APPENDIX C

COST APPENDIX FOR DESIGN PROJECT REPORT

for

MANISTIQUE SEA LAMPREY BARRIER

MANISTIQUE, MICHIGAN

Prepared by the

U.S. ARMY CORPS OF ENGINEERS
DETROIT DISTRICT

1. GENERAL INFORMATION:

1.1 Introduction: The purpose of this report is to present alternatives for construction of a new sea lamprey barrier at the existing Manistique Paper (MPI) Dam in Manistique, MI. This report will be an appendix to the Detailed Project Report (DPR) being prepared by Planning Office.

1.2 Background: The Manistique River was selected by the United States Fish and Wildlife Service (USFWS) for construction of a new sea lamprey barrier. The purpose of the barrier is to prevent the upstream migration of sea lamprey during spawning season. Currently, the river is treated with lampricides. Although testing indicates the lampricides are not detrimental to the ecosystem as a whole, there are some native species which are adversely affected by the chemical treatment. A barrier would significantly reduce, and possibly eliminate, the need for the costly lampricide treatment.

1.3 Location: The proposed barrier location is at the site of the current MPI Dam in Schoolcraft County in the city of Manistique, MI. The dam is no longer used by MPI for power production and MPI has begun the process for decommissioning the dam.

1.4 Existing Site Conditions: The existing concrete dam is 360 feet long. A concrete flume wall extends downstream from the dam approximately 3,000 feet dividing the river into two sections known as “the flume” and “the river”. The river section of the dam consists of five steel tainter gates, a log sluice and an abandoned fish ladder. The flume section of the dam consists of the five flume tainter gates, five bays making up the abandoned powerhouse section and three control gate bays. The river and flume gates remain operational but the control gates have been removed. The dam sill has been altered to function as a sea lamprey barrier. However studies in more recent years indicate the existing barrier is no longer preventing escapement of the lamprey. There is an active water service line traversing the dam that should not be disturbed during construction. Additionally, the dam itself should not be disturbed more than shown on the construction plans. Upstream of the dam on the west side of the river is a 1700-foot long concrete wall.

2. RECOMMENDED ALTERNATIVE: The recommended alternative is Alternative 1 – Cantilever Steel Sheet Pile Wall. This was found to be the most cost effective alternative. As mentioned previously, this alternative includes construction of a single cantilevered steel sheet pile (SSP) wall placed immediately downstream of the dam. The SSP would be placed in a trench formed in the bedrock which would be backfilled with concrete. The concrete filled trench will double as a cutoff wall to prevent possible lamprey escapement through the bedrock fissures. Dye testing would be performed for to verify a positive cutoff. Other features of this alternative are:

- Removal of the entire center flume wall.
- two lamprey traps with a work platform and hoist;
- steel walkway;

- excavation of bedrock downstream of the traps to form attractant flow;
- construction of clay berm ;
- vegetation removal along the length of the concrete wall;
- and stoplogs for future fishway.

3. PURPOSE AND SCOPE OF COST ENGINEERING APPENDIX

3.1 Purpose of Cost Engineering Appendix: The purpose of this appendix is to present the cost estimates associated with the four alternative plans identified in the preceding paragraphs. Excel summary spreadsheets are used to present the alternative cost estimates found in this appendix. O&M costs are considered in the summary sheet but not included in the TPCS.

3.2 Scope of Cost Engineering Appendix: The scope of this appendix is to present the construction cost of Alternative 1 – Cantilevered SSP Wall. This appendix is prepared in accordance with the guidance contained in ER 1110-2-1302, Civil Works Cost Engineering, and ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works. The submitted cost estimate was prepared using Micro-Computer Aided Cost Estimating System (MCACES), Second Generation (MII) software for cost estimating, and cost estimates will be presented in the Civil Works Breakdown Structure (CWBS) format to the sub-feature level. The Cost and Schedule Risk Analysis is provided in this appendix. The Total Project Cost Summary (TPCS) and the MII cost estimate and quantities are also included in this appendix.

4. ALTERNATIVE COST ESTIMATES: Construction quantities shown in the engineering technical appendix are used in the cost estimates presented in this appendix. Additional quantities and features that should be considered for the chosen alternative have been computed by the cost engineering personnel and included in the cost estimate. The quantities are therefore substantially complete from the standpoint of biddability, constructibility, and operability of the chosen alternative.

5. COST AND SCHEDULE RISK ANALYSIS: The cost and schedule risk analysis was performed by the Detroit District with PDT discussions that captured concerns for both cost and schedule risk. Discussions centered on any concerns and potential impacts that could impact current cost and schedule estimates. The concerns and discussions were meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

The analysis was focused on the cost estimate of alternative 3. Construction contingency was determined to be 23.24%. The informal risk register used for this process is attached to this appendix.

6. TOTAL PROJECT COST

Effective price level of the total project cost is 1 October 2018 and the program year is 2019. Fully funded total project cost was escalated to midpoint of construction in quarter 3 of 2019. Total project cost includes all estimated construction, lands and damages, planning, engineering, design and construction management costs.

7. LIFE CYCLE COST ANALYSIS : Life Cycle Cost considers the sum total of the indirect, recurring, nonrecurring, and other related costs incurred or estimated to be incurred in the design, development, production, operation, maintenance, support, and final disposition of a major system over its anticipated useful life span. Where system or project planning anticipates use of existing sites or facilities, restoration, and refurbishment costs are included.

Operation and maintenance for this project is expected to be minor over the estimated life. Maintenance of the project would include periodic inspections of all steel components, monitoring of the SSP for rotation or excess corrosion, and inspections of all stone placed to ensure no excessive displacement occurs. No major material corrosion or damage is expected over the expected 50 year design life of the project. Operation of the project may include the removal of accumulated debris at the spillway, and lamprey trap. Overall operation and maintenance would be performed by USFWS personnel. Annual operation and maintenance cost for Alternatives 1 and 2 is estimated at 2% of the construction cost over the 50 year life of the project.

WALLA WALLA COST ENGINEERING MANDATORY CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For Project No. 113901

Manistique Sea Lamprey Barrier Section 1135
Manistique, Michigan (CAP)

The Manistique Sea Lamprey Barrier project, as presented by Detroit District, has undergone a cost update and a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of October 25, 2017, the Cost MCX certifies the estimated total project cost:

FY 2018 Project First Cost:	$7,975,000 (excluding Feasibility costs)
Fully Funded Amount:	$8,250,000 (excluding Feasibility costs)
Estimated Feasibility Costs:	$1,481,000 (Feasibility costs)
Total Estimated Federal Cost:	$6,979,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management through the period of Federal participation.

CALLAN.KIM.C.1231558221
2017.10.26 07:36:46 -07'00'

Kim C. Callan, PE, CCE, PM
Chief, Cost Engineering MCX
Walla Walla District

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: **MANISTIQUE SEA LAMPREY BARRIER (SLB) ALT 1**
PROJECT NO: **P2 113901**
LOCATION: **MANISTIQUE, MICHIGAN**

DISTRICT: **Detroit District**
PREPARED: **10/25/2017**
POC: **CHIEF, COST ENGINEERING, BILL MERTE**

This Estimate reflects the scope and schedule in report; Feasibility STUDY - Section 1135 - October 2017 Update

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
						Program Year (Budget EC):				2018					
						Effective Price Level Date:				1-Oct- 17					
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	REMAINING COST ($K)	Spent Thru: 10/1/2017 ($K)	TOTAL FIRST COST ($K)	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
04	Mob/demob	$85	$20	23%	$105		$85	$20	$105		$105	3.1%	$88	$20	$108
04	Construction	$5,321	$1,234	23%	$6,555		$5,321	$1,234	$6,555		$6,555	3.1%	$5,485	$1,272	$6,757
	CONSTRUCTION ESTIMATE TOTALS:	$5,406	$1,254		$6,660		$5,406	$1,254	$6,660		$6,660	3.1%	$5,572	$1,293	$6,865
01	LANDS AND DAMAGES	$355	Incl		$355		$355		$355		$355	2.0%	$362		$362
30	PLANNING, ENGINEERING & DESIGN	$491	$77	16%	$568		$491	$77	$568		$568	3.9%	$510	$80	$590
31	CONSTRUCTION MANAGEMENT	$338	$54	16%	$392		$338	$54	$392		$392	10.4%	$373	$59	$433
	PROJECT COST TOTALS:	$6,590	$1,385	21%	$7,975		$6,590	$1,385	$7,975		**$7,975**	3.5%	$6,818	$1,432	$8,250

_____ CHIEF, COST ENGINEERING, BILL MERTE

_____ PROJECT MANAGER, PAUL POWELL

_____ CHIEF, REAL ESTATE, xxx

_____ CHIEF, PLANNING, ADAM FOX

_____ CHIEF, ENGINEERING, PHIL ROSS

_____ CHIEF, OPERATIONS, JOSH HACHEY

_____ CHIEF, CONSTRUCTION, PHIL ROSS

_____ CHIEF, CONTRACTING, ROBERT AUSTIN

_____ CHIEF, PM-PB, xxxx

_____ CHIEF, DPM, SCOTT THIEME

ESTIMATED TOTAL PROJECT COST:		**$8,250**
ESTIMATED FEDERAL COST:	75%	$6,187
ESTIMATED NON-FEDERAL COST:	25%	$2,062
22 - FEASIBILITY STUDY (CAP studies):		**$1,481**
ESTIMATED FEDERAL COST:		$791
ESTIMATED NON-FEDERAL COST:		$690
ESTIMATED FEDERAL COST OF PROJECT		**$6,979**

****** TOTAL PROJECT COST SUMMARY ******

****** CONTRACT COST SUMMARY ******

PROJECT: MANISTIQUE SEA LAMPREY BARRIER (SLB) ALT 1
LOCATION: MANISTIQUE, MICHIGAN
This Estimate reflects the scope and schedule in report; Feasibility STUDY - Section 1135 - October 2017 Update

DISTRICT: Detroit District
POC: CHIEF, COST ENGINEERING, BILL MERTE

PREPARED: 10/25/2017

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 10/23/2017 Estimate Price Level: 10/1/2017				Program Year (Budget EC): 2018 Effective Price Level Date: 1 -Oct-17								
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1 or CONTRACT 1													
04	Mob/Demob	$85	$20	23.2%	$105		$85	$20	$105	2019Q3	3.1%	$88	$20	$108
04	Construction	$5,321	$1,234	23.2%	$6,555		$5,321	$1,234	$6,555	2019Q3	3.1%	$5,485	$1,272	$6,757
	CONSTRUCTION ESTIMATE TOTALS:	$5,406	$1,254	23.2%	**$6,660**		$5,406	$1,254	$6,660			$5,572	$1,293	$6,865
01	LANDS AND DAMAGES (incl Admin $20K)	$355		Incl	$355		$355		$355	2019Q1	2.0%	$362		$362
30	PLANNING, ENGINEERING & DESIGN													
1.3%	Project Management	$68	$11	15.6%	$79		$68	$11	$79	2018Q4	2.8%	$70	$11	$81
5.0%	Engineering & Design	$270	$42	15.6%	$312		$270	$42	$312	2018Q4	2.8%	$278	$43	$321
1.0%	Engineering Tech Review ITR & VE	$54	$8	15.6%	$62		$54	$8	$62	2018Q4	2.8%	$56	$9	$64
0.5%	Contracting & Reprographics	$27	$4	15.6%	$31		$27	$4	$31	2018Q4	2.8%	$28	$4	$32
0.5%	Engineering During Construction	$27	$4	15.6%	$31		$27	$4	$31	2020Q3	10.4%	$30	$5	$34
0.4%	Real estate admin	$20	$3	15.6%	$23		$20	$3	$23	2020Q3	10.4%	$22	$3	$26
	Monitoring	$25	$4	15.6%	$29		$25	$4	$29	2020Q3	10.4%	$28	$4	$32
31	CONSTRUCTION MANAGEMENT													
0.05	Construction Management	$270	$43	15.9%	$313		$270	$43	$313	2020Q3	10.4%	$298	$47	$346
	Project Operation:			15.9%										
0.0125	Project Management	$68	$11	15.9%	$79		$68	$11	$79	2020Q3	10.4%	$75	$12	$87
	CONTRACT COST TOTALS:	$6,590	$1,385		**$7,975**		$6,590	$1,385	$7,975			$6,818	$1,432	**$8,250**

manistique slb preferred alt 1

Estimated by	Construction, Cost & General Engineering Branch
Designed by	Geotech & Structural Engineering Branch
Prepared by	Julie Udell
Preparation Date	10/23/2017
Effective Date of Pricing	10/23/2017
Estimated Construction Time	Days

Designed by
Geotech & Structural Engineering Branch
Estimated by
Construction, Cost & General Engineering Branch
Prepared by
Julie Udell

Design Document
Document Date 10/11/2017
District Detroit District
Contact Julie Udell
Budget Year 2018
UOM System Original

Direct Costs

LaborCost
EQCost
MatlCost
SubBidCost

Timeline/Currency

Preparation Date 10/23/2017
Escalation Date 10/11/2017
Eff. Pricing Date 10/23/2017
Estimated Duration 0 Day(s)

Currency US dollars
Exchange Rate 1.000000

Costbook CB15EngA: MII English Cost Book 2015 Rev A

Labor : MI-75 dated 13oct2017

e website for current Davis Bacon & Service Labor Rates. Fringes paid to the laborers are taxable. In a non-union job the whole fringes are taxable. In a union job, the vacatior

Labor Rates

LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP14R04: MII Equipment 2014 Region 04

04 NORTHCENTRAL

Sales Tax	5.85
Working Hours per Year	1,260
Labor Adjustment Factor	1.02
Cost of Money	2.13
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.094
Gas	3.750
Diesel Off-Road	3.490
Diesel On-Road	4.000

Shipping Rates

Over 0 CWT	22.71
Over 240 CWT	20.99
Over 300 CWT	18.72
Over 400 CWT	16.62
Over 500 CWT	12.23
Over 700 CWT	12.14
Over 800 CWT	7.90

Currency in US dollars

Direct Cost Markups

Overtime

Category

Overtime

Method

Overtime

	Days/Week	Hours/Shift	Shifts/Day	1st Shift	2nd Shift	3rd Shift
Standard	*5.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*6.00*	*8.00*	*1.00*	*10.00*	*0.00*	*0.00*

Day	OT Factor	Working	OT Percent	FCCM Percent
Monday	*1.50*	*Yes*	*16.67*	*(33.33)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		
Saturday	*1.50*	*Yes*		
Sunday	*2.00*	*No*		

Sales Tax — TaxAdj — Running % on Selected Costs

MatlCost

Contractor Markups

Category

Method

JOOH — JOOH — Running %

HOOH — HOOH — Running %

Profit — Profit — Profit Weighted Guidelines

Guideline	Value	Weight	Percentage
Risk	*0.075*	*20*	*1.50*
Difficulty	*0.100*	*15*	*1.50*
Size	*0.107*	*15*	*1.61*
Period	*0.052*	*15*	*0.78*
Invest (Contractor's)	*0.090*	*5*	*0.45*
Assist (Assistance by)	*0.070*	*5*	*0.35*
SubContracting	*0.105*	*25*	*2.63*
Total		*100*	*8.80*

Bond — Bond — Running %

Sub JOOH — JOOH — Running %

Sub HOOH — HOOH — Running %

Sub Profit — Profit — Running %

Currency in US dollars

Description	UOM	Quantity	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost	ProjectCost
IGE Summary			1,916,350.34	304,159.21	980,285.82	405,085.10	3,605,880.46	5,405,703.85
04 Dams	EA	1.0	1,916,350.34	304,159.21	980,285.82	405,085.10	3,605,880.46	5,405,703.85
MOB & DEMOB	EA	1.0	0.00	0.00	0.00	60,000.00	60,000.00	84,599.75
PREFERRED ALT 1 STEEL CANTILEVER - PARTIAL FLUME REMOVAL	EA	1.0	1,916,350.34	304,159.21	980,285.82	345,085.10	3,545,880.46	5,321,104.10
SITE PREPARATION	EA	1.0	1,412,574.01	183,247.81	508,370.54	115,785.60	2,219,977.96	3,130,159.55
Dewatering	EA	1.0	134,080.65	5,502.73	11,254.55	12,209.60	163,047.52	229,896.32
Construction access	EA	1.0	236,016.16	61,948.35	496,320.99	7,577.00	801,862.50	1,130,622.74
Demolition	CY	4,344.0	1,042,477.20	115,796.74	795.00	95,999.00	1,255,067.94	1,769,640.49
LAMPREY BARRIER	EA	1.0	179,268.64	56,041.99	162,464.08	4,354.00	402,128.71	566,999.78
PLATFORM/WALKWAY STEEL	EA	1.0	90,517.69	9,799.18	230,995.94	104,850.00	436,162.81	832,890.17
LAMPREY TRAP	EA	1.0	94,480.15	18,318.90	45,246.10	9,826.00	167,871.15	320,564.31
WATERLINE SUPPORT	EA	1.0	39,065.21	0.00	284.04	0.00	39,349.25	75,140.76
EARTHEN LEVEE	LF	775.0	100,444.65	36,751.32	32,925.12	110,269.50	280,390.59	395,349.54
EXCAVATION	LS	1.0	2,452.04	1,013.20	0.00	19,368.00	22,833.24	32,194.77
GRUBBING	LS	1.0	11,766.48	3,387.61	0.00	21,080.00	36,234.09	51,089.91
CLEARING/STRIPPING	LS	1.0	8,645.10	5,032.54	0.00	2,800.00	16,477.63	23,233.39
CLAY LEVEE FILL	CY	11,683.0	32,030.37	21,986.86	0.00	67,021.50	121,038.73	170,664.10
TOPSOIL	SF	71,300.0	573.66	179.63	10,621.20	0.00	11,374.48	16,037.98
SEEDING	SF	71,300.0	1,873.89	761.00	2,565.87	0.00	5,200.76	7,333.06
SCOUR STONE	EA	1.0	37,957.66	3,741.99	0.00	0.00	41,699.65	58,796.33
TIE IN WALLS	EA	1.0	5,145.46	648.49	19,738.05	0.00	25,532.00	36,000.01

Currency in US dollars

Abbreviated Risk Analysis

Project (less than $40M): **Manistique Sea Lamprey Barrier, Manistique, Michigan** **Alternative: Alt 1**

Project Development Stage/Alternative: Feasibility Study

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: 3/30/2017**

Total Estimated Construction Contract Cost = $ 5,405,705

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ 355,000		0.00%	$ -	$ 355,000
1	04 DAMS	**Mobilization & Demobilization**	$ 84,600		26.00%	$ 21,994	$ 106,594
2	04 DAMS	**Site Preparation**	$ 3,130,160		21.26%	$ 665,527	$ 3,795,687
3	04 DAMS	**Lamprey Barrier**	$ 567,000		24.27%	$ 137,589	$ 704,589
4	04 DAMS	**Platform/Walkway Steel**	$ 832,890		22.95%	$ 191,138	$ 1,024,028
5	04 DAMS	**Lamprey Trap**	$ 320,564		15.37%	$ 49,277	$ 369,841
6	04 DAMS	**Waterline Support**	$ 75,141		1.97%	$ 1,484	$ 76,625
7	11 01 LEVEES	**Earthen Levee**	$ 395,350		47.42%	$ 187,481	$ 582,831.07
8					0.00%	$ -	$ -
9			$ -		0.00%	$ -	$ -
10			$ -		0.00%	$ -	$ -
11			$ -		0.00%	$ -	$ -
12	All Other	**Remaining Construction Items**	$ -	*0.0%*	0.00%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ 316,000		15.60%	$ 49,307	$ 365,307
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ 224,000		15.93%	$ 35,692	$ 259,692
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ 355,000	0.00%	$ -	$	355,000.00
Total Construction Estimate	$ 5,405,705	23.21%	$ 1,254,490	$	6,660,195
Total Planning, Engineering & Design	$ 316,000	15.60%	$ 49,307	$	365,307
Total Construction Management	$ 224,000	15.93%	$ 35,692	$	259,692
Total Excluding Real Estate	**$ 5,945,705**	**23%**	**$ 1,339,488**	**$**	**7,285,193**
		Base	**50%**		**80%**
Confidence Level Range Estimate ($000's)		$5,946k	$6,749k		$7,285k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Manistique Sea Lamprey Barrier, Manistique, Michigan Alt

Feasibility Study

Abbreviated Risk Analysis

Meeting Date: 30-Mar-17

Risk Level

	Negligible	Marginal	Moderate	Significant	Critical
Very Likely	2	3	4	5	5
Likely	1	2	3	4	5
Possible	0	1	2	3	4
Unlikely	0	0	1	2	3

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood	Risk Level
Project Management & Scope Growth				**Maximum Project Growth**		**75%**
PS-1	Mobilization & Demobilization	none	As is, water too shallow for marine equipment; land based equipment is readily available. Marine equipment could be used with additional engineering effort. No turbidity issues; river bottom is bedrock.	Marginal	Possible	1
PS-2	Site Preparation	This portion category of the estimate contains demolition of 636 cy of concrete flume wall downstream from the project. There is currently no survey data for that portion of the wall. Also, if contractor chose to use marine equipment, engineering effort would have to take place to make workable.	Scope could change slightly due to lack of survey data; however, we do have survey data for other similar portions of the same flume wall in different locations. Dewatering has been generously considered in current estimate.	Marginal	Possible	1
PS-3	Lamprey Barrier	may continue to develop	If dye tests indicate seepage around the barrier the bedrock would need to have dental grout applied which would add additional cost & time.	Significant	Unlikely	2
PS-4	Platform/Walkway Steel	none	Well defined by customer. Large cost item so significant impact if scope/customer preference changed.	Moderate	Unlikely	1
PS-5	Lamprey Trap	none	Discussion has taken place w/ Fish & Wildlife/well defined and agreed upon. Large enough cost item that it could cause significant impact.	Moderate	Unlikely	1
PS-6	Waterline Support	none	This is just being reattached as it was before construction.	Marginal	Unlikely	0
PS-7	Earthen Levee	yes,	The alignment could change due to unknown subsurface conditions and current design is located in a floodplain.	Significant	Possible	3
PS-8	0			Negligible	Unlikely	0
PS-9	0			Negligible	Unlikely	0
PS-10	0			Negligible	Unlikely	0
PS-11	0			Negligible	Unlikely	0
PS-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
PS-13	Planning, Engineering, & Design	design refinements could increase E&D costs		Moderate	Possible	2
PS-14	Construction Management	scope refinement during construction could increase schedule & cost		Moderate	Possible	2
Acquisition Strategy				**Maximum Project Growth**		**30%**
AS-1	Mobilization & Demobilization	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-2	Site Preparation	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-3	Lamprey Barrier	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1

AS-4	Platform/Walkway Steel	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-5	Lamprey Trap	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-6	Waterline Support	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-7	Earthen Levee	Acquisition strategy not well defined, this could affect competition.	This is very unlikely as the project would likely advertise for small business. Project is not design build and construction is fairly typical and uncomplicated. This statement applies to all construction features.	Marginal	Possible	1
AS-8	0			Negligible	Unlikely	0
AS-9	0			Negligible	Unlikely	0
AS-10	0			Negligible	Unlikely	0
AS-11	0			Negligible	Unlikely	0
AS-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
AS-13	Planning, Engineering, & Design	certain stategy could add time to E&D schedule		Marginal	Possible	1
AS-14	Construction Management	none		Negligible	Possible	0
Construction Elements					**Maximum Project Growth**	**25%**
CON-1	Mobilization & Demobilization	yes,	A construction access plan is in place for equipment to get in/out of project location, river access is decent. The levee location is in a low, swampy area. May become more complex if contractor uses marine equipment.	Significant	Likely	4
CE-2	Site Preparation	yes, possible concern with dewatering effort	High water levels could effect productivity; working behind a dam. River span too wide to dewater all at once, will have to be done in stages. Obstacles exist upstream and downstream that must be addressed in order to dewater as necessary. Dewatering has been generously considered in current cost estimate	Marginal	Likely	2
CE-3	Lamprey Barrier	project is in the river, significant amount of rock excavation	Discussed with senior geotech staff and they had no concerns; however, project is in river.	Marginal	Likely	2
CE-4	Platform/Walkway Steel	project is in the river	Discussed with senior geotech staff and they had no concerns; however, project is in river.	Marginal	Unlikely	0
CE-5	Lamprey Trap	project is in the river	Lamprey traps are becoming typical in the Great Lakes region.	Marginal	Likely	2
CE-6	Waterline Support	none	Reattaching, fabrication with steel plate.	Negligible	Unlikely	0
CE-7	Earthen Levee	yes	Located in low swampy area.	Marginal	Likely	2
CE-8	0			Negligible	Unlikely	0
CE-9	0			Negligible	Unlikely	0
CE-10	0			Negligible	Unlikely	0
CE-11	0			Negligible	Unlikely	0
CE-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
CE-13	Planning, Engineering, & Design	construction refinements during design could increase schedule	addressed in scope category	Marginal	Possible	1
CE-14	Construction Management	river construction, excavation of rock could have potential problems either increasing the schedule or modifying the design		Marginal	Possible	1
Specialty Construction or Fabrication					**Maximum Project Growth**	**65%**
SC-1	Mobilization & Demobilization	None	Decent access to site.	Negligible	Unlikely	0
SC-2	Site Preparation	None	Decent access to site.	Negligible	Unlikely	0

SC-3	Lamprey Barrier	None	Large cost item but work performed in low water season.	Marginal	Unlikely	0
SC-4	Platform/Walkway Steel	possible	field fabrication could run into site condition issues	Moderate	Possible	2
SC-5	Lamprey Trap	possible lead time for fabrication	could increase construction schedule	Moderate	Possible	2
SC-6	Waterline Support	possible	field fabrication could run into site condition issues	Marginal	Unlikely	0
SC-7	Earthen Levee	N/A		Negligible	Unlikely	0
SC-8	0			Negligible	Unlikely	0
SC-9	0			Negligible	Unlikely	0
SC-10	0			Negligible	Unlikely	0
SC-11	0			Negligible	Unlikely	0
SC-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
SC-13	Planning, Engineering, & Design	refinement of lamprey trap design could increase schedule		Marginal	Unlikely	0
SC-14	Construction Management	potential differing field conditions related to field fabrication	this could lead to modifications	Marginal	Possible	1
Technical Design & Quantities				**Maximum Project Growth**		**30%**
T-1	Mobilization & Demobilization	None	Concerns very unlikely, Typical earth equipment needed	Negligible	Unlikely	0
T-2	Site Preparation	Yes	No survey data for the downstream flume wall demolition.	Marginal	Unlikely	0
T-3	Lamprey Barrier	If dye test fails,	grout may be required.	Significant	Unlikely	2
T-4	Platform/Walkway Steel	None	Well defined by customer. Large cost item so marginal impact if quantities did change for an unforseen reason.	Marginal	Unlikely	0
T-5	Lamprey Trap	Additional debris behind wall	Well defined by customer; marginal if quantities changed.	Marginal	Unlikely	0
T-6	Waterline Support	None	measured length, replacing back to current location.	Negligible	Unlikely	0
T-7	Earthen Levee	Yes	Missing geotechnical and survey data.	Significant	Likely	4
T-8	0			Negligible	Unlikely	0
T-9	0			Negligible	Unlikely	0
T-10	0			Negligible	Unlikely	0
T-11	0			Negligible	Unlikely	0
T-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
T-13	Planning, Engineering, & Design	potential site changes since original time of design	could lead to design refinement and increase cost	Marginal	Possible	1
T-14	Construction Management	potential differing field conditions	could cause modification	Marginal	Possible	1
Cost Estimate Assumptions				**Maximum Project Growth**		**35%**
EST-1	Mobilization & Demobilization	Possible	typical equipment assumed for construction in river of this width & depth unless the contractor tries to take a marine equipment approach.	Marginal	Likely	2
EST-2	Site Preparation	Possible	It could be difficult to control water; currently the designers do not want to rely on the dam as water control support. There are underwater remnants of an old powerplant upstream of dam and a flume wall down the center of the river downstream of dam	Marginal	Likely	2
EST-3	Lamprey Barrier	None	Assumed excavator with air hammer to excavate trench for barrier, equipment working directly in the river bed.	Marginal	Unlikely	0
EST-4	Platform/Walkway Steel	possible	Field conditions could prove estimate assumptions incorrect	Moderate	Possible	2
EST-5	Lamprey Trap	None	historic design provided	Marginal	Unlikely	0
EST-6	Waterline Support	None	Small amount of stainless steel plate and a field fabricator.	Negligible	Unlikely	0
EST-7	Earthen Levee	possible	Field conditions could prove estimate assumptions incorrect	Moderate	Possible	2
EST-8	0			Negligible	Unlikely	0
EST-9	0			Negligible	Unlikely	0

EST-10	0			Negligible	Unlikely	0
EST-11	0			Negligible	Unlikely	0
EST-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
EST-13	Planning, Engineering, & Design	could evolve if design is refined		Marginal	Possible	1
EST-14	Construction Management	differing field conditions could cause current estimate assumptions to change	potential cost impact	Marginal	Possible	1
External Project Risks				**Maximum Project Growth**		**40%**
EX-1	Mobilization & Demobilization	Weather	Rain could affect flow & water levels, small cost item.	Marginal	Likely	2
EX-2	Site Preparation	Weather	Rain could affect flow & water levels, small cost item.	Moderate	Likely	3
EX-3	Lamprey Barrier	Weather	Rain could affect flow & water levels, possibly affecting the dewatering effort; large cost item.	Moderate	Likely	3
EX-4	Platform/Walkway Steel	Weather	Rain could affect flow & water levels, possibly affecting the dewatering effort; large cost item.	Moderate	Likely	3
EX-5	Lamprey Trap	Weather	Rain could affect flow & water levels, possibly affecting the dewatering effort; large cost item.	Negligible	Likely	1
EX-6	Waterline Support	Weather	Rain could affect flow & water levels, small cost item.	Negligible	Unlikely	0
EX-7	Earthen Levee	Weather	Rain could affect the ability to perform work in the low lying area levee location.	Moderate	Likely	3
EX-8	0			Negligible	Unlikely	0
EX-9	0			Negligible	Unlikely	0
EX-10	0			Negligible	Unlikely	0
EX-11	0			Negligible	Unlikely	0
EX-12	Remaining Construction Items	None remain		Negligible	Unlikely	0
EX-13	Planning, Engineering, & Design	weather risk could cause additional E&D solutions		Marginal	Possible	1
EX-14	Construction Management	weather could cause increase to schedule		Marginal	Possible	1