100	
Subtotal				\$ 56,800	
Design, Permitting, and Administration (30%)				\$ 13,100	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 77,400	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 510	25% of damage repair and maintenance
End of life span maintenance	\$ 19,350	25% of original project cost
Future Capital Cost	\$ 187,900	
Future annual maintenance	\$ 24,260	
Future end of life span cost	\$ 34,950	
Total Future Worth	\$ 247,100	
Annualized Cost	\$ 5,200	

Table J5: Preliminary Cost Estimate for Site 2, Alternative B

Install riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,198	\$1,200	10% of project cost
Control of Water	LS	1	\$413	\$410	4% of primary item cost
Erosion Control	LS	1	\$620	\$620	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$420	
Select Tree Removal (>6")	EA	4	\$400	\$1,600	
Grading	SY	292	\$6	\$1,750	
Furnish and Install Fieldstone Riprap	TON	41	\$100	\$4,080	
Plant Trees	EA	4	\$100	\$400	
Topsoil Import	CY	49	\$33	\$1,600	
Seeding and Mulch	ACRE	0.1	\$8,000	\$480	
Damage Repair	LS	1	\$207	\$210	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$413	\$410	4% of primary item cost
Total				\$ 13,180	
Contingency (30%)				\$ 3,950	
Subtotal				\$ 17,100	
Design, Permitting, and Administration (30%)				\$ 3,950	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 21,100	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 160	25% of damage repair and maintenance
End of life span maintenance	\$ 10,550	50% of original project cost
Future Capital Cost	\$ 51,200	
Future annual maintenance	\$ 7,610	
Future end of life span cost	\$ 19,050	
Total Future Worth	\$ 77,900	
Annualized Cost	\$ 1,600	

Table J6: Preliminary Cost Estimate for Site 3, Alternative A

Extend riprap to tie into historic wall

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$834	\$830	10% of project cost
Control of Water	LS	1	\$288	\$290	4% of primary item cost
Erosion Control	LS	1	\$431	\$430	6% of primary item cost
Clearing and Grubbing	ACRE	0.02	\$7,000	\$130	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Grading	SY	89	\$6	\$530	
Furnish and Install Fieldstone Riprap	TON	31	\$100	\$3,110	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.02	\$8,000	\$150	
Erosion Control Blanket	SY	89	\$3	\$270	
Damage Repair	LS	1	\$144	\$140	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$288	\$290	4% of primary item cost
Total				\$ 9,170	
Contingency (30%)				\$ 2,750	
Subtotal				\$ 11,900	
Design, Permitting, and Administration (30%)				\$ 2,750	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 14,700	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 110	25% of damage repair and maintenance
End of life span maintenance	\$ 7,350	50% of original project cost
Future Capital Cost	\$ 35,700	
Future annual maintenance	\$ 5,230	
Future end of life span cost	\$ 13,270	
Total Future Worth	\$ 54,200	
Annualized Cost	\$ 1,100	

Table J7: Preliminary Cost Estimate for Site 3, Alternative B

Install boulder or log vanes

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$873	\$870	10% of project cost
Control of Water	LS	1	\$301	\$300	4% of primary item cost
Erosion Control	LS	1	\$452	\$450	6% of primary item cost
Clearing and Grubbing	ACRE	0.01	\$7,000	\$60	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Grading	SY	44	\$6	\$270	
Rock Boulder Vane	EA	2	\$2,000	\$4,000	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.01	\$8,000	\$70	
Erosion Control Blanket	SY	44	\$3	\$130	
Damage Repair	LS	1	\$151	\$150	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$301	\$300	4% of primary item cost
Total				\$ 9,600	
Contingency (30%)				\$ 2,880	
Subtotal				\$ 12,500	
Design, Permitting, and Administration (30%)				\$ 2,880	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 15,400	

30-yr and Annualized Cost analysis

Category:	Rock vanes	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 110	25% of damage repair and maintenance
End of life span maintenance	\$ 7,700	50% of original project cost
Future Capital Cost	\$ 37,400	
Future annual maintenance	\$ 5,230	
Future end of life span cost	\$ 13,910	
Total Future Worth	\$ 56,500	
Annualized Cost	\$ 1,200	

Table J8: Preliminary Cost Estimate for Site 4, Alternative A

Replace swale with catch basin, culvert & FES

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,243	\$1,240	10% of project cost
Control of Water	LS	1	\$429	\$430	4% of primary item cost
Erosion Control	LS	1	\$643	\$640	6% of primary item cost
Clearing and Grubbing	ACRE	0.01	\$7,000	\$60	
Grading	SY	44	\$6	\$270	
Install catch basin, culvert & FES	LS	1	\$8,000	\$8,000	
Furnish and Install Fieldstone Riprap	TON	16	\$100	\$1,560	
Topsoil Import	CY	4	\$33	\$120	
Plant Trees	EA	3	\$100	\$300	
Plant Shrubs	EA	6	\$50	\$300	
Seeding and Mulch	ACRE	0.005	\$8,000	\$40	
Erosion Control Blanket	SY	22	\$3	\$70	
Damage Repair	LS	1	\$214	\$210	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$429	\$430	4% of primary item cost
Total				\$ 13,670	
Contingency (30%)				\$ 4,100	
Subtotal				\$ 17,800	
Design, Permitting, and Administration (30%)				\$ 4,100	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 21,900	

30-yr and Annualized Cost analysis

Category:	Storm sewer	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 160	25% of damage repair and maintenance
End of life span maintenance	\$ 10,950	50% of original project cost
Future Capital Cost	\$ 53,200	
Future annual maintenance	\$ 7,610	
Future end of life span cost	\$ 19,780	
Total Future Worth	\$ 80,600	
Annualized Cost	\$ 1,700	

Table J9: Preliminary Cost Estimate for Site 4, Alternative B

Install boulder cross vane

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$564	\$560	10% of project cost
Control of Water	LS	1	\$195	\$190	4% of primary item cost
Erosion Control	LS	1	\$292	\$290	6% of primary item cost
Clearing and Grubbing	ACRE	0.005	\$7,000	\$30	
Grading	SY	22	\$6	\$130	
Rock Boulder Cross-vane	EA	1	\$4,000	\$4,000	
Plant Trees	EA	3	\$100	\$300	
Plant Shrubs	EA	6	\$50	\$300	
Seeding and Mulch	ACRE	0.005	\$8,000	\$40	
Erosion Control Blanket	SY	22	\$3	\$70	
Damage Repair	LS	1	\$97	\$100	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$195	\$190	4% of primary item cost
			Total	\$ 6,200	
			Contingency (30%)	\$ 1,860	
			Subtotal	\$ 8,100	
			Design, Permitting, and Administration (30%)	\$ 1,860	
			Environmental Oversight	\$ -	
			Total w/ Contingency & Engineering	\$ 9,900	

30-yr and Annualized Cost analysis

Category:	Rock vanes	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 70	25% of damage repair and maintenance
End of life span maintenance	\$ 4,950	50% of original project cost
Future Capital Cost	\$ 24,000	
Future annual maintenance	\$ 3,330	
Future end of life span cost	\$ 8,940	
Total Future Worth	\$ 36,300	
Annualized Cost	\$ 800	

Table J10: Preliminary Cost Estimate for Site 4, Alternative C

Install riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,730	\$1,730	10% of project cost
Control of Water	LS	1	\$596	\$600	4% of primary item cost
Erosion Control	LS	1	\$895	\$890	6% of primary item cost
Clearing and Grubbing	ACRE	0.03	\$7,000	\$190	
Select Tree Removal (>6")	EA	1	\$400	\$400	
Debris Removal	CY	11	\$10	\$110	
Grading	SY	133	\$6	\$800	
Excavation/Dispose of Contaminated Soil	CY	89	\$53	\$4,670	
Furnish and Install Fieldstone Riprap	TON	47	\$100	\$4,670	
Topsoil Import	CY	67	\$33	\$2,200	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	15	\$50	\$750	
Seeding and Mulch	ACRE	0.03	\$8,000	\$220	
Erosion Control Blanket	SY	133	\$3	\$400	
Damage Repair	LS	1	\$298	\$300	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$596	\$600	4% of primary item cost
Total				\$ 19,030	3 days @ \$1,500/day
Contingency (30%)				\$ 5,710	
Subtotal				\$ 24,700	
Design, Permitting, and Administration (30%)				\$ 5,710	
Environmental Oversight				\$ 4,500	
Total w/ Contingency & Engineering				\$ 35,000	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 230	25% of damage repair and maintenance
End of life span maintenance	\$ 17,500	50% of original project cost
Future Capital Cost	\$ 85,000	
Future annual maintenance	\$ 10,940	
Future end of life span cost	\$ 31,610	
Total Future Worth	\$ 127,600	
Annualized Cost	\$ 2,700	

Table J11: Preliminary Cost Estimate for Site 5, Alternative A

Install boulder or log vanes

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,096	\$2,100	10% of project cost
Control of Water	LS	1	\$723	\$720	4% of primary item cost
Erosion Control	LS	1	\$1,085	\$1,080	6% of primary item cost
Clearing and Grubbing	ACRE	0.02	\$7,000	\$130	
Select Tree Removal (>6")	EA	2	\$400	\$800	
Grading	SY	89	\$6	\$530	
Rock Boulder Cross-vane	EA	4	\$4,000	\$16,000	
Plant Trees	EA	2	\$100	\$200	
Seeding and Mulch	ACRE	0.02	\$8,000	\$150	
Erosion Control Blanket	SY	89	\$3	\$270	
Damage Repair	LS	1	\$362	\$360	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$723	\$720	4% of primary item cost
Total				\$ 23,060	
Contingency (30%)				\$ 6,920	
Subtotal				\$ 30,000	
Design, Permitting, and Administration (30%)				\$ 6,920	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 36,900	

30-yr and Annualized Cost analysis

Category:	Rock vanes	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 270	25% of damage repair and maintenance
End of life span maintenance	\$ 18,450	50% of original project cost
Future Capital Cost	\$ 89,600	
Future annual maintenance	\$ 12,850	
Future end of life span cost	\$ 33,320	
Total Future Worth	\$ 135,800	
Annualized Cost	\$ 2,900	

Table J12: Preliminary Cost Estimate for Site 5, Alternative B

Install composite rock/wood bankfull bench

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$3,485	\$3,490	10% of project cost
Control of Water	LS	1	\$1,202	\$1,200	4% of primary item cost
Erosion Control	LS	1	\$1,803	\$1,800	6% of primary item cost
Clearing and Grubbing	ACRE	0.03	\$7,000	\$200	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Debris Removal	CY	12	\$10	\$120	
Grading	SY	139	\$6	\$830	
Composite rock/wood bank protection	LF	125	\$200	\$25,000	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	15	\$50	\$750	
Seeding and Mulch	ACRE	0.03	\$8,000	\$230	
Erosion Control Blanket	SY	139	\$3	\$420	
Damage Repair	LS	1	\$601	\$600	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,202	\$1,200	4% of primary item cost
Total				\$ 38,340	
Contingency (30%)				\$ 11,500	
Subtotal				\$ 49,800	
Design, Permitting, and Administration (30%)				\$ 11,500	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 61,300	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 450	25% of damage repair and maintenance
End of life span maintenance	\$ 15,330	25% of original project cost
Future Capital Cost	\$ 148,800	
Future annual maintenance	\$ 21,410	
Future end of life span cost	\$ 27,690	
Total Future Worth	\$ 197,900	
Annualized Cost	\$ 4,200	

Table J13: Preliminary Cost Estimate for Site 5, Alternative C

Install VRSS and riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,491	\$2,490	10% of project cost
Control of Water	LS	1	\$859	\$860	4% of primary item cost
Erosion Control	LS	1	\$1,288	\$1,290	6% of primary item cost
Clearing and Grubbing	ACRE	0.03	\$7,000	\$200	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Debris Removal	CY	12	\$10	\$120	
Grading	SY	139	\$6	\$830	
Furnish and Install Fieldstone Riprap	TON	49	\$100	\$4,860	
Vegetated Reinforced Soil Slope	SF	250	\$40	\$10,000	
Import Granular Fill	CY	46	\$10	\$460	
Topsoil Import	CY	23	\$33	\$760	
Plant Trees	EA	8	\$100	\$800	
Plant Shrubs	EA	20	\$50	\$1,000	
Seeding and Mulch	ACRE	0.03	\$8,000	\$230	
Erosion Control Blanket	SY	69	\$3	\$210	
Damage Repair	LS	1	\$429	\$430	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$859	\$860	4% of primary item cost
Total				\$ 27,400	
Contingency (30%)				\$ 8,220	
Subtotal				\$ 35,600	
Design, Permitting, and Administration (30%)				\$ 8,220	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 43,800	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 320	25% of damage repair and maintenance
End of life span maintenance	\$ 10,950	25% of original project cost
Future Capital Cost	\$ 106,300	
Future annual maintenance	\$ 15,220	
Future end of life span cost	\$ 19,780	
Total Future Worth	\$ 141,300	
Annualized Cost	\$ 3,000	

Table J14: Preliminary Cost Estimate for Site 6, Alternative A

Grade stream bank and vegetate

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$16,533	\$16,530	10% of project cost
Control of Water	LS	1	\$5,701	\$5,700	4% of primary item cost
Erosion Control	LS	1	\$8,552	\$8,550	6% of primary item cost
Clearing and Grubbing	ACRE	0.3	\$7,000	\$1,770	
Select Tree Removal (>6")	EA	33	\$400	\$13,200	
Debris Removal	CY	204	\$10	\$2,040	
Remove/Replace Chain Link Fence	LF	550	\$5	\$2,750	
Grading	SY	1222	\$6	\$7,330	
Excavation/Dispose of Contaminated Soil	CY	1222	\$53	\$64,170	
Stabilize Contaminated Soil	CY	306	\$30	\$9,170	
Furnish and Install Fieldstone Riprap	TON	214	\$100	\$21,390	
Topsoil Import	CY	204	\$33	\$6,720	
Plant Trees	EA	33	\$100	\$3,300	
Plant Shrubs	EA	100	\$50	\$5,000	
Seeding and Mulch	ACRE	0.3	\$8,000	\$2,020	
Erosion Control Blanket	SY	1222	\$3	\$3,670	
Damage Repair	LS	1	\$2,851	\$2,850	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$5,701	\$5,700	4% of primary item cost
Total				\$ 181,860	10 days @ \$1,500/day
Contingency (30%)				\$ 54,560	
Subtotal				\$ 236,400	
Design, Permitting, and Administration (30%)				\$ 54,560	
Environmental Oversight				\$ 15,000	
Total w/ Contingency & Engineering				\$ 306,000	

30-yr and Annualized Cost analysis

Category:	General grading	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 860	10% of damage repair and maintenance
End of life span maintenance	\$ 30,600	10% of original project cost
Future Capital Cost	\$ 742,700	
Future annual maintenance	\$ 40,910	
Future end of life span cost	\$ 55,270	
Total Future Worth	\$ 838,900	
Annualized Cost	\$ 17,600	

Table J15: Preliminary Cost Estimate for Site 6, Alternative B

Install VRSS and riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$18,471	\$18,470	10% of project cost
Control of Water	LS	1	\$6,370	\$6,370	4% of primary item cost
Erosion Control	LS	1	\$9,554	\$9,550	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$880	
Select Tree Removal (>6")	EA	25	\$400	\$10,000	
Debris Removal	CY	204	\$10	\$2,040	
Remove/Replace Chain Link Fence	LF	550	\$5	\$2,750	
Grading	SY	611	\$6	\$3,670	
Excavation/Dispose of Contaminated Soil	CY	611	\$53	\$32,080	
Stabilize Contaminated Soil	CY	153	\$30	\$4,580	
Import Granular Fill	CY	306	\$10	\$3,060	
Furnish and Install Fieldstone Riprap	TON	214	\$100	\$21,390	
Vegetated Reinforced Soil Slope	SF	1650	\$40	\$66,000	
Topsoil Import	CY	102	\$33	\$3,360	
Plant Trees	EA	25	\$100	\$2,500	
Plant Shrubs	EA	100	\$50	\$5,000	
Seeding and Mulch	ACRE	0.1	\$8,000	\$1,010	
Erosion Control Blanket	SY	306	\$3	\$920	
Damage Repair	LS	1	\$3,185	\$3,180	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$6,370	\$6,370	4% of primary item cost
Total				\$ 203,180	8 days @ \$1,500/day
Contingency (30%)				\$ 60,950	
Subtotal				\$ 264,100	
Design, Permitting, and Administration (30%)				\$ 60,950	
Environmental Oversight				\$ 12,000	
Total w/ Contingency & Engineering				\$ 337,100	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 2,390	25% of damage repair and maintenance
End of life span maintenance	\$ 84,280	25% of original project cost
Future Capital Cost	\$ 818,200	
Future annual maintenance	\$ 113,710	
Future end of life span cost	\$ 152,220	
Total Future Worth	\$ 1,084,100	
Annualized Cost	\$ 22,800	

Table J16: Preliminary Cost Estimate for Site 6, Alternative C

Install boulder wall

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$19,319	\$19,320	10% of project cost
Control of Water	LS	1	\$6,662	\$6,660	4% of primary item cost
Erosion Control	LS	1	\$9,993	\$9,990	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$880	
Select Tree Removal (>6")	EA	25	\$400	\$10,000	
Debris Removal	CY	204	\$10	\$2,040	
Remove/Replace Chain Link Fence	LF	550	\$5	\$2,750	
Grading	SY	611	\$6	\$3,670	
Excavation/Dispose of Contaminated Soil	CY	306	\$53	\$16,040	
Stabilize Contaminated Soil	CY	76	\$30	\$2,290	
Import Granular Fill	CY	153	\$10	\$1,530	
Furnish and Install Fieldstone Riprap	TON	86	\$100	\$8,560	
Rock boulder wall	LF	550	\$200	\$110,000	
Topsoil Import	CY	102	\$33	\$3,360	
Plant Trees	EA	25	\$100	\$2,500	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$510	
Erosion Control Blanket	SY	306	\$3	\$920	
Damage Repair	LS	1	\$3,331	\$3,330	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$6,662	\$6,660	4% of primary item cost
Total				\$ 212,510	
Contingency (30%)				\$ 63,750	
Subtotal				\$ 276,300	
Design, Permitting, and Administration (30%)				\$ 63,750	
Environmental Oversight				\$ 7,500	5 days @ \$1,500/day
Total w/ Contingency & Engineering				\$ 347,500	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 2,500	25% of damage repair and maintenance
End of life span maintenance	\$ 173,750	50% of original project cost
Future Capital Cost	\$ 843,500	
Future annual maintenance	\$ 118,940	
Future end of life span cost	\$ 313,810	
Total Future Worth	\$ 1,276,300	
Annualized Cost	\$ 26,800	

Table J17: Preliminary Cost Estimate for Site 7, Alternative A

Install fieldstone riprap to create riffle-pool structure

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$7,735	\$7,740	10% of project cost
Control of Water	LS	1	\$2,668	\$2,670	4% of primary item cost
Erosion Control	LS	1	\$4,001	\$4,000	6% of primary item cost
Clearing and Grubbing	ACRE	0.02	\$7,000	\$160	
Select Tree Removal (>6")	EA	20	\$400	\$8,000	
Debris Removal	CY	148	\$10	\$1,480	
Grading	SY	444	\$6	\$2,670	
Excavation/Dispose of Contaminated Soil	CY	148	\$53	\$7,780	
Stabilize Contaminated Soil	CY	37	\$30	\$1,110	
Furnish and Install Fieldstone Riprap	TON	415	\$100	\$41,480	
Plant Trees	EA	20	\$100	\$2,000	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.02	\$8,000	\$180	
Erosion Control Blanket	SY	111	\$3	\$330	
Damage Repair	LS	1	\$1,331	\$1,330	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$2,661	\$2,660	4% of primary item cost
Total				\$ 85,090	5 days @ \$1,500/day
Contingency (30%)				\$ 25,530	
Subtotal				\$ 110,600	
Design, Permitting, and Administration (30%)				\$ 25,530	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 143,700	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 1,000	25% of damage repair and maintenance
End of life span maintenance	\$ 35,930	25% of original project cost
Future Capital Cost	\$ 348,800	
Future annual maintenance	\$ 47,580	
Future end of life span cost	\$ 64,890	
Total Future Worth	\$ 461,300	
Annualized Cost	\$ 9,700	

Table J18: Preliminary Cost Estimate for Site 7, Alternative B

Install boulder and/or log vanes to create step-pool structure

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$6,421	\$6,420	10% of project cost
Control of Water	LS	1	\$2,214	\$2,210	4% of primary item cost
Erosion Control	LS	1	\$3,322	\$3,320	6% of primary item cost
Clearing and Grubbing	ACRE	0.01	\$7,000	\$80	
Select Tree Removal (>6")	EA	15	\$400	\$6,000	
Debris Removal	CY	74	\$10	\$740	
Grading	SY	222	\$6	\$1,330	
Excavation/Dispose of Contaminated Soil	CY	74	\$53	\$3,890	
Stabilize Contaminated Soil	CY	19	\$30	\$560	
Rock Boulder Cross-Vane	EA	10	\$4,000	\$40,000	
Plant Trees	EA	15	\$100	\$1,500	
Plant Shrubs	EA	20	\$50	\$1,000	
Seeding and Mulch	ACRE	0.01	\$8,000	\$90	
Erosion Control Blanket	SY	56	\$3	\$170	
Damage Repair	LS	1	\$1,106	\$1,110	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$2,211	\$2,210	4% of primary item cost
Total				\$ 70,630	5 days @ \$1,500/day
Contingency (30%)				\$ 21,190	
Subtotal				\$ 91,800	
Design, Permitting, and Administration (30%)				\$ 21,190	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 120,500	

30-yr and Annualized Cost analysis

Category:	Rock vanes	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 830	25% of damage repair and maintenance
End of life span maintenance	\$ 60,250	50% of original project cost
Future Capital Cost	\$ 292,500	
Future annual maintenance	\$ 39,490	
Future end of life span cost	\$ 108,820	
Total Future Worth	\$ 440,800	
Annualized Cost	\$ 9,300	

Table J19: Preliminary Cost Estimate for Site 8, Alternative A

Remove debris and stabilize top of bank

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,185	\$2,190	10% of project cost
Erosion Control	LS	1	\$1,171	\$1,170	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$680	
Select Tree Removal (>6")	EA	8	\$400	\$3,200	
Grading	SY	472	\$6	\$2,830	
Topsoil Import	CY	79	\$33	\$2,600	
Plant Trees	EA	30	\$100	\$3,000	
Plant Shrubs	EA	100	\$50	\$5,000	
Seeding and Mulch	ACRE	0.1	\$8,000	\$780	
Erosion Control Blanket	SY	472	\$3	\$1,420	
Damage Repair	LS	1	\$390	\$390	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$780	\$780	4% of primary item cost
Total				\$ 24,040	
Contingency (30%)				\$ 7,210	
Subtotal				\$ 31,300	
Design, Permitting, and Administration (30%)				\$ 7,210	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 38,500	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 290	25% of damage repair and maintenance
End of life span maintenance	\$ 9,630	25% of original project cost
Future Capital Cost	\$ 93,400	
Future annual maintenance	\$ 13,800	
Future end of life span cost	\$ 17,390	
Total Future Worth	\$ 124,600	
Annualized Cost	\$ 2,600	

Table J20: Preliminary Cost Estimate for Site 8, Alternative B

Install buffer strip at top of bank

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$4,678	\$4,680	10% of project cost
Erosion Control	LS	1	\$2,506	\$2,510	6% of primary item cost
Clearing and Grubbing	ACRE	0.4	\$7,000	\$2,730	
Select Tree Removal (>6")	EA	8	\$400	\$3,200	
Debris Removal	CY	157	\$10	\$1,570	
Grading	SY	1889	\$6	\$11,330	
Topsoil Import	CY	315	\$33	\$10,390	
Plant Trees	EA	30	\$100	\$3,000	
Plant Shrubs	EA	100	\$50	\$5,000	
Seeding and Mulch	ACRE	0.4	\$8,000	\$3,120	
Erosion Control Blanket	SY	472	\$3	\$1,420	
Damage Repair	LS	1	\$835	\$840	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,670	\$1,670	4% of primary item cost
Total				\$ 51,460	
Contingency (30%)				\$ 15,440	
Subtotal				\$ 66,900	
Design, Permitting, and Administration (30%)				\$ 15,440	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 82,300	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 630	25% of damage repair and maintenance
End of life span maintenance	\$ 20,580	25% of original project cost
Future Capital Cost	\$ 199,800	
Future annual maintenance	\$ 29,970	
Future end of life span cost	\$ 37,170	
Total Future Worth	\$ 266,900	
Annualized Cost	\$ 5,600	

Table J21: Preliminary Cost Estimate for Site 9, Alternative A

Grade stream bank and vegetate

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$7,144	\$7,140	10% of project cost
Control of Water	LS	1	\$2,464	\$2,460	4% of primary item cost
Erosion Control	LS	1	\$3,695	\$3,700	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$960	
Select Tree Removal (>6")	EA	12	\$400	\$4,800	
Debris Removal	CY	56	\$10	\$560	
Grading	SY	667	\$6	\$4,000	
Excavation/Dispose of Contaminated Soil	CY	667	\$53	\$35,000	
Stabilize Contaminated Soil	CY	167	\$30	\$5,000	
Topsoil Import	CY	111	\$33	\$3,670	
Plant Trees	EA	20	\$100	\$2,000	
Plant Shrubs	EA	50	\$50	\$2,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$1,100	
Erosion Control Blanket	SY	667	\$3	\$2,000	
Damage Repair	LS	1	\$1,232	\$1,230	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$2,464	\$2,460	4% of primary item cost
Total				\$ 78,580	5 days @ \$1,500/day
Contingency (30%)				\$ 23,570	
Subtotal				\$ 102,200	
Design, Permitting, and Administration (30%)				\$ 23,570	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 133,200	

30-yr and Annualized Cost analysis

Category:	General grading	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 370	10% of damage repair and maintenance
End of life span maintenance	\$ 13,320	10% of original project cost
Future Capital Cost	\$ 323,300	
Future annual maintenance	\$ 17,600	
Future end of life span cost	\$ 24,060	
Total Future Worth	\$ 365,000	
Annualized Cost	\$ 7,700	

Table J22: Preliminary Cost Estimate for Site 9, Alternative B

Install root wads

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,506	\$2,510	10% of project cost
Control of Water	LS	1	\$864	\$860	4% of primary item cost
Erosion Control	LS	1	\$1,297	\$1,300	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$480	
Select Tree Removal (>6")	EA	6	\$400	\$2,400	
Grading	SY	333	\$6	\$2,000	
Root Wads	LF	15	\$750	\$11,250	
Topsoil Import	CY	56	\$33	\$1,830	
Plant Trees	EA	6	\$100	\$600	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$550	
Erosion Control Blanket	SY	333	\$3	\$1,000	
Damage Repair	LS	1	\$432	\$430	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$864	\$860	4% of primary item cost
Total				\$ 27,570	
Contingency (30%)				\$ 8,270	
Subtotal				\$ 35,800	
Design, Permitting, and Administration (30%)				\$ 8,270	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 44,100	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 320	25% of damage repair and maintenance
End of life span maintenance	\$ 11,030	25% of original project cost
Future Capital Cost	\$ 107,000	
Future annual maintenance	\$ 15,220	
Future end of life span cost	\$ 19,920	
Total Future Worth	\$ 142,100	
Annualized Cost	\$ 3,000	

Table J23: Preliminary Cost Estimate for Site 9, Alternative C

Install riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$2,941	\$2,940	10% of project cost
Control of Water	LS	1	\$1,014	\$1,010	4% of primary item cost
Erosion Control	LS	1	\$1,522	\$1,520	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$480	
Select Tree Removal (>6")	EA	6	\$400	\$2,400	
Grading	SY	333	\$6	\$2,000	
Excavation/Dispose of Contaminated Soil	CY	83	\$53	\$4,380	
Stabilize Contaminated Soil	CY	21	\$30	\$630	
Furnish and Install Fieldstone Riprap	TON	117	\$100	\$11,670	
Topsoil Import	CY	28	\$33	\$920	
Plant Trees	EA	6	\$100	\$600	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.03	\$8,000	\$280	
Erosion Control Blanket	SY	167	\$3	\$500	
Damage Repair	LS	1	\$507	\$510	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,014	\$1,010	4% of primary item cost
Total				\$ 32,350	2 days @ \$1,500/day
Contingency (30%)				\$ 9,710	
Subtotal				\$ 42,100	
Design, Permitting, and Administration (30%)				\$ 9,710	
Environmental Oversight				\$ 3,000	
Total w/ Contingency & Engineering				\$ 54,800	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 380	25% of damage repair and maintenance
End of life span maintenance	\$ 27,400	50% of original project cost
Future Capital Cost	\$ 133,000	
Future annual maintenance	\$ 18,080	
Future end of life span cost	\$ 49,490	
Total Future Worth	\$ 200,600	
Annualized Cost	\$ 4,200	

Table J24: Preliminary Cost Estimate for Site 9, Alternative D

Install willow stakes and live fascines

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,251	\$1,250	10% of project cost
Control of Water	LS	1	\$431	\$430	4% of primary item cost
Erosion Control	LS	1	\$647	\$650	6% of primary item cost
Clearing and Grubbing	ACRE	0.07	\$7,000	\$480	
Select Tree Removal (>6")	EA	4	\$400	\$1,600	
Live stakes	EA	150	\$5	\$750	
Live fascine	LF	300	\$15	\$4,500	
Plant Trees	EA	4	\$100	\$400	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.07	\$8,000	\$550	
Erosion Control Blanket	SY	333	\$3	\$1,000	
Damage Repair	LS	1	\$216	\$220	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$431	\$430	4% of primary item cost
Total				\$ 13,760	
Contingency (30%)				\$ 4,130	
Subtotal				\$ 17,900	
Design, Permitting, and Administration (30%)				\$ 4,130	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 22,000	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 160	25% of damage repair and maintenance
End of life span maintenance	\$ 5,500	25% of original project cost
Future Capital Cost	\$ 53,400	
Future annual maintenance	\$ 7,610	
Future end of life span cost	\$ 9,930	
Total Future Worth	\$ 70,900	
Annualized Cost	\$ 1,500	

Table J25: Preliminary Cost Estimate for Site 10, Alternative A

Lower culvert

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,137	\$1,140	10% of project cost
Control of Water	LS	1	\$392	\$390	4% of primary item cost
Erosion Control	LS	1	\$588	\$590	6% of primary item cost
Clearing and Grubbing	ACRE	0.01	\$7,000	\$80	
Select Tree Removal (>6")	EA	2	\$400	\$800	
Grading	SY	56	\$6	\$330	
Remove and Replace Culvert	LF	50	\$100	\$5,000	
Furnish and Install Fieldstone Riprap	TON	8	\$100	\$780	
Remove/Replace Bituminous Pavement	SY	44	\$45	\$2,000	
Topsoil Import	CY	2	\$33	\$60	
Plant Trees	EA	2	\$100	\$200	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.002	\$8,000	\$20	
Erosion Control Blanket	SY	11	\$3	\$30	
Damage Repair	LS	1	\$196	\$200	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$392	\$390	4% of primary item cost
Total				\$ 12,510	
Contingency (30%)				\$ 3,750	
Subtotal				\$ 16,300	
Design, Permitting, and Administration (30%)				\$ 3,750	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 20,000	

30-yr and Annualized Cost analysis

Category:	Storm sewer	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 150	25% of damage repair and maintenance
End of life span maintenance	\$ 10,000	50% of original project cost
Future Capital Cost	\$ 48,500	
Future annual maintenance	\$ 7,140	
Future end of life span cost	\$ 18,060	
Total Future Worth	\$ 73,700	
Annualized Cost	\$ 1,500	

Table J26: Preliminary Cost Estimate for Site 10, Alternative B

Shorten culvert and add riprap

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$271	\$270	10% of project cost
Control of Water	LS	1	\$94	\$90	4% of primary item cost
Erosion Control	LS	1	\$140	\$140	6% of primary item cost
Clearing and Grubbing	ACRE	0.002	\$7,000	\$20	
Select Tree Removal (>6")	EA	2	\$400	\$800	
Grading	SY	11	\$6	\$70	
Remove culvert	LF	10	\$25	\$250	
Furnish and Install Fieldstone Riprap	TON	4	\$100	\$390	
Topsoil Import	CY	2	\$33	\$60	
Plant Trees	EA	2	\$100	\$200	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.002	\$8,000	\$20	
Erosion Control Blanket	SY	11	\$3	\$30	
Damage Repair	LS	1	\$47	\$50	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$94	\$90	4% of primary item cost
Total				\$ 2,980	
Contingency (30%)				\$ 890	
Subtotal				\$ 3,900	
Design, Permitting, and Administration (30%)				\$ 890	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 4,800	

30-yr and Annualized Cost analysis

Category:	Storm sewer	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 40	25% of damage repair and maintenance
End of life span maintenance	\$ 2,400	50% of original project cost
Future Capital Cost	\$ 11,700	
Future annual maintenance	\$ 1,900	
Future end of life span cost	\$ 4,330	
Total Future Worth	\$ 17,900	
Annualized Cost	\$ 400	

Table J27: Preliminary Cost Estimate for Site 11, Alternative A

Lower culvert, add catch basin

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,397	\$1,400	10% of project cost
Control of Water	LS	1	\$482	\$480	4% of primary item cost
Erosion Control	LS	1	\$723	\$720	6% of primary item cost
Clearing and Grubbing	ACRE	0.005	\$7,000	\$30	
Select Tree Removal (>6")	EA	4	\$400	\$1,600	
Grading	SY	22	\$6	\$130	
Remove culvert	LF	20	\$25	\$500	
Install catch basin, culvert & FES	LS	1	\$8,000	\$8,000	
Furnish and Install Fieldstone Riprap	TON	8	\$100	\$780	
Topsoil Import	CY	2	\$33	\$60	
Plant Trees	EA	4	\$100	\$400	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.002	\$8,000	\$20	
Erosion Control Blanket	SY	11	\$3	\$30	
Damage Repair	LS	1	\$241	\$240	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$482	\$480	4% of primary item cost
Total				\$ 15,370	
Contingency (30%)				\$ 4,610	
Subtotal				\$ 20,000	
Design, Permitting, and Administration (30%)				\$ 4,610	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 24,600	

30-yr and Annualized Cost analysis

Category:	Storm sewer	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 180	25% of damage repair and maintenance
End of life span maintenance	\$ 12,300	50% of original project cost
Future Capital Cost	\$ 59,700	
Future annual maintenance	\$ 8,560	
Future end of life span cost	\$ 22,220	
Total Future Worth	\$ 90,500	
Annualized Cost	\$ 1,900	

Table J28: Preliminary Cost Estimate for Site 11, Alternative B

Add riprap at existing culvert

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$288	\$290	10% of project cost
Control of Water	LS	1	\$99	\$100	4% of primary item cost
Erosion Control	LS	1	\$149	\$150	6% of primary item cost
Clearing and Grubbing	ACRE	0.002	\$7,000	\$20	
Select Tree Removal (>6")	EA	2	\$400	\$800	
Grading	SY	11	\$6	\$70	
Furnish and Install Fieldstone Riprap	TON	8	\$100	\$780	
Topsoil Import	CY	2	\$33	\$60	
Plant Trees	EA	2	\$100	\$200	
Plant Shrubs	EA	10	\$50	\$500	
Seeding and Mulch	ACRE	0.002	\$8,000	\$20	
Erosion Control Blanket	SY	11	\$3	\$30	
Damage Repair	LS	1	\$50	\$50	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$99	\$100	4% of primary item cost
Total				\$ 3,170	
Contingency (30%)				\$ 950	
Subtotal				\$ 4,100	
Design, Permitting, and Administration (30%)				\$ 950	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 5,100	

30-yr and Annualized Cost analysis

Category:	Storm sewer	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 40	25% of damage repair and maintenance
End of life span maintenance	\$ 2,550	50% of original project cost
Future Capital Cost	\$ 12,400	
Future annual maintenance	\$ 1,900	
Future end of life span cost	\$ 4,610	
Total Future Worth	\$ 18,900	
Annualized Cost	\$ 400	

Table J29: Preliminary Cost Estimate for Site 12, Alternative A

Grade stream bank and vegetate

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$4,544	\$4,540	10% of project cost
Control of Water	LS	1	\$1,567	\$1,570	4% of primary item cost
Erosion Control	LS	1	\$2,350	\$2,350	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$610	
Select Tree Removal (>6")	EA	24	\$400	\$9,600	
Debris Removal	CY	35	\$10	\$350	
Grading	SY	422	\$6	\$2,530	
Excavation/Dispose of Contaminated Soil	CY	281	\$53	\$14,780	
Stabilize Contaminated Soil	CY	70	\$30	\$2,110	
Topsoil Import	CY	70	\$33	\$2,320	
Plant Trees	EA	24	\$100	\$2,400	
Plant Shrubs	EA	50	\$50	\$2,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$700	
Erosion Control Blanket	SY	422	\$3	\$1,270	
Damage Repair	LS	1	\$783	\$780	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,567	\$1,570	4% of primary item cost
Total				\$ 49,980	5 days @ \$1,500/day
Contingency (30%)				\$ 14,990	
Subtotal				\$ 65,000	
Design, Permitting, and Administration (30%)				\$ 14,990	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 87,500	

30-yr and Annualized Cost analysis

Category:	General grading	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 240	10% of damage repair and maintenance
End of life span maintenance	\$ 8,750	10% of original project cost
Future Capital Cost	\$ 212,400	
Future annual maintenance	\$ 11,420	
Future end of life span cost	\$ 15,800	
Total Future Worth	\$ 239,600	
Annualized Cost	\$ 5,000	

Table J30: Preliminary Cost Estimate for Site 12, Alternative B

Install VRSS

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$8,581	\$8,580	10% of project cost
Control of Water	LS	1	\$2,959	\$2,960	4% of primary item cost
Erosion Control	LS	1	\$4,438	\$4,440	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$610	
Select Tree Removal (>6")	EA	20	\$400	\$8,000	
Debris Removal	CY	35	\$10	\$350	
Grading	SY	422	\$6	\$2,530	
Excavation/Dispose of Contaminated Soil	CY	141	\$53	\$7,390	
Stabilize Contaminated Soil	CY	35	\$30	\$1,060	
Import Granular Fill	CY	70	\$10	\$700	
Furnish and Install Fieldstone Riprap	TON	148	\$100	\$14,780	
Vegetated Reinforced Soil Slope	SF	760	\$40	\$30,400	
Topsoil Import	CY	70	\$33	\$2,320	
Plant Trees	EA	20	\$100	\$2,000	
Plant Shrubs	EA	50	\$50	\$2,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$700	
Erosion Control Blanket	SY	211	\$3	\$630	
Damage Repair	LS	1	\$1,479	\$1,480	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$2,959	\$2,960	4% of primary item cost
Total				\$ 94,390	5 days @ \$1,500/day
Contingency (30%)				\$ 28,320	
Subtotal				\$ 122,700	
Design, Permitting, and Administration (30%)				\$ 28,320	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 158,500	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 1,110	25% of damage repair and maintenance
End of life span maintenance	\$ 39,630	25% of original project cost
Future Capital Cost	\$ 384,700	
Future annual maintenance	\$ 52,810	
Future end of life span cost	\$ 71,580	
Total Future Worth	\$ 509,100	
Annualized Cost	\$ 10,700	

Table J31: Preliminary Cost Estimate for Site 12, Alternative C

Install riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$3,816	\$3,820	10% of project cost
Control of Water	LS	1	\$1,316	\$1,320	4% of primary item cost
Erosion Control	LS	1	\$1,973	\$1,970	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$610	
Select Tree Removal (>6")	EA	10	\$400	\$4,000	
Grading	SY	422	\$6	\$2,530	
Excavation/Dispose of Contaminated Soil	CY	106	\$53	\$5,540	
Stabilize Contaminated Soil	CY	26	\$30	\$790	
Furnish and Install Fieldstone Riprap	TON	148	\$100	\$14,780	
Topsoil Import	CY	35	\$33	\$1,160	
Plant Trees	EA	10	\$100	\$1,000	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.04	\$8,000	\$350	
Erosion Control Blanket	SY	211	\$3	\$630	
Damage Repair	LS	1	\$658	\$660	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,316	\$1,320	4% of primary item cost
Total				\$ 41,980	3 days @ \$1,500/day
Contingency (30%)				\$ 12,590	
Subtotal				\$ 54,600	
Design, Permitting, and Administration (30%)				\$ 12,590	
Environmental Oversight				\$ 4,500	
Total w/ Contingency & Engineering				\$ 71,700	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 500	25% of damage repair and maintenance
End of life span maintenance	\$ 35,850	50% of original project cost
Future Capital Cost	\$ 174,000	
Future annual maintenance	\$ 23,790	
Future end of life span cost	\$ 64,750	
Total Future Worth	\$ 262,500	
Annualized Cost	\$ 5,500	

Table J32: Preliminary Cost Estimate for Site 12, Alternative D

Install boulder cross vane

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$728	\$730	10% of project cost
Control of Water	LS	1	\$251	\$250	4% of primary item cost
Erosion Control	LS	1	\$376	\$380	6% of primary item cost
Clearing and Grubbing	ACRE	0.005	\$7,000	\$30	
Select Tree Removal (>6")	EA	4	\$400	\$1,600	
Grading	SY	22	\$6	\$130	
Rock Boulder Cross-vane	EA	1	\$4,000	\$4,000	
Plant Trees	EA	4	\$100	\$400	
Seeding and Mulch	ACRE	0.005	\$8,000	\$40	
Erosion Control Blanket	SY	22	\$3	\$70	
Damage Repair	LS	1	\$125	\$130	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$251	\$250	4% of primary item cost
			Total	\$ 8,010	
			Contingency (30%)	\$ 2,400	
			Subtotal	\$ 10,400	
			Design, Permitting, and Administration (30%)	\$ 2,400	
			Environmental Oversight	\$ -	
			Total w/ Contingency & Engineering	\$ 12,800	

30-yr and Annualized Cost analysis

Category:	Rock vanes	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 100	25% of damage repair and maintenance
End of life span maintenance	\$ 6,400	50% of original project cost
Future Capital Cost	\$ 31,100	
Future annual maintenance	\$ 4,760	
Future end of life span cost	\$ 11,560	
Total Future Worth	\$ 47,400	
Annualized Cost	\$ 1,000	

Table J33: Preliminary Cost Estimate for Site 13, Alternative A

Grade stream bank and vegetate

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$4,703	\$4,700	10% of project cost
Control of Water	LS	1	\$1,622	\$1,620	4% of primary item cost
Erosion Control	LS	1	\$2,433	\$2,430	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$760	
Select Tree Removal (>6")	EA	25	\$400	\$10,000	
Debris Removal	CY	44	\$10	\$440	
Grading	SY	528	\$6	\$3,170	
Excavation/Dispose of Contaminated Soil	CY	264	\$53	\$13,850	
Stabilize Contaminated Soil	CY	66	\$30	\$1,980	
Topsoil Import	CY	88	\$33	\$2,900	
Plant Trees	EA	25	\$100	\$2,500	
Plant Shrubs	EA	50	\$50	\$2,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$870	
Erosion Control Blanket	SY	528	\$3	\$1,580	
Damage Repair	LS	1	\$811	\$810	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,622	\$1,620	4% of primary item cost
Total				\$ 51,730	5 days @ \$1,500/day
Contingency (30%)				\$ 15,520	
Subtotal				\$ 67,300	
Design, Permitting, and Administration (30%)				\$ 15,520	
Environmental Oversight				\$ 7,500	
Total w/ Contingency & Engineering				\$ 90,300	

30-yr and Annualized Cost analysis

Category:	General grading	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 240	10% of damage repair and maintenance
End of life span maintenance	\$ 9,030	10% of original project cost
Future Capital Cost	\$ 219,200	
Future annual maintenance	\$ 11,420	
Future end of life span cost	\$ 16,310	
Total Future Worth	\$ 246,900	
Annualized Cost	\$ 5,200	

Table J34: Preliminary Cost Estimate for Site 13, Alternative B

Install root wads

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$3,251	\$3,250	10% of project cost
Control of Water	LS	1	\$1,121	\$1,120	4% of primary item cost
Erosion Control	LS	1	\$1,682	\$1,680	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$760	
Select Tree Removal (>6")	EA	12	\$400	\$4,800	
Grading	SY	528	\$6	\$3,170	
Root Wads	LF	15	\$750	\$11,250	
Topsoil Import	CY	88	\$33	\$2,900	
Plant Trees	EA	12	\$100	\$1,200	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$870	
Erosion Control Blanket	SY	528	\$3	\$1,580	
Damage Repair	LS	1	\$561	\$560	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,121	\$1,120	4% of primary item cost
Total				\$ 35,760	2 days @ \$1,500/day
Contingency (30%)				\$ 10,730	
Subtotal				\$ 46,500	
Design, Permitting, and Administration (30%)				\$ 10,730	
Environmental Oversight				\$ 3,000	
Total w/ Contingency & Engineering				\$ 60,200	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 420	25% of damage repair and maintenance
End of life span maintenance	\$ 15,050	25% of original project cost
Future Capital Cost	\$ 146,100	
Future annual maintenance	\$ 19,980	
Future end of life span cost	\$ 27,180	
Total Future Worth	\$ 193,300	
Annualized Cost	\$ 4,100	

Table J35: Preliminary Cost Estimate for Site 13, Alternative C

Install riprap toe protection

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$4,867	\$4,870	10% of project cost
Control of Water	LS	1	\$1,678	\$1,680	4% of primary item cost
Erosion Control	LS	1	\$2,517	\$2,520	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$760	
Select Tree Removal (>6")	EA	12	\$400	\$4,800	
Grading	SY	528	\$6	\$3,170	
Excavation/Dispose of Contaminated Soil	CY	132	\$53	\$6,930	
Stabilize Contaminated Soil	CY	33	\$30	\$990	
Furnish and Install Fieldstone Riprap	TON	185	\$100	\$18,470	
Topsoil Import	CY	88	\$33	\$2,900	
Plant Trees	EA	12	\$100	\$1,200	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$440	
Erosion Control Blanket	SY	264	\$3	\$790	
Damage Repair	LS	1	\$839	\$840	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$1,678	\$1,680	4% of primary item cost
Total				\$ 53,540	3 days @ \$1,500/day
Contingency (30%)				\$ 16,060	
Subtotal				\$ 69,600	
Design, Permitting, and Administration (30%)				\$ 16,060	
Environmental Oversight				\$ 4,500	
Total w/ Contingency & Engineering				\$ 90,200	

30-yr and Annualized Cost analysis

Category:	Hard armor	
Estimated life span (years)	30	1 number of major maint. events
Expected annual maintenance	\$ 630	25% of damage repair and maintenance
End of life span maintenance	\$ 45,100	50% of original project cost
Future Capital Cost	\$ 218,900	
Future annual maintenance	\$ 29,970	
Future end of life span cost	\$ 81,460	
Total Future Worth	\$ 330,300	
Annualized Cost	\$ 6,900	

Table J36: Preliminary Cost Estimate for Site 13, Alternative D

Install willow stakes and live fascines

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,859	\$1,860	10% of project cost
Control of Water	LS	1	\$641	\$640	4% of primary item cost
Erosion Control	LS	1	\$962	\$960	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$760	
Select Tree Removal (>6")	EA	6	\$400	\$2,400	
Live stakes	EA	238	\$5	\$1,190	
Live fascine	LF	475	\$15	\$7,130	
Plant Trees	EA	6	\$100	\$600	
Plant Shrubs	EA	30	\$50	\$1,500	
Seeding and Mulch	ACRE	0.1	\$8,000	\$870	
Erosion Control Blanket	SY	528	\$3	\$1,580	
Damage Repair	LS	1	\$321	\$320	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$641	\$640	4% of primary item cost
Total				\$ 20,450	3 days @ \$1,500/day
Contingency (30%)				\$ 6,140	
Subtotal				\$ 26,600	
Design, Permitting, and Administration (30%)				\$ 6,140	
Environmental Oversight				\$ 3,000	
Total w/ Contingency & Engineering				\$ 35,700	

30-yr and Annualized Cost analysis

Category:	Bioengineering	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ 240	25% of damage repair and maintenance
End of life span maintenance	\$ 8,930	25% of original project cost
Future Capital Cost	\$ 86,700	
Future annual maintenance	\$ 11,420	
Future end of life span cost	\$ 16,130	
Total Future Worth	\$ 114,300	
Annualized Cost	\$ 2,400	

Table J37: Preliminary Cost Estimate for Site 14, Alternative A

Improve vegetation without grading

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,500	\$1,500	10% of project cost
Erosion Control	LS	1	\$803	\$800	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$800	
Select Tree Removal (>6")	EA	5	\$400	\$2,000	
Live stakes	EA	500	\$5	\$2,500	
Plant Trees	EA	5	\$100	\$500	
Plant Shrubs	EA	100	\$50	\$5,000	
Seeding and Mulch	ACRE	0.1	\$8,000	\$920	
Erosion Control Blanket	SY	556	\$3	\$1,670	
Damage Repair	LS	1	\$268	\$270	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$536	\$540	4% of primary item cost
Total				\$ 16,500	
Contingency (30%)				\$ 4,950	
Subtotal				\$ 21,500	
Design, Permitting, and Administration (30%)				\$ 4,950	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 26,400	

30-yr and Annualized Cost analysis

Category:	Veg. only	
Estimated life span (years)	10	3 number of major maint. events
Expected annual maintenance	\$ 410	50% of damage repair and maintenance
End of life span maintenance	\$ 6,600	25% of original project cost
Future Capital Cost	\$ 64,100	
Future annual maintenance	\$ 19,510	
Future end of life span cost	\$ 36,810	
Total Future Worth	\$ 120,400	
Annualized Cost	\$ 2,500	

Table J38: Preliminary Cost Estimate for Site 15, Alternative A

Clear trees and remove woody debris

Item Description	Unit	Estimated Quantity	Unit Price	Extension	Notes
Mobilization	LS	1	\$1,039	\$1,040	10% of project cost
Control of Water	LS	1	\$358	\$360	4% of primary item cost
Erosion Control	LS	1	\$537	\$540	6% of primary item cost
Clearing and Grubbing	ACRE	0.1	\$7,000	\$800	
Select Tree Removal (>6")	EA	10	\$400	\$4,000	
Remove Woody Debris	SY	56	\$10	\$560	
Plant Trees	EA	10	\$100	\$1,000	
Seeding and Mulch	ACRE	0.1	\$8,000	\$920	
Erosion Control Blanket	SY	556	\$3	\$1,670	
Damage Repair	LS	1	\$179	\$180	2% of primary item cost
One-Year Establishment Maintenance Period	LS	1	\$358	\$360	4% of primary item cost
Total				\$ 11,430	
Contingency (30%)				\$ 3,430	
Subtotal				\$ 14,900	
Design, Permitting, and Administration (30%)				\$ 3,430	
Environmental Oversight				\$ -	
Total w/ Contingency & Engineering				\$ 18,300	

30-yr and Annualized Cost analysis

Category:	Debris Removal	
Estimated life span (years)	20	1 number of major maint. events
Expected annual maintenance	\$ -	0% of damage repair and maintenance
End of life span maintenance	\$ 4,580	25% of original project cost
Future Capital Cost	\$ 44,400	
Future annual maintenance	\$ -	
Future end of life span cost	\$ 8,270	
Total Future Worth	\$ 52,700	
Annualized Cost	\$ 1,100	

Table J39: Preliminary Cost Estimate for Environmental Oversight, Planning, and Reporting

Item Description	Unit	Estimated Quantity	Unit Price ⁽¹⁾	Extension	Notes
Planning and Reporting Costs					
Specifications/Contracting/PHASP	Hour	10	\$ 160	\$ 1,600	Preparation of contaminated soil mgt. specifications, contract documents, health and safety plan update
Project Meetings	Hour	8	\$ 170	\$ 1,360	2 meetings with the MPCA and/or client
Response Action Plan	LS	1	\$ 14,000	\$ 14,000	RAP preparation and submittal
RAP Implementation Report	LS	1	\$ 10,000	\$ 10,000	Data management and RAP implementation report
Environmental Contingency Response	LS	1	\$ 5,000	\$ 5,000	Assumes one contingency item at one site
Grant Application Assistance	Hour	24	\$ 160	\$ 3,840	Assist with county ERF or other grant application
Regulatory Review and Assistance	Hour	24	\$ 125	\$ 3,000	MPCA charges for review and approval
Planning and Reporting Costs Subtotal				\$ 38,800	
Analytical Costs					
Excavation Confirmation Sampling	LS	-	\$ -	\$ -	Assumes no excavation confirmation sampling needed
Onsite Soil Sampling	Each	4	\$ 165	\$ 660	Assumes 2,000 cy of soil will be sampled at a rate of 1/500 cy and analyzed for PAHs, RCRA Metals, DRO, GRO
Lead Stabilization Sampling	Each	8	\$ 106	\$ 850	Assumes TCLP RCRA metals
Topsoil Sampling	Each	4	\$ 188	\$ 750	Assumes 2 backfill samples collected from 2 sources and analyzed for PAHs, RCRA Metals, VOCs, DRO with silica gel cleanup. Number may vary based on volume of import.
Labor Costs for Sampling	Hour	24	\$ 120	\$ 2,880	Assumes 1.5 hours/sample, including office support
Analytical Costs Subtotal				\$ 5,140	
Total Planning, Reporting, and Analytical				\$ 44,000	
Daily Environmental Oversight Costs					
Field Oversight	Hour	10	\$ 120	\$ 1,200	Assumes 8 hrs of onsite field oversight, 2 hrs task mgmt
Expenses	Day	1	\$ 250	\$ 250	Assumes PID, vehicle, camera
Total Daily Environmental Oversight				\$1,500	

(1) Hourly rates based on average hourly rate for anticipated staff for each task.