FOCUSED FEASIBILITY STUDY REPORT
FOR
40TH AVENUE PROJECT AREA
IN THE ST. LOUIS RIVER AREA OF CONCERN

August 28, 2015

APPENDIX Q. PROBABLE COST DATA

Presented in this Appendix are opinions of probable cost for; island or shoal design options, island/shoal sideslope protection, and for removal of anthropogenic and contaminated substrates.

Table 25. Opinion of Probable Construction Costs – Original Concept Design with Consolidation – Islands – 4:1 Slopes

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Mobilization & Demobilization	1	LS	$250,000	$250,000
2	On Site Dredge Removal/Placement[1]	175,270	CY	$15	$2,629,050
3	Maintenance Dredging Placement[2]	212,368	CY	$15	$3,185,520
4	Turbidity Barriers	5,100	SY	$27	$137,700
5	Wood Waste Disposal	29,407	CY	$10	$294,070
6	Undistributed Quantity of Turbidity Barriers	500	SY	$27	$13,500
	Subtotal				$6,509,840
	Engineering (15%)				$976,476
	Contingency (15%)				$976,476
	Total				**$8,462,792**

Notes: 1. This volume contains a quantity of contaminated sediments. Adjustments to the sediment removal costs in Appendix Q were made so that the cost of dredging this material was not estimated twice.
2. Adjusted for beneficial reuse of onsite dredge material

Table 26. Opinion of Probable Construction Costs – 10:1 Sideslopes - Islands

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Mobilization & Demobilization	1	LS	$250,000	$250,000
2	On Site Dredge Removal/Placement[1]	175,270	CY	$15	$2,629,050
3	Maintenance Dredging Placement[2]	276,764	CY	$15	$4,151,460
4	Turbidity Barriers	5,100	SY	$27	$137,700
5	Wood Waste Disposal	29,407	CY	$10	$294,070
6	Undistributed Quantity of Turbidity Barriers	500	SY	$27	$13,500
	Subtotal				$7,475,780
	Engineering (15%)				$1,121,367
	Contingency (15%)				$1,121,367
	Total				**$9,718,514**

Notes: 1. This volume contains a quantity of contaminated sediments. Adjustments to the sediment removal costs in Appendix Q were made so that the cost of dredging this material was not estimated twice.
2. Adjusted for beneficial reuse of onsite dredge material

Table 27. Opinion of Probable Construction Costs – Original Concept Design with Consolidation – Shoals – 4:1 Slopes

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Mobilization & Demobilization	1	LS	$250,000	$250,000
2	On Site Dredge Removal/Placement[1]	175,270	CY	$15	$2,629,050
3	Maintenance Dredging Placement[2]	142,858	CY	$15	$2,142,870
4	Turbidity Barriers	5,100	SY	$27	$137,700
5	Wood Waste Disposal	29,407	CY	$10	$294,070
6	Undistributed Quantity of Turbidity Barriers	500	SY	$27	$13,500
	Subtotal				$5,467,190
	Engineering (15%)				$820,079
	Contingency (15%)				$820,079
	Total				**$7,107,348**

Notes: 1. This volume contains a quantity of contaminated sediments. Adjustments to the sediment removal costs in Appendix Q were made so that the cost of dredging this material was not estimated twice.

2. Adjusted for beneficial reuse of onsite dredge material

Table 28. Opinion of Probable Construction Costs – 10:1 Sideslopes - Shoals

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Mobilization & Demobilization	1	LS	$250,000	$250,000
2	On Site Dredge Removal/Placement[1]	175,270	CY	$15	$2,629,050
3	Maintenance Dredging Placement[2]	185,385	CY	$15	$2,780,775
4	Turbidity Barriers	5,100	SY	$27	$137,700
5	Wood Waste Disposal	29,407	CY	$10	$294,070
6	Undistributed Quantity of Turbidity Barriers	500	SY	$27	$13,500
	Subtotal				$6,105,095
	Engineering (15%)				$915,764
	Contingency (15%)				$915,764
	Total				**$7,936,624**

Notes: 1. This volume contains a quantity of contaminated sediments. Adjustments to the sediment removal costs in Appendix Q were made so that the cost of dredging this material was not estimated twice.
2. Adjusted for beneficial reuse of onsite dredge material

Table 29. Riprap Island Sideslope Protection Quantities and Costs.

Feature	Riprap for Cofferdam Construction (CY)	Riprap for Cofferdam Construction Cost	Riprap for Slope Protection (CY)	Riprap for Cofferdam Construction (CY)
I1 - Island 1	9,000	$450,000	1,350	$81,000
I2 - Island 2	2,700	$135,000	575	$34,500
I3 - Island 3	3,000	$150,000	600	$36,000
I4 - Island 4	3,900	$195,000	800	$48,000
I5 - Island 5	5,200	$260,000	1,075	$64,500
Totals	**23,800**	**$1,190,000**	**4,400**	**$264,000**

Table 30. Riprap Shoal Sideslope Protection Quantities and Costs.

Feature	Riprap for Cofferdam Construction (CY)	Riprap for Cofferdam Construction Cost	Riprap for Slope Protection (CY)	Riprap for Cofferdam Construction (CY)
S1 - Shoal 1	4,000	$200,000	825	$49,500
S2 - Shoal 2	925	$46,250	250	$15,000
S3 - Shoal 3	1,125	$56,250	300	$18,000
S4 - Shoal 4	1,300	$65,000	350	$21,000
S5 - Shoal 5	1,800	$90,000	450	$27,000
Totals	**9,150**	**$457,500**	**$2,175**	**$130,500**

AREA OF ECOLOGICAL CONCERN OPINIONS OF PROBABLE COST

COFFEE GROUND FLATS

This area appears largely affected by anthropogenic substrates (wood waste). Removal and replacement of this material was recommended. Using the Peat mapping in Appendix F, an area of 19.5 acres was defined. It was assumed 25% of this area was shoreline which will require 1.2 meters of suitable material for the bioactive zone. For the remaining area 1 meter was assumed. For all estimates, dewatering is not assumed to reduce the quantity of material generated for disposal. Testing has shown substrates within the Project Area have relatively low moisture content. It is assumed that any required dewatering will be the result of moisture accumulated during substrate disturbance and handling.

Table 31. Opinion of Sediment Removal Costs – Coffee Ground Flats (MU's 1 and 3)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dredging/Dewatering	108,252	CY	$30	$3,247,560
2	Trucking/Disposal[1]	108,252	CY	$10	$1,082,520
3	Dredge Placement	119,000	CY	$15	$1,785,000
	Subtotal				$6,115,080
	Engineering (5%)				$305,754
	Contingency (15%)				$917,262
	Total				**$7,338,096**

Note: 1. Assumes lower disposal costs for uncontaminated wood waste material

AREA SOUTH OF MINNESOTA POWER

For the area south of the Minnesota Power Hibbard power plant the dioxin/furan TEQ kriging performed for SQT II in the *40th Avenue West, Duluth, MN Sediment Chemistry, Bioassay, Tissue Bioaccumulation, and Benthic Community Assessment Report* was used as a guide to define a 40.8 acre removal area in MU's 2, 4 and 5. It was assumed that by addressing the areas identified as being contaminated by dioxins/furans, the risk from other contaminants (PAHs and metals) would also be addressed. A one foot average removal depth was assumed. This removes dioxin/furan SQT II exceedances at several locations as well as numerous metal detections exceeding SQT I. More removal may be required near sample point 1017 (see Figure 16) based on dioxin/furan levels exceeding SQT II to a depth of at least 50cm. This estimated volume includes the area within the concept design Dredge Area 2 (the fish passage area). An adjustment for this area is presented in the cost data. This is because the cost of this dredging is already accounted for in the estimates for the concept designs (Table 15, Table 16, and Appendix Q). Also included in this area is sediment removal within MU 7 near sample 1010 due to

dioxin/furan levels exceeding SQT II being found at depth. The removal area was assumed to extend 200 feet from sample 1010 for a depth of four feet.

Table 32. Opinion of Sediment Removal Costs – Area South of Minnesota Power Hibbard Power Plant (MU 2, 4, 5, 7)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dredging/Dewatering	84,426	CY	$30	$2,532,780
2	Dredge Area 2 Adjustment[1]	(23,689)	CY	$15	($355,335)
3	Trucking/Disposal	84,426	CY	$21	$1,772,946
4	Dredge Placement	66,811	CY	$15	$1,002,165
	Subtotal				$4,952,556
	Engineering (5%)				$247,628
	Contingency (15%)				$742,883
	Total				**$5,943,067**

Note: 1. Reduction for dredge costs already reflected in concept design estimates

AREA NORTH OF MINNESOTA POWER

For the area North of the Minnesota Power Hibbard power plant (MU 11), a combination of the dioxin/furan TEQ kriging performed for SQT II, PAH kriging for SQT II and metal exceedances of SQT I were used to define a 13.1 acre area with removal depths of two feet near samples 1025 and 1026 and one foot near point 1027. Again, an adjustment was made for the fish overwintering dredge area (Dredge Area 3) in the concept design.

Table 33. Opinion of Sediment Removal Costs – Area North of Minnesota Power Hibbard Power Plant (MU11)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dredging/Dewatering	35,700	CY	$30	$1,071,000
2	Dredge Area 3 Adjustment [1]	(13,465)	CY	$15	($201,975)
3	Trucking/Disposal	35,700	CY	$21	$749,700
4	Dredge Placement	24,459	CY	$15	$366,885
	Subtotal				$1,985,610
	Engineering (5%)				$99,281
	Contingency (15%)				$297,842
	Total				**$2,382,733**

Note: 1. Reduction for dredge costs already reflected in concept design estimates

SOUTHWEST CORNER OF ERIE PIER

At the area near the southwest corner of Erie Pier (MU 13), the dioxin/furan TEQ kriging performed for SQT II was used to define a 3.5 acre area near sample points 1033 and 1034 with an estimated removal depth of four feet. As with other areas, it was assumed that by addressing the dioxin/furan risk, the risks from other contaminants would also be addressed. For sample point 1032 the removal area was assumed to extend 200 feet for a depth of four feet. It is recommended that sediment removal in this area not take place until after the pond behind Erie Pier is remediated. In addition, there may be concerns with excavating in close proximity with Erie Pier.

Table 34. Opinion of Sediment Removal Costs – Southwestern Corner of Erie Pier (MU 13)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dredging/Dewatering	41,042	CY	$30	$1,231,260
2	Trucking/Disposal	41,042	CY	$21	$861,882
3	Dredge Placement	45,146	CY	$15	$677,190
	Subtotal				$2,770,332
	Engineering (5%)				$138,517
	Contingency (15%)				$415,550
	Total				**$3,324,398**

SOUTHEAST CORNER OF ERIE PIER

At the area near the southeast corner of Erie Pier (MU's 9, 14, 15), the dioxin/furan TEQ kriging performed for SQT II was used to form the initial boundary for the removal area. Sample points 1021 and 1022 laid just outside the 0%-10% standard deviation line on the kriging map but contained SQT 1 exceedances for metals, dioxin/furans and Total PAH. A 100 foot buffer from these sample points was included in the removal area which is 21.8 acres. Depth of removal was assumed at two feet. For sample 1024 a 150 foot radius at a depth of four feet was assumed due to dioxin/furan SQT II exceedances at depth. Sample 1024 lies just outside the Project Area at the edge of the dredged navigation channel. It may make sense to coordinate sediment removal with future navigational dredging but for the purposes of the FFS, the costs are included in the quantities assumed in Table 35.

Table 35. Opinion of Sediment Removal Costs – Southeastern Corner of Erie Pier (MU's 9, 14 and 15)

Item No.	Description	Quantity	Unit	Unit Price	Total Cost
1	Dredging/Dewatering	80,832	CY	$30	$2,424,960
2	Trucking/Disposal	80,832	CY	$21	$1,697,472
3	Dredge Placement	88,915	CY	$15	$1,333,725
	Subtotal				$5,456,157
	Engineering (5%)				$272,808
	Contingency (15%)				$818,424
	Total				**$6,547,389**