Table B-1 Summary of Costs – Whatcom Waterway Site

Work Performed		Probable Cost	Construction Contingency	Upper Probable Cost
Alternative 1				
Phase 1	**Alternative 1 Total Costs**	**$ 8,178,000**	**$ 1,775,000**	**$ 9,953,000**
Alternative 2				
Phase 1		$ 14,088,000	$ 3,072,000	$ 17,160,000
Phase 2		$ 11,237,000	$ 2,646,000	$ 13,883,000
Phase 3		$ 9,133,000	$ 2,151,000	$ 11,283,000
Phase 4		$ 5,097,000	$ 1,200,000	$ 6,297,000
	Alternative 2 Total Costs	**$ 34,458,000**	**$ 7,869,000**	**$ 42,326,000**
Alternative 3				
Phase 1		$ 11,797,000	$ 2,533,000	$ 14,330,000
Phase 2		$ 11,827,000	$ 2,785,000	$ 14,613,000
Phase 3		$ 8,604,000	$ 2,026,000	$ 10,630,000
Phase 4		$ 1,852,495	$ 436,223	$ 2,288,719
	Alternative 3 Total Costs	**$ 34,080,495**	**$ 7,780,223**	**$ 41,861,719**
Alternative 4				
Phase 1	**Alternative 4 Total Costs**	**$ 21,122,000**	**$ 4,823,000**	**$ 25,945,000**
Alternative 5				
Phase 1		$ 10,850,000	$ 2,404,000	$ 13,255,000
Phase 2		$ 26,780,000	$ 6,481,000	$ 33,261,000
Phase 3		$ 4,029,000	$ 949,000	$ 4,978,000
	Alternative 5 Total Costs	**$ 41,659,000**	**$ 9,834,000**	**$ 51,494,000**
Alternative 6				
Phase 1		$ 14,036,000	$ 3,155,000	$ 17,191,000
Phase 2		$ 26,780,000	$ 6,481,000	$ 33,261,000
Phase 3		$ 3,072,000	$ 723,000	$ 3,795,000
	Alternative 6 Total Costs	**$ 43,888,000**	**$ 10,359,000**	**$ 54,247,000**
Alternative 7				
Phase 1 (multi-yr)		$ 36,740,000	$ 8,706,000	$ 45,446,000
Phase 2		$ 26,780,000	$ 6,481,000	$ 33,261,000
Phase 3 (multi-yr)		$ 10,889,000	$ 2,626,000	$ 13,515,000
	Alternative 7 Total Costs	**$ 74,409,000**	**$ 17,813,000**	**$ 92,222,000**
Alternative 8				
Phase 1 (multi-yr)		$ 39,856,000	$ 9,234,000	$ 49,090,000
Phase 2 (multi-yr)		$ 49,455,000	$ 11,646,000	$ 61,101,000
Phase 3		$ 26,852,000	$ 6,323,000	$ 33,175,000
Phase 4a & 4b:		$ 29,417,000	$ 7,102,000	$ 36,519,000
	Alternative 8 Total Costs	**$ 145,580,000**	**$ 34,305,000**	**$ 179,885,000**

Table B-2 Alternative 1 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 1 - Phase 1
Capping in Areas 5B, 6B, 6C and 8
MNR in other areas

Item	Description	Unit	Quantity	Unit Cost	Item Cost	Total Cost	Notes
1	**Mobilization**					**$62,350**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	$0		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	$3,000		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	$3,000		4
1.4	Front-end loader	EA	2	$100.00	$200		3
1.5	Tug, push, diesel, 500-hp	EA	1	$2,000.00	$2,000		4
1.6	Barge, flat-deck, 400-ton capacity	EA	2	$300.00	$600		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	$1,400		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	$0		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	$100		3
1.10	Conveyor, 24" x 50', trough belt, 7-1/2 hp electr.	EA	3	$200.00	$600		2
1.11	Construction office setup	EA	1	$1,450.00	$1,450		3,12
1.12	Nonscheduled contract costs	EA	1	$50,000.00	$50,000		4
2	**Capping** (2 units, 10-hr days, high production)					**$5,317,342**	1
2.1	Capping sand procurement and delivery (Areas 5B, 6B, 6C, and 8)	CY	206,653	$15.00	$3,099,791		3
2.2	Sand cap placement by pushing with dozer	CY	206,653	$6.50	$1,343,243		4
2.3	Conveyor system for ASB	MONTH	6	$3,300.00	$19,800		2,20
2.4	Front-end loader for conveyor	MONTH	6	$15,780.00	$94,680		2
2.5	Bulldozer anchors	MONTH	6	$32,921.00	$197,526		4,19
2.6	Bathymetric Survey (50 ft center to center, single beam sonar) (three events)	Acre	120	$50.00	$6,000		4
2.7	Floodlights	MONTH	6	$16,000.00	$96,000		10
2.8	Construction office	MONTH	6	$76,717.00	$460,302		11
3	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	$522,926	$522,926	**$522,926**	
4	**Demobilization**					**$14,150**	1
4.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	$0		4
4.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	$3,000		4
4.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	$3,000		4
4.4	Front-end loader	EA	2	$100.00	$200		3
4.5	Tug, push, diesel, 500-hp	EA	2	$2,000.00	$4,000		4
4.6	Barge, flat-deck, 400-ton capacity	EA	2	$300.00	$600		4
4.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	$1,200		4
4.8	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	$0		4
4.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	$100		3
4.10	Conveyor, 24" x 50', trough belt, 7-1/2 hp electr.	EA	3	$200.00	$600		2
4.11	Construction office teardown	EA	1	$1,450.00	$1,450		3,12
	Subtotal					**$5,916,768**	1
	Design, Engineering & Permitting		12%			$710,012	4
	Construction management and monitoring		7%			$414,174	4
	Long-term environmental monitoring		LS			$640,000	4
	Sales Taxes		8.4%			$497,009	
	TOTAL Cost Excluding Construction Contingency					$8,177,962	
	Contingency @		30%			$1,775,030	4
	Total*					**$9,952,993**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
18 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
19 Anchor dozers (2 dozers ea dredge x 11 months x $3,900/month + 2 ea x 219 days x 4 hr operating/day x $16/hr + 1 dozer operators x 219 days x $307/8-hr day = $181,065/ dredge) for 2 dredges per month (2 x $181,065 / 11 months) is $32,921/month.
20 Conveyor sand from staging area over the ASB berm to barge: assume 3 ea (rental @ $1,000/ea/month, operations at $0.42/ea/hr x 10 hr/day x 24 days/month) at $1,100/ea/month, or for 3 at total of $3,300/month.

Table B-3 Alternative 2 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 1
Capping in Area 8
CAD construction for containment of dredged sediments
Construction of offload facility outside CAD

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$62,994**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	1.0185	$4,888.80	$0		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
1.4	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
1.5	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
1.6	Barge, flat-deck, 2,000-ton capacity	EA	3	$700.00	1.0185	$712.95	$2,139		4
1.7	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		4
1.8	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.9	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.10	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Contained Aquatic Disposal and Offload Facility Construction**							**$5,542,510**	
2.1	Rock Procurement	CY	125,330	$33.75	1.0185	$34.37	$4,308,140		4, 21
2.2	Rock Placement	DAY	84	$3,250.00	1.0200	$3,315.00	$276,979		4, 25
2.3	Offload Facility Dock Construction	SF	8,000	$110.00	1.0185	$112.04	$896,280		4,24
2.4	Mooring Dolphins	LS	1	$60,000.00	1.0185	$61,110.00	$61,110		4
3	**Dredging**							**$566,594**	1
3.1	Floodlights	MONTH	6	$16,000.00	1.0185	$16,296.00	$97,776		10
3.2	Construction office	MONTH	6	$76,717.00	1.0185	$78,136.26	$468,818		11
4	**Capping**							**$3,534,819**	1
4.1	Capping sand procurement and delivery (Area 8)	CY	145,187	$15.00	1.0185	$15.28	$2,218,087		3
4.2	Sand cap placement by small dredge	CY	145,187	$6.50	1.0185	$6.62	$961,171		4
4.3	Conveyor system for ASB	MONTH	5	$3,222.00	1.0185	$3,281.61	$16,659		2,20
4.4	Front-end loader for conveyor	MONTH	5	$15,780.00	1.0185	$16,071.93	$81,588		2
4.5	Conveyor rerouting	DAY	112	$712.00	1.0185	$725.17	$80,989		4,18
4.6	Bulldozer anchors	MONTH	5	$32,921.00	1.0185	$33,530.04	$170,214		4,19
4.7	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	120	$50.00	1.0185	$50.93	$6,110		4
5	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	$522,926	1.0000	$522,926	$522,926	**$522,926**	3
6	**Demobilization**							**$11,764**	1
6.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	1.0185	$4,888.80	$0		4
6.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
6.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
6.4	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
6.5	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
6.6	Barge, flat-deck, 2,000-ton capacity	EA	3	$600.00	1.0185	$611.10	$1,833		4
6.7	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		4
6.8	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
6.9	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$10,241,606**	1
	Design, Engineering & Permitting		12%					$1,228,993	4
	Construction management and monitoring		7%					$716,912	4
	Long-term environmental monitoring		LS					$1,040,000	
	Sales Taxes		8.4%					$860,295	
	TOTAL Cost Excluding Construction Contingency							$14,087,805	
	Contingency @		30%					$3,072,482	4
	Total*							**$17,160,287**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
18 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
19 Anchor dozers (2 dozers ea dredge x 11 months x $3,900/month + 2 ea x 219 days x 4 hr operating/day x $16/hr + 1 dozer operators x 219 days x $307/8-hr day = $181,065/ dredge) for 2 dredges per month (2 x $181,065 / 11 months) is $32,921/month.
20 Conveyor sand from staging area over the ASB berm to barge: assume 3 ea (rental @ $1,000/ea/month, operations at $0.42/ea/hr x 8 hr/day x 22 days/month) at $1,074/ea/month, or for 3 at total of $3,222/month.
21 Rock berm for the CAD consists of 6 to 12-inch cobble. Approx length is 3,200 lf. with side slopes of 2:1 built to elevation +3ft. Start filling from the shoreline and work backwards towards the berm. Fill impacted material first followed by 1A/1B material followed by 3 ft clean import sand capping to elevation 0 ft. Per Tom Nathan of Glacier Northwest - Dupont Facility, barging cobble from Tacoma to Bellingham is approx. $5/ton plus $17.50 per ton for material totals $22.50 per ton delivered or $ 33.75 per cy
24 Assume dock size 200 ft by 40 ft, all inclusive
25 Skip attached to a crane for placement of rock for berm.$1,250 /day plus operating costs of $250/hr (equip and personnel) x 10-hr or $2,500 totals $3,250

Table B4 Alternative 2 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 2
Capping in Areas 2A, 2B, 2C, 3A, 3B
Dredge Areas 2A, 2B, 2C, 3A, and 3B

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$127,873**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		
1.6	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
1.7	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.10	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.12	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.13	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$5,738,964**	1
2.1	Dredge contaminated sediments (Areas 2A, 2B, 2C, 3A & 3B)	DAY	102	$9,225.00	1.0185	$9,395.66	$955,346		7,8
					1 production dredges, 20-hr days, 170 cy/hr production				
2.2	Overdredge contaminated sediments	DAY	28	$5,500.00	1.0185	$5,601.75	$157,943		22,23
					1 articulated dredge, 10-hr days, 50 cy/yr production rate				
2.3	Transportation of contaminated sediments to CAD	DAY	130	$14,400.00	1.0185	$14,666.40	$1,904,795		16
2.4	Placement of contaminated sediments in CAD	DAY	130	$14,446.00	1.0185	$14,713.25	$1,910,880		17
					2 Tremie Units, 20-hr days each, 70 cy/hr placement rate				
2.5	Floodlights	MONTH	6	$16,000.00	1.0185	$16,296.00	$96,202		10
2.6	Construction office	MONTH	6	$76,717.00	1.0185	$78,136.26	$461,269		11
2.7	Water Quality Monitoring	MONTH	6	42,000	1.0185	$42,777.00	$252,530		24
3	**Capping**							**$2,876,830**	1
3.1	Capping sand procurement and delivery (Areas 2A, 2B, 2C, 3A, 3B)	CY	110,584	$15.00	1.0185	$15.28	$1,689,451		3
					1 unit, 10-hr days, high production				
3.2	Front-end loader for loading barges	MONTH	4	$15,780.00	1.0185	$16,071.93	$62,143		2
3.3	Transport capping sand to placement locations	DAY	85	$4,500.00	1.0185	$4,583.25	$389,873		14
3.4	Sand cap placement	CY	110,584	$6.50	1.0185	$6.62	$732,095		4
3.5	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	64	$50.00	1.0185	$50.93	$3,267		4
					three events				
4	**Demobilization**							**$76,744**	1
4.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
4.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
4.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
4.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		
4.6	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
4.7	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
4.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
4.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
4.10	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
4.12	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$8,820,410**	1
	Design, Engineering & Permitting		12%					$1,058,449	4
	Construction management and monitoring		7%					$617,429	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$740,914	
	TOTAL Cost Excluding Construction Contingency							$11,237,202	
	Contingency @		30%					$2,646,123	4
	Total*							**$13,883,325**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

2 Supplier quote.

3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.

4 Professional judgment based on previous projects.

7 Dredge contaminated sediment: 1700 cy/hr x 20 hr/day = 3,400 cy/20-hr day

8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.

10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.

11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.

12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).

14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.

16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to CAD, two tugs alternate to rotate barges between loading at waterway and unloading at CAD. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.

17 Assume contaminated and uncontaminated sediment transfer to CAD by combination of 2 cranes (2 -20 hr) offloading over the CAD into smaller barges inside the CAD, and 2 hopper/tremie on barge to dump the material. Rental ($1,250 * 2 /day crane + $1,250 * 2/day tremie +$853*2 /day 400T barge 2 donkey tugs x $150/day) at $7,006/day and operations ($39 x40 hr/day crane+$39/hr x 40 hr/day tremie + $20 x 40 hr/day tug) at $3,120/day and labor (5 ea x $432/ea/10-hr shift x 2 shifts/day) at $4,320/day for a total of $14,446/day.

22 Overdredge sediment production rate: 1400 cy/20-hr day

23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.

24 $1500/day, 28 days/month

Table B5 Alternative 2 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 3
Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$76,948**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		3
1.6	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		4
1.7	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.10	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		3
1.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3,12
1.12	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		4
1.13	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		
2	**Dredging**							**$4,814,650**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	73	$5,725.00	1.0185	$5,830.91	$426,683		6,8
					1 production dredge, 10-hr days, 150 cy/hr production total from the dredge				
2.2	Dredge contaminated sediments (Areas 1C1, 1C2 & 1C3)	DAY	47	$5,725.00	1.0185	$5,830.91	$272,085		7,8
					1 production dredge, 10-hr days, 150 cy/hr production total from the dredge				
2.3	Overdredge of contaminated sediments (Areas 1C1, 1C2 & 1C3)	DAY	28	$3,500.00	1.0185	$3,564.75	$100,502		22,23
2.5	Transportation of contaminated and uncontaminated sediments	DAY	148	$10,000.00	1.0185	$10,185.00	$1,507,704		16
2.6	Placement of contaminated and uncontaminated sediments	DAY	148	$12,418.00	1.0185	$12,647.73	$1,872,267		17
					2 Tremie Units, 20-hr days each, 70 cy/hr placement rate				
2.7	Floodlights	MONTH	7	$16,000.00	1.0185	$16,296.00	$109,651		10
2.8	Construction office	MONTH	7	$76,717.00	1.0185	$78,136.26	$525,757		11
2.9	Water Quality Monitoring	MONTH	7	42,000	1.0185	$42,777.00	$287,834		24
3	**Capping**							**$1,599,157**	1
3.1	Capping sand procurement and delivery (Areas 5B, 6B, and 6C)	CY	61,466	$15.00	1.0185	$15.28	$939,050		3
					1 unit, 10-hr days, high production				
3.2	Front-end loader for loading barges	MONTH	2	$15,780.00	1.0185	$16,071.93	$34,541		2
3.3	Transport capping sand to placement locations	DAY	47	$4,500.00	1.0185	$4,583.25	$216,704		14
3.4	Sand cap placement	CY	61,466	$6.50	1.0185	$6.62	$406,922		4
3.7	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	38	$50.00	1.0185	$50.93	$1,940		4
					three events				

Table B5 Alternative 2 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 3
Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
4	**Demobilization**							**$75,267**	1
4.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
4.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
4.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
4.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		3
4.6	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		4
4.7	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
4.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
4.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
4.10	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		3
4.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3,12
4.12	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		
5	**Under-Dock Work Stabilization**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
	Subtotal							**$7,168,626**	1
	Design, Engineering & Permitting		12%					$860,235	4
	Construction management and monitoring		7%					$501,804	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$602,165	
	TOTAL Cost Excluding Construction Contingency							$9,132,830	
	Contingency @		30%					$2,150,588	4
	Total*							**$11,283,418**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B5 Alternative 2 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 3
Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge uncontaminated sediment: 1700 cy/hr x 10 hr/day x 1 = 1,700 cy/10-hr day
7 Dredge contaminated sediment: 1700 cy/hr x 10 hr/day x 1 = 1,700 cy/10-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport contaminated and uncontaminated sediment to CAD, two tugs alternate to rotate barges between loading at waterway and unloading at CAD. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 10 hr tug) at $4,400/day for a total of $10,000/day. Labor included in operations costs.

17 Assume contaminated and uncontaminated sediment transfer to CAD by combination of 2 cranes (2 -20 hr) offloading over the CAD into smaller barges inside the CAD, and 2 hopper/tremie on barge to dump the material. Rental ($1,250 * 2 /day crane + $1,250 * 2/day tremie +$853*4 /day 400T barge). $6,706/day and operations ($39 x40 hr/day crane+$39/hr x 40 hr/day tremie) at $3,120/day and labor (3 ea x $432/ea/10-hr shift x 2 shifts/day) at $2,592/day for a total of $12,418/day.
22 Overdredge sediment production rate: 700 cy/10-hr day
23 Overdredge contaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 10 hr or $2,000/day totals $3500/day.
24 $1500/day, 28 days/month

Table B6 Alternative 2 - Phase 4

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 2 - Phase 4
Cap CAD with 3-ft clean import sand

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$19,504**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	1.0185	$4,888.80	$0		4
1.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	0	$3,000.00	1.0185	$3,055.50	$0		4
1.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		3
1.6	Front-end loader	EA	1	$100.00	1.0185	$101.85	$102		4
1.7	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
1.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.10	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		3
1.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3,12
1.12	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		4
1.13	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		
2	**Capping**							**$3,963,036**	1
2.1	Capping sand procurement and delivery (Area within CAD from 0 to -3)	CY	141,115	$15.00	1.0185	$15.28	$2,155,884		3
2.2	Front-End loader for loading barges	MONTHS	5	$15,780.00	1.0185	$16,071.93	$72,993		2
2.3	Transport capping sand to placement locations	DAY	109	$4,500.00	1.0185	$4,583.25	$497,512		14
2.4	Sand cap placement	DAY	109	$11,126.00	1.0185	$11,331.83	$1,235,170		4
			2 Tremie Units, 10-hr days each, 70 cy/hr placement rate						
2.5	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	29 three events	$50.00	1.0185	$50.93	$1,477		4
3	**Demobilization**							**$18,027**	1
3.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	0	$4,800.00	1.0185	$4,888.80	$0		4
3.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
3.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
3.4	Barge-mounted backhoe, 5-cy bucket	EA	0	$3,000.00	1.0185	$3,055.50	$0		4
3.5	Barge-mounted Tremie	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		3
3.6	Front-end loader	EA	1	$100.00	1.0185	$101.85	$102		4
3.7	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
3.8	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
3.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
3.10	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		3
3.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3,12
3.12	Construction office Teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		

Subtotal		**$4,000,568**	1
Design, Engineering & Permitting	12%	$480,068	4
Construction management and monitoring	7%	$280,040	4
Long-term environmental monitoring	*included in Year 1*	NA	
Sales Taxes	8.4%	$336,048	
TOTAL Cost Excluding Construction Contingency		$5,096,723	
Contingency @	30%	$1,200,170	4
Total*		**$6,296,894**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to CAD. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.

Table B7 Alternative 3 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 3 - Phase 1
Construction of Offload Facility outside ASB
Divide ASB and move Materials from corner of ASB
Water Management from ASB

Item	Description	Unit	Quantity	2004 Unit Cost	2004-2005 Cost Escalator	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$69,421**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Hydraulic Dredge	EA	1	$3,260.00	1.0185	$3,320.31	$3,320		4
1.3	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
1.4	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
1.6	Front-end loader	EA	1	$100.00	1.0185	$101.85	$102		3
1.7	Crane	EA	1	$250.00	1.0185	$254.63	$255		3
1.8	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
1.9	Barge, flat deck, 400 ton capacity	EA	1	$300.00	1.0185	$305.55	$306		4
1.10	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.11	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.12	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.13	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**ASB Rock Berm and Offload Facility Construction**							**$6,532,724**	
2.1	Rock Procurement	CY	83,487	$33.75	1.00	$33.75	$2,817,686		4, 21
2.2	Rock Placement	DAY	56	$3,250.00	1.0185	$3,310.13	$184,235		4,25
2.3	Sand Blanket Procurement	CY	6,456	$15.00	1.0185	$15.28	$98,625		27
2.4	Sand Blanket Placement	DAY	6	$3,250.00	1.0185	$3,310.13	$21,369		24, 28
2.5	Clay Liner Purchase	SF	58,100	$1.00	1.0185	$1.02	$59,175		4
2.6	Clay Liner Placement	SF	58,100	$2.00	1.0185	$2.04	$118,350		4
2.7	Construct gravel ramps	CY	1,200	23	1.0185	23	$28,111		4
2.8	Remove top of out ASB berms to +16	CY	25,600	4.00	1.0185	4.07	$104,294		2, 4, 30
2.9	Transport removed material to load/stockpile site	CY	25,600	3.00	1.0185	3.06	$78,221		30,31
2.1	Load onto barge or stockpile	CY	25,600	0.62	1.0185	0.63	$16,079		30,32
2.11	Pile driving equipment and labor, including setup	DAY	76	6,473	1.0185	6,593	$501,071		3
2.12	Steel sheet piling (to be left in place)	SF	76,000	20	1.0185	20	$1,548,120		3
2.13	Offload Facility Dock Construction	SF	8,000	$110.00	1.0185	$112.04	$896,280		4,24
2.14	Mooring Dolphins	LS	1	$60,000.00	1.0185	$61,110.00	$61,110		4
3	**Dredging**							**$569,001**	1
3.1	Layout 12" pipeline to dredge	LF	1,000	$23.66	1.0185	$24.10	$24,098		3
3.2	Pump Setup	EA	3	$200.00	1.0185	$203.70	$611		4
3.3	Pump lagoon to elev. +3'	DAY	39	$900.00	1.0185	$916.65	$35,749		33
3.4	Pump rental	MONTH	7	$6,000.00	1.0185	$6,111.00	$42,777		34
3.5	Setup dredge using truck crane	EA	1	$2,302.00	1.0185	$2,344.59	$2,345		35
3.6	Hydraulic Dredge contaminated sediments (Portion of Area 8)	CY	71,424	$2.93	1.0185	$2.98	$213,144		36
3.7	Pipe Rerouting	DAY	49	$712.00	1.0185	$725.17	$35,720		37
3.8	Bulldozer Anchors	MONTH	2	$17,370.00	1.0185	$17,691.35	$39,611		38
3.9	Construction office	MONTH	2	$76,717.00	1.0185	$78,136.26	$174,947		11
4	**Discharge to POTW**							**$731,142**	1
4.1	Hydraulic Dredge supernatant	CCF	28,927	$13.52	1.0185	$13.77	$398,324		26, 39
4.2	Rainwater from lagoon	CCF	39,200	$2.21	1.0185	$2.25	$88,236		2,43
4.3	Pump Rental	MONTH	2	$2,000.00	1.0185	$2,037.00	$4,718		42
4.4	Pump Operation	DAYS	51	$900.00	1.0185	$916.65	$46,712		42
4.5	Water Filtration Unit, handle up to 300 gpm	MONTH	7	$20,000.00	1.0185	$20,370.00	$141,550		2
4.6	Chitosan for Filtration, 1% solution	GAL	2,309	$10.91	1.0185	$11.11	$25,652		41
4.7	Water Treatment Operator, full-time	DAY	51	$500.00	1.0185	$509.25	$25,951		4
5	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	$522,925.70	1.00	$522,926	$522,926	**$522,926**	
6	**Demobilization**							**$18,496**	1
6.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
6.2	Hydraulic Dredge	EA	1	$3,260.00	1.0185	$3,320.31	$3,320		4
6.3	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
6.4	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
6.5	Front-end loader	EA	1	$100.00	1.0185	$101.85	$102		3
6.6	Crane	EA	1	$250.00	1.0185	$254.63	$255		3
6.7	Tug, push, diesel, 500-hp	EA	1	$2,000.00	1.0185	$2,037.00	$2,037		4
6.8	Barge, flat deck, 400 ton capacity	EA	1	$300.00	1.0185	$305.55	$306		4
6.9	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
6.10	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
6.11	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$8,443,710**	1
	Design, Engineering & Permitting		12%					$1,013,245	4
	Construction management and monitoring		7%					$591,060	4
	Long-term environmental monitoring		LS					$1,040,000	4
	Sales Taxes		8.4%					$709,272	
	TOTAL Cost Excluding Construction Contingency							$11,797,287	
	Contingency @		30%					$2,533,113	4
	Total*							**$14,330,400**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
5 Since work to be done during fish window, assume work is performed using two units working 10-hr shifts per day, six days per week.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
21 Rock berm for the ASB interior consists of 6 to 12-inch cobble. Approx length is 700 lf. with side slopes of 2:1 built to elevation +22ft. Per Tom Nathan of Glacier Northwest - Dupont Facility, barging cobble from Tacoma to Bellingham is approx. $5/ton plus $17.50 per ton for material totals $22.5 per ton delivered or $ 33.75 per cy
24 Assume dock size 200 ft by 40 ft, all inclusive
25 Skip attached to a crane for placement of rock for berm.$1,250 /day plus operating costs of $250/hr (equip and personnel) x 10-hr or $2,500 totals $3,250
26 Assume 53,000,000 gal to pump (from +3' to "dry") to POTW. This is ~71,000 ccf x $2.21/ccf = $156,900. Assume monthly average of 6.25 lb BOD/1,000 lb of effluent, and monthly average of 5.0 lb TSS/1,000 lb of effluent.
27 Assume Sand Blanket 3 feet thick on one side of ASB cutoff berm to provide for filling cobble interstitial space and blanketing layer. 700 lf for slope at 2:1 from -15 to +22 = 83 ft.
28 Assume Sand Placement Rate at 1000 CY/day
29 Average Berm cross-section from +24 to +16 = 576 sf, 1200 lf removed
30 Assumes that all types of berm materials moved at same rates
31 Assumes 6 trucks at 10 trips ea/day at $75/hr for 1200 cy/day = $3/cy
32 Assumes loader at $250/day rental, operator at $334/day, and operating cost at $22/hr. For 8 hours days, 1200 cy/day = $0.62/cy
33 Assume water volume =~ 145,500,000gal; assume 6" pump operating 20hr/day at 1,600gpm pumps ~1,900,000gal/day, allow 77 days or 3 months. MP&E rental at $2,000/month per each; maintenance mechanic at $400/10-hr day; each pump operates at $5/hr or $100/day; assume 2 mechanics to cover 20 hr/day x $400/day plus $100/day operating cost for a total of $900/day;
34 3 pumps * 39 days each = 4 months + 2 months for final dewatering = 6 months
35 Dredge setup includes truck crane ($1,100), crane operator ($307), dredge leverman ($319), and dredge deckhand ($304) working 1-8 hr day with crane operations (8 hr x $34/hr = $272) per each machine, or $2,302/ea.
36 Dredge operations include rental ($3,320.89/day), operations (10 hours/day) (1 ea @ 8 hr/day x $319/8hr-day = $319), dredge deckhand (1 ea @ 8 hr/day x $304/8hr-day = $304), dredge oiler (1 ea @ 8 hr/day x $305/8hr-day = $305) for a total of $4,248.89/dredge/day for 145 cy/hr at 10 hr/day $2.93/cy.
37 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
38 Anchor dozers (2 dozers ea dredge x $3,900/month + 2 ea x 4 hr operating/day x $16/hr x 22 days/month + 1 dozer operators x $307/8-hr day x 22 days/month) $17,370/ dredge/month.
39 Roughly 1.5 the volume of ASB sludge is generated as water through the hydraulic dredging process because of low solids content
40 1 MGD
41 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr @ 100 gpm = 1.067e-4 gal/gal
42 MP&E rental at $2,000/month per each; maintenance mechanic at $400/10-hr day; each pump operates at $5/hr or $100/day; assume 2 mechanics to cover 20 hr/day x $400/day plus $100/day operating cost for a total of $900/day;
43 Based on average annual Bellingham rainfall of 36 inches over area of ASB

Table B8 Alternative 3 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 3 - Phase 2
Capping in Areas 2A, 2B, 2C, 3A, 3B
Dredge Areas 2A, 2B, 2C, 3A and 3B

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$121,762**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
1.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.1	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.11	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.12	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$6,214,519**	1
2.1	Dredge contaminated sediments (Areas 2A, 2B, 2C, 3A & 3B)	DAY	112	$9,225.00	1.0185	$9,395.66	$1,050,881		7,8
2.2	Overdredge contaminated sediments	DAY	28	$5,500.00	1.0185	$5,601.75	$157,943		22,23
2.3	Transportation of contaminated sediments to ASB	DAY	140	$14,400.00	1.0185	$14,666.40	$2,053,922		16
2.4	Placement of contaminated sediments in ASB	DAY	140	$12,494.00	1.0185	$12,725.14	$1,782,063		17
2.5	Rainwater from lagoon	CCF	39,200	$2.21	1.0185	$2.25	$88,236		2,27
2.6	Dredge Supernatant	CCF	30,803	$2.21	1.0185	$2.25	$69,334		2
2.7	Pump Rental	MONTH	5	$2,000.00	1.0185	$2,037.00	$10,356		2, 25, 26
2.8	Pump Operation	DAYS	140	$900.00	1.0185	$916.65	$128,370		26
2.9	Floodlights	MONTH	6	$16,000.00	1.0185	$16,296.00	$103,733		10
2.10	Construction office	MONTH	6	$76,717.00	1.0185	$78,136.26	$497,382		11
2.11	Water Quality Monitoring	MONTH	6	42,000	1.0185	$42,777.00	$272,300		24
3	**Capping**							**$2,876,830**	1
3.1	Capping sand procurement and delivery (Areas 2A, 2B, 2C, 3A, 3	CY	110,584	$15.00	1.0185	$15.28	$1,689,451		3
3.2	Front-end loader for loading barges	MONTH	4	$15,780.00	1.0185	$16,071.93	$62,143		2
3.3	Transport capping sand to placement locations	DAY	85	$4,500.00	1.0185	$4,583.25	$389,873		14
3.4	Sand cap placement	CY	110,584	$6.50	1.0185	$6.62	$732,095		4
3.5	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	64	$50.00	1.0185	$50.93	$3,267		4
4	**Demobilization**							**$70,633**	1
4.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
4.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
4.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
4.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
4.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
4.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
4.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
4.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.10	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
4.11	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$9,283,743**	1
	Design, Engineering & Permitting		12%					$1,114,049	4
	Construction management and monitoring		7%					$649,862	4
	Long-term environmental monitoring		*included in Year 1*						
	Sales Taxes		8.4%					$779,834	
	TOTAL Cost Excluding Construction Contingency							$11,827,489	
	Contingency @		30%					$2,785,123	4
	Total*							**$14,612,612**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 1700 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to CAD, two tugs alternate to rotate barges between loading at waterway and unloading at CAD. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.
17 Assume contaminated and uncontaminated sediment transfer to CAD by combination of 2 cranes (2 -20 hr) offloading over the CAD into smaller barges inside the CAD, and front-end loader and dozer to dump the material. Rental ($1,250 * 2 /day crane + $350/day loader + $1,000/ dozer+$853*4 /day 400T barge) at $7,262/day and operations ($39 x40 hr/day crane+$15/hr x 20 hr/day loader + $39/hr x 20hr/day dozer) at $2,640/day and labor (3 ea x $432/ea/10-hr shift x 2 shifts/day) at $2,592/day for a total of $12,494/day.
22 Overdredge sediment production rate: 1400 cy/20-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
24 $1500/day, 28 days/month
25 Assumes 30% of volume dredged is water given up and that settlement time in ASB is sufficient to allow management as stormwater
26 MP&E rental at $2,000/month per each; maintenance mechanic at $400/10-hr day; each pump operates at $5/hr or $100/day; assume 2 mechanics to cover 20 hr/day x $400/day plus $100/day operating cost for a total of $900/day;
27 Based on average annual Bellingham rainfall of 36 inches over area of ASB

Table B9 Alternative 3 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 3 - Phase 3

Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$121,762**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
1.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.1	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.11	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.12	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$4,359,488**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	73	$5,725.00	1.0185	$5,830.91	$426,683		6,8
2.2	Dredge contaminated sediments (Areas 1C1, 1C2 & 1C3)	DAY	47	$5,725.00	1.0185	$5,830.91	$272,085		7,8
2.3	Overdredge of contaminated sediments (Areas 1C1, 1C2 & 1	DAY	28	$3,500.00	1.0185	$3,564.75	$100,502		22,23
2.5	Transportation of contaminated and uncontaminated sedimen	DAY	148	$10,000.00	1.0185	$10,185.00	$1,507,704		16
2.6	Placement of contaminated and uncontaminated sediments	DAY	148	$8,280.00	1.0185	$8,433.18	$1,248,379		17
2.5	Rainwater from lagoon	CCF	39,200	$2.21	1.0185	$2.25	$88,236		2,27
2.6	Dredge Supernatant	CCF	18,100	$2.21	1.0185	$2.25	$40,742		2
2.7	Pump Rental	MONTH	7	$2,000.00	1.0185	$2,037.00	$13,706		2, 25, 26
2.8	Pump Operation	DAYS	148	$900.00	1.0185	$916.65	$135,693		26
2.8	Construction office	MONTH	7	$76,717.00	1.0185	$78,136.26	$525,757		11
2.9	Water Quality Monitoring	MONTH	7	42,000	1.0185	$42,777.00	$287,834		24
3	**Capping**							**$1,599,157**	1
3.1	Capping sand procurement and delivery (Areas 5B, 6B, and 6	CY	61,466	$15.00	1.0185	$15.28	$939,050		3
3.2	Front-end loader for loading barges	MONTH	2	$15,780.00	1.0185	$16,071.93	$34,541		2
3.3	Transport capping sand to placement locations	DAY	47	$4,500.00	1.0185	$4,583.25	$216,704		14
3.4	Sand cap placement	CY	61,466	$6.50	1.0185	$6.62	$406,922		4
3.7	Bathymetric Survey (50 ft center to center, single beam sonar	Acre	38	$50.00	1.0185	$50.93	$1,940		4
4	**Demobilization**							**$70,633**	1
4.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
4.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
4.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
4.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
4.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
4.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
4.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
4.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
4.10	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
4.11	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
5	**Under-Dock Work (Addendum 1)**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
	Subtotal							**$6,753,644**	1
	Design, Engineering & Permitting		12%					$810,437	4
	Construction management and monitoring		7%					$472,755	4
	Long-term environmental monitoring		*included in Year 1*						
	Sales Taxes		8.4%					$567,306	
	TOTAL Cost Excluding Construction Contingency							$8,604,142	
	Contingency @		30%					$2,026,093	4
	Total*							**$10,630,236**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge uncontaminated sediment: 1500 cy/hr x 10 hr/day x 1 = 1,500 cy/10-hr day
7 Dredge contaminated sediment: 1500 cy/hr x 10 hr/day x 1 = 1,500 cy/10-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport contaminated and uncontaminated sediment to CAD, two tugs alternate to rotate barges between loading at waterway and unloading at CAD. Rental (2 ea x $2,000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 10 hr tug) at $4,400/day for a total of $10,000/day. Labor included in operations costs.
17 Assume contaminated and uncontaminated sediment transfer to CAD by combination of 2 cranes (2 x 10-hr) offloading over the CAD into smaller barges inside the CAD, and front-end loader and dozer to dump the material. Rental ($1,250 * 2 /day cr $5,556/day and operations ($39 x 10 hr/day crane x 2 +$15/hr x 20 hr/day loader + $39/hr x 20/day x 20hr/day dozer) at $1,860/day and labor (2 ea x $432/ea/10-hr shift x 1 shifts/day) at $864/day for a total of $8,280/day.
22 Overdredge sediment production rate: 700 cy/10-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 10 hr or $2,000/day totals $3500/day.
24 $1500/day, 28 days/month
25 Assumes 30% of volume dredged is water given up and that settlement time in ASB is sufficient to allow management as stormwater
26 MP&E rental at $2,000/month per each; maintenance mechanic at $400/10-hr day; each pump operates at $5/hr or $100/day; assume 2 mechanics to cover 20 hr/day x $400/day plus $100/day operating cost for a total of $900/day;
27 Based on average annual Bellingham rainfall of 36 inches over area of ASB

Table B10 Alternative 3 - Phase 4

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 3 - Phase 4
Add soil cap to ASB

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$52,707**	1
1.1	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.2	Roller, vibrating	EA	2	$100.00	1.0185	$101.85	$204		4
1.3	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,5
1.4	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Place Fill Soils**							**$1,399,588**	1
2.1	Fill Soil Procurement and Delivery (5 feet)	CY	135,733	$8.00	1.0185	$8.15	$1,105,955		6
2.2	Fill Soil Placement and Compaction	CY	161,333	$1.25	1.0185	$1.27	$205,398		7
2.3	Rainwater from lagoon	CCF	39,200	$2.21	1.0185	$2.25	$88,236		2,8
3	**Demobilization**							**$1,782**	1
3.1	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
3.2	Roller, vibrating	EA	2	$100.00	1.0185	$101.85	$204		4
3.3	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,5
	Subtotal							**$1,454,078**	1
	Design, Engineering & Permitting		12%					$174,489	4
	Construction management and monitoring		7%					$101,785	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$122,143	
	TOTAL Cost Excluding Construction Contingency							$1,852,495	
	Contingency @		30%					$436,223	4
	Total*							**$2,288,719**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
5 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
6 Assume general fill delivered at $8/CY, re-use of materials removed from berm
7 Assume Soil placed by bulldozer ($1000/day) and 2 vibrating rollers ($750/day each) at 2,000 CY/day for a total of $1.25/CY
8 Based on average annual Bellingham rainfall of 36 inches over area of ASB

Table B11 Alternative 4 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 4 - Phase 1
Capping in Areas 1C3, 2C, 5B, 6B, 6C and 8

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$119,012**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	5	$100.00	1.0185	$101.85	$509		3
1.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
1.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.1	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.11	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.12	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Construct Dredge Spoil Offload Facility at GP**							**$667,769**	
2.1	Track Installation - 100-lb rail, steel ties in concrete, incl fasteners and plates	FT	2,000	$224.00	1.0185	$228.14	$456,288		24
2.2	Track Switch Installation	EA	2	$28,820.00	1.0185	$29,353.17	$58,706		25
2.3	Sediment Stockpile Construction	LS	1	$75,000.00	1.0185	$76,387.50	$76,388		4
2.4	Stormwater Upgrades	LS	1	$75,000.00	1.0185	$76,387.50	$76,388		4
3	**Dredging**							**$1,306,055**	1
3.1	Dredge uncontaminated sediments	DAY	73	$5,725.00	1.0185	$5,830.91	$426,683		6,8
					1 production dredge, 10-hr days, 170 cy/hr production total from the dredge				
3.2	Dredge contaminated sediments	DAY	35	$5,725.00	1.0185	$5,830.91	$204,158		7,8
					1 production dredge, 10-hr days, 170 cy/hr production total from the dredge				
3.3	Overdredge contaminated sediments	DAY	23	$3,500.00	1.0185	$3,564.75	$80,602		22,23
					1 articulated dredge, 10-hr days, 70 cy/yr production rate				
3.4	Construction office	MONTH	5	$76,717.00	1.0185	$78,136.26	$384,249		11
3.5	Water Quality Monitoring	MONTH	5	$42,000.00	1.0185	$42,777.00	$210,364		26
4	**Offloading and On-shore Management**							**$1,360,029**	1
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	66	$283.00	1.0185	$288.24	$18,982		31
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	66	$238.00	1.0185	$242.40	$15,964		32
4.3	24-inch HDPE Pipe Installation	LF	200	$65.00	1.0185	$66.20	$13,241		33
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	3	$20,000.00	1.0185	$20,370.00	$61,110		37,38
4.5	Chitosan for Filtration, 1% solution	GAL	371	$11.00	1.0185	$11.20	$4,156		39
4.6	Water Treatment Unit Operator, full-time	DAY	66	$500.00	1.0185	$509.25	$33,537		4
4.7	Transport sediment to offload facility	DAY	58	$9,200.00	1.0185	$9,370.20	$539,946		16
4.8	Offload Sediments to Stockpile	CY	79,050	$5.73	1.0185	$5.84	$461,468		40
4.9	Transport to Railcar or Large Stockpile	CY	79,050	$0.86	1.0185	$0.88	$69,240		27
4.10	Load into Railcars	CY	79,050	$0.63	1.0185	$0.65	$50,991		34
4.11	Yard Locomotive	DAY	58	$516.00	1.0185	$525.55	$30,284		35
4.12	Assorted Water Management	MONTH	3	$20,000.00	1.0185	$20,370.00	$61,110		4
5	**Landfill Disposal**							**$3,610,966**	1
5.1	Railcar transport to and tipping at Roosevelt, WA	TON	118,574	$29.90	1.0185	$30.45	$3,610,966		2, 36
6	**Capping**							**$6,699,802**	1
6.1	Capping sand procurement and delivery (Areas 1C1, 1C2, 2A, 2B, 3B, 5B, 6B, 6C, and 8)	CY	263,754	$15.00	1.0185	$15.28	$4,029,503		3
					2 units, 10-hr days, high production (one for waterway and one for ASB)				
6.2	Front-end loader for loading barges	MONTH	9	$15,780.00	1.0185	$16,071.93	$148,218		2
6.3	Transport capping sand to placement locations	DAY	91	$4,500.00	1.0185	$4,583.25	$418,019		14
					assumes barges in waterway				
6.4	Sand cap placement	CY	263,754	$6.50	1.0185	$6.62	$1,746,118		4
					2 units, 10-hr days, high production (one for waterway and one for ASB)				
6.5	Conveyor system for ASB	MONTH	5	$3,222.00	1.0185	$3,281.61	$16,659		2,20
					assumes conveyor in ASB				
6.6	Front-end loader for conveyor	MONTH	5	$15,780.00	1.0185	$16,071.93	$81,588		2
6.7	Conveyor rerouting	DAY	112	$712.00	1.0185	$725.17	$80,989		4,18
6.8	Bulldozer anchors	MONTH	5	$32,921.00	1.0185	$33,530.04	$170,214		4,19
6.9	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	167	$50.00	1.0185	$50.93	$8,495		4
7a	**Under Dock Work**	LS	1	591,659	1.0185	591,659	$591,659	**$591,659**	
7b	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	522,926	1.0000	$522,925.70	$522,926	**$522,926**	
8	**Transportation**							**$1,073,228**	1
8.1	Barge uncontaminated sediment to Rosario PSDDA Site	DAY	73	14,400	1.0185	$14,666.40	$1,073,228		16
9	**PSDDA Disposal**							**$95,025**	1
9.1	PSDDA Disposal Fee	TON	186,599	$0.50	1.0185	$0.51	$95,025		

Table B11 Alternative 4 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 4 - Phase 1
Capping in Areas 1C3, 2C, 5B, 6B, 6C and 8

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
10	**Demobilization**							**$30,199**	1
10.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
10.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
10.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
10.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
10.5	Front-end loader	EA	5	$100.00	1.0185	$101.85	$509		3
10.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
10.7	Barge, flat deck, 400 ton capacity	EA	2	$300.00	1.0185	$305.55	$611		4
10.8	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
10.9	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
10.10	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
10.11	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$16,076,669**	1
	Design, Engineering & Permitting		12%					$1,929,200	4
	Construction management and monitoring		7%					$1,125,367	4
	Long-term environmental monitoring		LS					$640,000	4
	Sales Taxes		8.4%					$1,350,440	
	TOTAL Cost Excluding Construction Contingency							$21,121,677	
	Contingency @		30%					$4,823,001	4
	Total*							**$25,944,678**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge uncontaminated sediment: 170 cy/hr x 10 hr/day x 1 = 1,700 cy/10-hr day
7 Dredge contaminated sediment: 170 cy/hr x 10 hr/day x 1 = 1,700 cy/10-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barges and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport contaminated sediment to offload facility, one tug to alternate to rotate barges between loading at waterway and unloading. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea x $220/hr x 20 hr tug) at $4,400/day for a total of $9,200/day. Labor included in operations costs.
18 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
19 Anchor dozers (2 dozers ea dredge x 11 months x $3,900/month + 2 ea x 219 days x 4 hr operating/day x $16/hr + 1 dozer operators x 219 days x $307/8-hr day = $181,065/ dredge) for 2 dredges per month (2 x $181,065 / 11 months) is $32,921/month.
20 Conveyor sand from staging area over the ASB berm to barge: assume 3 ea (rental @ $1,000/ea/month, operations at $0.42/ea/hr x 8 hr/day x 22 days/month) at $1,074/ea/month, or for 3 at total of $3,222/month.
22 Overdredge sediment production rate: 700 cy/10-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 10 hr or $2,000/day totals $3500/day.
24 Need ~2000 feet trackage to complete loop (40 CYD/car, each car 65 ft long, 1500 feet already available), Costs 05650-700-1020
25 Assume 2 needed. Costs from 05650-700-2200, plus cost index of 110% for Bellingham
26 $1500/day, 28 days/month
27 Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
31 Costs from 01590-800-0010, assumes 7 day/week operation
32 Costs from 01590-400-4400, assumes 7 day/week operation
33 Costs from 02510-760-0900
34 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
35 Costs from 01590-500-7000
36 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
37 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent
38 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
39 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*58 shifts = 371 gallons
40 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift

Talbe B12 Alternative 5 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 5 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$114,428**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	4,800	1.0185	$4,888.80	$9,778		4
1.2	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	40,000	1.0185	$40,740.00	$40,740		2
1.5	Front-end loader	EA	3	100	1.0185	$101.85	$306		3
1.6	Tug, push, diesel, 500-hp	EA	1	2,000	1.0185	$2,037.00	$2,037		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	700	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
1.10	Construction office setup	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	50,000	1.0185	$50,925.00	$50,925		4
2	**Construct Dredge Spoil Offload Facility**							**$547,159**	
2.1	Track Installation - 100-lb rail, steel ties in concrete, incl fasteners and plates	FT	1,600	224	1.0185	$228.14	$365,030.40		28
2.2	Track Switch Installation	EA	1	28,820	1.0185	$29,353.17	$29,353.17		29
2.3	Sediment Stockpile Construction	LS	1	75,000	1.0185	$76,387.50	$76,388		4
2.4	Stormwater Upgrades	LS	1	75,000	1.0185	$76,387.50	$76,388		4
3	**Dredging - Waterway**							**$1,005,818**	1
3.1	Dredge contaminated sediments (Areas 2A, 2B, 3B, 1C)	DAY	39	5,725	1.0185	$5,830.91	$226,745		7,8
3.2	Overdredge contaminated sediments	DAY	12	3,500	1.0185	$3,564.75	$41,220		18,19
3.3	Floodlights	MONTH	5	16,000	1.0185	$16,296.00	$87,633		10
3.4	Construction office	MONTH	5	76,717	1.0185	$78,136.26	$420,183		11
3.5	Water Quality Monitoring	MONTH	5	42,000	1.0185	$42,777.00	$230,036		21
4	**Offloading and On-shore Management**							**$1,156,817**	
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	58	283	1.0185	$288.24	$16,618.85		31
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	58	238	1.0185	$242.40	$13,976.28		32
4.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		33
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	3	20000	1.0185	$20,370.00	$61,110.00		24, 37
4.5	Chitosan for Filtration, 1% solution	GAL	371	11	1.0185	$11.20	$4,156.50		25
4.6	Water Treatment Unit Operator, full-time	DAY	58	500	1.0185	$509.25	$29,361.93		4
4.7	Transport sediment to offload facility	DAY	50	7,000	1.0185	$7,129.50	$359,683.66		16
4.8	Offload Sediments to Stockpile	CY	77,602	5.73	1.0185	$5.84	$453,016.00		26
4.9	Transport to Railcar or Large Stockpile	CY	77,602	0.86	1.0185	$0.88	$67,972.16		27
4.10	Load into Railcars	CY	77,602	0.63	1.0185	$0.65	$50,057.02		34
4.11	Yard Locomotive	DAY	50	516	1.0185	$525.55	$26,513.82		35
4.12	Assorted Water Management	MONTH	3	20,000	1.0185	$20,370.00	$61,110.00		4
5	**Capping**							**$616,471**	1
5.1	Barge delivery from ASB to placement point	DAY	57	4,100	1.0185	$4,175.85	$238,447		13,14, 23
5.2	Sand cap placement by small dredge	CY	57,101	7	1.0185	$6.62	$378,025		4
5.3	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	51	50	1.0185	$50.93	$2,592		4,30
6	**Disposal**							**$3,544,827**	1
6.1	Railcar transport to and tipping at Roosevelt, WA	TON	116,403	30	1.0185	$30.45	$3,544,827		2, 36

Talbe B12 Alternative 5 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 5 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
7a	**Under Dock Work**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
7b	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	362,877	1.0000	$362,877.35	$362,877	**$362,877**	
8	**Demobilization**							**$63,300**	1
8.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	4,800	1.0185	$4,888.80	$9,778		4
8.2	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
8.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
8.4	Barge-mounted backhoe, 5-cy bucket	EA	1	40,000	1.0185	$40,740.00	$40,740		
8.5	Front-end loader	EA	3	100	1.0185	$101.85	$306		3
8.6	Tug, push, diesel, 500-hp `	EA	1	2,000	1.0185	$2,037.00	$2,037		4
8.7	Barge, flat-deck, 2,000-ton capacity	EA	2	600	1.0185	$611.10	$1,222		4
8.8	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
8.9	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
8.10	Construction office teardown	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$8,014,302**	1
	Design, Engineering & Permitting (Year 1 and 3)		12%					$961,716	4
	Construction management and monitoring		7%					$561,001	4
	Long-term environmental monitoring		LS					$640,000	4
	Sales Taxes		8.4%					$673,201	
	TOTAL Cost Excluding Construction Contingency							$10,850,220	
	Contingency @		30%					$2,404,291	4
	Total* (including contingency)							**$13,254,511**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Talbe B12 Alternative 5 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 5 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham, escalated per note 1.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 170 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day.
$1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month
= $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month
x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
13 Capping sand transport to site by barge at 2,000 ton/trip/1.5 ton/cy = 1,300 cy/trip; assume trip takes 1/2 hr; unload 1,300 cy @ 100 cy/hr in 13hr
14 Assume two 2,000-ton barge and one tug combinations . Cost each combination for rental
($800/day barge + $500/day tug) at $2,100/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,100/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport contaminated sediment to offload facility, one tug to alternate to rotate barges between loading at
waterway and unloading. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea
x $220/hr x 10 hr tug) at $2,200/day for a total of $7,000/day. Labor included in operations costs.
18 Overdredge contaminated sediment production rate: 1,400 cy/20-hr day
19 Overdredge contaminated sediment: backhoe dredge at $1,500/day plus operating costs of $200/hr (equipment and personnel) x 10 hr or $2,000/day totals $3,500/day.
21 $1500/day, 28 days/month
23 Assumes that costs of excavation from ASB, transport to barge loading site, and loading of barge included in ASB cost estimate
24 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
25 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*58 shifts = 371 gallons
26 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400
27 CY for 20 hours = $0.85/CY
28 Need ~1600 feet trackage to finish loop track for loading (40 CYD/car, each car 65 ft long), Costs 05650-700-1020
29 Assume 1 needed. Costs from 05650-700-2200, plus cost index of 110% for Bellingham
30 Assumes 4 surveys of work area
31 Costs from 01590-800-0010, assumes 7 day/week operation
32 Costs from 01590-400-4400, assumes 7 day/week operation
33 Costs from 02510-760-0900
34 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
35 Costs from 01590-500-7000
36 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
37 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent

Table B13 Alternative 5 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 5 - Phase 2
Removal within the ASB
Dredge Area 8

Item	Description	Unit	Quantity	Unit Cost	Item Cost	Total Cost	Notes
1	**ASB Dredging (See ASB - Construction Subtotal)**	LS	1	$21,602,915	$21,602,915	**$21,602,915**	
	Subtotal					**$21,602,915**	
	Design, Engineering & Permitting		LS			$1,850,000	
	Construction management and monitoring		7%			$1,512,204	
	Sales Taxes		8.4%			$1,814,645	
	TOTAL Cost Excluding Construction Contingency					$26,779,764	
	Contingency @		30%			$6,480,875	
	Total*					**$33,260,639**	

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and litigation costs. property owner agreements, and owner agreements, and litigation costs.

Notes 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

Table B14 Alternative 5 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 5 - Phase 3
Capping in Areas 5B, 6B, 6C, 2C
Dredge Areas 1A, 1B
Estimate assumes that ASB berm sands can be reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalation (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$70,531**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	4,800	1.0185	$4,888.80	$4,889		4
1.2	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
1.3	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
1.4	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
1.5	Barge, flat-deck, 2,000-ton capacity	EA	2	700	1.0185	$712.95	$1,426		4
1.6	Barge, flat-deck or split-hull, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
1.7	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
1.8	Construction office setup	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
1.9	Nonscheduled contract costs	EA	1	50,000	1.0185	$50,925.00	$50,925		4
2	**Dredging - Waterway**							**$687,826**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	37	9,225	1.0185	$9,395.66	$343,768		6,8
2.2	Floodlights	MONTH	4	16,000	1.0185	$16,296.00	$59,373		10
2.3	Construction office	MONTH	4	76,717	1.0185	$78,136.26	$284,684		11
4	**Capping**							**$1,753,059**	1
4.1	Barge movement from loading area to capping area	DAY	73	10,600	1.0185	$10,796.10	$785,038		13,14
4.2	Sand cap placement by small dredge	CY	145,430	7	1.0185	$6.62	$962,783		4
4.3	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	103	50	1.0185	$50.93	$5,237		4
5	**Transportation**							**$536,614**	1
5.1	Barge uncontaminated sediment to Rosario PSDDA Site	DAY	37	14,400	1.0185	$14,666.40	$536,614		16
6	**Disposal**							**$95,025**	1
6.1	PSDDA Disposal Fee	TON	186,599	1	1.0185	$0.51	$95,025		
7	**Demobilization**							**$19,402**	1
7.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	4,800	1.0185	$4,888.80	$4,889		4
7.2	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
7.3	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
7.4	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
7.5	Barge, flat-deck, 2,000-ton capacity	EA	2	600	1.0185	$611.10	$1,222		4
7.6	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
7.7	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
7.8	Construction office teardown	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$3,162,457**	1
	Design, Engineering & Permitting		12%					$379,495	4
	Construction management and monitoring		7%					$221,372	4
	Long Term Environmental Monitoring		*included in year 1*					NA	
	Sales Taxes		8.4%					$265,646	
	TOTAL Cost Excluding Construction Contingency							$4,028,971	
	Contingency @		30%					$948,737	4
	Total*							**$4,977,708**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge and overdredge uncontaminated sediment: 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
13 Capping sand transport to site by barge at 2,000 ton/trip/1.5 ton/cy = 1,300 cy/trip; assume trip takes 1/2 hr; unload 1,300 cy @ 100 cy/hr in 13 hr
14 Assume two 2,000-ton barge and one tug combinations to bring capping sand to waterway. Cost each combination for rental ($800/day ($800/day barge + $500/day tug) at $2,100/day plus operations ($200/hr x 20 hr tug) at $4,000/day for a total of $6,100/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport uncontaminated sediment to PSDDA site, two tugs alternate to rotate barges between loading at waterway and unloading at habitat berm sites. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.

Table B15 Alternative 6 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 6 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands can be reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$116,465**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	4,800	1.0185	$4,888.80	$9,778		4
1.2	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	40,000	1.0185	$40,740.00	$40,740		2
1.5	Front-end loader	EA	3	100	1.0185	$101.85	$306		3
1.6	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	700	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
1.10	Construction office setup	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	50,000	1.0185	$50,925.00	$50,925		4
2	**Construct Dredge Spoil Offload Facility**							**$547,159**	
2.1	Track Installation - 100-lb rail, steel ties in concrete, incl fasteners and plates	FT	1,600	224	1.0185	$228.14	$365,030.40		28
2.2	Track Switch Installation	EA	1	28,820	1.0185	$29,353.17	$29,353.17		29
2.3	Sediment Stockpile Construction	LS	1	75,000	1.0185	$76,387.50	$76,388		4
2.4	Stormwater Upgrades	LS	1	75,000	1.0185	$76,387.50	$76,388		4
3	**Dredging - Waterway**							**$806,289**	1
3.1	Dredge contaminated sediments (Areas 2A, 2B, 3B, 1C)	DAY	30	9,225	1.0185	$9,395.66	$283,299		7,8
3.2	Overdredge contaminated sediments	DAY	20	5,500	1.0185	$5,601.75	$111,362		18,19
3.3	Floodlights	MONTH	3	16,000	1.0185	$16,296.00	$48,888		10
3.4	Construction office	MONTH	3	76,717	1.0185	$78,136.26	$234,409		11
3.5	Water Quality Monitoring	MONTH	3	42,000	1.0185	$42,777.00	$128,331		21
4	**Offloading and On-shore Management**							**$1,682,497**	
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	57	283	1.0185	$288.24	$16,481.16		31
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	57	238	1.0185	$242.40	$13,860.48		32
4.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		33
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	3	20000	1.0185	$20,370.00	$61,110.00		24, 37
4.5	Chitosan for Filtration, 1% solution	GAL	540	11	1.0185	$11.20	$6,049.89		25
4.6	Water Treatment Unit Operator, full-time	DAY	57	500	1.0185	$509.25	$29,118.66		4
4.7	Transport sediment to offload facility	DAY	50	9,200	1.0185	$9,370.20	$468,810.35		16
4.8	Offload Sediments to Stockpile	CY	134,049	5.73	1.0185	$5.84	$782,538.93		26
4.9	Transport to Railcar or Large Stockpile	CY	134,049	0.86	1.0185	$0.88	$117,414.97		27
4.10	Load into Railcars	CY	134,049	0.63	1.0185	$0.65	$86,468.39		34
4.11	Yard Locomotive	DAY	50	516	1.0185	$525.55	$26,294.15		35
4.12	Assorted Water Management	MONTH	3	20,000	1.0185	$20,370.00	$61,110.00		4
5	**Capping**							**$208,676**	1
5.1	Sand cap placement by small dredge	CY	31,521	7	1.0185	$6.62	$208,676		4
5.2	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	30	50	1.0185	$50.93	$1,516		4,30

Table B15 Alternative 6 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 6 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands can be reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
6	**Disposal**							**$6,123,327**	1
6.1	Railcar transport to and tipping at Roosevelt, WA	TON	201,074	30	1.0185	$30.45	$6,123,327		2, 36
7a	**Under-Dock Work**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
7b	**Log Pond Shoreline Enhancements (See Addendum 1)**	LS	1	362,877	1.0000	$362,877.35	$362,877	**$362,877**	
8	**Demobilization**							**$65,337**	1
8.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	4,800	1.0185	$4,888.80	$9,778		4
8.2	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
8.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
8.4	Barge-mounted backhoe, 5-cy bucket	EA	1	40,000	1.0185	$40,740.00	$40,740		
8.5	Front-end loader	EA	3	100	1.0185	$101.85	$306		3
8.6	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
8.7	Barge, flat-deck, 2,000-ton capacity	EA	2	600	1.0185	$611.10	$1,222		4
8.8	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
8.9	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
8.10	Construction office teardown	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$10,515,233**	1
	Design, Engineering & Permitting		12%					$1,261,828	4
	Construction management and monitoring		7%					$736,066	4
	Long-term environmental monitoring		LS					$640,000	4
	Sales Taxes		8.4%					$883,280	
	TOTAL Cost Excluding Construction Contingency							$14,036,407	
	Contingency @		30%					$3,154,570	4
	Total* (including contingency)							**$17,190,977**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B15 Alternative 6 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 6 - Phase 1
Capping in Areas 2A, 2B, 2C, 3B
Dredge Areas 1C1, 1C2, 1C3, 2A, 2B, 2C, 3B
Estimate assumes that ASB berm sands can be reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham, escalated per note 1.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 170 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day.
$1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month
= $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month
x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
16 Assume two 6,000-ton barges available to transport contaminated sediment to offload facility, one tug to alternate to rotate barges between loading at
waterway and unloading. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea
x $220/hr x 20 hr tug) at $4,400/day for a total of $9,200/day. Labor included in operations costs.
18 Overdredge contaminated sediment production rate: 1,400 cy/20-hr day
19 Overdredge contaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
21 $1500/day, 28 days/month
23 Assumes that costs of excavation from ASB, transport to barge loading site, and loading of barge included in ASB cost estimate
24 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
25 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*84 shifts = 540 gallons
26 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus
27 $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
28 Need ~1600 feet trackage to finish loop track for loading (40 CYD/car, each car 65 ft long), Costs 05650-700-1020
29 Assume 1 needed. Costs from 05650-700-2200, plus cost index of 110% for Bellingham
30 Assumes 4 surveys of work area
31 Costs from 01590-800-0010, assumes 7 day/week operation
32 Costs from 01590-400-4400, assumes 7 day/week operation
33 Costs from 02510-760-0900
34 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
35 Costs from 01590-500-7000
36 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
37 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent

Table B16 Alternative 6 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 6 - Phase 2
Removal within the ASB
Dredge Area 8

Item	Description	Unit	Quantity	Unit Cost	Item Cost	Total Cost	Notes
1	**ASB Dredging (See ASB - Construction Subtotal)**	LS	1	$21,602,915	$21,602,915	**$21,602,915**	
	Subtotal					**$21,602,915**	
	Design, Engineering & Permitting		LS			$1,850,000	
	Construction management and monitoring		7%			$1,512,204	
	Sales Taxes		8.4%			$1,814,645	
	TOTAL Cost Excluding Construction Contingency					$26,779,764	
	Contingency @		30%			$6,480,875	
	Total*					**$33,260,639**	

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

Table B17 Alternative 6 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 6 - Phase 3
Capping in Areas 5B, 6B, 6C, 2C
Dredge Areas 1A, 1B
Estimate assumes that ASB berm sands can be reused as capping material.

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalation (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$70,531**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	4,800	1.0185	$4,888.80	$4,889		4
1.2	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
1.3	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
1.4	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
1.5	Barge, flat-deck, 2,000-ton capacity	EA	2	700	1.0185	$712.95	$1,426		4
1.6	Barge, flat-deck or split-hull, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
1.7	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
1.8	Construction office setup	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
1.9	Nonscheduled contract costs	EA	1	50,000	1.0185	$50,925.00	$50,925		4
2	**Dredging - Waterway**							**$721,497**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	37	9,225	1.0185	$9,395.66	$343,768		6,8
2.2	Floodlights	MONTH	4	16,000	1.0185	$16,296.00	$65,184		10
2.3	Construction office	MONTH	4	76,717	1.0185	$78,136.26	$312,545		11
3	**Capping**							**$968,020**	1
3.1	Sand cap placement by small dredge	CY	145,430	7	1.0185	$6.62	$962,783		4
3.2	Bathymetric Survey (50 ft center to center, single beam son	Acre	103	50	1.0185	$50.93	$5,237		4
4	**Transportation**							**$536,614**	1
4.1	Barge uncontaminated sediment to Rosario PSDDA Site	DAY	37	14,400	1.0185	$14,666.40	$536,614		16
5	**Disposal**							**$95,025**	1
5.1	PSDDA Disposal Fee	TON	186,599	0.50	1.0185	$0.51	$95,025		
6	**Demobilization**							**$19,402**	1
6.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	4,800	1.0185	$4,888.80	$4,889		4
6.2	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	1	3,000	1.0185	$3,055.50	$3,056		4
6.3	Tug, bow, diesel, 900-hp	EA	1	1,500	1.0185	$1,527.75	$1,528		4
6.4	Tug, push, diesel, 500-hp	EA	2	2,000	1.0185	$2,037.00	$4,074		4
6.5	Barge, flat-deck, 2,000-ton capacity	EA	2	600	1.0185	$611.10	$1,222		4
6.6	Barge, flat-deck, 6,000-ton capacity	EA	2	1,500	1.0185	$1,527.75	$3,056		4
6.7	Dozer, diesel, crawler, 100-hp	EA	1	100	1.0185	$101.85	$102		3
6.8	Construction office teardown	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$2,411,090**	1
	Design, Engineering & Permitting		*12%*					$289,331	4
	Construction management and monitoring		7%					$168,776	4
	Long Term Environmental Monitoring		*included in year 1*					NA	
	Sales Taxes		8.4%					$202,532	
	TOTAL Cost Excluding Construction Contingency							$3,071,729	
	Contingency @		30%					$723,327	4
	Total*							**$3,795,056**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge and overdredge uncontaminated sediment: 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106). ($800/day barge + $500/day tug) at $2,100/day plus operations ($200/hr x 20 hr tug) at $4,000/day for a total of $6,100/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available to transport uncontaminated sediment to PSDDA site, two tugs alternate to rotate barges between loading at waterway and unloading at habitat berm sites. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.

Table B18 Alternative 7 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 7 - Phase 1
Capping in Areas 2A, 2B, 2C, 3A, 3B
Dredge Areas 2A, 2B, 2C, 3A and 3B

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$116,262**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
1.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.1	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Construct Dredge Spoil Offload Facility**							**$547,159**	
2.1	Track Installation - 100-lb rail, steel ties in concrete, incl fasteners and plates	FT	1,600	224	1.0185	$228.14	$365,030.40		25
2.2	Track Switch Installation	EA	1	28,820	1.0185	$29,353.17	$29,353.17		26
2.3	Sediment Stockpile Construction	LS	1	75,000	1.0185	$76,387.50	$76,388		4
2.4	Stormwater Upgrades	LS	1	75,000	1.0185	$76,387.50	$76,388		4
3	**Dredging**							**$2,082,239**	1
3.1	Dredge contaminated sediments (Areas 2A, 2B, 2C, 3A & 3B)	DAY	112	$9,225.00	1.0185	$9,395.66	$1,050,881		7,8
				1 production dredges, 20-hr days, 170 cy/hr production					
3.2	Overdredge contaminated sediments	DAY	28	$5,500.00	1.0185	$5,601.75	$157,943		22,23
					1 articulated dredge, 10-hr days, 50 cy/yr production rate				
3.3	Floodlights	MONTH	6	$16,000.00	1.0185	$16,296.00	$103,733		10
3.4	Construction office	MONTH	6	$76,717.00	1.0185	$78,136.26	$497,382		11
3.5	Water Quality Monitoring	MONTH	6	42,000	1.0185	$42,777.00	$272,300		24
4	**Offloading and On-shore Management**							**$4,943,249**	
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	160	283	1.0185	$288.24	$46,131.74		28
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	160	238	1.0185	$242.40	$38,796.30		29
4.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		30
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	7	20000	1.0185	$20,370.00	$142,590.00		27, 31
4.5	Chitosan for Filtration, 1% solution	GAL	1792	11	1.0185	$11.20	$20,076.67		32
4.6	Water Treatment Unit Operator, full-time	DAY	160	500	1.0185	$509.25	$81,504.84		4
4.7	Transport sediment to offload facility	DAY	140	9,200	1.0185	$9,370.20	$1,312,227.91		16
4.8	Offload Sediments to Stockpile	CY	417,534	5.73	1.0185	$5.84	$2,437,439.57		33
4.9	Transport to Railcar or Large Stockpile	CY	417,534	0.86	1.0185	$0.88	$365,722.25		34
4.10	Load into Railcars	CY	417,534	0.63	1.0185	$0.65	$269,330.34		35
4.11	Yard Locomotive	DAY	140	516	1.0185	$525.55	$73,598.87		36
4.12	Assorted Water Management	MONTH	7	20,000	1.0185	$20,370.00	$142,590.00		4
5	**Capping**							**$1,867,232**	1
5.1	Capping sand procurement and delivery (Areas 2A, 2B, 2C, 3A, 3B)	CY	65,584	$15.00	1.0185	$15.28	$1,001,963		3, 38
					1 unit, 10-hr days, high production				
5.2	Front-end loader for loading barges	MONTH	2	$15,780.00	1.0185	$16,071.93	$36,855		2, 39
5.3	Transport capping sand to placement locations	DAY	85	$4,500.00	1.0185	$4,583.25	$389,873		14
5.4	Sand cap placement	CY	65,584	$6.50	1.0185	$6.62	$434,184		4
5.5	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	86	$50.00	1.0185	$50.93	$4,356		4,40
					three events				
6	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	362,877	1.000	$362,877	$362,877	**$362,877**	
7	**Disposal**							**$19,072,841**	1
7.1	Railcar transport to and tipping at Roosevelt, WA	TON	626,301	30	1.0185	$30.45	$19,072,841		2, 37
8	**Demobilization**							**$27,449**	1
8.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
8.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
8.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
8.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
8.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
8.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
8.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
8.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
8.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
8.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$29,019,307**	1
	Design, Engineering & Permitting		9%					$2,611,738	4
	Construction management and monitoring		7%					$2,031,352	4
	Long-term environmental monitoring		LS					$640,000	
	Sales Taxes		8.4%					$2,437,622	
	TOTAL Cost Excluding Construction Contingency							$36,740,018	
	Contingency @		30%					$8,705,792	4
	Total*							**$45,445,810**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes
1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 1700 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to offload, one tugs alternate to rotate barges between loading at waterway and unloading at offload site. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea x $220/hr x 20 hr tug) at $4,400/day for a total of $9,200/day. Labor included in operations costs.
22 Overdredge sediment production rate: 1400 cy/20-hr day

23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
24 $1500/day, 28 days/month
25 Need ~1600 feet trackage to finish loop track for loading (40 CYD/car, each car 65 ft long), Costs 05650-700-1020
26 Assume 1 needed. Costs from 05650-700-2200, plus cost index of 110% for Bellingham
27 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
28 Costs from 01590-800-0010, assumes 7 day/week operation
29 Costs from 01590-400-4400, assumes 7 day/week operation
30 Costs from 02510-760-0900
31 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent
32 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*280 shifts = 1792 gallons
33 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
34 Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
35 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
36 Costs from 01590-500-7000
37 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
38 Assumes 45,000 CYD available from ASB, rest must be purchased
39 Assumes that costs of excavation from ASB, transport to barge loading site, and loading of barge included in ASB cost estimate for sands from ASB
40 Assumes 4 surveys of work area

Table B19 Alternative 7 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 7 - Phase 2
Removal within the ASB
Dredge Area 8

Item	Description	Unit	Quantity	Unit Cost	Item Cost	Total Cost	Notes
1	**ASB Dredging (See ASB - Construction Subtotal)**	LS	1	$21,602,915	$21,602,915	**$21,602,915**	
	Subtotal					**$21,602,915**	
	Design, Engineering & Permitting		LS			$1,850,000	
	Construction management and monitoring		7%			$1,512,204	
	Sales Taxes		8.4%			$1,814,645	
	TOTAL Cost Excluding Construction Contingency					$26,779,764	
	Contingency @		30%			$6,480,875	
	Total*					**$33,260,639**	

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

Table B20 Alternative 7 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 7 - Phase 3
Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$114,428**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
1.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	4	$700.00	1.0185	$712.95	$2,852		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.10	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$1,008,559**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	37	$5,725.00	1.0185	$5,830.91	$213,341		6,8
			1 production dredge, 10-hr days, 150 cy/hr production total from the dredge						
2.2	Dredge contaminated sediments (Areas 1C1, 1C2 & 1C3)	DAY	47	$5,725.00	1.0185	$5,830.91	$272,085		7,8
			1 production dredge, 10-hr days, 150 cy/hr production total from the dredge						
2.3	Overdredge contaminated sediments (Areas 1C1, 1C2 & 1C3)	DAY	13	5,500	1.0185	$5,601.75	$75,059		18,19
2.4	Floodlights	MONTH	4	$16,000.00	1.0185	$16,296.00	$61,666		10
2.5	Construction office	MONTH	4	$76,717.00	1.0185	$78,136.26	$295,676		11
2.6	Water Quality Monitoring	MONTH	2	42,000	1.0185	$42,777.00	$90,731		24
3	**Offloading and On-shore Management**							**$1,485,336**	
3.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	69	283	1.0185	$288.24	$19,785.07		31
3.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	69	238	1.0185	$242.40	$16,639.03		32
3.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		33
3.4	Water Filtration Unit, handle up to 300 gpm	MONTH	3	20000	1.0185	$20,370.00	$61,110.00		25, 37
3.5	Chitosan for Filtration, 1% solution	GAL	371	11	1.0185	$11.20	$4,156.50		26
3.6	Water Treatment Unit Operator, full-time	DAY	69	500	1.0185	$509.25	$34,955.95		4
3.7	Transport sediment to offload facility	DAY	60	9,200	1.0185	$9,370.20	$562,790.72		16
3.8	Offload Sediments to Stockpile	CY	92,406	5.73	1.0185	$5.84	$539,437.27		27
3.9	Transport to Railcar or Large Stockpile	CY	92,406	0.86	1.0185	$0.88	$80,939.12		28
3.10	Load into Railcars	CY	92,406	0.63	1.0185	$0.65	$59,606.33		34
3.11	Yard Locomotive	DAY	60	516	1.0185	$525.55	$31,565.22		35
3.12	Assorted Water Management	MONTH	3	20,000	1.0185	$20,370.00	$61,110.00		4
4	**Capping**							**$626,212**	1
4.1	Transport capping sand to placement locations	DAY	47	$4,500.00	1.0185	$4,583.25	$216,704		14
4.2	Sand cap placement	CY	61,466	$6.50	1.0185	$6.62	$406,922		4
				Sand from ASB					
4.3	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	51	$50.00	1.0185	$50.93	$2,587		4, 30
5	**Transportation**							**$536,614**	1
5.1	Barge uncontaminated sediment to Rosario PSDDA Site	DAY	37	14,400	1.0185	$14,666.40	$536,614		15
6	**Disposal**							**$4,316,095**	1
6.1	PSDDA Disposal Fee	TON	186,599	1	1.0185	$0.51	$95,025		
6.2	Railcar transport to and tipping at Roosevelt, WA	TON	138,609	29.9	1.0185	$30.45	$4,221,069		2, 36
7	**Under Dock Work**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
8	**Demobilization**							**$63,096**	1
8.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
8.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
8.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
8.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
8.5	Front-end loader	EA	2	$100.00	1.0185	$101.85	$204		3
8.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
8.7	Barge, flat-deck, 2,000-ton capacity	EA	4	$600.00	1.0185	$611.10	$2,444		4
8.8	Barge, flat-deck, 6,000-ton capacity	EA	0	$1,500.00	1.0185	$1,527.75	$0		4
8.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
8.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$8,752,945**	1
	Design, Engineering & Permitting		9%					$787,765	4
	Construction management and monitoring		7%					$612,706	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$735,247	
	TOTAL Cost Excluding Construction Contingency							$10,888,663	
	Contingency @		30%					$2,625,883	4
	Total*							**$13,514,547**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B20 Alternative 7 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 7 - Phase 3
Dredge Areas 1A, 1B and 1C
Cap Areas 5B, 6B, 6C

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge uncontaminated sediment: 1500 cy/hr x 10 hr/day x 1 = 1,500 cy/10-hr day
7 Dredge contaminated sediment: 1500 cy/hr x 10 hr/day x 1 = 1,500 cy/10-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
15 Assume two 6,000-ton barges available to transport uncontaminated sediment to PSDDA site, two tugs alternate to rotate barges between loading at waterway and unloading at habitat berm sites. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.
16 Assume two 2,000-ton barges available to transport contaminated sediment to offload, two tugs alternate to rotate barges between loading at waterway and unloading at CAD. Rental (2 ea x $1000/ea/day barges + 2 ea x $800/day tug) at $3,600/day plus operations (2 ea x $220/hr x 10 hr tug) at $4,400/day for a total of $8,000/day. Labor included in operations costs.
18 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
19 Anchor dozers (2 dozers ea dredge x 11 months x $3,900/month + 2 ea x 219 days x 4 hr operating/day x $16/hr + 1 dozer operators x 219 days x $307/8-hr day = $181,065/ dredge) for 2 dredges per month (2 x $181,065 / 11 months) is $32,921/month.
24 $1500/day, 28 days/month
25 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
26 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*58 shifts = 371 gallons
27 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
28 Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
30 Assumes 4 surveys of work area
31 Costs from 01590-800-0010, assumes 7 day/week operation
32 Costs from 01590-400-4400, assumes 7 day/week operation
33 Costs from 02510-760-0900
34 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
35 Costs from 01590-500-7000
36 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
37 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent

Table B21 Alternative 8 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 1
Capping in Areas 2A, 2B, 2C, 3A, 3B
Dredge Areas 2A, 2B, 2C, 3A, 3B

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$127,771**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	$4,800.00	1.0185	$4,888.80	$9,778		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
1.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	3	$1,500.00	1.0185	$1,527.75	$4,583		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.1	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Construct Dredge Spoil Offload Facility**							**$547,159**	
2.1	Track Installation - 100-lb rail, steel ties in concrete, incl fasteners and p	FT	1,600	224	1.0185	$228.14	$365,030.40		25
2.2	Track Switch Installation	EA	1	28,820	1.0185	$29,353.17	$29,353.17		26
2.3	Sediment Stockpile Construction	LS	1	75,000	1.0185	$76,387.50	$76,388		4
2.4	Stormwater Upgrades	LS	1	75,000	1.0185	$76,387.50	$76,388		4
3	**Dredging**							**$2,201,525**	1
3.1	Dredge contaminated sediments (Areas 2A, 2B, 2C, 3A & 3B)	DAY	119	$9,225.00	1.0185	$9,395.66	$1,122,576		7,8
				1 production dredges, 20-hr days, 170 cy/hr production					
3.2	Overdredge contaminated sediments	DAY	28	$5,500.00	1.0185	$5,601.75	$157,943		22,23
				1 articulated dredge, 10-hr days, 50 cy/yr production rate					
3.3	Floodlights	MONTH	7	$16,000.00	1.0185	$16,296.00	$109,386		10
3.4	Construction office	MONTH	7	$76,717.00	1.0185	$78,136.26	$524,484		11
3.5	Water Quality Monitoring	MONTH	7	42,000	1.0185	$42,777.00	$287,137		24
4	**Offloading and On-shore Management**							**$5,276,686**	
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	169	283	1.0185	$288.24	$48,645.37		28
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	169	238	1.0185	$242.40	$40,910.24		29
4.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		30
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	8	20000	1.0185	$20,370.00	$162,960.00		27, 31
4.5	Chitosan for Filtration, 1% solution	GAL	1869	11	1.0185	$11.20	$20,939.34		32
4.6	Water Treatment Unit Operator, full-time	DAY	169	500	1.0185	$509.25	$85,945.87		4
4.7	Transport sediment to offload facility	DAY	148	9,200	1.0185	$9,370.20	$1,383,728.58		16
4.8	Offload Sediments to Stockpile	CY	445,699	5.73	1.0185	$5.84	$2,601,856.95		33
4.9	Transport to Railcar or Large Stockpile	CY	445,699	0.86	1.0185	$0.88	$390,392.03		34
4.10	Load into Railcars	CY	445,699	0.63	1.0185	$0.65	$287,498.01		35
4.11	Yard Locomotive	DAY	148	516	1.0185	$525.55	$77,609.12		36
4.12	Assorted Water Management	MONTH	8	20,000	1.0185	$20,370.00	$162,960.00		4
5	**Capping**							**$1,867,232**	1
5.1	Capping sand procurement and delivery (Areas 2A, 2B, 2C, 3A, 3B)	CY	65,584	$15.00	1.0185	$15.28	$1,001,963		3, 38
				1 unit, 10-hr days, high production					
5.3	Front-end loader for loading barges	MONTH	2	$15,780.00	1.0185	$16,071.93	$36,855		2, 39
5.4	Transport capping sand to placement locations	DAY	85	$4,500.00	1.0185	$4,583.25	$389,873		14
5.5	Sand cap placement	CY	65,584	$6.50	1.0185	$6.62	$434,184		4
5.6	Bathymetric Survey (50 ft center to center, single beam sonar)	Acre	86	$50.00	1.0185	$50.93	$4,356		4,40
				three events					
6	**Log Pond Shoreline Enhancements (Addendum 1)**	LS	1	$ 362,877	1.0000	$362,877	$362,877	**$362,877**	
7	**Disposal**							**$20,359,398**	1
7.1	Railcar transport to and tipping at Roosevelt, WA	TON	668,548	30	1.0185	$30.45	$20,359,398		2, 37
8	**Demobilization**							**$38,958**	1
8.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	$4,800.00	1.0185	$4,888.80	$9,778		4
8.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
8.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	3	$3,000.00	1.0185	$3,055.50	$9,167		4
8.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
8.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
8.6	Tug, push, diesel, 500-hp	EA	3	$2,000.00	1.0185	$2,037.00	$6,111		4
8.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
8.8	Barge, flat-deck, 6,000-ton capacity	EA	3	$1,500.00	1.0185	$1,527.75	$4,583		4
8.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
8.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$30,781,606**	1
	Design, Engineering & Permitting		12%					$3,693,793	4
	Construction management and monitoring		7%					$2,154,712	4
	Long-term environmental monitoring		LS					$640,000	
	Sales Taxes		8.4%					$2,585,655	
	TOTAL Cost Excluding Construction Contingency							$39,855,765	
	Contingency @		30%					$9,234,482	4
	Total*							**$49,090,247**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B21 Alternative 8 - Phase 1

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 1
Capping in Areas 2A, 2B, 2C, 3A, 3B
Dredge Areas 2A, 2B, 2C, 3A, 3B

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 1700 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
14 Assume two 2,000-ton barge and one tug to bring capping sand to waterway. Cost each combination for rental ($1000/day barge + $500/day tug) at $2,500/day plus operations ($200/hr x 10 hr tug) at $2,000/day for a total of $4,500/day. Labor included in operations cost.
16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to offload, one tugs alternate to rotate barges between loading at waterway and unloading at offload site. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea x $220/hr x 20 hr tug) at $4,400/day for a total of $9,200/day. Labor included in operations costs.
22 Overdredge sediment production rate: 1400 cy/20-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
24 $1500/day, 28 days/month
25 Need ~2000 feet trackage to finish loop track for loading (40 CYD/car, each car 65 ft long), Costs 05650-700-1020
26 Assume 3 needed. Costs from 05650-700-2200, plus cost index of 110% for Bellingham
27 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
28 Costs from 01590-800-0010, assumes 7 day/week operation
29 Costs from 01590-400-4400, assumes 7 day/week operation
30 Costs from 02510-760-0900
31 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent
32 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*292 shifts = 1869 gallons
33 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
34 Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
35 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
36 Costs from 01590-500-7000
37 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal
38 Assumes 45,000 CYD available from ASB, rest must be purchased
39 Assumes that costs of excavation from ASB, transport to barge loading site, and loading of barge included in ASB cost estimate for sands from ASB
40 Assumes 4 surveys of work area

Table B22 Alternative 8 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 2
Dredge Areas 5A, 5B, 6A, 6B, 6C, 1C

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$121,151**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	$4,800.00	1.0185	$4,888.80	$9,778		4
1.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
1.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.1	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$3,290,241**	1
2.1	Dredge contaminated sediments using production (Areas 5A, 5B, 6A, 6B, 6C, 1C)	DAY	131	$9,225.00	1.0185	$9,395.66	$1,233,483		7,8
					1 production dredges, 20-hr days, 170 cy/hr production				
2.2	Dredge contaminated sediments using fixed-arm dredge (areas 5A, 5B, 6A, 6B, 6C overdredge)	DAY	105	$5,500.00	1.0185	$5,601.75	$585,786		22,23
					1 articulated dredge, 10-hr days, 50 cy/yr production rate				
2.3	Floodlights	MONTH	11	$16,000.00	1.0185	$16,296.00	$174,704		10
2.4	Construction office	MONTH	11	$76,717.00	1.0185	$78,136.26	$837,671		11
2.5	Water Quality Monitoring	MONTH	11	42,000	1.0185	$42,777.00	$458,597		24
4	**Offloading and On-shore Management**							**$7,526,462**	
4.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	270	283	1.0185	$288.24	$77,693.19		28
4.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	270	238	1.0185	$242.40	$65,339.15		29
4.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		30
4.4	Water Filtration Unit, handle up to 300 gpm	MONTH	12	20000	1.0185	$20,370.00	$244,440.00		27, 31
4.5	Chitosan for Filtration, 1% solution	GAL	1869	11	1.0185	$11.20	$20,939.34		32
4.6	Water Treatment Unit Operator, full-time	DAY	270	500	1.0185	$509.25	$137,267.12		4
4.7	Transport sediment to offload facility	DAY	236	9,200	1.0185	$9,370.20	$2,210,000.62		16
4.8	Offload Sediments to Stockpile	CY	596,460	5.73	1.0185	$5.84	$3,481,957.40		33
4.9	Transport to Railcar or Large Stockpile	CY	596,460	0.86	1.0185	$0.88	$522,445.48		34
4.10	Load into Railcars	CY	596,460	0.63	1.0185	$0.65	$384,746.67		35
4.11	Yard Locomotive	DAY	236	516	1.0185	$525.55	$123,952.21		36
4.12	Assorted Water Management	MONTH	12	20,000	1.0185	$20,370.00	$244,440.00		4
5	**Disposal**							**$27,246,139**	1
5.1	Railcar transport to and tipping at Roosevelt, WA	TON	894,690	30	1.0185	$30.45	$27,246,139		2, 37
6	**Under Dock Work**	LS	1	591,659	1.0185	$602,604.69	$602,605	**$602,605**	
7	**Demobilization**							**$32,337**	1
7.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	2	$4,800.00	1.0185	$4,888.80	$9,778		4
7.2	Tug, bow, diesel, 900-hp	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
7.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
7.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
7.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
7.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
7.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
7.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
7.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
7.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$38,818,935**	1
	Design, Engineering & Permitting		12%					$4,658,272	4
	Construction management and monitoring		7%					$2,717,325	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$3,260,791	
	TOTAL Cost Excluding Construction Contingency							$49,455,323	
	Contingency @		30%					$11,645,680	4
	Total*							**$61,101,003**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B22 Alternative 8 - Phase 2

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 2
Dredge Areas 5A, 5B, 6A, 6B, 6C, 1C

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day.
$1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month
= $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month
x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to offload, one tugs alternate to rotate barges between loading at
waterway and unloading at offload site. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea x $220/hr x 20 hr tug) at $4,400/day for a total of
$9,200/day. Labor included in operations costs.
22 Overdredge sediment production rate: 1400 cy/20-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
24 $1500/day, 28 days/month
27 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
28 Costs from 01590-800-0010, assumes 7 day/week operation
29 Costs from 01590-400-4400, assumes 7 day/week operation
30 Costs from 02510-760-0900
31 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent
32 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*292 shifts = 1869 gallons
33 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour oper
34 @3400 CY for 20 hours = $0.85/CY
35 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
36 Costs from 01590-500-7000
37 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal

Table B23 Alternative 8 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 3
Dredge Area 7

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$114,734**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$40,000.00	1.0185	$40,740.00	$40,740		4
1.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
1.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$700.00	1.0185	$712.95	$1,426		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
1.1	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$1,771,916**	1
2.1	Dredge contaminated sediments using production (Area 7)	DAY	78	$9,225.00	1.0185	$9,395.66	$729,546		7,8
					1 production dredges, 20-hr days, 170 cy/hr production				
2.2	Dredge contaminated sediments using fixed-arm dredge (7 overdredge)	DAY	47	$5,500.00	1.0185	$5,601.75	$264,083		22,23
					1 articulated dredge, 10-hr days, 50 cy/yr production rate				
2.3	Floodlights	MONTH	6	$16,000.00	1.0185	$16,296.00	$92,435		10
2.4	Construction office	MONTH	6	$76,717.00	1.0185	$78,136.26	$443,210		11
2.5	Water Quality Monitoring	MONTH	6	42,000	1.0185	$42,777.00	$242,643		24
3	**Offloading and On-shore Management**							**$4,090,174**	
3.1	Barge rental, 400 ton, 30 ft x 90 ft	DAY	143	283	1.0185	$288.24	$41,107.30		28
3.2	Centrifugal Gas Pump, 6-inch, 90 MGPH	DAY	143	238	1.0185	$242.40	$34,570.80		29
3.3	24-inch HDPE Pipe Installation	LF	200	65	1.0185	$66.20	$13,240.50		30
3.4	Water Filtration Unit, handle up to 300 gpm	MONTH	6	20000	1.0185	$20,370.00	$122,220.00		27, 31
3.5	Chitosan for Filtration, 1% solution	GAL	1869	11	1.0185	$11.20	$20,939.34		32
3.6	Water Treatment Unit Operator, full-time	DAY	143	500	1.0185	$509.25	$72,627.73		4
3.7	Transport sediment to offload facility	DAY	125	9,200	1.0185	$9,370.20	$1,169,306.47		16
3.8	Offload Sediments to Stockpile	CY	330,000	5.73	1.0185	$5.84	$1,926,441.83		33
3.9	Transport to Railcar or Large Stockpile	CY	330,000	0.86	1.0185	$0.88	$289,050.30		34
3.10	Load into Railcars	CY	330,000	0.63	1.0185	$0.65	$212,866.50		35
3.11	Yard Locomotive	DAY	125	516	1.0185	$525.55	$65,582.84		36
3.12	Assorted Water Management	MONTH	6	20,000	1.0185	$20,370.00	$122,220.00		4
4	**Disposal**							**$15,074,309**	1
4.1	Railcar transport to and tipping at Roosevelt, WA	TON	495,000	30	1.0185	$30.45	$15,074,309		2, 37
5	**Demobilization**							**$25,921**	1
5.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
5.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
5.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	2	$3,000.00	1.0185	$3,055.50	$6,111		4
5.4	Barge-mounted backhoe, 5-cy bucket	EA	1	$3,000.00	1.0185	$3,055.50	$3,056		4
5.5	Front-end loader	EA	4	$100.00	1.0185	$101.85	$407		3
5.6	Tug, push, diesel, 500-hp	EA	2	$2,000.00	1.0185	$2,037.00	$4,074		4
5.7	Barge, flat-deck, 2,000-ton capacity	EA	2	$600.00	1.0185	$611.10	$1,222		4
5.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
5.9	Dozer, diesel, crawler, 100-hp	EA	1	$100.00	1.0185	$101.85	$102		3
5.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$21,077,054**	1
	Design, Engineering & Permitting		12%					$2,529,246	4
	Construction management and monitoring		7%					$1,475,394	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$1,770,473	
	TOTAL Cost Excluding Construction Contingency							$26,852,166	
	Contingency @		30%					$6,323,116	4
	Total*							**$33,175,282**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Table B23 Alternative 8 - Phase 3

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 3
Dredge Area 7

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
7 Dredge contaminated sediment: 1700 cy/hr x 20 hr/day = 3,400 cy/20-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 20 hr or $7,000/day totals $9,225/day.
10 Floodlights, trailer mounted with generator, 2-1,000 watt lights, rental @ $1,000/month, operation @ $100/day. $1,000/month + (30 days/month x $100/day) = $4,000/month/ea x 4 ea = $16,000/month.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
16 Assume two 6,000-ton barges available per dredge to transport contaminated sediment to offload, one tugs alternate to rotate barges between loading at waterway and unloading at offload site. Rental (2 ea x $2000/ea/day barges + 1 ea x $800/day tug) at $4,800/day plus operations (1 ea x $220/hr x 20 hr tug) at $4,400/day for a total of $9,200/day. Labor included in operations costs.
22 Overdredge sediment production rate: 1400 cy/20-hr day
23 Overdredge contaminated and uncontaminated sediment: backhoe dredge at $1500/day plus operating costs of $200/hr (equipment and personnel) x 20 hr or $4,000/day totals $5500/day.
24 $1500/day, 28 days/month
27 Assume 20% moisture from one day production equals amount of water to be treated. Avg 1,500 cy/ shift * 0.2 * 27 cf/cy * 7.5 g/cf = 121,500 gpd = 84 gpm, say 100 gpm
28 Costs from 01590-800-0010, assumes 7 day/week operation
29 Costs from 01590-400-4400, assumes 7 day/week operation
30 Costs from 02510-760-0900
31 Filtration unit includes sand filters, pumps and controls. Requires 3-phase power to run the unit. Costs from Rain for Rent
32 $3,000 for a tote of chitosan, 275 gallons at 1% solution. Per vendor, dosage rate is 0.64 gal/hr at 100 gpm, consumption = 0.64gal/hr*10 hr*292 shifts = 1869 gallons
33 Assumes crane rental at $2000/day, plus $200/hr for operating cost, $439 per 10 hour shift for operation, 2 10-hour shifts/day at avg 1200 CY / shift
34 Assume offload at 170 CY/hr, need to move 1000 feet. At 5 CY/trip, 170 CY/hour is 2 min/trip. Use 2 loaders, allow 4 min/trip. Loaders ($350/day rent, plus $15/hr operate, plus $40/hour operator each) @3400 CY for 20 hours = $0.85/CY
35 Assume 1 loader, operating 2 10-hour shifts/day, loading an average of 1200 CYD/sediment/shift
36 Costs from 01590-500-7000
37 Mechanically dredged sediments assumed to be 1.5 tons/in-situ cubic yard at disposal

Table B24 Alternative 8 - Phase 4a

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Phase 4a
Dredge Areas 1A, 1B

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator 2004-2005	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$61,874**	1
1.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
1.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
1.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	0	$3,000.00	1.0185	$3,055.50	$0		4
1.4	Barge-mounted backhoe, 5-cy bucket	EA	0	$40,000.00	1.0185	$40,740.00	$0		4
1.5	Front-end loader	EA	0	$100.00	1.0185	$101.85	$0		3
1.6	Tug, push, diesel, 500-hp	EA	0	$2,000.00	1.0185	$2,037.00	$0		4
1.7	Barge, flat-deck, 2,000-ton capacity	EA	0	$700.00	1.0185	$712.95	$0		4
1.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
1.9	Dozer, diesel, crawler, 100-hp	EA	0	$100.00	1.0185	$101.85	$0		3
1.1	Construction office setup	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
1.11	Nonscheduled contract costs	EA	1	$50,000.00	1.0185	$50,925.00	$50,925		4
2	**Dredging**							**$828,862**	1
2.1	Dredge uncontaminated sediments (Areas 1A & 1B)	DAY	73	$5,725.00	1.0185	$5,830.91	$426,683		6,8
			1 production dredge, 10-hr days, 150 cy/hr production total from the dredge						
2.2	Construction office	MONTH	3	$76,717.00	1.0185	$78,136.26	$259,895		11
2.3	Water Quality Monitoring	MONTH	3	42,000	1.0185	$42,777.00	$142,284		24
3	**Transportation**							**$1,073,228**	1
3.1	Barge uncontaminated sediment to Rosario PSDDA Site	DAY	73	14,400	1.0185	$14,666.40	$1,073,228		15
4	**Disposal**							**$95,025**	1
4.1	PSDDA Disposal Fee	TON	186,599	1	1.0185	$0.51	$95,025		
5	**Demobilization**							**$10,949**	1
5.1	Barge-mounted derrick crane, 100-ton, 7-cy bucket	EA	1	$4,800.00	1.0185	$4,888.80	$4,889		4
5.2	Tug, bow, diesel, 900-hp	EA	1	$1,500.00	1.0185	$1,527.75	$1,528		4
5.3	Barge-mounted derrick crane, 40-ton, 4-cy bucket	EA	0	$3,000.00	1.0185	$3,055.50	$0		4
5.4	Barge-mounted backhoe, 5-cy bucket	EA	0	$40,000.00	1.0185	$40,740.00	$0		4
5.5	Front-end loader	EA	0	$100.00	1.0185	$101.85	$0		3
5.6	Tug, push, diesel, 500-hp	EA	0	$2,000.00	1.0185	$2,037.00	$0		4
5.7	Barge, flat-deck, 2,000-ton capacity	EA	0	$600.00	1.0185	$611.10	$0		4
5.8	Barge, flat-deck, 6,000-ton capacity	EA	2	$1,500.00	1.0185	$1,527.75	$3,056		4
5.9	Dozer, diesel, crawler, 100-hp	EA	0	$100.00	1.0185	$101.85	$0		3
5.10	Construction office teardown	EA	1	$1,450.00	1.0185	$1,476.83	$1,477		3,12
	Subtotal							**$2,069,938**	1
	Design, Engineering & Permitting		12%					$248,393	4
	Construction management and monitoring		7%					$144,896	4
	Long-term environmental monitoring		*included in Year 1*					NA	
	Sales Taxes		8.4%					$173,875	
	TOTAL Cost Excluding Construction Contingency							$2,637,100	
	Contingency @		30%					$620,981	4
	Total*							**$3,258,082**	1

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment based on previous projects.
6 Dredge uncontaminated sediment: 1500 cy/hr x 10 hr/day x 1 = 1,500 cy/10-hr day
8 Big (100-ton) dredge at $2,225/day plus operating costs of $350/hr (equipment and personnel) x 10 hr or $3,500/day totals $5,725/day.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($787/10-hr shift x 30 days/month = $23,610/month), 2-foremen ($515/ea/10-hr shift x 30 day/month x 2 ea = $30,900/month), 2-clerks ($146/ea/10-hr shift x 30 day/month x 2 ea = $8,760), 1-timekeeper ($401/ea/10-hr shift x 30 days/month = $12,030/month) for a total of $76,717/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
15 Assume two 6,000-ton barges available to transport uncontaminated sediment to PSDDA site, two tugs alternate to rotate barges between loading at waterway and unloading at habitat berm sites. Rental (2 ea x $2000/ea/day barges + 2 ea x $800/day tug) at $5,600/day plus operations (2 ea x $220/hr x 20 hr tug) at $8,800/day for a total of $14,400/day. Labor included in operations costs.
24 $1500/day, 28 days/month

Table B25 Alternative 8 - Phase 4b

Whatcom Waterway Remediation
Estimated Costs

ALTERNATIVE 8 - Year 4
Removal within the ASB
Dredge Area 8

Item	Description	Unit	Quantity	Unit Cost	Item Cost	Total Cost	Notes
1	**ASB Dredging (See ASB - Construction Subtotal)**	LS	1	$21,602,915	$21,602,915	**$21,602,915**	
	Subtotal					**$21,602,915**	
	Design, Engineering & Permitting		LS			$1,850,000	
	Construction management and monitoring		7%			$1,512,204	
	Sales Taxes		8.4%			$1,814,645	
	TOTAL Cost Excluding Construction Contingency					$26,779,764	
	Contingency @		30%			$6,480,875	
	Total*					**$33,260,639**	

* Exclusions include land costs for staging area, mitigation, legal costs associated with deed restrictions and property owner agreements, and litigation costs.

Notes 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)

Table B26 ASB Estimate
Whatcom Waterway - ASB Remediation (Area 8)
Estimated Costs

Item	Description	Unit	Quantity	Unit Cost (2004)	Cost Escalator (2004-2005)	Unit Cost	Item Cost	Total Cost	Notes
					1.85%				
1	**Mobilization**							**$95,759**	1
1.1	Hydraulic Dredge	EA	2	3,260	1.0185	$3,320.31	$6,641		4
1.2	Pumping equipment	EA	3	100	1.0185	$101.85	$306		2
1.3	Bulldozer	EA	4	100	1.0185	$101.85	$407		2
1.4	Crane	EA	1	250	1.0185	$254.63	$255		3
1.5	Front-end loader	EA	4	100	1.0185	$101.85	$407		2
1.6	Excavator	EA	2	100	1.0185	$101.85	$204		
1.7	Conveyor system	EA	1	200	1.0185	$203.70	$204		2
1.8	Pipe	EA	3	100	1.0185	$101.85	$306		3
1.9	Dewatering centrifuge	EA	2	27,000	1.0185	$27,499.50	$54,999		2
1.10	Construction office setup	EA	1	1,450	1.0185	$1,476.83	$1,477		3,12
1.11	Equipment yard preparation	EA	1	30,000	1.0185	$30,555.00	$30,555		
2	**Site Preparation**							**$3,802,107**	1
2.1	Demo sheet pile weir	DAY	27	5,000	1.0185	$5,092.50	$137,498		3
2.2	Demo aerators	EA	2,023	25	1.0185	$25.58	$51,758		2,3,15
2.3	Layout 18" pipeline to dewatering facility	LF	1,300	47	1.0185	$48.01	$62,416		3
2.4	Layout 12" pipeline to dredge	LF	2,000	23	1.0185	$23.66	$47,320		3
2.5	Pump setup	EA	3	200	1.0185	$203.70	$611		4
2.6	Pump lagoon to elev. +3'	DAY	39	900	1.0185	$916.65	$35,749		2,6
2.7	Pump rental	MONTH	7	6,000	1.0185	$6,111.00	$41,546		2, 27
2.8	Setup dredges using truck crane	EA	2	2,302	1.0185	$2,344.59	$4,689		2,5
2.9	Construct gravel ramps	CY	1,200	23	1.0185	$23.43	$28,111		4
2.10	Remove top of berm to +16 and inside of berms to +10	CY	48,000	4	1.0185	$4.07	$195,552		2, 24
2.11	Transport removed material to load/stockpile site	CY	48,000	3	1.0185	$3.06	$146,664		22, 24
2.12	Load onto barge or stockpile	CY	48,000	1	1.0185	$0.63	$30,148		23, 24
2.13	Pile driving equipment and labor, including setup	DAY	180	6,473	1.0185	$6,593.04	$1,186,746		3
2.14	Steel sheet piling (to be salvaged)	SF	180,000	10	1.0185	$10.19	$1,833,300		3
3	**Sludge Removal**							**$1,485,818**	1
3.1	Hydraulic Dredging	CY	378,000	2	1.0185	$2.34	$885,484		4,8
3.2	Pipe rerouting	DAY	130	712	1.0185	$725.17	$94,522		4,10
3.3	Bulldozer anchors	MONTH	7	32,921	1.0185	$33,530.04	$227,954		2,7,9
3.4	Construction office	MONTH	7	40,128	1.0185	$40,870.37	$277,857		3,7,11
4	**Sludge Dewatering**							**$3,785,869**	1
4.1	Centrifuge chemicals	CY	378,000	6	1.0185	$5.94	$2,244,509		2
4.2	Centrifuge processing	CY	378,000	4	1.0185	$3.92	$1,482,223		2
4.3	Rent Clarifier	MONTH	6	3,000	1.0185	$3,055.50	$18,103		4
4.4	Operate Clarifier	MONTH	6	6,800	1.0185	$6,925.80	$41,034		4
5	**Sludge Handling/Transfer**							**$114,665**	1
5.1	Conveyor system	MONTH	6	3,222	1.0185	$3,281.61	$19,443		2,16
5.2	Front-end loader	MONTH	6	15,780	1.0185	$16,071.93	$95,222		2
6	**Sludge Transportation & Disposal**							**$6,166,829**	1
6.1	2-20' boxes (30 ton/box) railcars to Roosevelt	TON	202,502	30	1.0185	$30.45	$6,166,829		2, 25
7	**Debris Transportation & Disposal**							**$99,218**	1
7.1	Truck debris to county landfill	TON	2,645	27	1.0185	$27.33	$72,278		3,13,14,17
7.2	Debris disposal	TON	2,645	10	1.0185	$10.19	$26,939		2,14,17
8	**Demolition**							**$58,055**	1
8.1	Outfall outlet structure	EA	1	27,000	1.0185	$27,499.50	$27,500		4
8.2	Plug outfall under breakwater	EA	1	30,000	1.0185	$30,555.00	$30,555		4
9	**Sediment Transportation & Disposal**							**$2,330,154**	1
9.1	Excavate sediment down to elevations -15' to -16'	CY	38,444	4	1.0185	$4.07	$156,623		2
9.2	Truck roundtrip 20' boxes from lagoon to railcars	CY	38,444	2	1.0185	$2.17	$83,402		19,21
9.3	Toplift boxes to railcars, then empty onto truck	CY	38,444	9	1.0185	$8.69	$333,998		19,20
9.4	2-20' boxes (30 ton/box) railcars to Roosevelt	TON	57,667	30	1.0185	$30.45	$1,756,132		2, 26
10	**Discharge to POTW**							**$1,088,364**	1
10.1	From +3' to "dry"	CCF	70,865	14	1.0185	$13.77	$975,820		2,18
10.2	Rainwater from lagoon	CCF	50,000	2	1.0185	$2.25	$112,544		2
11	**Remove Materials from Berm for Waterway Use**							**$1,897,805**	
11.1	Excavate Materials	CY	170,000	4	1.0185	$4.07	$692,580		2, 24
11.2	Transport to barge loading site	CY	170,000	3	1.0185	$3.06	$519,435		22, 24
11.3	Stockpile or Load onto barge	CY	170,000	1	1.0185	$0.63	$106,773		23, 24
11.4	Barge movement from loading area to capping area	DAY	85	6,100	1.0185	$6,212.85	$528,092		29,30
11.5	Site Controls	LS	1	50,000	1.0185	$50,925.00	$50,925		

Table B26 ASB Estimate
Whatcom Waterway - ASB Remediation (Area 8)

Estimated Costs

12	**Demobilization**						**$678,274**	1
12.1	Pile extraction equipment and labor	DAY	120	5,000	1.0185	$5,092.50	$611,100	3
12.2	Excavator	LS	1	300	1.0185	$305.55	$306	2
12.3	Pile driving equipment	LS	1	25,000	1.0185	$25,462.50	$25,463	3
12.4	Hydraulic Dredge	EA	2	4,902	1.0185	$4,992.69	$9,985	4
12.5	Bulldozer	EA	4	100	1.0185	$101.85	$407	2
12.6	Crane	EA	1	250	1.0185	$254.63	$255	3
12.7	Front-end loader	EA	2	100	1.0185	$101.85	$204	2
12.8	Conveyor system	LS	1	200	1.0185	$203.70	$204	2
12.9	Pumping equipment	EA	3	100	1.0185	$101.85	$306	2
12.10	Dewatering centrifuge	EA	1	25,000	1.0185	$25,462.50	$25,463	2
12.11	Construction office teardown	EA	1	4,500	1.0185	$4,583.25	$4,583	3,12
	Subtotal						**$21,602,915**	1
	Engineering & Permitting	LS					$1,850,000	4
	Construction management and Monitoring	7%					$1,512,204	4, 28
	Sales Tax	8.4%					$1,814,645	4
	TOTAL Cost Excluding Construction Contingency						$26,779,764	
	Contingency	30%					$6,480,875	4
	Total						**$33,260,639**	1

Notes

1 2005 dollars, based on escalating 2004 unit costs by 1.85% (RS Means Construction Cost Increase)
2 Supplier quote.
3 RSMeans *Heavy Construction Cost Data 2004* with cost index of 110% for Bellingham.
4 Professional judgment.
5 Dredge setup includes truck crane ($1,100), crane operator ($307), dredge leverman ($319), and dredge deckhand ($304) working 1-8 hr day with crane operations (8 hr x $34/hr = $272) per each machine, or $2,302/ea.
6 Assume water volume =~ 145,500,000gal; assume 6" pump operating 20hr/day at 1,600gpm pumps ~1,900,000gal/day, allow 77 days or 3 months.
MP&E rental at $2,000/month per each; maintenance mechanic at $400/10-hr day; each pump operates at $5/hr or $100/day;
assume 2 mechanics to cover 20 hr/day x $400/day plus $100/day operating cost for a total of $900/day;
assume two pumps operating full time requires 39 days to pump down, third pump on standby, alternate pumps daily;
7 378,000 cy of sludge to remove; 2 dredges at 145 cy/hr x 10 hr/day x 20 day/month = 58,000 cy/month, so allow 7 months.
8 Dredge operations include rental ($3,32.89/day), operations (10 hours/day)
(1 ea @ 8 hr/day @ 219 days x $319/8hr-day = $69,861), dredge deckhand (1 ea @ 8 hr/day @ 219 days x $304/8hr-day = $66,576),
dredge oiler (1 ea @ 8 hr/day @ 219 days x $305/8hr-day = $66,795) for a total of $772,632/dredge x 2 ea = $1,545,264/350,000 cy is $4.42/cy.
9 Anchor dozers (2 dozers ea dredge x 11 months x $3,900/month + 2 ea x 219 days x 4 hr operating/day x $16/hr + 1 dozer operators x 219 days x $307/8-hr day = $181,065/ dredge) for 2 dredges per month (2 x $181,065 / 11 months) is $32,921/month.
10 Pipe rerouting includes a dredge mate and a general laborer working each shift to move pipe (1 shift/day x ($307/shift + $255/shift) = $562/day) plus a skiff ($150/day) for a total of $712/day.
11 Construction office includes rental ($350/month), utilities and equipment ($630/month), 1-superintendent ($572/8-hr shift x 22 days/month = $12,584/month), 2-foremen ($374/ea/8-hr shift x 22 day/month x 2 ea = $16,456/month), 2-clerks ($106/ea/8-hr shift x 22 day/month x 2 ea = $4,664), 1-timekeeper ($292/ea/8-hr shift x 22 days/month = $6,424/month) for a total of $40,128/month.
12 Office setup or teardown includes 1-day time for 1-superintendent ($572), 1- foreman ($374) 1-timekeeper ($292), 2-clerks (2 x $106).
13 Debris disposal assumes 4 trips to the landfill per day: truck (rental @ $300/day, operation cost @ $22/hr x 8 hr/day = $176/day, and driver @ $155/day), front-end loader (rental @ $167/day, operation @ $176/day, operator @ $314/day) for a total of $1,288/day; assuming 4-round trips per day at 12 ton/trip = $26.83/ton.
14 Demolition debris assumes 600 ton of wood piling, 50 ton of concrete anchors, 25 ton of plastic aerators and rope, 2,000 tons of asphalt, 20 tons of plastic pipe, 30 tons of aluminum pipe, 10 tons of miscellaneous debris. A total of 2,135 tons of demolition debris.
15 Assume team of 1 foreman ($48/hr) and 4 laborers ($32/hr) pulling 6 aerators and ancillary equipment per hour, working from powered barge ($500/Day):
Foreman at $48/hr x 8 hr/day = $384
Labor at $32/hr x 4 ea x 8 hr/day = $1,024
Barge at $500/day = $500
Total = $1,908/day, and at 6 aerators/hr x 8 hr/day = 48 ea/day
$1,908/day divided by 48 ea/day = $39.75/ea.
16 Conveyor cake from dewatering facility to railcars: assume 3 ea (rental @ $1,000/ea/month, operations at $0.42/ea/hr x 8 hr/day x 22 days/month) at $1,074/ea/month, or for 3 at total of $3,222/month.
17 Outlet structure debris assume 30' dia x 1' thick x 50' high x 155 pcf + ramp of 4' wide x 1' thick x 60' long x 155 pcf = 388 ton; outfall pipe under berm assume 5' dia x 6" thick x 200' long x 155 pcf = 122 ton; total of 510 ton of debris.
18 Assume 53,000,000 gal to pump (from +3' to "dry") to POTW. This is ~71,000 ccf x $2.21/ccf = $156,900. Assume monthly average of 6.25 lb BOD/1,000 lb of effluent, and monthly average of 5.0 lb TSS/1,000 lb of effluent.
19 Assume each truck hauls 20 cy (30 ton)/trip, with 6 trucks making 10 trips/day yields 1,200 cy/day.
20 Toplift rental and operation at $1,600/day and ILWU gang labor [($8,636/day) at total of $10,236/day, or $10,236/day//1,200 cy/day is $8.53/cy.
21 Truck rental and operation ($270/ea/day x 6 ea) at $1,620/day and labor [($155/day x 6 ea) at $930/day for total of $2,550/day, or $2.13/cy.
22 Assumes 6 trucks at 10 trips ea/day at $75/hr for 1200 cy/day = $3/cy
23 Assumes loader at $250/day rental, operator at $334/day, and operating cost at $22/hr. For 8 hours days, 1200 cy/day = $0.62/cy
24 Assumes that all types of berm materials moved at same rates
formula based on .177 in-situ wet density x .908 total tons/total CY = .161 tons solid/ total C`
25 then multiply by total CY to get total solids, and make up total tonnage based on 30% by weight solids (i.e. divide by 0.3)
26 Assumes 1.5 T sediment shipped *In-situ CY excavated*
27 3 pumps * 39 days each = 4 months + 2 months for final dewatering = 6 months
28 Assumes design & permitting are conducted jointly with the Whatcom Waterway cleanup work and with the design & permitting of future ASB marina. Higher costs for independe work.
29 Capping sand transport to site by barge at 2,000 ton/trip/1.5 ton/cy = 1,300 cy/trip; assume trip takes 1/2 hr; unload 1,300 cy @ 100 cy/hr in 13 hr
30 Assume two 2,000-ton barge and one tug combinations to bring capping sand to waterway. Cost each combination for rental ($800/day ($800/day barge + $500/day tug) at $2,100/day plus operations ($200/hr x 20 hr tug) at $4,000/day for a total of $6,100/day. Labor included in operations cost.

Appendix B – Addendum 1
Whatcom Waterway Remediation -- Log Pond Shoreline Enhancements
Estimated Costs

REMEDIAL COST ELEMENTS	COSTS ASSUMING ASB MATERIAL REUSE				COSTS ASSUMING NO ASB MATERIAL REUSE			
	Quantity	Units	Unit Cost	**Probable Costs**	Quantity	Units	Unit Cost	**Probable Costs**
REMEDIAL CONSTRUCTION COSTS								
Mobilization, Demobilization, Non-Scheduled Contract	10	%	$ 329,889	$ 32,989	10	%	$ 475,387	$ 47,539
Demolition								
Removal of pilings, debris	1	total est.	$ 15,000	$ 15,000	1	total est.	$ 15,000	$ 15,000
Beach Stabilization & Enhancement								
Western Groin (Armor Stone)								
Material Placement	2,400	cyd	$ 7	$ 16,800	2,400	cyd	$ 7	$ 16,800
Material Purchase & Delivery	3,600	ton	$ -	$ -	3,600	ton	$ 23	$ 82,800
Eastern Groin (Armor Stone)								
Material Placement	533	cyd	$ 7	$ 3,731	533	cyd	$ 7	$ 3,731
Material Purchase & Delivery	800	ton	$ -	$ -	800	ton	$ 23	$ 18,389
Central Groin (Armor Stone)								
Material Placement	770	cyd	$ 7	$ 5,390	770	cyd	$ 7	$ 5,390
Material Purchase & Delivery	1,155	ton	$ 3	$ 3,465	1,155	ton	$ 23	$ 26,565
Type 1 Material (Fine Gravel Mix)								
Material Placement	5,247	cyd	$ 7	$ 36,729	5,247	cyd	$ 7	$ 36,729
Material Purchase & Delivery	7,871	ton	$ 18	$ 141,669	7,871	ton	$ 18	$ 141,669
Type 2 Material (Coarse Gravel Mix)								
Material Placement	2,911	cyd	$ 7	$ 20,377	2,911	cyd	$ 7	$ 20,377
Material Purchase & Delivery	4,367	ton	$ 18	$ 78,597	4,367	ton	$ 18	$ 78,597
Type 3 Material (Stone)								
Material Placement	707	cyd	$ 7	$ 4,949	707	cyd	$ 7	$ 4,949
Material Purchase & Delivery	1,061	ton	$ 3	$ 3,182	1,061	ton	$ 23	$ 24,392
	CONSTRUCTION SUBTOTAL			**$ 362,877**	**CONSTRUCTION SUBTOTAL**			**$ 522,926**
ENGINEERING & REGULATORY				**$ 157,209**				**$ 208,905**
Design, Permitting (12%)	12%	of Construction Costs		$ 43,545	12%	of Construction Costs		$ 62,751
Construction Management & Monitoring (7%)	12%	of Construction Costs		$ 43,545	12%	of Construction Costs		$ 62,751
Additional Bathymetric Monitoring Events	2	total est.	$ 20,000	$ 40,000	2	total est.	$ 20,000	$ 40,000
WSST (8.3%)	8.3%	of Construction Costs		$ 30,119	8.3%	of Construction Costs		$ 43,403
TOTAL EXCLUDING CONTINGENCY				**$ 520,087**				**$ 731,831**
CONTINGENCY (30%)				$ 156,026				$ 219,549
TOTAL INCLUDING CONTINGENCY				**$ 676,113**				**$ 951,380**

Notes:

Costs for design and permitting assume that the work is completed as part of the design & permitting of the Whatcom Waterway site final remedial action.