

Kootenai River Habitat Restoration Project Master Plan



Chapter 7 – Estimated Costs

Kootenai Tribe of Idaho
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7 Estimated Costs

Chapter 7 presents estimated costs associated with the Kootenai River Habitat Restoration Project. This chapter includes an overview of the Kootenai Tribe’s approach to developing cost estimates for this Master Plan, discussion of the cost categories used, identification of assumptions associated with each category and examples of costs by category, discussion of additional cost considerations, and estimated costs and cost considerations for implementation scenarios. Additional detailed supporting information for this chapter is presented in Appendix F.

7.1 Overview

Chapter 7 presents estimated costs associated with the conceptual habitat restoration approach defined in Chapter 1 and discussed in chapters 3, 4, and 5. The cost estimates contained in this chapter have been developed only to the conceptual level. Cost estimates will be further refined during the preliminary and final design phases when specific habitat restoration actions and priorities are identified.

Section 7.2 presents a summary of cost development methods for eight cost categories:

- Planning, coordination, data collection, and preliminary and final designs;
- Construction;
- As-built documentation and establishment of monitoring baselines;
- Post-construction effectiveness monitoring;
- Biological monitoring;
- Post-construction maintenance;
- Permitting and environmental compliance; and
- Land use management.

Section 7.2 also addresses land acquisition and leases, and costs applied to all cost categories. Section 7.3 describes additional cost considerations such as project sequencing, economy of scale, and cost escalation. Section 7.4 provides a summary of cost estimates for conceptual minimum, moderate and maximum implementation scenarios in the Braided Reaches, Straight Reach, and Meander Reaches.

7.2 Development of Cost Estimates

Since approaches to development of cost estimates can vary from project to project, this section describes the cost categories, approach to development of cost estimates, and assumptions and details associated with each cost category that were used in development of this Master Plan.

7.2.1 Approach to Development of Cost Estimates

The Tribe's approach to developing the cost estimates presented follows standard and accepted practices for a project of this type and size. The Tribe believes the level of certainty associated with the estimated costs presented in this chapter is appropriate to the conceptual phase of this project.

In general, development certainty around cost estimates depends on being able to break apart and define an organized scope of work to the smallest level of detail, and then to break down direct and indirect costs associated with each detail. Even in the early planning stages where work and deliverables may not be well defined, a formal and systematic approach can be followed to define work to the most accurate level possible. This is important to ensuring that general relationships between activities are well understood and critical activities are not overlooked, and thus left out of project cost estimates. The system of organizing a scope of work into components to which costs can be applied is called a "Work Breakdown Structure" (Haugan 2002; PMI 2004). This methodology is the basis for most standardized computer-based cost estimating programs and is the basis of cost development for the majority of cost categories and estimated costs described in this chapter.

To develop cost estimates for this project the Kootenai Tribe contracted with a major construction firm with extensive experience planning, estimating, and building projects of similar scope and scale. Representatives from this firm met in-person and by-phone with the Tribe's project planning and river design contractors on a number of occasions to review the proposed restoration treatments and implementation scenarios. They also visited the project area in order to view specific on-the-ground conditions, and develop a more thorough understanding of the proposed restoration treatments and implementation scenarios.

Based on this information, the construction firm provided estimated construction and construction related costs for the minimum, moderate and maximum implementation scenarios presented in Chapter 4 for each of the project reaches (i.e., Braided Reaches 1 and 2, Straight Reach, and Meander Reaches 1 and 2).

The conceptual costs for the minimum, moderate and maximum implementation scenarios for each project reach were then translated into unit costs (e.g., linear feet, cubic yards of cut, cubic yards of fill, acres, etc.) in order to provide a flexible and relatively accurate way to gage potential project costs by reach, scenario and treatment. This approach to development of unit costs based on actual construction estimates by reach and implementation scenario will help ensure that the initial identification of potential constraints, means and methods, estimates of economies of scale, and costs specific to the regional location of the project are considered (as opposed to applying gross unit figures from a similar project in a different locale and scaling up or down). The cost estimates presented in this chapter include direct and indirect costs for all cost categories.

As noted earlier in this document, the implementation scenarios presented in Chapter 4, and for which conceptual costs are presented in this chapter, represent illustrative examples of potential combinations of actions; they are not meant to be interpreted as wholesale recommendations. Specific actions and sequencing schedules will be developed in subsequent project phases and may contain different combinations of habitat treatments at different scales than those presented in Chapter 4. Likewise, the cost estimates that are presented in this chapter for

minimum, moderate and maximum implementation scenarios are provided for illustrative purposes only. However, in subsequent design phases the underlying unit costs used to develop the minimum, moderate and maximum implementation cost estimates for this Master Plan will provide the foundation to develop detailed specific cost estimates for the selected habitat actions.

7.2.2 Development of Costs by Category

This section describes the cost categories and provides a basis for costs developed in each category. The assumptions used in developing these cost estimates are presented along with the relative level of certainty associated with cost estimates for each category. In reviewing these estimated costs, it is important to understand that cost estimates can vary widely depending upon the cost category.

As noted previously, costs presented in this Master Plan are developed to the conceptual level. Costs are presented for each cost category for the Meander Reaches, Straight Reach and Braided Reaches implementation scenarios.

Costs estimates in all categories are presented in current (2009) dollars, which will provide a benchmark for future planning. As the project proceeds through preliminary and final design phases and as associated costs are refined, other cost considerations (Section 7.3) such as sequencing, economy of scale and inflation and escalation will also need to be considered.

As might be expected, the highest proportion of costs are associated with the construction cost category. The costs in other categories generally are based on the extent and scope of a specific implementation scenario. Because of the level of uncertainty associated with this conceptual planning stage, contingencies have been applied to each cost category. The contingencies vary depending on the specific cost category.

To help illustrate the basis for developing construction costs, Table 7-1 shows the moderate implementation scenario for Braided Reach 1 (from Chapter 4), including the associated restoration treatments, estimated units (e.g., linear feet, cubic yards of cut cubic yards of fill, acres), and number of given units for each treatment. An estimated lump sum cost for infrastructure mitigation was also included in the analysis for each reach.

Treatment	Treatment Name	Unit Description	No. Units
BR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	5,280
BR-A	Excavate and/or dredge the river to modify the channel geometry	Cu yds (cut)	527,063
BR-B	Construct floodplain surfaces	Acres	71
BR-B	Construct floodplain surfaces	Cu yds (fill)	527,063
BR-C	Construct and/or enhance wetlands	Acres	36
BR-D	Construct and/or enhance secondary channels	Ft	10,072
BR-E	Revegetate the floodplain	Acres	71
BR-F	Install bank structures (bank stabilization, bioengineering)	Ft	16,313
BR-G	Install in-stream structures (habitat, river training, grade control)	Units	10
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1

Table 7-2 presents a summary of estimated costs by category for the Braided Reach 1 at a moderate treatment level. Subsequent tables in this section include breakdowns of cost

estimates by cost category for the Braided Reach 1 example (i.e., labor, direct costs, travel, equipment, supplies). Construction estimates are presented for each treatment by unit cost (i.e., cubic yard, acre). Underlying details for all cost categories are presented in the estimating templates contained in Appendix F. In Section 7.4, tables for each project reach show cost estimates including labor, direct costs, vehicles, travel, equipment, and supplies, for all categories except construction. The actual estimated construction costs for each treatment along with associated costs are provided as separate tables for each implementation scenario.

Table 7-2. Braided Reach 1, cost estimate summary (all cost categories), moderate implementation scenario.		
Cost Estimation Category	Total Estimated Cost (2009 Dollars)	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$4,368,000	Cost from Table 7-3 and Appendix F-1
Construction	\$22,508,000	Cost from Table 7-4 and Appendix F-2
As-built documentation and establishment of monitoring baselines	\$222,000	Cost from Table 7-5 and Appendix F-3
Post-construction (effectiveness) monitoring	\$136,000	Cost from Table 7-6 and Appendix F-4
Biological monitoring	\$404,000	Cost from Table 7-7 and Appendix F-5
Post-construction maintenance	\$675,000	Cost from Table 7-8 and Appendix F-6
NEPA (Environmental Impact Statement)	\$657,600	Cost from Table 7-10 and Appendix F-7
Environmental compliance (permits)	\$151,000	Cost from Table 7-9 and Appendix F-7
Management of land use practices	\$301,000	Cost from Table 7-11 and Appendix F-8

7.2.2.1 Planning, Coordination, Data Collection, Preliminary and Final Design

The cost category titled “planning, coordination, data collection and preliminary and final design”, presents costs associated with all activities that will occur during the interim, preliminary and final design phases. Cost included in this category include planning, coordination, data collection (as necessary to further refine designs and confirm feasibility), preliminary design and final design, and development of funding strategies. Contingencies are based on the level of certainty associated with each cost estimate and are applied to all costs.

Planning, Coordination, Data Collection, and Preliminary and Final Design Estimated Cost Assumptions

- Estimates are based on labor and direct costs generally associated with the scope of each implementation scenario.
- For this category, costs were estimated for a moderate scenario for representative reaches, then escalated or reduced based on the scope of each implementation scenario.
- Data collection and analysis, conceptual engineering, planning, and coordination conducted to date for this Master Plan are not included in these costs.
- Estimates for coordination, planning, sampling and data collection at the preliminary and final design stages are included. Estimates take into consideration the coordination with multidisciplinary technical teams and use technical reviewers at specific project milestones.

- The time frame used to develop estimates is fall 2009 through fall 2010 for preliminary planning and design phase activities and fall 2010 through summer 2011 for final planning and design activities.¹
- Labor costs include resources for design, planning, coordination, related data collection and other fieldwork, incorporation of additional technical resources for the preliminary and final design phases, and project management.
- Estimated costs were cross-checked in three ways: 1) estimated hours and direct costs of specific tasks, 2) estimated resources for the specific time periods (annual), and 3) comparison of costs to the scope of the implementation scenario to which the costs apply.
- Estimated costs are based on 2009 dollars and will need to be escalated to the actual year in which they are incurred.
- A contingency of 20% has been applied.
- Assumed escalation for the planning and design cost category is 3% annually (see Section 7.3.3).

Table 7-3 provides an example of estimated costs associated with planning, coordination, data collection, preliminary and final design costs for Braided Reach 1 based on the moderate implementation scenario. Additional detailed information for Braided Reach 1 cost estimates is presented in Appendix F-1.

Table 7-3. Braided Reach 1, estimated planning, coordination, data collection, preliminary and final design costs, moderate implementation scenario.	
Description	Total Estimated Cost (2009 Dollars)
Staff (payroll, fringe, indirect) and subcontractors	\$3,301,000
Vehicles (fuel, insurance, lease, maintenance)	\$12,000
Equipment, boats (fuel, maintenance, repair)	\$20,000
Equipment, rent, lease	\$14,000
Supplies (office, field, lab, other)	\$44,000
Telephone, utilities	\$6,000
Travel (mileage, lodging, per diem, auto rental, airfare)	\$233,000
Insurance, other dues	\$10,000
Subtotal	\$3,640,000
Contingency (20%)	\$728,000
Total	\$4,368,000

7.2.2.2 Construction

Construction cost estimates for the minimum, moderate and maximum implementation scenarios were developed using standard construction cost estimating methods as mentioned in Section 7.1. Detailed conceptual construction estimates were developed for each reach and then

¹ This time frame is subject to change pending the Kootenai Tribe's identification of specific project milestones and target dates.

consolidated and summarized as units (e.g., linear feet, acres, etc.) for each implementation scenario. The costs of all construction activities and related general conditions and overhead for each treatment were combined to produce an estimated unit cost for each treatment in each reach. As previously noted, the construction estimators provided actual bid estimates for minimum, moderate, and maximum implementation scenarios for Braided Reaches 1 and 2, Straight Reach, and Meander Reaches 1 and 2, as defined in Chapter 4.

In addition to estimating costs for restoration treatments directly related to restoration activities, an estimated cost associated with mitigating for infrastructure impacts is presented as a line item in the construction category for each implementation scenario. There is a variety of existing infrastructure in the project area including water intakes, diversions, and discharge points; utilities (power transmission lines and natural gas lines); river gages; levees and diking; bridges; and roads (see Chapter 2 for more discussion about infrastructure). All of these infrastructure components will need to be considered during the preliminary and final design and implementation phases. While efforts will be made to avoid affecting existing infrastructure, it is possible that structures might need to be relocated, re-oriented, and/or acquired before restoration work can proceed.

Estimated Construction Cost Assumptions

- Cost estimates are based on quantities and areas provided in Chapter 4.
- All potential direct and indirect costs were considered.
- Lump sum unit costs were provided by subcontractors for several treatments including revegetation of wetlands and floodplains.
- Cost estimates were developed by breaking down and defining work based on descriptions of restoration treatments provided in Chapter 3.
- Costs estimates include all standard mark-ups, insurance, bonding, and other related costs which, would be incurred by project contractors.
- Costs are based on estimated work defined for an individual restoration treatment; however, it should be noted that all efficiencies that might be gained through combining activities among treatments could not be fully considered at this stage.
- Construction of restoration actions involving cut and fill work will be structured so that materials cut from one location will be used as fill in other locations to avoid potentially prohibitive costs of importing and exporting material.
- Estimates are based on current April 2009 costs.
- Costs estimates include a contingency built in by cost area (labor, overhead, materials, equipment, subcontractors, etc.)

Assumed escalation, for future planning, is 4% annually (see Section 7.3.3). Table 7-4 shows an example of the treatments, units, and cost estimates for a moderate treatment of Braided Reach 1. Additional, more detailed cost information for Braided Reach 1 is presented in Appendix F-2.

Table 7-4. Braided Reach 1, units and estimated construction costs, moderate implementation scenario.					
Treatment	Treatment Explanation	Unit Description	No. Units (Moderate)	Est. Cost / Unit	Estimated Total Cost (2009 Dollars)
BR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	5,280	N/A	N/A
		Cu yds (cut)	527,063	\$13	\$6,614,641
BR-B	Construct floodplain surfaces	Acres	71	N/A	N/A
		Cu yds (fill)	527,063	\$10	\$5,223,194
BR-C	Construct and/or enhance wetlands	Acres	36	\$39,952	\$1,438,282
BR-D	Construct and/or enhance secondary channels	Ft	10,072	\$63	\$637,558
BR-E	Revegetate the floodplain	Acres	71	\$39,952	\$2,836,611
BR-F	Install bank structures (bank stabilization, bioengineering)	Ft	16,313	\$267	\$4,350,188
BR-G	Install in-stream structures (habitat, river training, grade control)	Units	10	\$119,413	\$1,194,128
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$213,802	\$213,802

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

7.2.2.3 As-Built Documentation and Establishment of Monitoring Baselines

As-built surveys are intended to document the changes made as a result of implementing a specific restoration design. These surveys will be conducted following completion of each project sequence, and permanent monitoring stations will be established at that time. Data collected for as-built surveys will include aerial and ground photography, GPS surveys, and channel substrate and profile information. This category is assumed to be a one-time occurrence for each implementation scenario.

As-built Cost Estimate Assumptions

- Costs are based on labor and direct costs associated with each implementation scenario.
- As-built documentation is a one-time cost per implementation scenario.
- For this category, costs were estimated for a moderate scenario for representative reaches, then escalated or reduced based on the scope of each implementation scenario.
- Labor and expenses were estimated based on required expertise and activities described in Section 5.3.2.
- It is assumed that these costs would apply to each phase of construction for a specific reach.
- Estimated costs are based on 2009 dollars and will need to be escalated to the actual year in which construction is completed.
- The assumed escalation for this cost category is 3% annually (see Section 7.3.3).
- A contingency of 30% has been applied.

Table 7-5 shows a breakdown of the cost estimates by area for Braided Reach 1, moderate implementation scenario example. Additional, more detailed information for Braided Reach 1 is presented in Appendix F-3.

Table 7-5. Braided Reach 1, estimated as-built documentation and establishment of monitoring baselines costs, moderate implementation scenario.	
Description	Total Estimated Cost (2009 Dollars)
Staff (payroll, fringe, indirect) and subcontractors	\$120,000
Vehicles (fuel, insurance, lease, maintenance)	\$3,000
Equipment, boats (fuel, maintenance, repair)	\$2,000
Equipment, rent, lease	\$4,000
Supplies (office, field, lab, other)	\$16,000
Telephone, utilities	\$3,000
Travel (mileage, lodging, per diem, car rental, airfare)	\$19,000
Insurance, other dues	\$3,000
Subtotal	\$171,000
Contingency (30%)	\$51,000
Total	\$222,000

7.2.2.4 Post-Construction Effectiveness Monitoring

Monitoring will occur before and after construction takes place. Before construction, data will be collected to support design work and to establish a baseline for post-construction monitoring. After construction, monitoring will be focused on the effectiveness of restoration treatments.

Post-construction, or effectiveness, monitoring, as described in Chapter 5, will be linked to adaptive management and will measure progress toward achieving project goals and objectives (Section 5.3.3). Post-construction effectiveness monitoring will encompass many disciplines including hydrology, engineering, and biology and ecology. The disciplines involved in monitoring are the same disciplines that are involved in project planning and design. The results of post-construction effectiveness monitoring will be used to determine if changes are needed in the existing (already implemented) or planned (sequenced for later implementation) restoration actions. Post-construction effectiveness monitoring will also be used to determine project maintenance needs.

The level of effort associated with post-construction monitoring activities will vary according to the particular monitoring method used and the metric being monitored. Table 5-3 presents monitoring metrics with associated timing and scheduled frequency. Some parameters will be measured annually and some will be measured at an interval of several years.

Post-construction Effectiveness Monitoring Cost Estimate Assumptions

- Cost estimates are based on labor and direct costs specific to the scope of each implementation scenario.
- For this category, costs were estimated for a moderate scenario for representative reaches, then escalated or reduced based on the scope of each implementation scenario.

- Labor costs include specific resources and expertise (described in Table 5-3) to address the example effort.
- Estimated costs were cross-checked in three ways: 1) estimated hours and direct costs of specific tasks, 2) estimated resources for the specific time periods, and 3) comparison of costs to the scope of the implementation scenario to which the costs apply.
- It is assumed that the costs would include one monitoring cycle prior to implementation, followed by annual expenses after implementation; frequency would be as defined in Table 5-3.
- Estimated costs are based on 2009 dollars and will need to be escalated to the actual year completed.
- A contingency of 30% has been applied.
- Assumed escalation for this category is 3% annually (see Section 7.3.3).

Table 7-6 shows the costs associated with post-construction effectiveness monitoring for the moderate Braided Reach 1 implementation scenario example. Additional, more detailed cost information is presented in Appendix F-4.

Table 7-6. Braided Reach 1, estimated post-construction effectiveness monitoring costs, moderate implementation scenario.	
Description	Total Estimated Cost (2009 Dollars)
Staff (payroll, fringe, indirect) and subcontractors	\$73,000
Vehicles (fuel, insurance, lease, maintenance)	\$2,000
Equipment, boats (fuel, maintenance, repair)	\$3,000
Equipment, rent, lease	\$3,000
Supplies (office, field, lab, other)	\$8,000
Telephone, utilities	\$2,000
Travel (mileage, lodging, per diem, car rental, airfare)	\$12,000
Insurance, other dues	\$2,000
Subtotal	\$105,000
Contingency (30%)	\$31,000
Total	\$136,000

7.2.2.5 Biological Monitoring

Much of the biological monitoring efforts that will help determine the biological effectiveness of this program and will inform the adaptive management program, is being conducted through programs other than the Kootenai River Habitat Restoration Project (Section 5.5). Rather than duplicating these monitoring efforts as part of this project, the Kootenai Tribe plans to integrate biological monitoring data and other information gathered by the agencies and organizations through other processes, with information gathered as part of the pre- and post-construction monitoring proposed under this project, under the auspices of the project's Adaptive Management and Monitoring program.

Cost estimates provided for the biological monitoring category include data and information management, coordination among entities involved in monitoring, and incorporation of biological data into the Adaptive Management and Monitoring program. The Tribe assumes that additional Kootenai Tribe staff will be necessary to accomplish these functions. Costs associated with this category will also include coordination of an interdisciplinary adaptive management and monitoring team, and a Kootenai Tribe full-time program manager and assistant program manager.

Biological Monitoring Cost Estimate Assumptions

- Cost estimates are based on labor and direct costs associated with specific scopes for each implementation scenario.
- For this category, costs were estimated for a moderate scenario for the representative reaches, then escalated or reduced based on the scope of each implementation scenario.
- Labor costs include specific resources and expertise (described in Table 5-3) to address the example efforts.
- Estimated costs were cross-checked in three ways: 1) estimated hours and direct costs of specific tasks, 2) estimated resources for the specific time period (annual), and 3) comparison of costs to the scope of the implementation scenario to which the costs apply.
- The Tribe assumes that the costs would be incurred annually.
- Estimated costs are based on 2009 dollars and will need to be escalated for the actual year in which they are incurred.
- A contingency of 30% has been applied.
- Assumed escalation for this category is 3% annually (see Section 7.3.3).

Table 7-7 shows a breakdown of cost estimates by area for the moderately treated Braided Reach 1 example. Appendix F-5 presents more detailed cost information for the Braided Reach 1 example.

Table 7-7. Braided Reach 1, estimated biological monitoring costs, moderate implementation scenario.	
Description	Total Estimated Cost (2009 Dollars)
Staff (payroll, fringe, indirect) and subcontractors	\$285,000
Vehicles (fuel, insurance, lease, maintenance)	\$4,000
Equipment, boats (fuel, maintenance, repair)	\$2,000
Equipment, rent, lease	\$10,000
Supplies (office, field, lab, other)	\$4,000
Telephone, utilities	\$3,000
Travel (mileage, lodging, per diem, auto rental, airfare)	\$3,000
Insurance, other dues	\$1,000
Subtotal	\$311,000
Contingency (30%)	\$93,000
Total	\$404,000

7.2.2.6 Post-Construction Project Maintenance

Post-construction project maintenance involves a variety of activities including watering and maintenance of newly planted areas, replanting areas in subsequent years where the initial planting has not thrived, adjusting river training structures, and controlling weeds in planted areas. Costs for activities in this category were based on a percentage of the estimated cost and the general scope of construction for each implementation scenario. The duration and intervals of the costs will be consistent with chapters 4 and 5.

Post-construction Maintenance Estimated Cost Assumptions

- Costs are estimated based on varying percentages of construction costs for each implementation scenario. The percentage applied is based on the scope of the scenario and the activities described in Section 5.3.3.2, and generally ranges from 3% to 5% depending on the implementation scenario.
- Frequency will be based on the schedule provided in Table 5-3.
- The lump sum estimated cost presented is a one-time cost that may be allocated over several years according to the frequencies shown in Table 5-3.
- Estimated costs are based on 2009 dollars and will need to be escalated for the actual year in which they are incurred.
- Assumed escalation for this area is 4% annually (see Section 7.3.3).

Table 7-8 presents the costs associated with post-construction maintenance for the moderately treated Braided Reach 1 example. Additional, more detailed information for the Braided Reach 1 example is presented in Appendix F-6.

Table 7-8. Braided Reach 1, estimated post-construction maintenance costs, moderate implementation scenario.			
Estimated Total Construction Cost	Estimated Percentage of Total Construction Cost	Estimated Post-Construction Maintenance Cost (2009 Dollars)	Comments
\$22,508,000	3%	\$675,000	Total estimated cost allocated between multiple years

7.2.2.7 Permitting and Environmental Compliance

Chapter 6 discusses environmental compliance and permits requirements for the Kootenai River Habitat Restoration Project and provides a list of potential permits and authorizations in Table 6-1. Of these, the most significant review process will occur under the National Environmental Policy Act (NEPA). The environmental effects of the restoration project will be assessed in an environmental impact statement (Section 6.1) prepared under NEPA guidelines. Because the Tribe expects to implement the project in distinct phases, more than one EIS will likely be

required.² Similarly, environmental and construction permits will be sought in phases that parallel the NEPA evaluations. Permitting costs identified in Table 7-9 reflect the potential level of effort associated with implementing the “moderate” array of treatments in Braided Reach 1. NEPA costs presented in Table 7-10 identify the possible level of effort to prepare an EIS for measures proposed in Braided Reach 1.

Environmental compliance costs primarily involve labor, site visits, meetings with agencies and the project sponsors, and document production. For the purposes of this Master Plan, costs are estimated by permit requirement for a moderate implementation scenario for Braided Reach 1 and then are increased or decreased based on the scope of the implementation scenarios to which they are applied (see Tables 7-13, 7-15, 7-17, 7-19 and 7-21).

Cost Estimate Assumptions Associated with Environmental Compliance (Permits)

- For this category, costs are estimated based on each specific permit requirement identified in Table 6-1 for the Braided Reach 1 moderate implementation scenario. The costs are then reduced or increased and applied to the other reaches according to the scope of the implementation scenarios.
- Estimated costs are based on labor and direct costs associated with each permit requirement.
- Permitting for an implementation scenario is treated as a one-time cost.
- Estimated costs are based on 2009 dollars and will need to be escalated to the actual year in which they are incurred.
- A contingency of 30% is applied.
- Assumed escalation for this category is 3% annually.

Table 7-9. Braided Reach 1, estimated environmental compliance (permits) costs, moderate implementation scenario.

Project Area/ Permit	Total Estimated Cost (2009 dollars)
Water Supply	
NPDES General Construction Stormwater (EPA)	\$10,000
Storm Water Pollution Prevention Plan (SWPPP)	\$30,000
Water Quality Certification for Channel Modifications (DEQ)	\$8,000
Instream Work	
USACE Section 404/10	\$30,000
Instream Alteration Permit (Idaho Dept. of Water Resources)	\$5,000
Navigational Encroachment Permit (Idaho Dept. of Lands)	\$6,000
Planning Approvals	
Fugitive Dust Control (Idaho Dept. of Environmental Quality)	\$6,000
Boundary County Dept of Land Conservation and Development – Floodway Development Permit	\$5,000

² Depending scope and impact of specific habitat actions implemented in different phases, it may be appropriate in some cases to prepare a less complex Environmental Assessment to document the effects under NEPA.

Table 7-9. Braided Reach 1, estimated environmental compliance (permits) costs, moderate implementation scenario.

Project Area/ Permit	Total Estimated Cost (2009 dollars)
Boundary County Site Development Permit	\$8,000
NEPA Record of Decision	Cost included in Table 7-10
USFWS Concurrence or Biological Opinion	Cost included in Table 7-10
Section 106 Clearance	Cost included in Table 7-10
Construction	
Boundary County Road and Bridge Permits	\$9,000
Subtotal	\$117,000
Contingency (30%)	\$35,000
Total	\$151,000

Table 7-10 provides an estimate for a one-time cost range for NEPA documentation. More detailed cost information for the Braided Reach 1 example is found in Appendix F-7.

Environmental Impact Statement (NEPA) Cost Estimate Assumptions

- Costs for an EIS (NEPA) were estimated based on coordination, management, and resource areas required to accomplish the general scope of work for a project of this magnitude.
- Estimated costs for NEPA requirements are presented as an estimate for one EIS (note that an EIS likely will be required for each phase of implementation).
- Labor costs included specific resources and expertise for all resource areas needed for NEPA on a project of this scope.
- Estimated costs were cross-checked in three ways: 1) estimated hours and direct costs of specific tasks, 2) estimated resources for the specific time period (annual), and 3) comparison of costs to the overall scope of the project.
- Estimated costs are based on 2009 dollars and will need to be escalated for the actual year in which they are incurred.
- Cost estimates should be viewed as mid-range estimates; actual costs could be higher.
- A contingency of 30% is applied.
- Assumed escalation for this item is 3% annually (see Section 7.3.3).

Table 7-10. Braided Reach 1, estimated environmental compliance costs for (NEPA EIS), moderate implementation scenario.

Task	Total Estimated Labor Costs	Total Estimated Direct Expenses	Total Estimated Costs (2009 Dollars)
Project management, coordination	\$41,000	\$2,000	\$43,000
Public scoping and comments, coordination, preparation of DEIS and FEIS	\$124,000	\$4,000	\$128,000
Geology and soils	\$29,000	\$600	\$29,600
Water resources (quality, hydrology, water rights, climate)	\$35,000	\$0	\$35,000

Table 7-10. Braided Reach 1, estimated environmental compliance costs for (NEPA EIS), moderate implementation scenario.			
Task	Total Estimated Labor Costs	Total Estimated Direct Expenses	Total Estimated Costs (2009 Dollars)
Biological resources (fish, plants, wildlife, threatened and endangered species)	\$91,000	\$7,000	\$98,000
Cultural	\$34,000	\$200	\$34,200
Air, noise, health and public safety	\$20,000	\$0	\$20,000
Visuals	\$26,000	\$900	\$26,900
Land use, transportation and recreation	\$31,000	\$800	\$31,800
Socioeconomics	\$16,000	\$100	\$16,100
Cumulative effects	\$43,000	\$0	\$43,000
		Subtotal	\$505,600
		Contingency (30%)	\$152,000
		Total	\$657,600

7.2.2.8 Land Use Management

Restoration activities will affect and will be affected by land use practices adjacent to the Kootenai River. The Tribe anticipates that funds will be needed for coordination with landowners and for community outreach. Labor and expenses are the costs associated with this category are expected to include one full-time staff member and part-time assistant to facilitate on-the-ground communications with area landowners to support project design and implementation. Meeting coordination and facilitation associated with formal community outreach will also require services of part-time administrator and part-time assistant to help the Kootenai Tribe’s Fish and Wildlife Department Director.

It is possible that the proposed project may need to acquire structures and/or pay reparation to land owners for impacts to their structures (Section 7.2.2.9). There may also be costs associated with mitigation for infrastructure (e.g., relocation). These cost estimates are captured in the construction costs (Section 7.2.2.2).

Land Use Management Cost Estimate Assumptions

- Estimates are based on labor and direct costs specific to the scope of each implementation scenario.
- For this category, costs were estimated for a moderate scenario for a representative reach, then escalated or reduced based on the scope of each implementation scenario.
- Estimated costs were cross-checked in three ways: 1) estimated hours and direct costs of specific tasks, 2) estimated resources for the specific time period (annual), and 3) comparison of costs to the scope of the implementation scenario to which the costs apply.
- Costs in this category will not increase or decrease as dramatically as other cost categories solely based on the scope of implementation scenarios i.e., the costs are expected to remain approximately the same whether a minimum, moderate, or maximum scenario is implemented.

- It is assumed that costs in this category would be ongoing annual expenses.
- Costs are based on 2009 dollars and will need to be escalated for the actual year in which they are incurred.
- A contingency of 30% has been applied.
- The assumed escalation for this category is 3% annually (see Section 7.3.3).

Table 7-11 shows a breakdown of cost estimates by area for management of land use practices. More information about costs associated with the Braided Reach 1 moderate example may be found in Appendix F-8.

Table 7-11. Braided Reach 1, estimated management of land use practices costs, moderate implementation scenario.	
Description	Total Estimated Cost (2009 Dollars)
Staff (payroll, fringe, indirect) and subcontractors	\$206,000
Vehicles (fuel, insurance, lease, maintenance)	\$6,000
Equipment, boats (fuel, maintenance, repair)	\$0
Equipment, rent, lease	\$10,000
Supplies (office, field, lab, other)	\$2,000
Telephone, utilities	\$4,000
Travel (mileage, lodging, per diem, auto rental, airfare)	\$3,000
Insurance, other dues	\$1,000
Subtotal	\$232,000
Contingency (30%)	\$69,000
Total	\$301,000

7.2.2.9 Land Acquisition, Leases, and Agreements

It is possible that certain parcels of land may need to be managed and/or acquired through use agreements, leases, or acquisition during the course of the proposed project. At this point, the need for and extent of land acquisition, leases, and other agreements is unknown. Costs for acquisition, if needed, will be estimated during the next project design phase(s). The Tribe expects that during the preliminary design phase, specific implementation scenarios and associated restoration actions will be defined and prioritized. This will allow parcels of land likely to be affected by the future proposed projects to be identified.

A placeholder for costs would be difficult to define at this time. At the conceptual level, it is sufficient to recognize that costs associated with land acquisition, leases, and/or agreements will be included as implementation costs and refined during preliminary design. This is currently identified as a cost category with no cost estimates applied.

7.2.2.10 Costs Applied to All

Costs that would potentially be applied to all of the project reaches include those associated with management of Libby Dam flow and management of backwater from Kootenay Lake.

Libby Dam Flow

As noted in Chapter 2 operation of Libby Dam affects all reaches of the Kootenai River Habitat Restoration Project. Libby Dam operations are dictated by a combination of power production, flood control, fish and recreation objectives. Operations of Libby Dam are also impacted by requirements identified in the Biological Opinion Regarding the Effects of Libby Dam Operations on the Kootenai River White Sturgeon, Bull Trout, and Kootenai Sturgeon Critical Habitat (USFWS 2006, clarified in 2008) and the Biological Opinion on Federal Columbia River Power System Operations.

Changes to Libby Dam flow (e.g., installation of a new turbine) would involve a number of significant management issues and potential associated costs. No estimated costs have been included in this Master Plan for modifications to Libby Dam flows since: 1) potential actions related to Libby Dam flows would be identified in the preliminary design phase in relation to other implementation scenarios, and 2) the USACE will be responsible for identifying costs and funding associated with Libby Dam.

Kootenay Lake Backwater

It is not possible to estimate costs associated with potential changes to management of Kootenay Lake at this stage of planning. Potential operational actions to modify Kootenay Lake backwater effects will be explored during preliminary design phase. Pending the outcome of that effort, cost estimates based on specific management actions may be developed as part of the preliminary and final design phases.

7.3 Other Cost Considerations

Project sequencing, economy of scale, and cost escalation/inflation are considerations that affect costs in a broad manner across all cost categories. These considerations have been included in the cost estimates presented in Section 7.4 and are summarized in this section.

7.3.1 Project Sequencing

The Kootenai River Habitat Restoration Project will likely be implemented over a number of construction seasons (Section 4.3). Sequencing will be extremely important in managing costs. In some cases, significant savings can be realized by conducting a project in phases. In other cases, cost savings may be realized by minimizing numerous mobilizations of equipment, materials, and manpower (Section 7.3.2). As design and implementation strategies are refined it will be possible to determine which approach is likely be most cost efficient in accomplishing the varying scopes of work.

Implementation sequencing will also be affected by ecological factors. For example, in-stream work may not be possible at certain times of the year due to water conditions or presence of sensitive life stages of ESA listed fish species. In these cases, sequencing the project on a strict cost basis alone will not be possible. Accommodating ecological concerns could lead to higher costs in some circumstances because mobilization or construction may not be able to be accomplished in the most cost-efficient way. In the early stages of planning, numerous sequencing options that consider all potential treatments for each reach will be explored. Significant efficiencies could be realized for a project of this size with well-thought out, creative planning and implementation.

7.3.2 Economy of Scale

Economy of scale is an important aspect to consider when determining potential efficiencies and costs for a particular project. The considerations are similar in some aspects to those mentioned above for project sequencing. The main issue is whether cost savings will be realized if a larger scope of work is accomplished during one mobilization. This usually relates to fixed costs that would occur even if the amount or duration of work is increased.

For example, grading and placement of 50,000 yards of stabilization materials will require mobilization of equipment and manpower and use of fuels and other expendable supplies. Costs associated with mobilization would include labor, equipment rental, supplies, transportation, etc. The fixed cost of this mobilization would likely be the same if 75,000 yards of material were graded and placed with one mobilization. The fixed costs would be incurred each time the activity is mobilized. Therefore, it would be most economical to mobilize once and complete a larger scope of work than to start, stop, and start again.

7.3.3 Inflation and Cost Escalation

Cost escalation, in cost engineering, is defined as “changes in the cost or price of specific goods or services in a given economy over a period of time” (Hollman and Dysert 2007). Escalation is specific to an item or class of items, is not always driven by changes in the money supply, and tends to be less sustained than inflation. It is also driven by changes in technology, practices, and particularly by supply-demand imbalances specific to goods or services (NPPC 2007). For example, while general inflation in the United States was less than 5% during the 2003-2007 time period, steel prices increased (escalated) by over 50% because of supply-demand imbalance.

Inflation and cost escalation will affect costs in all categories over the life of the proposed project. However, escalation mostly applies to construction costs. In development of cost estimates, inflation and price indices are considered to reflect “real time” costs when work might actually occur. Application of these indices can result in more accurate cost estimates.

Currently, the construction industry is experiencing a downturn, However, it is uncertain how various government programs and other market forces may affect costs over the life of the proposed project. Construction costs can fluctuate significantly from year to year as shown on the ENR Construction Cost Index (<http://enr.com>), which has recorded construction costs since 1913. Since 1978, changes in annual national averages for construction costs have ranged from +11.6% in 1978 to -0.5% in 2001. The fluctuation range of average construction costs from 1997 through 2008 has been between -0.5% and +9.1%.

Though various portions of construction expenses might be escalated at different rates e.g., labor at 4%, materials at 3%, etc., for purposes of this Master Plan, construction cost estimates and post-construction maintenance cost categories have been escalated at 4.0%. Cost estimates for other cost categories were escalated at 3% annually. These estimates may be high or low in any given year depending on the state of the economy, but at this time, they are considered to be reasonable estimates. Escalation will need to be considered as planning proceeds to the preliminary and final design phases and costs are being projected into future years. For example, delaying implementation of a \$10,000,000 project for one year could potentially add \$400,000 to the cost of the project due to an escalation of 4%.

7.4 Estimated Costs and Cost Considerations for Implementation Scenarios

Section 7.4 presents the conceptual costs for the Braided Reaches 1 and 2, Straight Reach, and Meander Reaches 1 and 2, for the implementation scenarios presented in Chapter 4. Minimum, moderate, and maximum costs, based on level of treatment, are shown for each scenario.

7.4.1 Costs Associated with Implementation Scenarios in the Braided Reaches

Estimated construction costs including unit costs and total cost by treatment, as well as a summary of potential costs for all categories for each implementation scenario described in Chapter 4, for each reach, are presented. It should be noted that the unit costs for construction are “loaded costs” i.e., they include all standard mark-ups, insurance, bonding and other related costs that a construction contractor would incur on a project such as this. It should be noted that for all reaches, as the scope of construction increases, fixed costs (described in Section 7.3.2) may remain the same so a cost of a specific line item can actually drop (i.e., costs associated with infrastructure) from a minimum to a maximum implementation scenario. Assumptions outlined in Section 7.2.2.2 apply to these cost estimates. Cost estimation details for all cost categories are provided in Appendix F.

7.4.1.1 Braided Reach 1

Within Braided Reach 1, construction costs are different among the minimum, moderate and maximum implementation scenarios; these differences correspond to the extent of channel reconstruction and the length of bank that would be treated. In areas where the channel is being reconstructed, a new floodplain surface would also be constructed and instream structures would be installed, so costs increase proportionately for each implementation scenario for each of these restoration treatments. Bank treatments are tied to BEHI ratings, so they are independent of the channel work, but the extent of bank treatments and associated costs also increase from minimum to moderate and maximum implementation scenarios.

Braided Reach 1 implementation scenario criteria that form the basis for costs are explained in Chapter 4. Table 7-12 shows estimated construction costs for Braided Reach 1 for examples of the minimum, moderate and maximum implementation scenarios. Table 7-13 provides other cost categories for each implementation scenario in Braided Reach 1.

Table 7-12. Braided Reach 1, summary of estimated construction costs for all implementation scenarios.

Treatment	Treatment Name	Unit Description	Minimum		Moderate		Maximum	
			No. Units	Total Estimated Cost	No. Units	Total Estimated Cost	No. Units	Total Estimated Cost
BR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	0	N/A	5,280	N/A	20,630	N/A
		Cu yds (cut)	0	\$0	527,063	\$6,615,000	1,723,682	\$16,530,000
BR-B	Construct floodplain surfaces	Acres	0	N/A	71	N/A	115	N/A
		Cu yds (fill)	0	\$0	527,063	\$5,223,000	1,723,682	\$16,582,000
BR-C	Construct and/or enhance wetlands	Acres	0	\$0	36	\$1,438,000	55	\$2,160,000
BR-D	Construct and/or enhance secondary channels	Ft	0	\$0	10,072	\$638,000	13,135	\$817,000
BR-E	Revegetate the floodplain	Acres	0	\$0	71	\$2,837,000	115	\$4,517,000
BR-F	Install bank structures (bank stabilization, bioengineering)	Ft	7,138	\$2,014,000	16,313	\$4,350,000	41,835	\$10,967,000
BR-G	Install in-stream structures (habitat, river training, grade control)	Units	0	\$0	10	\$1,194,000	35	\$4,109,000
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$226,000	1	\$214,000	1	\$210,000

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

Table 7-13. Braided Reach 1, estimated costs for all Implementation scenarios (all cost categories).				
Cost Estimation Category	Minimum Estimated Costs	Moderate Estimated Costs	Maximum Estimated Costs	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$524,000	\$4,368,000	\$4,368,000	Cost from Table 7-3 and Appendix F-1
Construction	\$2,240,000	\$22,508,000	\$55,892,000	Cost from Table 7-4 and Appendix F-2
As-built documentation and establishment of monitoring baselines	\$56,000	\$222,000	\$444,000	Cost from Table 7-5 and Appendix F-3
Post-construction (effectiveness) monitoring	\$136,000	\$136,000	\$341,000	Cost from Table 7-6 and Appendix F-4
Biological monitoring	\$202,000	\$404,000	\$404,000	Cost from Table 7-7 and Appendix F-5
Post-construction maintenance	\$112,000	\$675,000	\$1,677,000	Cost from Table 7-8 and Appendix F-6
NEPA (Environmental Impact Statement)		\$657,600		Cost from Table 7-10 and Appendix F-7
Environmental compliance (permits)	\$26,000	\$151,000	\$303,000	Cost from Table 7-9 and Appendix F-7
Management of land use practices	\$151,000	\$301,000	\$301,000	Cost from Table 7-11 and Appendix F-8

Notes and Assumptions:

- Because the project is expected to be implemented in distinct phases, more than one EIS may be required. An estimated cost for an EIS for a moderate implementation scenario is shown. This cost could be more or less depending on the complexity and scope of the proposed project.

7.4.1.2 Braided Reach 2

Within Braided Reach 2, construction costs are nearly identical among the minimum, moderate and maximum implementation scenarios because the quantities are similar for all restoration scenarios. Construction costs decrease slightly going from the minimum to moderate to maximum scenarios due to assumed fixed costs mostly related to mobilization and other general costs such as insurance and bonding.

Implementation scenario criteria for Braided Reach 2 that form the basis for costs are explained in Chapter 4. Braided Reach 2 estimated construction costs for examples of minimum, moderate and maximum implementation scenarios are summarized in Table 7-14. Other cost categories for Braided Reach 2 are summarized in Table 7-15.

Table 7-14. Braided Reach 2, summary of estimated construction costs for all implementation scenarios.								
Treatment	Treatment Name	Unit Description	Minimum		Moderate		Maximum	
			No. Units	Total Estimated Cost	No. Units	Total Estimated Cost	No. Units	Total Estimated Cost
BR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	16,669	N/A	16,669	N/A	16,669	N/A
		Cu yds (cut)	1,527,334	\$14,311,000	1,527,334	\$13,532,000	1,527,334	\$13,303,000
BR-B	Construct floodplain surfaces	Acre	253	N/A	253	N/A	253	N/A
		Cu yds (fill)	1,527,334	\$8,599,000	1,527,334	\$15,625,000	1,527,334	\$7,988,000
BR-C	Construct and/or enhance wetlands	Acre	133	\$5,621,000	133	\$5,314,000	133	\$5,224,000
BR-D	Construct and/or enhance secondary channels	Ft	13,688	\$917,000	13,688	\$866,000	13,688	\$852,000
BR-E	Revegetate the floodplain	Acre	253	\$10,693,000	253	\$10,108,000	253	\$9,937,000
BR-F	Install bank structures (bank stabilization, bioengineering)	Ft	12,050	\$3,399,000	19,083	\$5,089,000	29,059	\$7,618,000
BR-G	Install in-stream structures (habitat, river training, grade control)	Units	47	\$5,937,000	47	\$5,612,000	47	\$5,517,000
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$226,000	1	\$214,000	1	\$210,000

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

Table 7-15. Braided Reach 2, estimated costs for all implementation scenarios (all cost categories).

Cost Estimation Category	Minimum Estimate Costs	Moderate Estimated Costs	Maximum Estimate Costs	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$6,552,000	\$6,522,000	\$6,522,000	Costs from Appendix F-1
Construction	\$49,704,000	\$56,360,000	\$50,648,000	Costs from Appendix F-2
As-built documentation and establishment of monitoring baselines	\$666,000	\$666,000	\$666,000	Costs from Appendix F-3
Post-construction (effectiveness) monitoring	\$409,000	\$409,000	\$409,000	Costs from Appendix F-4
Biological monitoring	\$485,000	\$485,000	\$485,000	Costs from Appendix F-5
Post-construction maintenance	\$1,491,126	\$1,691,000	\$1,519,000	Costs from Appendix F-6
NEPA (Environmental Impact Statement)		\$657,600		Costs from Appendix F-7
Environmental compliance (permits)	\$454,000	\$454,000	\$454,000	Costs from Appendix F-7
Management of land use practices	\$361,000	\$361,000	\$361,000	Costs from Appendix F-8

Notes and Assumptions:

- Because the project is expected to be implemented in distinct phases, more than one EIS may be required. An estimated cost for an EIS for a moderate implementation scenario is shown. This cost could be more or less depending on the complexity and scope of the proposed project.

7.4.2 Costs Associated with Straight Reach Implementation Scenario

Within the Straight Reach, construction costs are different among the minimum, moderate and maximum implementation scenarios. These differences are driven by the extent of channel reconstruction, the length of bank that would be treated, and the amount of riparian revegetation.

Instream structures would be installed throughout the entire Straight Reach as part of all three implementation scenarios. Bank treatments are tied to BEHI ratings and the extent of bank treatments and associated costs increase from minimum to moderate and maximum implementation scenarios. Similarly, riparian revegetation is tied to the amount of vegetation currently present and the level of revegetation increases moving from the minimum to moderate and maximum implementation scenarios.

Straight Reach implementation scenario criteria that form the basis for costs are explained in Chapter 4. Table 7-16 shows estimated construction costs for the Straight Reach for examples of the minimum, moderate and maximum implementation scenarios. Table 7-17 shows other cost categories for each implementation scenario in the Straight Reach.

Table 7-16. Straight Reach, summary of estimated construction costs for all implementation scenarios.								
Treatment	Treatment Name	Unit Description	Minimum		Moderate		Maximum	
			No. Units	Total Estimated Cost	No. Units	Total Estimated Cost	No. Units	Total Estimated Cost
SR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	5,821	N/A	5,821	N/A	5,821	N/A
		Cu yds (cut)	0	\$0	218,356	\$2,646,000	436,713	\$4,778,000
SR-B	Revegetate the riparian corridor and establish a riparian buffer	Ft	0	\$0	3,151	\$2,285,000	11,340	\$3,967,000
SR-C	Install bank structures (bank stabilization, bioengineering)	Ft	398	\$112,000	3,480	\$927,000	9,944	\$2,603,000
SR-D	Install in-stream structures (habitat, river training, grade control)	Units	10	\$1,445,000	10	\$1,366,000	10	\$1,342,000
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$540,000	1	\$511,000	1	\$502,000

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

Table 7-17. Straight Reach, estimated costs for all implementation scenarios (all cost categories).

Cost Estimation Category	Minimum Estimated Costs	Moderate Estimated Costs	Maximum Estimated Costs	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$393,000	\$1,747,000	\$3,058,000	Costs from Appendix F-1
Construction	\$2,097,000	\$7,734,000	\$13,193,000	Costs from Appendix F-2
As-built documentation and establishment of monitoring baselines	\$133,000	\$222,000	\$222,000	Costs from Appendix F-3
Post-construction (effectiveness) monitoring	\$136,000	\$136,000	\$136,000	Costs from Appendix F-4
Biological monitoring	\$202,000	\$404,000	\$404,000	Costs from Appendix F-5
Post-construction maintenance	\$105,000	\$232,000	\$396,000	Costs from Appendix F-6
NEPA (Environmental Impact Statement)		\$657,600		Costs from Appendix F-7
Environmental compliance (permits)	\$114,000	\$114,000	\$125,000	Costs from Appendix F-7
Management of land use practices	\$301,000	\$301,000	\$301,000	Costs from Appendix F-8

Notes and Assumptions:

- Because the project is expected to be implemented in distinct phases, more than one EIS may be required. An estimated cost for an EIS for a moderate implementation scenario is shown. This cost could be more or less depending on the complexity and scope of the proposed project.

7.4.3 Costs Associated with Implementation Scenarios in the Meander Reaches

7.4.3.1 Meander Reach 1

Within Meander Reach 1, construction costs are different among the minimum, moderate and maximum implementation scenarios. These differences result primarily from the length of bank structures and acres of wetland restoration in the floodplain outside the levees. Other restoration treatment costs that vary among the scenarios include secondary channel construction, floodplain re-vegetation adjacent to the river, instream structure installation and tributary restoration.

It is important to note that costs for the most expensive restoration treatments (bank structures and wetland restoration outside the levees) are based on all identified lengths and areas that have potential for restoration, based on criteria for each implementation scenario. Actual lengths and areas would be determined based on coordination in later project phases with landowners and owners of infrastructure that would be affected by restoration work. This is also true for some of the other restoration treatments including secondary channel restoration, floodplain re-vegetation adjacent to the river and tributary restoration.

Meander Reach 1 implementation scenario criteria that form the basis for costs are explained in Chapter 4. Table 7-18 shows estimated construction costs for the Meander Reach 1 for examples of the minimum, moderate and maximum implementation scenarios. Table 7-19 shows other cost categories for each implementation scenario in Meander Reach 1.

Table 7-18. Meander Reach 1, summary of estimated construction costs for all implementation scenarios.								
Treatment	Treatment Name	Unit Description	Minimum		Moderate		Maximum	
			No. Units	Total Estimated Cost	No. Units	Total Estimated Cost	No. Units	Total Estimated Cost
MR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	0	\$0	0	\$0	0	\$0
MR-B	Excavate floodplain adjacent to the river	Acres	0	\$0	0	\$0	0	\$0
		Cu yds (cut)	0	\$0	0	\$0	0	\$0
MR-C	Construct and/or enhance wetlands adjacent to the river	Acres	0	\$0	0	\$0	0	\$0
MR-D	Construct and/or enhance wetlands behind levees and connect to the river	Ft	0	\$0	2,242	\$14,503,000	7,844	\$49,881,000
MR-E	Construct or enhance secondary channels adjacent to the river	Ft	0	\$0	0	\$0	0	\$0
MR-F	Construct or enhance secondary channels behind levees and connect to the river	Ft	0	\$0	30,350	\$1,011,000	39,172	\$1,445,000
		Cu yds	0	\$0	76,445	N/A	117,893	N/A
MR-G	Revegetate the floodplain adjacent to the river	Ft	0	\$0	25,039	\$743,000	70,794	\$2,066,000
		Acres	0	\$0	0	N/A	0	N/A
MR-H	Install bank structures	Ft	10,456	\$2,950,000	31,085	\$8,289,000	84,504	\$22,153,000
MR-I	Install in-stream structures	Units	0	\$0	15	\$1,791,000	35	\$4,109,000
MR-J	Tributary restoration	Barriers	0	\$0	3	\$356,000	3	\$4,133,000
		Ft	0	\$0	0	N/A	34,102	N/A
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$226,000	1	\$214,000	1	\$210,000

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

Table 7-19. Meander Reach 1, estimated costs for all implementation scenarios (all cost categories).				
Cost Estimation Category	Minimum Estimated Costs	Moderate Estimated Costs	Maximum Estimated Costs	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$612,000	\$4,412,000	\$9,609,000	Costs from Appendix F-1
Construction	\$3,176,000	\$26,908,000	\$83,996,000	Costs from Appendix F-2
As-built documentation and establishment of monitoring baselines	\$97,000	\$278,000	\$555,000	Costs from Appendix F-3
Post-construction (effectiveness) monitoring	\$65,000	\$163,000	\$409,000	Costs from Appendix F-4
Biological monitoring	\$202,000	\$404,000	\$525,000	Costs from Appendix F-5
Post-construction maintenance	\$95,000	\$807,000	\$2,520,000	Costs from Appendix F-6
NEPA (Environmental Impact Statement)		\$657,600		Costs from Appendix F-7
Environmental compliance (permits)	\$21,000	\$106,000	\$176,000	Costs from Appendix F-7
Management of land use practices	\$181,000	\$301,000	\$391,000	Costs from Appendix F-8

Notes and Assumptions:

- Because the project is expected to be implemented in distinct phases, more than one EIS may be required. An estimated cost for an EIS for a moderate implementation scenario is shown. This cost could be more or less depending on the complexity and scope of the proposed project.

7.4.3.2 Meander Reach 2

Within Meander Reach 2, construction costs are different among the minimum, moderate and maximum implementation scenarios. These differences are driven mainly by the length of bank structures, area of floodplain excavation inside the levees, and acres of wetland restoration in the floodplain outside the levees. Other restoration treatment costs that vary among the scenarios include secondary channel construction, floodplain revegetation adjacent to the river, instream structure installation and tributary restoration.

As with Meander Reach 1, it is important to note that costs for the most expensive restoration treatments (bank structures, area of floodplain excavation inside the levees and wetland restoration outside the levees) are based on all identified lengths and areas that have potential for restoration, based on criteria for each implementation scenario. Actual lengths and areas would be determined based on coordination with landowners and owners of infrastructure who would be affected by restoration work. This is also true for some of the other restoration treatments including secondary channel restoration, floodplain revegetation adjacent to the river and tributary restoration.

Meander Reach 2 implementation scenario criteria that form the basis for costs are explained in Chapter 4. Table 7-20 shows estimated construction costs for Meander Reach 2 for examples of the minimum, moderate and maximum implementation scenarios. Table 7-21 shows other cost categories for each implementation scenario in Meander Reach 2.

Table 7-20. Meander Reach 2, summary of estimated construction costs for all implementation scenarios.

Treatment	Treatment Name	Unit Description	Minimum		Moderate		Maximum	
			No. Units	Total Estimated Cost	No. Units	Total Estimated Cost	No. Units	Total Estimated Cost
MR-A	Excavate and/or dredge the river to modify the channel geometry	Ft	0	\$0	0	\$0	0	\$0
MR-B	Excavate floodplain adjacent to the river	Acres	0	\$0	767	N/A	1,396	N/A
		Cu yds (cut)	0	\$0	7,930,550	\$71,058,000	17,259,190	\$151,881,000
MR-C	Construct and/or enhance wetlands adjacent to the river	Acres	0	\$0	0	\$0	0	\$0
MR-D	Construct and/or enhance wetlands behind levees and connect to the river	Ft	0	\$0	3,690	\$14,503,000	10,456	\$40,399,000
MR-E	Construct or enhance secondary channels adjacent to the river	Ft	0	\$0	0	\$0	0	\$0
MR-F	Construct or enhance secondary channels behind levees and connect to the river	Ft	0	\$0	57,137	\$3,490,000	161,490	\$14,482,000
		Cu yds	0	\$0	170,340	N/A	1,051,925	N/A
MR-G	Revegetate the floodplain adjacent to the river	Ft	0	\$0	204,134	\$6,061,000	314,599	\$5,959,000
		Acres	0	\$0	767	N/A	1,396	N/A
MR-H	Install bank structures	Ft	78,071	\$22,025,000	232,116	\$61,898,000	330,433	\$86,623,000
MR-I	Install in-stream structures	Units	0	\$0	0	\$0	126	\$14,791,000
MR-J	Tributary restoration	Barriers	0	\$0	13	\$1,544,000	13	\$8,045,000
		Ft	0	\$0	0	N/A	58,839	N/A
KR-D	Mitigate for impacts from or to infrastructure	Lump Sum	1	\$352,000	1	\$333,000	1	\$327,000

* N/A indicates estimate not provided in this unit, see alternate unit estimate for this treatment.

Table 7-21. Meander Reach 2, estimated costs for all implementation scenarios (all cost categories).

Cost Estimation Category	Minimum Estimated Costs	Moderate Estimated Costs	Maximum Estimated Costs	Associated Detailed Costs
Planning, coordination, data collection, preliminary and final design	\$4,412,000	\$10,046,000	\$19,655,000	Costs from Appendix F-1
Construction	\$22,376,000	\$158,886,000	\$322,506,000	Costs from Appendix F-2
As-built documentation and establishment of monitoring baselines	\$275,000	\$888,000	\$1,332,000	Costs from Appendix F-3
Post-construction (effectiveness) monitoring	\$142,000	\$545,000	\$953,000	Costs from Appendix F-4
Biological monitoring	\$404,000	\$969,000	\$1,212,000	Costs from Appendix F-5
Post-construction maintenance	\$671,000	\$4,767,000	\$9,675,000	Costs from Appendix F-6
NEPA (Environmental Impact Statement)		\$657,600		Costs from Appendix F-7
Environmental compliance (permits)	\$65,000	\$1,212,000	\$3,029,000	Costs from Appendix F-7
Management of land use practices	\$301,000	\$602,000	\$602,000	Costs from Appendix F-8

Notes and Assumptions:

- Because the project is expected to be implemented in distinct phases, more than one EIS may be required. An estimated cost for an EIS for a moderate implementation scenario is shown. This cost could be more or less depending on the complexity and scope of the proposed project.

7.5 Summary Discussion

As explained at the outset of this chapter, estimated costs presented in this Master Plan have been developed to the conceptual level. The estimated costs presented in this chapter are based on illustrative examples of potential restoration scenarios. In subsequent projects phases (see Chapter 9 for discussion of next steps), specific habitat actions and implementation sequences will be identified and at that time it will be possible to develop more specific and refined cost estimates.

These conceptual cost estimates are designed to help inform the planning process by:

- Helping guide the Kootenai Tribe, their agency partners, co-managers and stakeholders in weighing the pros and cons of various scales of implementation (e.g., by pointing to potential economy of scale);
- Allowing potential funders, agency partners, and stakeholders to better understand the costs associated with various scales of implementation, and specific habitat actions, and thus to be better prepared to weigh the potential cost trade-offs relative to ecological benefit; and
- Providing a cost framework for use in development, refinement and implementation of a Kootenai River Habitat Restoration Project funding strategy.

Since the cost estimates presented in this Master Plan are based on unit costs, it should be relatively simple to revise cost estimates to describe costs associated with implementation scenarios that are different from those presented in this Master Plan, and to adjust costs of specific units as necessary.

In the following chapters, additional information is provided that will be relevant to future refinement of costs and funding mechanisms.