

2021

South Branch Pike River Ecosystem Restoration

Appendix F – Cost Engineering



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1.0 Study Area

The project is located in southeast Wisconsin in Kenosha County. The SBPR study area is part of the Pike River watershed which drains approximately 52 square miles. The SBPR originates as a drainage way near Highway 50 in Kenosha County. From there, it flows north along the Union Pacific Railroad, picking up contributions from agriculture drainage tiles and several tributaries including the Airport Branch and Somers Branch.

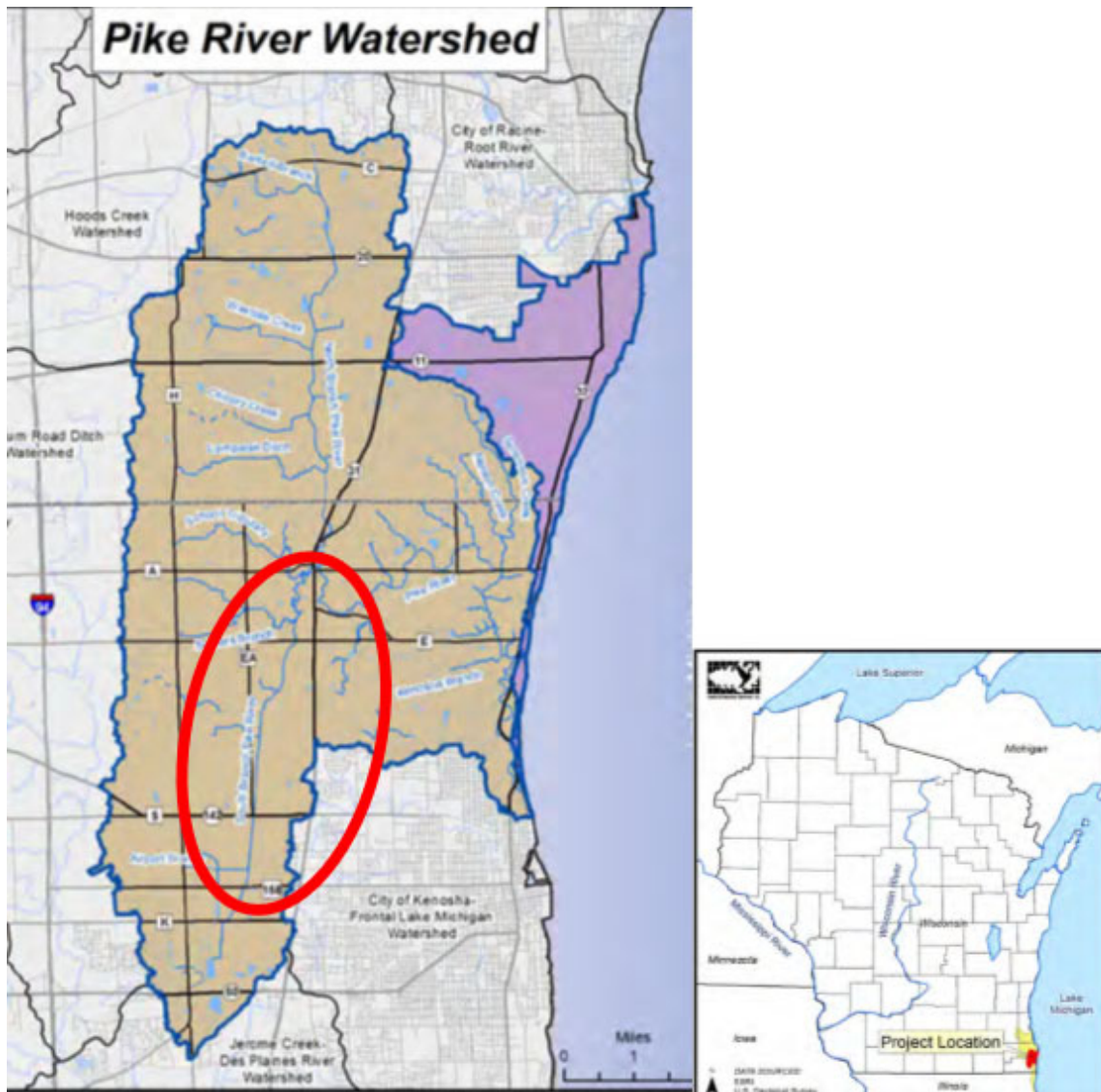


Figure 1: Location of South Branch Pike River in Kenosha County, Wisconsin. (Source: Pike River Water Restoration Plan accessed at: <http://www.rootpikewin.org/pike-river-plan>)

The study area has been broken into Phase I and Phase II to eventually facilitate project implementation in an upstream to downstream sequence. Phase I is bordered to the south by Highway K (60th Street), to the north by Highway 158 (52nd Street), the Canadian Pacific Railroad on the west and the Union Pacific Railroad on the east. The Phase I study area is approximately 52 acres. Phase II is bordered to the south by Highway 158 (52nd Street)

and to the north by Highway S (38th Street), Canadian Pacific Railroad on the west and the Union Pacific Railroad on the east and a triangular piece of property to the west of the Canadian Pacific Railroad tracks on County Correctional Institution property. The Phase II study area is approximately 194 acres. Phase I and II total approximately 246 acres.

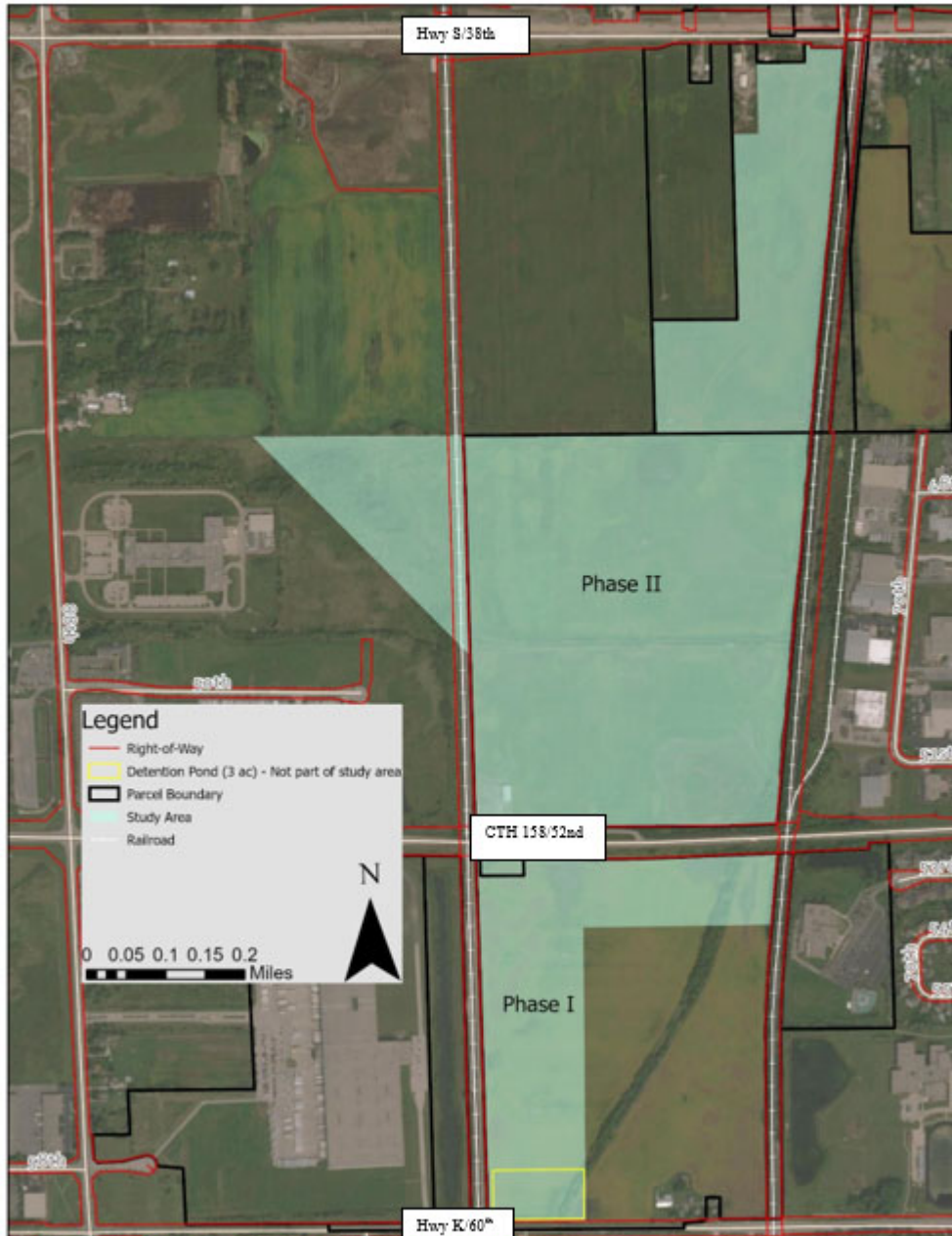


Figure 2: Phase I (52 acres) and II (194 acres) Study Area

2.0 Basis of NER Total Project Cost Estimate

Due to the level of design and technical information available, the estimate is designated a Class 3 level (per ER 1110-2-1302).

Class 3 – Technical information (including designs) are approaching a 10-60% quality of project definition. There is greater confidence in project planning and scope, construction elements and quantity development. The estimates rely less on generic cost book items, greater reliance on quotes, recent historical and site-specific crew based details. Class 3 estimates are a reflection of improved technical documents. The estimates must be supported by a technical information (scope, design, acquisition and construction methods, etc.) discussion within the estimate and the uncertainties associated with each major cost item in the estimate. Special attention must be given to large construction elements and items that are sensitive to technical information change.

2.1 Design

The PDT team provided the SOW for the Alternatives and respective measures in conceptual form describing each measure in a narrative format through email correspondence and documented throughout the report. An itemized table of measures was developed by the Environmental Planning/Formulation lead with hydrologic and hydraulic features as well as native plant communities' measures. The 2019 Federal Interest Determination (FID) report as well recent site photos and videos were also referenced for evaluation of site characteristics, consideration of risk factors, and for gathering additional conceptual scope of work detail.

2.1.1 Measures

The Measures considered for this study are categorized as hydrogeomorphic, native plant community, adaptive management and best management practices.

2.1.1.1 Hydrogeomorphic Measures

The following is a list of potential measures for restoring and creating the hydrogeomorphic setting(s) for native communities. The following outline provides a brief overview of potential actions, with measures italicized, and followed by specific parametric measure descriptions:

- Demolition
 - Loose fragments and foreign debris
 - Remove drain tiles/pipes
 - *Valve* drain tiles/pipes
 - Reroute pipes
- Excavation
 - Excavation to achieve hydrology
 - Side stream wetland shelves, riparian pocket wetlands
 - Transitional communities
 - Channel reconfiguration
 - Meandering, braiding, etc.
 - Development for riffle/run/glide/pool
- Grading
 - To achieve hydrology, slopes, and necessary microtopography
 - Terracing for different plant communities
 - Reducing bank slopes on inside bends and straight runs
 - Floodplain connectivity
- Native Rock Structures
 - Riffles (cobble and filter layer)
- Large Woody Debris Structures

Demolition – this measure entails those activities associated with the removal of structures within the channel, bank and floodplain zones. Specific structures that could be removed include but are not limited to drain tiles, culverts, pipes, outfalls and other defunct infrastructure. Specific materials to be removed under this measure

include but are not limited to large foreign debris, concrete, metal, angular riprap, clay drainage tiles, plastic drain tiles, concrete pipe, etc. All materials removed would be appropriately reused, recycled or disposed of.

Excavation – this measure includes the removal of earthen materials to achieve required geomorphologies and hydrology for native communities. Large to small earth moving machines would be utilized to excavate earthen materials to specific elevations as required by the targeted native community. All materials would be reused on site to create diverse geomorphologies; stockpiled for reuses by others; and/or disposed of appropriately at other non-federal sponsor owned lands. This measure is typically coupled with grading.

Grading – this measure includes the movement of earthen materials to achieve required geomorphologies and hydrology for native communities. Large to small earth moving machines would be utilized to spread, smooth and undulate surface soils to specific elevation as required by the targeted native plant community. This measure would typically be combined with excavation to provide final elevation, and/or soil amendments (if necessary) to ensure proper incorporation into surficial soils.

Native Rock Structures – this measure includes the placement of rock/stone into the stream channel to provide required geomorphology and substrates for a native stream community. This measure would be more applicable to those channel reaches that exhibit higher stream velocities. Large to small construction machinery would place rock slabs, boulders and/or cobbles that are of the same make up and general shapes as natural reaches with similar gradient. Rock/stone materials would take on various configurations as necessitated by the particular stream parameters present at the restoration site. Different configurations of rock structures would include but not be limited to slab-rock, riffle, boulder cluster, j-hook, cross-vane and cobble bar. All stone structure materials would be appropriately sized based on in-channel parameters. All materials would be sourced from local permitted sources to ensure clean and inert materials. This measure is combinable with a variety of measures as it can add critical habitat and stability components.

Large Woody Debris Structures – this measure includes the placement of large woody debris (LWD) into the stream channel or into wetlands for habitat and stability components. This measure would be more applicable to those channel reaches that exhibit lower stream velocities and wetlands. Large woody debris consists of trees, their major branches, their rootwad and combinations of such. Typically, larger trees (20+ DBH) removed for excavation, grading or native plant community restoration are retained and utilized. These structures may consist of one to many trees placed into the stream channel and bank zones in various configurations to provide habitat and temporary stability. Depending on the forces exhibited in the area targeted, LWD may or may not need to be keyed into and/or tethered to the stream floor or earthen bank.

2.1.1.2 Native Plant Community Measures

- *Invasive Species Clearing & Grubbing*
 - *Clearing, grubbing, mowing*
 - *Herbicide*
 - *Flooding*
 - *Burning*
- *Native Species Planting*
 - *Seeding*
 - *Dormant rootstock*
 - *Live plugs*
 - *Shrubs and trees*
- *Native Species Establishment*
 - *Herbivory control*
 - *Invasive species control*

Invasive Species Removal – this measure includes the complete removal of non-native weeds and the selective removal of native weeds in areas that are not treated with other measures that would also provide clearing, such

as excavation, grading and some demolition activities. Methods for removing invasive plant species include but are not limited to clearing and grubbing, mowing, burning, flooding, broad-cast herbicide application, spot-treatment herbicide application, etc. This measure is a one-time initial application or an initial series of applications to provide conditions for native plantings; this measure is not the same as those small spot treatment applications under the Native Plant Establishment measure.

Native Plantings – this measure includes the procurement and planting of native plant species and contract grown plantings. Native planting lists would be specifically developed per plant community type specifying the rates of native seed, live root stock, live plugs and live tree/shrub containers. Current potential for plant community general types include aquatic bed, marsh, meadow, prairie, savanna, woodland and forest.

Native Plant Establishment – this measure includes those elements required to establish and maintain newly created or restored plant communities. Specific elements include but are not limited to invasive species management, herbivory control, protective fencing, limited short-term watering, general plant survival, growth and coverage, etc.

2.1.1.3 Adaptive Management Measures

A 5 year contract would be utilized to ensure recruitment and establishment of native communities (abiotic and biotic) is successful. All hydrogeomorphic work would be accomplished within the first several months of the contract to allow establishment and monitoring time. Options would be placed in the contract for future adaptive management measures that could be exercised at any point of the contract duration, but most frequently in years 3, 4 and 5. These may include but are not limited to changing or adjusting features to achieve the required hydrology, hydraulics and/or geomorphology; additional native plant treatments; or other improvements. All adaptive management decisions and exercising of contract options would be driven by monitoring. To be conservative, three adaptive management options would be included under this measure for high, medium and low adaptive adjustment needs. These would be Option A – for more intensive adjustments of geomorphology or hydrology \$75,000; Option B – for more moderate adjustments of habitat and/or additional plantings \$25,000; Option C – for minor habitat adjustments or additional plantings \$10,000.

2.2 Quantities

LRC Civil Engineering provided quantities for the earthwork (Channel Excavation and In-Stream & Site Placement features), LRC Planning provided quantities for the Drain Tile features, Channel Grading, and Channel/Habitat Structures and Native Plant Community measures. LRC Cost Engineering developed estimated Ancillary cost quantities and independently conducted quantity takeoffs for Drain Tile and Excavation/Grading feature quantity verification.

2.3 Construction Cost Estimate

Significant construction feature costs were developed with the crew concept utilizing the Tri-Services Cost Engineering System Micro-Computer Aided Cost Estimating System (MCACES) Second Generation (MII) software (MII 4.4.2). Cost book items were updated with the latest equipment, labor and material pricing. Site specific productivity rates were applied as necessary and the feature costs verified against historical data.

2.3.1 Ancillary Construction Cost

2.3.1.1 Mobilization & Demobilization.

Feature includes mobilizing and demobilizing construction resources to/from the job site pre/post construction.

2.3.1.2 Temporary Construction Facilities

Temporary Construction Facilities cost includes temporary features of work assumed during construction such as: Field offices, staging areas, access paths, erosion control, project signage, and safety/security fencing. This feature includes Best Management Practices as described and quantitated by Planning.

2.3.1.3 Temporary Traffic Control

Traffic Control includes installation and maintenance of roadside signage and barricades for public awareness and protection of equipment and personnel during construction activities near roadways and those involving frequent site entry and departure.

2.3.1.4 Boundary Survey

A boundary survey was included with crew output rates differentiated between cleared land and wooded areas.

2.3.2 General Conditions, Markups, and Assumptions

- The estimate assumes that the prime contractor will self-perform a majority of construction features, primarily those related to planting & establishment activities, and subcontract out the remaining features of work.
- Prime contractor Markups include Home Office Overhead (HOOH), calculated Job Office Overhead (JOOH) including small tools, and Profit on own work as well as subs.
- Sub-contractor markups include HOOH and profit.
- Assumed MII B-Bond Table % for the Performance and Payment Bonding on the Prime Contractor and Sub-contractor's work. Rate comparable to historical LRC projects of similar magnitude.
- Labor Rates per General Decision Number: WI20210015 07/09/2021, State: Wisconsin, Construction Types: Heavy, Counties: Statewide (Kenosha Co. used)
- Equipment rates per EP 1110-1-8, Volume 2, 2020.
- Materials that will become permanent features of the federal project are assumed exempt from state sales tax in Wisconsin (i.e. NO sale tax estimated).
- Cost-of-Money based on the U.S. Department of the Treasury Prompt Payment rate for Jan-21 through Jun-21.
- Fuel pricing based on GasBuddy prices 10/1/21.

2.4 Construction Schedule and Escalation

The construction schedule is based on the overall project schedule (P&S late FY23 through FY24, award contract in FY24, and construction starting summer 2025) provided by the PM, MII construction feature elements durations, considers specific seasons for clearing, planting, and establishment activities, environmental windows, as well as weather days. Escalation on the major construction features assumes mid-point of construction 3Q FY2025 [1st QTR = OCT THRU DEC] per EM 110-2-1304.

2.5 Acquisition Plan

Currently, no contracting plan has been established. A contracting member has not been assigned to the project and therefore the acquisition strategy is undetermined. If the project is solicited/awarded as less than fully open and competitive, contracting levels and respective overhead cost typically increase. The base estimate assumes a small business contract. There is a slight chance that the project would not have a small business requirement, which would slightly decrease the base estimate. It is more likely the acquisition will be restricted typically adding at least 1 additional contracting markup layer and potentially a 15-30% increase in cost of subcontracted features.

2.6 Risk Assessment and Contingency Development

An abbreviated risk analysis (ARA) was performed to collectively develop a construction cost estimate contingency based on approved Corps methodology. The major concerns are captured in the ARA Risk Register along with discussion and determination details for the selection of each potential likelihood and impact level. Some concerns include the fact that a contracting member is not currently on the PDT and the acquisition strategy could be more restrictive than currently assumed. Project costs have the potential to increase due to scope and quantity changes during engineering design and after further technical analysis. Unknown subsurface conditions may impact demolition and excavation features. Working within a waterway may drive costs, dictate means/methods, and constrain the windows of operation due to dewatering or unsuitable working conditions. Endangered species

concerns may conflict with the construction schedule and potential critical path features. Measurable events and/or flash floods may alter existing conditions and require design changes for channel configuration and respective planting/restoration features. Considering LRC has completed similar Section 206 eco-restoration projects in geographic proximity and good historical data is available for referencing scope of work (SOW) and pricing, it is reasonable to assume a contingency value in the Class 3 Cost Estimate Classification range. A range of 20-50% is suggested by Engineering Regulations ER 1110-2-1302 at this level.

Major Risk Elements considered during the analysis are listed in Table 1: Typical Project Risk Elements

<u>Risk Element</u>	<u>Typical Concerns</u>
Project Management & Scope Growth	<ul style="list-style-type: none"> • Potential for scope growth, added features? • Project accomplishes intent? • Funding Difficulties? • Sufficient Staffing/Support?
Acquisition Strategy	<ul style="list-style-type: none"> • Contracting plan firmly established? • 8a or small business likely? • Requirement for subcontracting? • Accelerated schedule or harsh weather schedule? • High-risk acquisition limits competition, design/build? • Limited bid competition anticipated? • Bid schedule developed to reduce quantity risks?
Construction Elements	<ul style="list-style-type: none"> • Accelerated schedule or harsh weather schedule? • High risk or complex construction elements, site access, in-water? • Water care and diversion plan? • Unique construction methods? • Special mobilization? • Special equipment or subcontractors needed? • Potential for construction modification and claims?
Specialty Construction or Fabrication	<ul style="list-style-type: none"> • Atypical construction elements, unusual material or equipment manufactured or installed? • Confidence in constructibility or methodology? • One of a kind and confidence in fabrication and installation? • Ability to reasonably transport? • Risk of specialty equipment functioning first time? Testing?
Technical Design & Quantities	<ul style="list-style-type: none"> • Level of confidence based on design and assumptions? • Possibility for increased quantities due to loss, waste, or subsidence? • Appropriate methods applied to calculate quantities? • Sufficient investigations to develop quantities? • Quality control check applied?
Cost Estimate Assumptions	<ul style="list-style-type: none"> • Reliability and number of key quotes? • Assumptions related to prime and subcontractor markups/assignments? • Assumptions regarding crew, productivity, overtime? • Site accessibility, transport delays, congestion? • Overuse of Cost Book, lump sum, allowances? • Lack confidence on critical cost items?
External Project Risks	<ul style="list-style-type: none"> • Potential for severe adverse weather? • Political influences, lack of support, obstacles? • Unanticipated inflations in fuel, key materials? • Potential for market volatility impacting competition, pricing? • Funding Constraints

Table 1: Typical Project Risk Elements and Concerns

A running total project weighted contingency of 26.2% was estimated from the ARA (excluding LERRDS). The total weighted construction contingency estimated at 29.2%. The contingency accounts for potential impacts and the likelihood of occurrence of the Typical Risk Elements Concerns as they pertain to each major feature of work.

3.0 Lands and Damages (CW-WBS 01, LERRDS)

Real Estate costs and contingency were developed and provided by LRC Real Estate.

4.0 Planning, Engineering, and Design (CW-WBS 30)

Cost for the 30 account (PED) was provided by the LRC Cost Engineering Chief at 12% total construction cost. The percentage is comparable to historical feasibility level projects in the Chicago District and are in the recommended range suggested by the Cost MCX, Walla Walla.

5.0 Construction Management (CW-WBS 31)

Cost for the 31 account (CM) was provided by the LRC Cost Engineering Chief at 8% of the total construction cost. The percentages are comparable to historical feasibility level projects in the Chicago District and are in the recommended range suggested by the Cost MCX, Walla Walla

6.0 Alternative Analysis

For the Alternatives Analysis, the Cost of Measures comprising each Alternative were developed largely based on historical parametric cost of similarly scoped eco-restoration projects in close geographic proximity. These unit costs were applied to preliminary quantities determined by the PDT and then two distinct analyses, Cost effectiveness and incremental cost analysis (CE/ICA), were conducted to evaluate the effects of alternative plans according to USACE policy.

The Alternative Development and Screening details can be found in the Report Body.

7.0 References

U.S. Army Corps of Engineers, 1993, *Engineering and Design Cost Engineering Policy and General Requirements, Engineering Regulation 1110-1-1300*, Department of the Army, Washington D.C., 26 March 1993.

U.S. Army Corps of Engineers, 1999, *Engineering and Design for Civil Works Projects, Engineering Regulation 1110-2-1150*, Department of the Army, Washington D.C., 31 August 1999.

U.S. Army Corps of Engineers, 2016, *Civil Works Cost Engineering, Engineering Regulation 1110-2-1302*, Department of the Army, Washington D.C., 30 June 2016.

U.S. Army Corps of Engineers, 2020, *Civil Works Construction Cost Index System (CWCCIS), Engineering Manual 1110-2-1304*, Department of the Army, Washington D.C., 30 September 2020.

Unified Facilities Criteria, 2011, *Handbook: Construction Cost Estimating*, Unified Facilities Criteria (UFC) 3-740-05, Department of Defense, 1 June 2011.

8.0 Attachments

8.1 Abbreviated Risk Analysis

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
Project Management & Scope Growth					
Maximum Project Growth					
PS-1	Mob/Demob, Temp Fac., Maint traffic, Survey	Potential scope growth with preliminary quantity and uncertain subsurface conditions	Changes are LIKELY for the quantities and will increase as work ensues. Impact considered MODERATE given that these are not major scope items.	Moderate	Likely
PS-2	Drain Tile Removal/Abandonment & In-Line Valves	Potential scope growth with uncertain subsurface conditions.	Historical field tile may not be apparent and it is LIKELY the quantities will increase as work ensues. Tile blowouts may be discovered during construction and require filling or regrading as is common with tile abandonment. Impact considered SIGNIFICANT given drain tile has been partially surveyed and identified but questionable.	Significant	Likely
PS-3	Clearing and Grubbing, Rem pipes/outfalls	Potential scope change (material type & quantity)	It is POSSIBLE the quantities may increase from design to construction due to uncertainties with dynamic site features and conditions. The resulting impacts would be MARGINAL considering minor scope changes.	Marginal	Possible
PS-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	The SOW is fairly well defined and channel design is largely conceptual.	It is POSSIBLE that archeological remains may be unearthed while excavating and regrading near a historical stream bed. Schedule impacts are possible if further investigation is necessary. Although a phase I Environmental Site Assessment was conducted for the site, excavated material, previously used as fill in the historical canal alignment, may prove to be non-native and contain high concentrations of debris requiring increased CCD disposal fees or possibly special handling and disposal. Additional rill or gully regrading may be required. Cost and schedule impacts are considered MODERATE due to the feature magnitude relative to the overall project.	Moderate	Possible
PS-5	Riffles, Woody jam (instream habitat)	Potential scope growth with more detailed survey and site observation, trees near structures, utilities, and roadways.	A comprehensive tree survey has not been conducted. SOW is approximate based on site visit observations. It is POSSIBLE the number of woody invasives >6 IN DBH will vary from current assumptions though may increase or decrease therefore impact considered MARGINAL.	Marginal	Possible
PS-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	Potential scope growth with woody invasive species removal, extensive determination of species and densities will be refined moving forward.	Planning is confident with the planting/seeding/establishment SOW for this feature. Several similar projects have been completed by LRC successfully in the past with good available historical data. Although it is POSSIBLE scope could change impacts are not expected to be greater than MODERATE due to the current observations and teams experience with similar projects.	Moderate	Possible
PS-7	Multiuse trails	The SOW is fairly well defined for the trail.	It is POSSIBLE that SOW will increase as construction ensues due to identification of actual subsurface utilities. The boundary survey may present new conflicts between neighboring landowners. Both conditions could lead to MODERATE schedule and cost increases.	Moderate	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
PS-8	Planning, Engineering, & Design	Potential scope growth during design, Amendments, and construction Modifications increasing estimated PDT involvement.	It is POSSIBLE the SOW will change moving forward due to potential utility, HTRW, cultural, real estate conflicts requiring more specialized PDT member involvement moving forward and therefore could MARGINALLY impact PED & EDDC scheduling and cost.	Marginal	Possible
PS-9	Construction Management	Potential scope growth increase QA	POSSIBLE scheduling impacts though considering the overall expected construction involvement and overall performance period the impacts should be MARGINAL.	Marginal	Possible

Acquisition Strategy

Maximum Project Growth

AS-1	Mob/Demob, Temp Fac., Maint traffic, Survey	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-2	Drain Tile Removal/Abandonment & In-Line Valves	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-3	Clearing and Grubbing, Rem pipes/outfalls	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-5	Riffles, Woody jam (instream habitat)	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
AS-7	Multiuse trails	Assumes fully open/competitive acquisition. Selective acquisition may increase contractor markups. Unclear regarding RFQ, IFB, Sole sourced?	historical cost carries some level of subcontracting and related markups, construction vs service contract. Construction contract more costly. RFQ/IFB/SS may drive cost. Mix of construction and service labor assumed. It is POSSIBLE the acquisition method could become less competitive resulting in a MODERATE cost impact.	Moderate	Possible
AS-8	Planning, Engineering, & Design	NA	NA	Negligible	Unlikely
AS-9	Construction Management	NA	NA	Negligible	Unlikely
Construction Elements			Maximum Project Growth		
CE-1	Mob/Demob, Temp Fac., Maint traffic, Survey	Potential for modifications with uncertain quantities and subsurface conditions	Unidentified items may exist in and it is LIKELY the quantities will increase as work ensues. Impact is considered MODERATE given the SOW has been fairly well identified.	Moderate	Likely
CE-2	Drain Tile Removal/Abandonment & In-Line Valves	Potential for modifications with uncertain quantities	Unidentified field tile may exist in the ag fields and it is LIKELY the quantities will increase as work ensues or additional mutual drains will be discovered. Impact is considered MODERATE given drain tile has been surveyed and identified.	Moderate	Likely
CE-3	Clearing and Grubbing, Rem pipes/outfalls	Site conditions may differ from design requiring field changes	It is POSSIBLE the quantities may increase for instream structures from design to construction due to uncertainties with dynamic bed and embankment conditions at the time of construction. Impacts considered MARGINAL due to potential minor material increase relative to the overall design.	Marginal	Possible
CE-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	The current channel design is largely conceptual with typical sections though not well defined or comprehensively modeled. Soil types and subsurface conditions unknown. Bank stability could be an issue during construction. Gullies/rills may not be currently identified due to thick vegetation.	It is POSSIBLE that archeological remnants may be unearthed while excavating and regrading near a historical stream bed. Although no archeological or historic properties have been identified within the study area. Schedule impacts are POSSIBLE if further investigation is necessary. Although the overall environmental risks appear to be low, based on the documentation reviewed, and there are no indications of a release or specific issue, there are NO soil or sediment chemical analyses. Cost and schedule impacts are considered MODERATE due to the overall channel excavation and regrading scope.	Moderate	Possible
CE-5	Riffles, Woody jam (instream habitat)	Potential increase in quantities	It is POSSIBLE the quantities will increase from current assumptions. Cost and schedule impacts could be MODERATE.	Moderate	Possible
CE-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	Potential for more extensive invasive species removal. Densities and species identified during construction may increase activities.	Planning is confident with planting/seeding/establishment SOW for this feature. Several similar projects completed by LRC successfully in the past with good historical data. Typically the contractors will walk the site and generalize invasives for removal. It is still POSSIBLE invasives will be under characterized in the plans & specs leading to a change in site conditions during actual construction with MARGINAL impacts to cost and scheduling.	Marginal	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
CE-7	Multiuse trails	Potential scope growth, Amendments, EDDC, Modifications	Modifications are POSSIBLE and may be necessary to address utility or boundary conflicts as further identified during construction. Impacts to schedule coordinating with utility members and reconciling neighboring land owner disputes could be noticeable though given the total project area and relative cost magnitude the impacts are considered MARGINAL.	Marginal	Possible
CE-8	Planning, Engineering, & Design	Potential scope growth, Amendments, EDDC, Modifications	It is LIKELY a project site of this size will not be completely investigated before design is finalized and project solicited. Storm events during construction may reveal drainage and erosion issues and require design alterations. H&H has not conducted comprehensive analysis. Considering PED has experienced most issues in the past the impacts are considered NEGLIGIBLE.	Negligible	Likely
CE-9	Construction Management	Differing site conditions lead to modifications and potential schedule conflicts. Potential scope growth increase QA	Scheduling impacts are POSSIBLE though considered MARGINAL due to the overall performance period expected for ecorestoration projects.	Marginal	Possible

Technical Design & Quantities

Maximum Project Growth

T-1	Mob/Demob, Temp Fac., Maint traffic, Survey	Rough quantities and conceptual design	Quantities are ROM and conceptual level of design, LIKELY increase during PED with potentially MODERATE scope and cost impacts considering the magnitude of tile and valves accounted for.	Moderate	Likely
T-2	Drain Tile Removal/Abandonment & In-Line Valves	Broad based cost engineering quantity assumptions may understate actual quantities onsite.	Quantities are ROM and conceptual level of design, LIKELY increase during PED with potentially MODERATE scope and cost impacts considering the magnitude of tile and valves accounted for.	Moderate	Likely
T-3	Clearing and Grubbing, Rem pipes/outfalls	Conceptual level design of in-stream features & quantities	Quantities are rough order of magnitude (ROM), it is POSSIBLE they will increase and/or the design slightly change during PED with MARGINAL impacts anticipated relative to the overall project scope.	Marginal	Possible
T-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	Channel design is generalized, potential qty changes, uncertain subsurface conditions, potential non-native fill, extensive channel survey data may alter current assumptions.	Current quantities are ROM and overall channel and flood plain design conceptual. It is LIKELY that technical design changes will MODERATELY drive quantities and therefore cost.	Moderate	Likely
T-5	Riffles, Woody jam (instream habitat)	Rough quantities from preliminary field observation data	Quantities are ROM and it's POSSIBLE they may change moving forward. Cost impacts are considered MARGINAL.	Marginal	Possible
T-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	Rough quantities from preliminary field observation data	It is POSSIBLE the SOW will differ during PED though impacts are considered MODERATE considering the PDT knowledge base and experience on similar projects.	Moderate	Possible
T-7	Multiuse trails	Potentially unknown project features (utilities), boundary conflicts, and subsurface conditions at this stage	Potential modifications and increased qty and design due to findings are POSSIBLE resulting in MARGINAL scope, design, and cost impacts.	Marginal	Possible
T-8	Planning, Engineering, & Design	conceptual design	Potential modifications and increased qty and design due to findings are POSSIBLE resulting in MARGINAL PED impacts.	Marginal	Possible
T-9	Construction Management	conceptual design	Potential modifications and increased qty and design due to findings are POSSIBLE resulting in MARGINAL CM impacts.	Marginal	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
Cost Estimate Assumptions			Maximum Project Growth		
EST-1	Mob/Demob, Temp Fac., Maint traffic, Survey	Material Costs, fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Materials, fuel, cost of money, and labor rates are LIKELY to increase though escalation factors are expected to capture changes therefore impacts considered MARGINAL. Sub-Contracting level assumed for Drain Tile work. Construction Means/Methods and productivity based on historical work.	Marginal	Likely
EST-2	Drain Tile Removal/Abandonment & In-Line Valves	Fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Fuel, cost of money, and labor rates are LIKELY to increase though escalation factors are expected to capture changes therefore impacts considered MARGINAL. Prime-Contracting level assumed. Construction Means/Methods and productivity based on historical work.	Marginal	Likely
EST-3	Clearing and Grubbing, Rem pipes/outfalls	Material Costs, fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Materials, fuel, cost of money, and labor rates typically increase in time though escalation factors are expected to capture changes. Prime-Contracting level assumed for instream features, it's POSSIBLE this may end up being sub-contracted. Construction Means/Methods and productivity are based on historical work. It is POSSIBLE dewatering or water diversion may be necessary to complete these features of work, though it is not currently accounted for. Cost impacts could be MODERATE.	Moderate	Possible
EST-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	Fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Fuel, cost of money, and labor rates typically increase in time though escalation factors are expected to capture changes. Prime-Contracting level assumed for earthwork, it's POSSIBLE this may end up being sub-contracted. Construction Means/Methods and productivity are based on historical work. It is UNLIKELY dewatering or water diversion may be necessary to complete these features of work, though it is not currently accounted for. Cost impacts could be SIGNIFICANT.	Significant	Unlikely
EST-5	Riffles, Woody jam (instream habitat)	Fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Materials, fuel, cost of money, and labor rates typically increase with time though escalation factors are expected to capture these changes. Sub-Contracting level assumed for > 6" DBH tree removal. Construction Means/Methods and productivity based on historical work. It's POSSIBLE the productivity rates may change MARGINAL Y impacting cost.	Marginal	Possible
EST-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	Material Costs, fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Materials, fuel, cost of money, and labor rates typically increase with time though escalation factors are expected to capture these changes. Prime-Contracting level assumed for these features. Construction Means/Methods and productivity based on historical work. It's POSSIBLE the productivity rates may change MARGINAL Y impacting cost.	Marginal	Possible
EST-7	Multiuse trails	Material Costs, fuel pricing, cost of money, labor rates, contracting level (Prime or Sub), construction Means/Methods assumptions, and productivity rates	Materials, fuel, cost of money, and labor rates typically increase with time though escalation factors are expected to capture these changes. Construction Means/Methods and productivity based on historical work. It's POSSIBLE the productivity rates may change MARGINAL Y impacting cost.	Marginal	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
EST-8	Planning, Engineering, & Design	Based on historical % of construction cost. Unknown PDT member level of involvement	Although PED changes are LIKELY the impacts are considered MARGINAL to PED due to application of a historical % rate. Less experienced team members may require more labor hours but typically at a lower rate for new hires.	Marginal	Likely
EST-9	Construction Management	Based on historical % of construction cost. Unknowns with submittals and construction modifications.	Although modifications and differing submittal assumptions are LIKELY the impacts are considered MARGINAL to construction management due to the overall anticipated performance period and ongoing field office involvement. The final % of construction is just as LIKELY to decrease as it is to increase considering the % based on a range of LRC historical project types.	Marginal	Likely

External Project Risks			Maximum Project Growth		
EX-1	Mob/Demob, Temp Fac., Maint traffic, Survey	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence construction means/methods and conflict with project schedule. Heavy rain/runoff could impact construction activities and site access. These features of work are straight forward but external impacts could be MODERATE.	Moderate	Possible
EX-2	Drain Tile Removal/Abandonment & In-Line Valves	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence construction means/methods related to debris removal and conflict with project schedule, if found to be of cultural significance. The debris/trash characterization is uncertain exposing and unearthing archeological finds could lead to potential MODERATE scheduling/cost impacts from external sources. It is POSSIBLE that heavy rain/runoff could lead to MODERATE impacts to construction activities and site access.	Moderate	Possible
EX-3	Clearing and Grubbing, Rem pipes/outfalls	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations. Rain events may halt construction in-stream	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence material, design selection, and construction means/methods and could conflict with project schedule. Heavy rain/runoff could impact construction activities, considering these are in-stream structures. These features of work are relatively straight forward, respectively low in quantity, and the overall performance period enough to allow delayed construction if necessary therefore potential worst case impacts are assumed MODERATE.	Moderate	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Meeting Date: Var.

Risk Level					
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
	Negligible	Marginal	Moderate	Significant	Critical

Risk Register

Risk Element	Feature of Work	Concerns	PDT Discussions & Conclusions (Include logic & justification for choice of Likelihood & Impact)	Impact	Likelihood
EX-4	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence alignment design, channel geometry, and construction means/methods and could conflict with overall scope of work and project schedule. It is POSSIBLE that heavy rain/runoff could impact construction activities and site access. This is a major construction feature on the critical path requiring adequate construction timing for the establishment and restoration of stream features. These features of work are design critical and weather dependant for completion. The potential impacts could be SIGNIFICANT.	Significant	Possible
EX-5	Riffles, Woody jam (instream habitat)	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence construction means/methods and conflict with project schedule. Heavy rain/runoff could impact construction activities and site access. These features of work are straight forward therefore potential impacts are assumed MARGINAL.	Marginal	Possible
EX-6	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	External influences and private property owners near project may predicate design and impact operations. Heavy rain/runoff could impact construction activities and site access. Windy days or extensive dry conditions may halt burn days. POSSIBLE scheduling conflicts with burns and spraying herbicide near residents though impacts considered MARGINAL due to the overall performance period anticipated.	Marginal	Possible
EX-7	Multiuse trails	External interest groups could influence construction means/methods and conflict with the overall project schedule. Weather conditions may impact operations.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence construction means/methods and conflict with project schedule. Heavy rain/runoff could impact construction activities and site access. These features of work are straight forward therefore potential impacts are assumed MODERATE.	Moderate	Possible
EX-8	Planning, Engineering, & Design	Political interests, Government agencies (federal, state, municipal), environmental, cultural, and community groups involvement could influence design and conflict with project schedule. Excessive storm events could alter the existing site conditions and impact the design and specifications.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence design means/methods and conflict with project schedule. Heavy rain/runoff could impact final design. Potential impacts to PED could be MODERATE considering the level of PDT involvement.	Moderate	Possible
EX-9	Construction Management	Political interests, Government agencies (federal, state, municipal), environmental, cultural, and community groups involvement could influence construction operations and conflict with the overall project schedule. Excessive storm events could alter the existing site conditions and impact construction activities.	It is POSSIBLE that political interests, Government agencies (federal, state, municipal), environmental, cultural, and community group involvement could influence construction means/methods and conflict with the construction schedule. Heavy rain/runoff could impact construction activities and site access. Construction management will span the overall performance period therefore potential impacts are assumed MARGINAL.	Marginal	Possible

S Branch Pike River Ecosystem Restoration Sec 206 R3 + H1

Feasibility (Recommended Plan)

Abbreviated Risk Analysis

Risk Evaluation

<u>WBS</u>	<u>Potential Risk Areas</u>	Project Management & Scope Growth	Acquisition Strategy	Construction Elements	Technical Design & Quantities	Cost Estimate Assumptions	External Project Risks
01 LANDS AND DAMAGES	Real Estate						
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Mob/Demob, Temp Fac., Maint traffic, Survey	3	2	3	3	2	2
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Drain Tile Removal/Abandonment & In-Line Valves	4	2	3	3	2	2
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Clearing and Grubbing, Rem pipes/outfalls	1	2	1	1	2	2
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Excavating & Sculpting Channel, Grading Flood Plain, & Gullies	2	2	2	3	2	3
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Riffles, Woody jam (instream habitat)	1	2	2	1	1	1
06 03 WILDLIFE FACILITIES AND SANCTUARIES	Invasive Species Removal, Planting/Seeding, Establishment, & Adaptive Management	2	2	1	2	1	1
14 MULTIUSE TRAILS	Multiuse trails	2	2	1	1	1	2
30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	1	0	1	1	2	2
31 CONSTRUCTION MANAGEMENT	Construction Management	1	0	1	1	2	1

8.2 MCACES Estimate

S Branch Pike River 206_Feasibility

The project is located in southeast Wisconsin in Kenosha County. The SBPR, where the project is located, is part of the Pike River watershed which drains approximately 52 square miles. The SBPR originates as a drainage way near Highway 50 in Kenosha County. From there, it flows north along the Union Pacific Railroad, picking up contributions from agriculture drainage tiles and several tributaries including the Airport Branch and Somers Branch.

Initially, the study area consisted of four Phases and 29,000 linear feet of river. Early in the planning process the NFS requested that the study area be reduced to Phase I and II only. The NFS does not own most of the real estate within the study area and Phase I and II would require them to purchase only three parcels, whereas Phase III and IV would have required purchase of 30 additional properties. It was also suspected that the four Phase project would exceed the CAP limit of \$10 million dollars. Due to the number of properties that would need to be acquired and possible exceedance of the CAP limit, the NFS decided to reduce the scope of the study area to Phase I and II.

The study area has been broken into Phase I and Phase II to accommodate major road crossings, and allow for easy to read maps of the project. Phase I is bordered to the south by Highway K (60th Street), to the north by Highway 158 (52nd Street), the Canadian Pacific Railroad on the west and the Union Pacific Railroad on the east. The Phase I study area is approximately 52 acres. Phase II is bordered to the south by Highway 158 (52nd Street) and to the north by Highway S (38th Street), Canadian Pacific Railroad on the west and the Union Pacific Railroad on the east and a triangular piece of property to the west of the Canadian Pacific Railroad tracks on County Correctional Institution property. The Phase II study area is approximately 194 acres. Phase I and II total approximately 246 acres). Both Phases are located in Kenosha County, WI.

Includes Measures R3 and H1

Estimated by LRC
Designed by LRC
Prepared by David Druzbecki

Preparation Date 10/1/2021
Effective Date of Pricing 10/1/2021
Estimated Construction Time 365 Days

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Description	ProjectCost
Project Items	7,631,356
06 Fish and Wildlife Facilities	6,586,830
PHASE 1	2,398,467
0001 MOBILIZATION/DEMOBILIZATION	127,594
MOBILIZATION	63,797
0002 DEMOBILIZATION	63,797
0002 TEMPORARY CONSTRUCTION FACILITIES	186,129
Contractor Office Trailer	34,245
0014AB Site Erosion Control	28,866
Project and Safety Signs	4,471
Channel Erosion Control	52,454
USACE COR and QA Trailer	30,649
BMP	16,850
0003 MAINTENANCE OF TRAFFIC	63,857
0004 BOUNDARY SURVEY	126,164
R3	1,315,711
Clearing & grubbing for channel work	17,537
2 CHANNEL EXCAVATION (Creation of meandered channel geomorphology)	676,235
BENEFICIAL PLACEMENT / CHANNEL MATERIAL TO BACKFILL EXISTING CHANNEL	107,592
BENEFICIAL PLACEMENT / CHANNEL MATERIAL TO CREATE BERMS	44,974
BENEFICIAL PLACEMENT / DISPOSAL OF CHANNEL MATERIAL ON SITE	278,379
Rock Structures at Ingress/Egress Points	21,948
0004AB Riffle -instream habitat	7,316
Connectivity structure for bridge crossing/culverts	21,948
0004 Woody jam - Instream habitat	24,701
Biodegradable, non-plastic erosion control blankets	8,425
Coir Logs	15,457
Coir Fabric	16,199
ADAPTIVE MANAGEMENT PLAN	75,000
H1	579,013

Description	ProjectCost
Disable 30" RCP (excav, break in place, backfill)	9,228
0007 DRAIN TILE VALVES (Installation of backwater valves, Structures TYP "A" & "B")	41,423
MOWING	22,428
BROADCAST HERBICIDE	59,283
Seeding	256,515
Native Plugs (Commercial)	54,319
Native Tree Planting (5 Gal)	28,645
Native Shrub Planting (5 Gal)	4,036
Spot herbicide invasive species cost for 1 application (5 applications per acre for 5 year establishment activities during April-October of each year)	31,527
Perform prescribed burns	28,881
Coir Logs	7,728
ADAPTIVE MANAGEMENT PLAN	35,000
PHASE 2	4,188,363
0001 MOBILIZATION/DEMOBILIZATION	127,594
MOBILIZATION	63,797
0002 DEMOBILIZATION	63,797
0002 TEMPORARY CONSTRUCTION FACILITIES	214,579
Contractor Office Trailer	34,245
0014AB Site Erosion Control	28,866
Project and Safety Signs	4,471
Channel Erosion Control	80,905
USACE COR and QA Trailer	30,649
BMP	16,850
0003 MAINTENANCE OF TRAFFIC	63,857
0004 BOUNDARY SURVEY	379,674
R3	2,185,875
Clearing & grubbing for channel work	129,337
Removal of pipes/outfalls for daylighting	26,348
2 CHANNEL EXCAVATION (Creation of meandered channel geomorphology)	1,167,740
BENEFICIAL PLACEMENT / CHANNEL MATERIAL TO BACKFILL EXISTING CHANNEL	566,331

Description	ProjectCost
BENEFICIAL PLACEMENT / CHANNEL MATERIAL TO CREATE BERMS	12,726
BENEFICIAL PLACEMENT / DISPOSAL OF CHANNEL MATERIAL ON SITE	76,760
Sculpting fo meandered channel and floodplain	2,517
Grading banks for floodplain connectivity	771
Rock Structures at Ingress/Egress Points	21,948
0004AB Riffle -instream habitat	7,316
Connectivity structure for bridge crossing/culverts	21,948
0004 Woody jam - Instream habitat	37,052
Biodegradable, non-plastic erosion control blankets	8,425
Coir Logs	15,457
Coir Fabric	16,199
ADAPTIVE MANAGEMENT PLAN	75,000
H1	1,216,783
Disable 30" RCP (excav, break in place, backfill)	12,638
0007 DRAIN TILE VALVES (Installation of backwater valves, Structures TYP "A" & "B")	96,653
MOWING	20,961
BROADCAST HERBICIDE	130,423
Seeding	641,288
Native Plugs (Commercial)	144,851
Native Shrub Planting (5 Gal)	25,681
Spot herbicide invasive species cost for 1 application (5 applications per acre for 5 year establishment activities during April-October of each year)	63,053
Perform prescribed burns	38,507
Coir Logs	7,728
ADAPTIVE MANAGEMENT PLAN	35,000
14 Multiuse Facilities	1,044,526
MULTIUSE TRAIL Phase 1	411,453
Main River Phase 1 Agg Path	411,453
Placement of Channel Material for Base	159,879
Crushed Gravel	162,776
Plantings for Soil Stabilization	1,782

Description	ProjectCost
Open Box Culvert	87,016
MULTIUSE TRAIL Phase 2	633,073
Main River Phase 2 Agg Path	633,073
Placement of Channel Material for Base	351,776
Crushed Gravel	202,206
Plantings for Soil Stabilization	3,921
Open Box Culvert	67,731
12" Culvert	7,439

8.3 Total Project Cost Summary (TPCS)

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

PROJECT: South Branch Pike River Aquatic Ecosystem Restoration Section 206
PROJECT NO: P2 xxxxxx
LOCATION: Kenosha, WI

DISTRICT: Chicago District
POC: CHIEF, COST ENGINEERING, Rana S. Mishra
PREPARED: 12/10/2021

This Estimate reflects the scope and schedule in report; Integrated Feasibility Report and Environmental Assessment

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	Program Year (Budget EC): 2023 Effective Price Level Date: 1 OCT 22		TOTAL FIRST COST (\$K) K	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
										Spent Thru: 1-Oct-21 (\$K)						
06	FISH & WILDLIFE FACILITIES	\$6,587	\$1,923	29.2%	\$8,510	2.6%	\$6,760	\$1,974	\$8,734	\$0	\$8,734	6.4%	\$7,192	\$2,100	\$9,292	
14	MULTIUSE FACILITIES	\$1,044	\$305	29.2%	\$1,349	2.6%	\$1,071	\$313	\$1,384	\$0	\$1,384	6.4%	\$1,140	\$333	\$1,473	
	CONSTRUCTION ESTIMATE TOTALS:	\$7,631	\$2,228		\$9,859	2.6%	\$7,831	\$2,287	\$10,118	\$0	\$10,118	6.4%	\$8,332	\$2,433	\$10,764	
01	LANDS AND DAMAGES	\$1,920	\$185	9.6%	\$2,105	2.6%	\$1,970	\$190	\$2,160	\$0	\$2,160	0.0%	\$1,970	\$190	\$2,160	
30	PLANNING, ENGINEERING & DESIGN	\$917	\$136	14.8%	\$1,053	2.5%	\$940	\$139	\$1,079	\$850	\$1,929	3.3%	\$971	\$144	\$1,965	
31	CONSTRUCTION MANAGEMENT	\$610	\$76	12.5%	\$687	2.5%	\$626	\$78	\$704	\$0	\$704	6.4%	\$666	\$83	\$749	
	PROJECT COST TOTALS:	\$11,079	\$2,625	23.7%	\$13,704		\$11,368	\$2,694	\$14,062	\$850	\$14,912	5.2%	\$11,939	\$2,850	\$15,639	

- _____ CHIEF, COST ENGINEERING, Rana S. Mishra
- _____ PROJECT MANAGER,
- _____ CHIEF, REAL ESTATE, Michael B. Rohde
- _____ CHIEF, PLANNING, Susanne J. Davis
- _____ CHIEF, ENGINEERING, John A. Groboski
- _____ CHIEF, OPERATIONS, Timothy J. Kroll
- _____ CHIEF, CONSTRUCTION, Philip A. Stravrides
- _____ CHIEF, CONTRACTING
- _____ CHIEF, PM-PB, Felicia Kirksey-Harris
- _____ CHIEF, DPM, Felicia Kirksey-Harris

ESTIMATED TOTAL PROJECT COST:	\$15,639
ESTIMATED FEDERAL COST (INCLUDING FID):	63% \$9,321
ESTIMATED NON-FEDERAL COST:	37% \$5,468
22 - FEASIBILITY STUDY (CAP studies):	\$850
ESTIMATED FEDERAL COST:	56% \$475
ESTIMATED NON-FEDERAL COST:	44% \$375
ESTIMATED FEDERAL COST OF PROJECT	\$9,796

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

**** CONTRACT COST SUMMARY ****

PROJECT: South Branch Pike River Aquatic Ecosystem Restoration Section 206
 LOCATION: Kenosha, WI
 This Estimate reflects the scope and schedule in report; Integrated Feasibility Report and Environmental Assessment

DISTRICT: Chicago District
 POC: CHIEF, COST ENGINEERING, Rana S. Mishra
 PREPARED: 12/10/2021

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 1-Oct-21		Effective Price Level: 1-Oct-21		Program Year (Budget EC): 2023		Effective Price Level Date: 1 OCT 22						
WBS NUMBER	Civil Works Feature & Sub-Feature Description	RISK BASED			ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date	INFLATED (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)	
		COST (\$K)	CNTG (\$K)	CNTG (%)										TOTAL (\$K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
PHASE 1														
06	FISH & WILDLIFE FACILITIES	\$2,399	\$701	29.2%	\$3,100	2.6%	\$2,462	\$719	\$3,181	2025Q3	6.4%	\$2,619	\$765	\$3,384
14	MULTIUSE FACILITIES	\$411	\$120	29.2%	\$531	2.6%	\$422	\$123	\$545	2025Q3	6.4%	\$449	\$131	\$580
CONSTRUCTION ESTIMATE TOTALS:		\$2,810	\$821	29.2%	\$3,631		\$2,462	\$719	\$3,181			\$3,068	\$896	\$3,964
01	LANDS AND DAMAGES	\$1,920	\$185	9.6%	\$2,105	2.6%	\$1,970	\$190	\$2,160	2023Q1	0.0%	\$1,970	\$190	\$2,160
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	\$28	\$4	14.8%	\$32	2.5%	\$29	\$4	\$33	2024Q1	2.5%	\$30	\$4	\$34
0.5%	Planning & Environmental Compliance	\$14	\$2	14.8%	\$16	2.5%	\$14	\$2	\$17	2024Q1	2.5%	\$15	\$2	\$17
6.0%	Engineering & Design	\$169	\$25	14.8%	\$194	2.5%	\$173	\$26	\$199	2024Q1	2.5%	\$178	\$26	\$204
0.5%	Reviews, ATRs, IEPRs, VE	\$14	\$2	14.8%	\$16	2.5%	\$14	\$2	\$17	2024Q1	2.5%	\$15	\$2	\$17
0.3%	Life Cycle Updates (cost, schedule, risks)	\$7	\$1	14.8%	\$8	2.5%	\$7	\$1	\$8	2024Q1	2.5%	\$7	\$1	\$8
0.8%	Contracting & Reprographics	\$21	\$3	14.8%	\$24	2.5%	\$22	\$3	\$25	2024Q1	2.5%	\$22	\$3	\$25
1.0%	Engineering During Construction	\$28	\$4	14.8%	\$32	2.5%	\$29	\$4	\$33	2025Q3	6.4%	\$31	\$5	\$35
1.0%	Planning During Construction	\$28	\$4	14.8%	\$32	2.5%	\$29	\$4	\$33	2025Q3	6.4%	\$31	\$5	\$35
0.5%	Adaptive Management & Monitoring	\$14	\$2	14.8%	\$16	2.5%	\$14	\$2	\$17	2025Q3	6.4%	\$15	\$2	\$18
0.5%	Project Operations	\$14	\$2	14.8%	\$16	2.5%	\$14	\$2	\$17	2024Q1	2.5%	\$15	\$2	\$17
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	\$169	\$21	12.5%	\$190	2.5%	\$173	\$22	\$194	2025Q3	6.4%	\$184	\$23	\$207
1.0%	Project Operation:	\$28	\$4	12.5%	\$32	2.5%	\$29	\$4	\$32	2025Q3	6.4%	\$31	\$4	\$34
1.0%	Project Management	\$28	\$4	12.5%	\$32	2.5%	\$29	\$4	\$32	2025Q3	6.4%	\$31	\$4	\$34
CONTRACT COST TOTALS:		\$5,293	\$1,084		\$6,376		\$5,009	\$989	\$5,998			\$5,641	\$1,169	\$6,810

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

**** CONTRACT COST SUMMARY ****

PROJECT: South Branch Pike River Aquatic Ecosystem Restoration Section 206
 LOCATION: Kenosha, WI
 This Estimate reflects the scope and schedule in report; Integrated Feasibility Report and Environmental Assessment

DISTRICT: Chicago District
 POC: CHIEF, COST ENGINEERING, Rana S. Mishra
 PREPARED: 12/10/2021

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F	ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	Mid-Point Date P	INFLATED (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O
	PHASE 2													
06	FISH & WILDLIFE FACILITIES	\$4,188	\$1,223	29.2%	\$5,411	2.6%	\$4,298	\$1,255	\$5,553	2025Q3	6.4%	\$4,573	\$1,335	\$5,908
14	MULTIUSE FACILITIES	\$633	\$185	29.2%	\$818	2.6%	\$650	\$190	\$839	2025Q3	6.4%	\$691	\$202	\$893
	CONSTRUCTION ESTIMATE TOTALS:	\$4,821	\$1,408	29.2%	\$6,229		\$4,948	\$1,445	\$6,392			\$5,264	\$1,537	\$6,801
01	LANDS AND DAMAGES	\$0	\$0	0.0%	\$0	0.0%	\$0	\$0	\$0	0	0.0%	\$0	\$0	\$0
30	PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	\$48	\$7	14.8%	\$55	2.5%	\$49	\$7	\$57	2024Q1	2.5%	\$51	\$7	\$58
0.5%	Planning & Environmental Compliance	\$24	\$4	14.8%	\$28	2.5%	\$25	\$4	\$28	2024Q1	2.5%	\$25	\$4	\$29
6.0%	Engineering & Design	\$290	\$43	14.8%	\$333	2.5%	\$298	\$44	\$342	2024Q1	2.5%	\$305	\$45	\$350
0.5%	Reviews, ATRs, IEPRs, VE	\$24	\$4	14.8%	\$28	2.5%	\$25	\$4	\$28	2024Q1	2.5%	\$25	\$4	\$29
0.3%	Life Cycle Updates (cost, schedule, risks)	\$12	\$2	14.8%	\$14	2.5%	\$12	\$2	\$14	2024Q1	2.5%	\$13	\$2	\$15
0.8%	Contracting & Reprographics	\$36	\$5	14.8%	\$42	2.5%	\$37	\$5	\$43	2024Q1	2.5%	\$38	\$6	\$44
1.0%	Engineering During Construction	\$48	\$7	14.8%	\$55	2.5%	\$49	\$7	\$57	2025Q3	6.4%	\$53	\$8	\$60
1.0%	Planning During Construction	\$48	\$7	14.8%	\$55	2.5%	\$49	\$7	\$57	2025Q3	6.4%	\$53	\$8	\$60
0.5%	Adaptive Management & Monitoring	\$24	\$4	14.8%	\$28	2.5%	\$25	\$4	\$28	2025Q3	6.4%	\$26	\$4	\$30
0.5%	Project Operations	\$24	\$4	14.8%	\$28	2.5%	\$25	\$4	\$28	2024Q1	2.5%	\$25	\$4	\$29
31	CONSTRUCTION MANAGEMENT													
6.0%	Construction Management	\$289	\$36	12.5%	\$325	2.5%	\$296	\$37	\$334	2025Q3	6.4%	\$315	\$39	\$355
1.0%	Project Operation:	\$48	\$6	12.5%	\$54	2.5%	\$49	\$6	\$56	2025Q3	6.4%	\$53	\$7	\$59
1.0%	Project Management	\$48	\$6	12.5%	\$54	2.5%	\$49	\$6	\$56	2025Q3	6.4%	\$53	\$7	\$59
	CONTRACT COST TOTALS:	\$5,786	\$1,542		\$7,328		\$5,937	\$1,582	\$7,519			\$6,298	\$1,680	\$7,978