



**US Army Corps  
of Engineers**

Omaha District

---

## **Lewis and Clark Lake Sediment Management Plan**

### **Section 22 - Planning Assistance to States**

#### **Project Management Plan**

**May 2020**

#### **Revisions:**

Date	Comments	Person
08 APR19	Initial draft of Scoping Tasks	Boyd, P.
10 APR 19	Schedule and Budget Draft	Goode, T.
12 APR 19	Planning and Engineering Edits	Boyd, P.
22 APR 19	Sponsor Comment Edits	Boyd, P.
20 AUG 19	Draft Phase 2 Tasks Added	Boyd, P.
12 DEC 19	Phase 2 Tasks and Budget Updated	Boyd, P. Goode, T.
22 DEC 20	Phase 2 Tasks and Budget Updated	Boyd, P. Goode, T.
20 MAY 20	Phase 2 Tasks and Budget Updated, Phase 3 Tasks Updated	Boyd, P. Goode, T.

U.S. Army Corps of Engineers  
Omaha, Nebraska

**TABLE OF CONTENTS**

<b>1. Project Scope .....</b>	<b>5</b>
1.1. Site Location .....	5
1.2. Study Authority.....	5
1.3. Purpose of the Project Management Plan .....	5
1.4. Purpose of the Study .....	6
<b>2. Study Process .....</b>	<b>7</b>
<b>3. PHASE ONE.....</b>	<b>9</b>
3.1. Phase one purpose.....	9
3.2. Study Schedule.....	9
3.2.1. Key Study Milestones .....	9
3.2.2. General .....	9
3.2.3. Study Responsibilities.....	9
3.2.4. Task Schedule .....	9
3.3. Work-In-Kind Services .....	10
3.4. Phase one Project Team (USACE).....	10
3.5. Study Scope of Work with Costs.....	10
3.5.1. Study Scope.....	10
3.5.2. Budget.....	11
<b>4. phase two .....</b>	<b>13</b>
4.1. phase two purpose.....	13
4.1.1. Study Footprint.....	14
4.1.2. study schedule .....	14
4.1.3. key study milestones.....	14
4.1.4. general .....	14
4.1.5. study responsibilities .....	14
4.1.6. task schedule (Funding availability dependent) .....	15
4.2. Work in-kind services (TBD) .....	15
4.3. phase two project Team (USACE).....	16
4.4. Study Scope of Work with Costs.....	16
4.4.1. study scope.....	16
4.4.2. budget .....	21
<b>5. phase three.....</b>	<b>23</b>
5.1. phase three purpose .....	23
5.1.1. Study Footprint.....	23
5.1.2. study schedule .....	24
5.1.3. key study milestones.....	24
5.1.4. general .....	24
5.1.5. study responsibilities .....	24
5.1.6. task schedule .....	24
5.2. Work in-kind services .....	25
5.3. phase three project Team (USACE) .....	25

5.4. Study Scope of Work with Costs.....	25
5.4.1. study scope.....	25
5.4.2. budget.....	27
<b>6. Acquisition plan.....</b>	<b>27</b>
<b>7. Quality Management Plan.....</b>	<b>27</b>
7.1. District Quality Control/Quality Assurance.....	28
7.1.1. Interdisciplinary Check.....	28
7.1.2. Quality Check Review.....	28
<b>8. Safety Plan.....</b>	<b>29</b>
8.1. Safety Requirements.....	29
<b>9. Change Management Plan.....</b>	<b>29</b>
9.1. PMP Changes.....	29
9.2. Study Changes.....	29
<b>10. Communication Plan.....</b>	<b>30</b>
10.1. usace and Sponsor Communication.....	30
10.2. Agency Coordination.....	30
<b>11. Closeout Plan.....</b>	<b>30</b>
<b>12. Approvals.....</b>	<b>31</b>

## List of Acronyms

ATR	Agency Technical Review
FCSA	Feasibility Cost Sharing Agreement
GI	General Investigation
CAP	Continuing Authorities Program
DQC	District Quality Control
LCLSMP	Lewis and Clark Lake Sediment Management Plan
MSAC	Missouri River Sedimentation Action Coalition
MSC	Major Subordinate Command
PAS	Planning Assistance to States
PDT	Project Delivery Team
PM	Project Manager
PMP	Project Management Plan
QMP	Quality Management Plan
SME	Subject Matter Expert
USACE	U.S. Army Corps of Engineers
WBS	Work Breakdown Structure
WIK	Work-in-kind

## 1. PROJECT SCOPE

### 1.1. SITE LOCATION

The study area is bounded by Fort Randall Dam at Pickstown, SD, at the upstream end, and Ponca, NE on the downstream end, to include the Missouri River and its watershed tributaries above Gavin's Point Dam. The incremental watershed above Gavin's Point dam (Figure 1) supplies sediment to the Missouri River and Lewis and Clark Lake. Consideration will be given to the entire watershed, as the lower reaches of each of the Missouri River tributaries has experienced some sedimentation impacts. Below Gavin's Point Dam, the main channel of the Missouri River will be included for impact and benefit assessment.



Figure 1. Project Study area

### 1.2. STUDY AUTHORITY

The Planning Assistance to States Program, also known as the Section 22 Program, is authorized by Section 22 of the 1974 Water Resources Development Act. This program authorizes the U.S. Army Corps of Engineers (USACE) to use its technical expertise in management of water and related land resources to help States deal with their water resource problems. Upon request, the USACE will cooperate with States in the preparation of plans for the development, utilization, and conservation of water and related land resources located within the boundaries of the State. However, USACE is not permitted to prepare site-specific structural designs or construction specifications under this authority.

### 1.3. PURPOSE OF THE PROJECT MANAGEMENT PLAN

The purpose of this Project Management Plan (PMP) is to guide the preparation of a Section 22 study to develop a Lewis and Clark Lake Sediment Management Plan Study (LCLSMP). It defines the baseline scope, schedule, and budget for preparing the study and provides a change management plan for the Project. The PMP is intended to be a living document created by USACE, the non-Federal sponsor, and involved stakeholders detailing how work will be executed and resources will be expended in preparation of the Section 22 study.

This PMP is intended to document the Federal and non-Federal efforts ultimately required to conduct the study and shall be developed jointly by USACE and the Sponsor. The PMP will ensure that the work required for the study has been carefully developed and considered. It outlines the project scope, budget, schedules, and roles and responsibilities of the participating agencies. Providing a quality study that identifies the Sponsors needs and expectations, and that is completed on schedule and within budget is the primary goal of all participants. Critical components of the final PMP are:

- a) Identifying the objectives of the project.
- b) Developing sufficient level of plan detail.
- c) Identifying costs of the study.
- d) Identifying schedule of activities to be performed during the study.

#### **1.4. PURPOSE OF THE STUDY**

A consortium of local sponsors, including the Missouri Sedimentation Action Coalition (MSAC), City of Yankton, SD, counties, and other groups have identified the need for comprehensive Sediment Management Plan for Lewis and Clark Lake to address the continual loss of project benefits to sedimentation, develop strategies to mitigate current sedimentation impacts throughout the watershed, and minimize future impacts. The study expects to mimic the goals and objectives from the WRDA 2016 Section 1179a authorization.

*Section 1179(a)(3) Plan Elements. A sediment management plan under paragraph (2) shall*

- a) Provide opportunities for project beneficiaries and other stakeholders to participate in sediment management decisions;*
- b) Evaluate the volume of sediment in a reservoir and impact on storage capacity;*
- c) Identify preliminary sediment management option, including sediment dikes and dredging;*
- d) Identify constraints;*
- e) Assess technical feasibility, economic justification, and environmental impacts;*
- f) Identify beneficial uses for sediment; and*
- g) To the maximum extent practicable, use, develop, and demonstrate innovative, cost-saving technologies, including structural and nonstructural technologies and designs, to manage sediment.*

Omaha District USACE intends to conduct a Section 22 Planning Assistance to States (PAS) study to develop the LCLSMP for the watershed around Gavin's Point Dam. The study will summarize the evolution of the delta (Figure 1) and related sediment impacts at the project and upstream river reach and provide a review of current and emerging sediment management methodologies and their applicability at Lewis and Clark Lake.

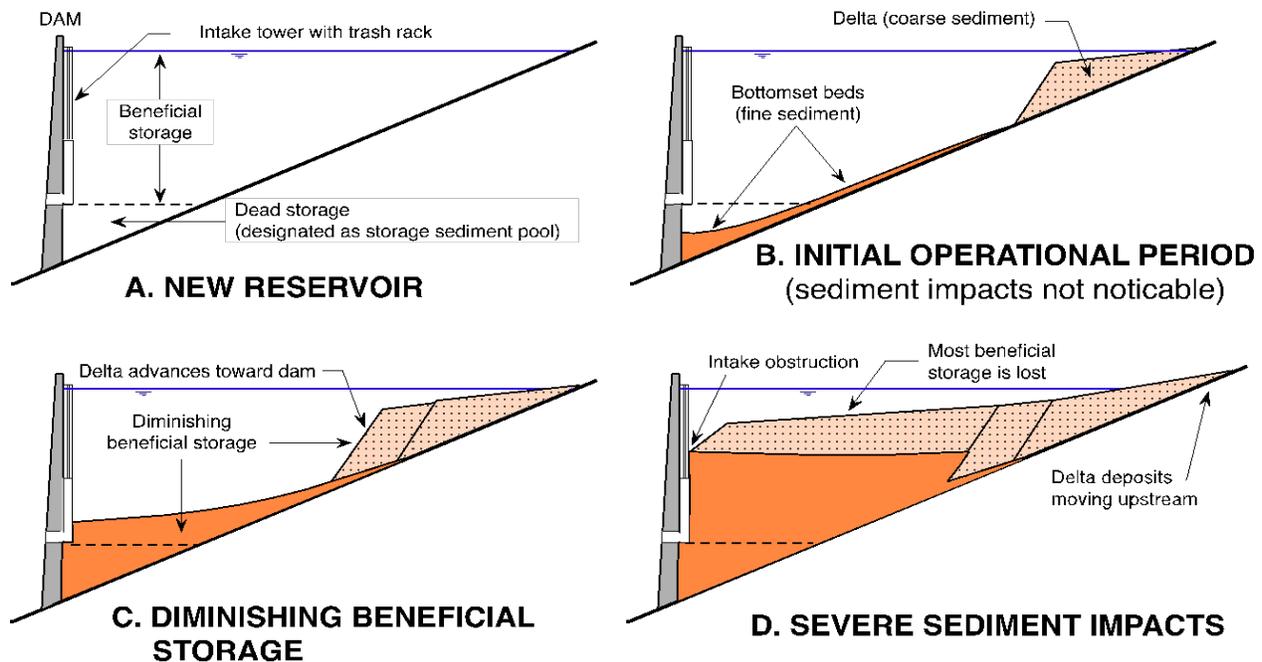


Figure 1. Delta Development in Reservoirs (Morris, 2018)

The PAS study will not in itself lead to construction of a project, but if a construction or management project is identified through this process, other study authorizations may be considered. A request for a Section 1179a new start is a possibility that could be used to complete later phases, construction/implementation, or both. USACE and the Sponsor will continually evaluate the best pathways forward for subsequent phases, and request project appropriations if needed.

## 2. STUDY PROCESS

USACE uses a defined six-step process for conducting comprehensive planning studies. The process is iterative, with steps iterated as necessary to formulate efficient, effective, complete, and acceptable plans. The six steps in USACE planning process are as follows.

- Step 1 – Identifying Problems and Opportunities
- Step 2 – Inventorying and Forecasting Conditions
- Step 3 – Formulating Alternative Plans
- Step 4 – Evaluating Alternative Plans
- Step 5 – Comparing Alternative Plans
- Step 6 – Selecting/Recommending a Plan

Section 22 studies are flexible, and in this case, the study process consists of three phases.

The problem framework identified for the study is:

- **Cause:** The interruption of dynamic flows on the Missouri River due to the construction and management of Gavin's Point Dam.
- **Symptoms:**
  - Chronic sediment delivery from the watershed has resulted in sediment deposition in Lewis and Clark Lake, the Missouri and Niobrara Rivers, and Bazile and Ponca Creeks.
  - Lewis and Clark Lake was measured to have lost 26% of the total storage capacity as of 2011, and the Missouri River and tributaries have all exhibited bed aggradation that may affect river stage-discharge relationships.
  - The absence of sediment in the downstream Missouri River channel has resulted in channel degradation, reduction in fish and wildlife habitat, and other infrastructure impacts.
- **Impacts:**
  - Increased surface and ground water elevations have resulted in lost land productivity, transportation limitations, housing relocations, and increased flood risk.
  - Sediment delta in Lewis and Clark Lake limits recreation, storage volume in all reservoir pools, and the ability to reliably take reservoir water for water supply and irrigation.
  - Downstream degradation has increased bank height and erosion, reduced aquatic and sandbar habitat, and required bank stabilization.
- **Actions:**
  - No long-term management plan is in place to mitigate the loss of benefits due to sedimentation or prevent future symptoms and impacts.

The study objectives are identified as follows:

- Provide opportunities for project beneficiaries and other stakeholders to participate in sediment management decisions;
- Evaluate the volume of sediment in the reservoir and impact on storage capacity;
- Assess the economic benefits of all project purposes;
- Assess the economic impact of previous and future sedimentation;
- Identify sediment management options;
- Identify constraints to implementation;
- Assess technical feasibility and environmental impacts;
- Identify beneficial uses for sediment;
- To the maximum extent practicable, use, develop, and demonstrate innovative, cost-saving technologies, including structural and nonstructural technologies and designs, to manage sediment; and
- Develop a Sediment Management Plan with recommendations of sediment management actions that conserve the greatest benefits and attempt to establish a sustainable reservoir.

The PAS study will be conducted in three phases. The first phase will consist of a scoping effort that will include a kick-off meeting, assembling existing information, identifying data gaps, holding a scoping workshop, project management activities, and developing a Project Management Plan for conducting the second and third phases.

### 3. PHASE ONE

#### 3.1. PHASE ONE PURPOSE

The purpose of the Phase One scoping effort is to identify study objectives, constraints, and collaborate on developing the study scope for Phases Two and Three. The second phase will focus on leveraging existing sediment management studies coupled with the application of economic models to consider the costs and benefits associated with sediment management. The third phase will expand the technical analysis to consider emerging technologies, integrate the environmental benefits and impacts, and develop a detailed Sediment Management Plan for Lewis and Clark Lake.

The product for Phase One will be the PMP to encompass all planned tasks, budget, and schedule for all three phases. Phases Two and Three will result in technical reports. Phase Two can and may be completed without any obligation for execution of Phase Three.

#### 3.2. STUDY SCHEDULE

##### 3.2.1. KEY STUDY MILESTONES

Milestones will be developed during the Phase One scoping effort for all subsequent phases.

##### 3.2.2. GENERAL

The Work Breakdown Structure (WBS) is a breakdown of the project into its component work tasks and products. At this time this section presents information on study responsibilities, in-kind services, and references to the scopes of work. Following negotiations on the in-kind services with the Sponsor this section and supporting documentation will be updated.

##### 3.2.3. STUDY RESPONSIBILITIES

The study is being cost-shared 50% Federal and 50% non-Federal. The sponsor partnership will be undertaking several tasks to assist in completing the study, which are outlined in the study tasks table below.

Agencies performing work for the Federal Government are: USACE.

##### 3.2.4. TASK SCHEDULE

**Table 1: Phase One Task Schedule**

Task	Description	Performed By	Begin	End
1	<b>Phase Two and Three Scoping</b>		<b>01 May 2019</b>	<b>31 Jul 2019</b>
1a	Sponsor and USACE identification of PDT members	USACE & Sponsor Team	01 May 2019	10 May 2019
1b	Coordination and concurrence of scope for Phase One with sponsor	USACE & Sponsor Team	01 May 2019	10 May 2019
1c	Initial Phase Two and Three scoping call and webinar	USACE & Sponsor Team	20 May 2019	31 May 2019
1d	Stakeholder meeting and Scoping review	USACE & Sponsor Team	03 Jun 2019	21 Jun 2019
1e	Revision of Phase Two and Three Scope	USACE	21 Jun 2019	30 Jun 2019
1f	Development of Phase Two and Three Cost estimates	USACE	30 Jun 2019	12 Jul 2019
1g	Stakeholder input/feedback	USACE & Sponsor Team	12 Jul 2019	20 Jul 2019
1h	PMP Update	USACE	20 Jul 2019	31 Jul 2019

### 3.3. WORK-IN-KIND SERVICES

The Sponsor may contribute up to 50 percent of the Study Costs through the provision of Work-In-Kind services (WIK), subject to applicable laws and as negotiated as part of the cost share agreement. The WIK work is geared to services that sponsor and cooperating officials can provide more efficiently and which improve the accuracy of the study. WIK are activities performed by the non-Federal sponsor in lieu of the Federal Government. The WIK to be provided by the Sponsor, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided will be specified in the PMP established for the cost-shared study phase.

The local Sponsor shall provide documentation of the method by which the WIK were computed. The determination of the dollar value of in-kind products or services will be negotiated, based on a detailed government estimate and sponsor proposal, between the Federal Government and the non-Federal sponsor as fixed fee items, applying applicable Federal regulations. The dollar value of the in-kind effort will be established prior to the initiation of the in-kind effort. Acceptance of the product will be as called for in this PMP.

### 3.4. PHASE ONE PROJECT TEAM (USACE)

**Table 2: Phase One Project Team**

<b>Name</b>	<b>Org</b>	<b>Role</b>
Timothy Goode, Ph.D.	USACE/PMA-A	Project Manager
J. Greg Johnson	USACE/PMA-A	Chief, Plan Formulation Section
Dan Pridal, P.E.	USACE/EDH-F	Chief, River and Reservoir Engineering Section
Paul Boyd, Ph.D., P.E.	USACE/EDH-F	Engineer, River and Reservoir Engineering
Drew Minert	USACE/PMA-B	Chief, Economics Section

### 3.5. STUDY SCOPE OF WORK WITH COSTS

#### 3.5.1. STUDY SCOPE

The Phase One tasks are identified below:

1. Sponsor and USACE identification of PDT members

USACE will develop a list of technical and programmatic team members that will participate in the study. The sponsor will identify the participating partners and their roles.

2. Coordination and concurrence of scope for Phase One with sponsor

The sponsor will review this document, including tasks, schedule, and budget. The sponsor will at that time provide an estimate of in-kind services that they expect to provide as part of this phase.

3. Initial Phase Two and Phase Three scoping call and webinar

The PDT will schedule a two hour conference call and webinar to review and revise the specific tasks for Phase Two and Phase Three. The USACE PDT will develop the initial framework referencing the Section

1179a (WRDA 2016) USACE Implementation guidance.

4. Stakeholder Meeting and Scoping Review (Yankton, SD, Springfield, SD, or Niobrara, NE)

USACE will revise Phase Two and Phase Three scopes based on sponsor feedback and develop an interactive presentation for a scoping meeting. The meeting will not exceed four hours and will provide the opportunity for all sponsor representatives to make recommendations and revisions to the scopes.

5. Revision of Phase Two and Phase Three Scope

USACE will update the scopes with feedback and comments from the meeting.

6. Development of Phase Two and Phase Three Cost estimates

After agreement on the scope revisions from the sponsor, USACE will develop a cost estimate for the scoped actions.

7. Stakeholder input/feedback

Stakeholder feedback on the cost estimate will be received, and revision made if necessary based on available project resources.

8. PMP Update

USACE will update the PMP and develop the Federal Cost Share Agreement (FCSA) for the sponsor's participation in Phase Two.

### 3.5.2. BUDGET

The initial agreement is for Phase One and is for the purpose of scoping ensuing Phases Two and Three. The budget in the initial FCSA is for Phase One only and will be updated once the other phases are scoped and budgeted. For this initial scoping during phase one, the budget is \$24,000, as indicated in **Table 3**.

**Table 3: Phase One Overall Budget**

	<b>USACE</b>	<b>MSAC</b>	
<b>Cash</b>	\$12,000	\$7,000	\$19,000
<b>WIK</b>	\$0	\$5,000	\$5,000
<b>Total Budget</b>			<b>\$24,000</b>

The USACE/MSAC involvement for Phase One with corresponding budget is summarized in **Table 4**.

**Table 4: Phase One USACE/MSAC Budget Breakdown**

<b>USACE Section</b>	<b>Budget</b>
Project Management	\$5,000
Engineering	\$5,000
Economics	\$5,000
Environment	\$3,000
Other/Travel	\$1,000
<b>Sub Total</b>	<b>\$19,000</b>
<b>MSAC</b>	
WIK	\$5,000
Sub Total	\$5,000
<b>TOTAL</b>	<b>\$24,000</b>

The estimated budget by task is indicated in **Table 5**.

**Table 5: Phase One Budget by Task**

<b>Task</b>	<b>Description</b>	<b>Performed By</b>	<b>Hours</b>	<b>Labor</b>	<b>Misc/Travel</b>
<b>1</b>	<b>Phase Two and Three Scoping</b>				
1a	Sponsor and USACE identification of PDT members	USACE & Sponsor Team		\$500	
1b	Coordination and concurrence of scope for Phase One with sponsor	USACE & Sponsor Team		\$2,000	
1c	Initial Phase Two and Three scoping call and webinar	USACE & Sponsor Team		\$500	
1d	Stakeholder meeting and Scoping review	USACE & Sponsor Team		\$5,000	\$1,000
1e	Revision of Phase Two and Three Scope	USACE		\$5,000	
1f	Development of Phase Two and Three Cost estimates	USACE		\$5,000	
1g	Stakeholder input/feedback	USACE & Sponsor Team		\$3,000	
1h	PMP Update	USACE		\$2,000	
	<b>Totals</b>			<b>\$23,000</b>	<b>\$1,000</b>

## **4. PHASE TWO**

### **4.1. PHASE TWO PURPOSE**

The second phase will focus on leveraging and updating existing sediment management studies coupled with the application of economic models to consider the costs and benefits associated with sediment management. Multiple sediment management methods have been studied in the recent past for application at Lewis and Clark Lake. Of these, three dredging scenarios that have been developed through support of the Missouri River Recovery Program have the most defensible likelihood of success and cost estimates.

Using dredging scenarios, an economic analysis will be completed. This analysis will estimate 1) the cost of implementation of the three dredging scenarios (updating costs to 2020 dollars), 2) the realized benefits since project creation, 3) the value of benefits lost to sedimentation, 4) estimate the future benefits lost, and those that could be preserved through sediment management, 5) the incurred and future direct costs of mitigation of sedimentation impacts, and 6) the cost of decommissioning. It should be noted that the uncertainty in the future estimates will be high.

The USACE standard economic model will be applied to determine the benefit/cost ratio for implementation. In addition, dredging will be modeled with alternative discount rates and the Life-Cycle economic model, which takes into account the value of preserved benefits.

While dredging may not be the most economically feasible management activity at Lewis and Clark Lake, an analysis has been completed with a detailed cost estimate. For this reason, the analysis will use the dredging cost estimates as a way to compare various economic models.

Many of the traditional management actions for reservoir sedimentation have been previously studied. Dredging can be effective, but is expensive and invasive. Drawdown flushing has limited effectiveness due to limitations in the infrastructure, and above-reservoir sediment capture creates a transport and use problem. Over the past few years, practitioners have increasingly looked for new, novel, and creative solutions to collecting and transport sediment trapped by reservoirs.

To explore the full spectrum of possible solutions, a Solutions Workshop will be held. The workshop will include representatives of the Sponsor, USACE, other Federal Agencies, and invited subject matter experts. Invited presentations will discuss new ideas and applications, and attendees will be encouraged to brainstorm on innovative ideas. The attendees will attempt to develop qualitative assessments of the ideas.

With a prioritized list of ideas, a brief effort will be made to apply a simplified cost estimate to each of the ideas. This will allow for a rudimentary comparison with the dredging scenarios. Ideas that show engineering and economic promise will be recommended for more thorough investigation in Phase Three.

The phase two report will summarize the economic inventory and analysis of the dredging scenario and the summary of the Solutions Workshop. The phase two report will be a complete report, not dependent upon any future phases.

#### **4.1.1. STUDY FOOTPRINT**

Gavin's Point Dam impounds Lewis and Clark Lake at River mile 811 of the Missouri River. The top of the flood control pool (elevation 1210.0 feet NVGD 1929) extends approximately 25 miles upriver, to just above Springfield, SD.

Sedimentation inputs from within and outside the project footprint combine to create the current conditions. Approximately 60% of the supply is from the Niobrara River, 30% from the Missouri River, and the remaining 10% from smaller tributaries (Ponca, Bazile creek etc.), bank erosion, and the local watershed. To create a more complete assessment of sediment impacts the upstream footprint will extend up the Missouri to Fort Randall Dam, to the lower 15 miles of the Niobrara River, and the lower reaches of Ponca and Bazile Creek.

The reach of the Missouri River below Gavin's Point Dam is not within the project boundary but is heavily impacted by the lack of sediment delivery from upstream. The Missouri River downstream to Ponca, NE (RM 753) and the lower reaches of the James River and Vermillion River will be included in the study footprint.

#### **4.1.2. STUDY SCHEDULE**

Approximately 18 months from kickoff. See Table 6. The schedule may be adjusted based on USACE team availability and Federal or Sponsor funding availability.

#### **4.1.3. KEY STUDY MILESTONES**

Solutions Workshop

Completion of engineering analysis

Completion of economic analysis

50% draft review by sponsor

90% draft review by sponsor

#### **4.1.4. GENERAL**

The Work Breakdown Structure (WBS) is a breakdown of the project into its component work tasks and products. At this time this section presents information on study responsibilities, in-kind services, and references to the scopes of work. Following negotiations on the in-kind services with the Sponsor this section and supporting documentation will be updated.

#### **4.1.5. STUDY RESPONSIBILITIES**

The study is being cost-shared 50% Federal and 50% non-Federal. The sponsor partnership will be undertaking several tasks to assist in completing the study, which are outlined in the study tasks table below.

Agencies performing work for the Federal Government are: USACE.

#### 4.1.6. TASK SCHEDULE (FUNDING AVAILABILITY DEPENDENT)

**Table 6: Phase Two Task Schedule**

Task	Description	Performed By	Begin	End
1	Project History and Literature Review	CENWO-EDH-F	01 OCT 20	31 JAN 21
2.1	Determine the Sedimentation Impacts Footprint	CENWO-EDH-F	01 OCT 20	01 DEC 20
2.2	GIS Project Development	CENWO-EDH-F	01 OCT 20	31 JUL 21
		CENWO-EDG-D		
2.3	Economic Analysis Inventory Development	CENWO-PMA-B	01 OCT 20	31 MAR 21
2.4	Estimate of Near Term Sediment Management Costs	CENWO-PMA-B	01 DEC 20	28 FEB 21
2.5	Identify Beneficial Uses for Sediment	CENWO-EDH-F	01 APR 21	31 JUN 21
3.1	Dredging Scenarios Update	CENWO-EDH-F	01 OCT 20	31 MAR 21
		CEMVN-ED-SC		
3.2	Solutions Workshop	MSAC Board (8) CENWO-EDH-F CENWO-PMA-A CEERD-CHL CENWK External SMEs	01 MAY 21	30 JUN 21
4	Economic Analysis	CENWO-PMA-B	01 DEC 20	31 DEC 21
5	Environmental	CENWO-PMA	01 APR 21	30 NOV 21
6	Constraints	CENWO-EDH-F	01 APR 21	31 MAY 21
7.1	Draft Report Outline	CENWO-EDH-F CENWO-PMA-B	01 MAR 21	30 APR 20
7.2	50% Draft Report	CENWO-EDH-F CENWO-PMA-B	01 JAN 22	28 FEB 22
7.3	90% Draft Report	CENWO-EDH-F CENWO-PMA-B	01 MAR 22	30 APR 22
7.4	Final Report	CENWO-EDH-F CENWO-PMA-B	01 MAY 22	30 MAY 22
8.1	Kick-off Meeting (In-Person)	CENWO-EDH-F CENWO-PMA-B CENWO-PMA-A	01 OCT 20	31 OCT 20
8.2	Initial Economic Analysis Results Meeting	CENWO-EDH-F CENWO-PMA-B	01 AUG 21	31 AUG 21
8.3	50% Report Draft Meeting	CENWO-EDH-F CENWO-PMA-B CENWO-PMA-A	01 MAR 22	31 MAR 22
8.4	Second Economic Analysis Results Meeting	CENWO-EDH-F CENWO-PMA-B CENWO-PMA-A	01 DEC 21	31 DEC 21
8.5	90% Draft Report Meeting (In-Person)	CENWO-EDH-F CENWO-PMA-B CENWO-PMA-A	01 APR 22	30 APR 22
9	Project Management	CENWO-PMA-A	01 OCT 20	30 MAY 22
10	Program Management	CENWO-PMA	01 OCT 20	30 MAY 22

#### 4.2. WORK IN-KIND SERVICES

Work-in-kind services from the sponsor have been identified in two tasks.

Task 1 – Sponsor will provide content for the project history task

Task 3.2 – Sponsor will be responsible for the travel of MSAC board members, and travel and

labor for the three non-USACE SME’s who will participate in the Solutions Workshop.

### 4.3. PHASE TWO PROJECT TEAM (USACE)

**Table 7: Phase Two Project Team**

<b>Name</b>	<b>Org</b>	<b>Role</b>
Timothy Goode, Ph.D.	USACE/PMA-A	Project Manager
J. Greg Johnson	USACE/PMA-A	Chief, Plan Formulation Section
Dan Pridal, P.E.	USACE/EDH-F	Chief, River and Reservoir Engineering Section
Paul Boyd, Ph.D., P.E.	USACE/EDH-F	Engineer, River and Reservoir Engineering
Drew Minert	USACE/PMA-B	Chief, Economics and Quality Review Section
Eric Laux, PMP	USACE/PMA-C	Chief, Env and Cultural Resources Section

### 4.4. STUDY SCOPE OF WORK WITH COSTS

#### 4.4.1. STUDY SCOPE

The phase two tasks are listed below.

#### **Task 1: Project History and Literature Review**

Develop a project history narrative that includes pre-dam legislation, design reports, and historical analysis of sedimentation. Two phase literature review 1) Technical reports from USACE, other research, and journals on sedimentation impacts across the footprint and 2) Social literature on the lifestyle and economic impacts of sedimentation.

#### **Task 2: Current and Future Conditions**

##### **2.1 Determine the Sedimentation Impacts Footprint**

Using existing data (surveys, imagery, gage trends, aggradation studies) estimate the future physical changes within the study footprint due to sedimentation. Reduction and increase in annual sediment delivery will be considered. Estimated time to sedimentation impact for infrastructure within the footprint will be developed. Estimates of the extents of impacts will be made by decade out to 150 years will be made by estimating delta migration based on the long term annual aggradation rate. The exact date of impact will be uncertain, but the estimate of the progression of sedimentation will allow for the estimate of the economic impacts.

##### **2.2 GIS Project Development**

A GIS project will be developed that will catalog all infrastructure in the study area and shapefiles created that will estimate the area of impact for future decades. The GIS project will also be used to animate the expanding effects of sedimentation.

##### **2.3 Economic Analysis Inventory Development**

An inventory of damageable infrastructure (i.e. homes, roads, water intakes, etc.), economic outputs (i.e. hydropower generation, navigation, recreation, etc.), and costs (decommissioning, ESH construction, etc.) that could be impacted under a full sedimentation scenario would be developed to determine the potential socioeconomic effects. The potentially impacted resource areas are described below.

### **Flood Risk Management**

Land, property (both urban and rural), infrastructure, and people in the floodplain can be affected by sedimentation through reduced storage capacity. An inventory of residential, non-residential, and agricultural structures, critical infrastructure, and cropland will be developed to evaluate the change in economic damages that could occur from changes in sedimentation.

### **Hydropower**

The Gavin's Point Dam and power plant along with their associated facilities were brought online in 1956 and today has 3 units with generator capacity. Changes in system storage due to different sedimentation levels can impact the magnitude of normal seasonal generating patterns and reduce the flexibility to meet hourly peaking demands. This analysis will look at the changes in accrued costs from finding replacement energy sources as well as potential turbine damage due to increased sedimentation.

### **Irrigation**

The irrigation intakes permitted on the Missouri River are a mix of semi-permanent (portable) and permanent structures. Impacts to irrigators are based on changing river and reservoir conditions. As river flows and reservoir elevations fall below minimum operating requirements, intakes become unavailable to provide water to farm operations (including private farms, Tribes, and commercial operations). This analysis would estimate changes in net farm income from irrigated agricultural operations.

### **Navigation**

USACE supports a navigation season when the river is ice-free and navigable and USACE releases water from Gavin's Point Dam. The decision to have a navigation season and its potential length are based on system storage. The navigation assessment would evaluate how changes sedimentation and system storage can affect commercial navigation on the Missouri River.

### **Recreation**

Lewis and Clark Lake attracts more than a million visitors each year to its shores. Recreation opportunities around the lake include camping, fishing, hunting, hiking, boating, sailing, swimming, bird-watching, and photography. The recreation analysis will address effects that sedimentation has on recreational activities in the analysis area. This includes evaluating the change in economic value that could occur from impacts to recreation activities and/or resources.

### **Water Supply**

Water is withdrawn from Gavin's Point Dam and the Missouri River for multiple purposes including municipal, industrial, and commercial water supply as well as domestic and public uses. Water supply can be affected by conditions such as river flows and stages, reservoir water surface elevations, river water chemistry including sediment, and channel locations. Changes to these physical components, in turn, lead to changes in water supply access, operation and maintenance, and water treatment requirements. This analysis would focus on the costs to water supply operations to adapt to changing river and reservoir conditions caused by sedimentation.

### **Other Economic Costs**

The analysis will also focus on other future expenditures resulting from future sedimentation. These costs include dam decommissioning or retrofitting. Other impacts could include downstream bank stabilization and sandbar construction.

### **2.4 Estimate of Near Term Sediment Management Costs**

While a Sustainability Plan is being developed and implemented, sediment deposition will continue to create impacts throughout the region. Using the estimates of future sediment impacts for the next 20 years, the cost associated with maintaining the current functionality of facilities and uses will be determined.

### **2.5 Identify Beneficial Uses for Sediment**

The beneficial uses of current and future sediment in the system will be researched. In addition to a literature review, the beneficial uses of sediment in the construction, mining, petrochemical, and other industries will be reviewed.

## **Task 3: Engineering Analysis**

### **3.1 Dredging Scenarios Update**

Three dredging scenarios for transporting sediment from the face of the Lewis and Clark Lake delta and discharging into the Missouri River channel below Gavin's Point Dam were developed in 2015. Those scenarios were:

- Multiple Dredges (each dredge collects and discharges to the next)
- Single Dredge with Booster Pumps
- Physical Excavation and Transport via Barge

All three scenarios temporarily deposit sediment near the dam and use a permanent hydraulic unloader to lift a slurry in a pipeline over the dam crest and discharge into the river below. The scenarios will be updated as necessary to reflect the current conditions within the reservoir and updated to year 2020 dollars.

### **3.2 Solutions Workshop**

Beyond dredging, drawdown flushing and watershed sediment collection have been studied in the past. Both would likely have minor to moderate success with significant collateral impacts. Looking past these traditional methods, significant effort is being exerted by subject matter experts to look for new, novel, and innovative solutions to the collection, transport, and distribution of reservoir sediments. As an example, the US Bureau of Reclamation (supported by USACE) is conducting a multiple phase prize challenge offering financial rewards to anyone with a novel idea. See <https://www.usbr.gov/newsroom/stories/detail.cfm?RecordID=66923> for the results of the first phase of the competition. The second phase of the competition is ongoing.

A three day Solutions Workshop will be hosted by the Sponsor in the vicinity of Lewis and Clark Lake and Gavin's Point Dam. The Workshop will provide the opportunity for the Sponsor and their representatives to meet and discuss innovative ideas with subject matter experts on reservoir sedimentation. The first day will be an extensive site visit, the second a Sponsor/SME/USACE Solutions Workshop, and the third day an open house with panel discussion for the public/stakeholders. Possible candidates include:

MSAC Board Members

Rollin Hotchkiss, Ph.D., P.E., Brigham Young University, Provo, UT  
Gregory Morris, Ph.D., P.E., GMA Engineering, San Juan, PR  
John Shelley, Ph.D., P.E., USACE Kansas City District, Kansas City, MO  
Timothy Welp, Ph.D., P.E., USACE ERDC, Vicksburg, MS  
Tim Randle, Ph.D., P.E., Bureau of Reclamation, Retired, Denver, CO

The USACE team for this study will facilitate the workshop. The cost estimate is based on a three day workshop (1 day field trip, 1 day workshop, ½ day Open house with Panel discussion) for those listed above and the USACE team.

The outcomes of the workshop are expected to be the prioritization of sediment management ideas and a description of their general operation.

#### **Task 4: Economic Analysis**

##### **4.1 Past, Present, and Future Project Benefits**

A summary of the economic benefits directly attributed to the Gavin's Point Dam project. Published values will be used from 1955 from 2019. Using the inventory from task 2.3 and an estimate of the declining value of benefits in the future will be developed. Future cost predictions will be made until all authorized project purpose benefits are estimated to be near zero. At the current sedimentation rate, the time until complete storage loss ranges from 125 to 175 years.

##### **4.2 Federal, State, and Local Costs Associated with Sedimentation**

All levels of government, as well and private citizen have spent extensively in response to sedimentation buildup. Town and park relocations, bridge and roadway upgrades, flooding easements, flood damage claims, water intake relocations, dredging of access points, and other expenses have all been completed. Building upon the Hotchkiss paper that summarizes many of these costs, any additional costs that can be identified will be added.

##### **4.3 The Cost of No Action Future**

Cumulative assessment of current and future benefits lost and future Federal, State, and Local costs due to sedimentation. Included will be an estimate of the decommissioning cost in year 2120. Decommissioning would be expected to take multiple decades to prevent overloading the downstream channel with nearly 200 years of impounded sediment.

##### **4.4 Dredging**

The development of the dredging scenarios included an extensive cost estimate developed by the Corps' New Orleans District. The estimate will modified and updated to current dollars. Estimate the loss of recreation benefits due the equipment on reservoir. Estimate the extended project benefits and preventing future losses. Also to consider the benefits to downstream channel. The reduction or elimination of the Emergent Sandbar Habitat program will be included in the estimated project benefits.

##### **4.5 Benefit/Cost Ratio Analysis for Dredging Scenarios**

The B/C Ratio analysis will be completed. Based on the economic analysis, a summary of damages avoided and benefits retained will be developed. Dredging will be analyzed as a permanent installation to manage sediment for a 50 year time span. Multiple discount rates will be used in the analysis to show the variation in results (Green Book gives good example of declining interest rates) Hartman, David paper from 2003).

#### **4.6 Life-Cycle Cost Analysis for Implementation of Management Methods**

Apply the Life-Cycle Cost Analysis to consider the future benefits preserved and future impacts eliminated. See Annandale, Extending the Life of Reservoirs. This analysis will leverage the cost estimating spreadsheet for reservoir sediment management in development by the National Reservoir Sedimentation and Sustainability Team (NRSST).

#### **4.7 Cost Estimate for Implementation of Methods Identified in Workshop**

Between the economics section and cost engineering, a one day effort will be afforded to estimate the cost of implantation and maintenance of the workshop selected methods. These estimates will have high uncertainty, but will allow for an order of magnitude comparison with the dredging scenarios. The cost estimate is based on three methods.

### **Task 5: Environmental**

A qualitative environmental impact analysis of the dredging alternative as well as the top ranking ideas from the Solutions Workshop will be developed. The literature review conducted in Task One of this scope and will be utilized as the basis of information from which to draw conclusions regarding the impacts of each of the alternatives compared to the “no action”.

### **Task 6: Constraints**

A summary of the engineering and economic constraints that will be revealed during the study process. Any suggestions for overcoming these constraints will be listed.

### **Task 7: Reports**

#### **7.1 Draft Report Outline**

#### **7.2 50% Draft Report**

#### **7.3 90% Draft Report**

#### **7.4 Final Report**

### **Task 8: Meetings**

#### **8.1 Kickoff Meeting (In-person)**

#### **8.2 Initial Economic Analysis Results Meeting**

#### **8.3 50% Draft Report Meeting**

#### **8.4 Second Economic Analysis Results Meeting**

#### **8.5 90% Draft Report Meeting (In person)**

### **Task 9: Project/Program Management**

#### **Project Manager**

The Project Manager (PM) will be responsible for day-to-day management of the entire process. This includes responsibility for ensuring quality control of documentation and bi-monthly progress reports. The PM will coordinate the efforts of all team members, integrate their effort in the report drafts, provide quality control and reviews, cross check and assemble reports, and integrate Corps review comments where required. The PM will also ensure regularly communication throughout the period of the study with

the PDT is conducted to discuss status and coordination typically through phone call/webinar of approximately one hour. Calls may be scheduled twice per month during some portions of the effort as needed. Unscheduled phone calls and regular e-mail correspondence are encouraged to address questions, comments, or issues that arise between the scheduled calls and this will be coordinated either by the PM or Lead Engineer in consultation with applicable parties and/or Sponsor.

In preparation for Phase 3, the PM will conduct another scoping session for revisiting the Phase 3 scope and updated documentation accordingly.

**Program Management**

The Program Analyst/Scheduler has regularly reporting requirements and meetings with the Project Manager. The Project Scheduler meets once per month with the PM for schedule updates as well as funds transfers as necessary.

**4.4.2. BUDGET**

**Table 8: Phase Two Overall Budget**

	<b>USACE</b>	<b>MSAC</b>	
<b>Cash</b>	\$107,834	\$84,434	
<b>WIK</b>	\$0	\$23,400	
<b>Total Budget</b>	<b>\$107,834</b>	<b>\$107,834</b>	

**Table 9: Phase Two USACE/MSAC Budget Breakdown**

<b>USACE Section</b>	<b>Budget</b>
Project Management/Program Management	\$18,897
Engineering	\$54,600
Economics	\$81,400
Environmental	\$4,000
Other	\$25,800
<b>Labor Sub Total</b>	<b>\$184,697</b>
<b>Contingency 10%</b>	<b>\$18,470</b>
Travel	\$12,500
Total	\$215,667
<b>MSAC</b>	
WIK	\$23,400
Sub Total	
<b>TOTAL</b>	

1) Travel not included in contingency

**Table 10: Phase Two Budget by Task**

Task	Description	Performed By	Hours	Labor	Travel	Comments
1	Project History and Literature Review	CENWO-EDH-F	40	\$3,600/\$2,400		
2.1	Determine the Sedimentation Impacts Footprint	CENWO-EDH-F	20	\$3,000		
2.2	GIS Project Development	CENWO-EDH-F	20	\$3,000		
		CENWO-EDG-D	20	\$3,000		
2.3	Economic Analysis Inventory Development	CENWO-PMA-B	480	\$48,000		
2.4	Estimate of Near Term Sediment Management Costs	CENWO-PMA-B	30	\$3,000		
2.5	Identify Beneficial Uses for Sediment	CENWO-EDH-F	32	\$4,800		
3.1	Dredging Scenarios Update	CENWO-EDH-F	20	\$6,000		
		CEMVN-ED-SC	20			
3.2	Solutions Workshop	MSAC Board (8)			\$1,000	Boat crew incl.  Welp Shelley Hotchkiss, Morris, Randle
		CENWO-EDH-F	88	\$13,200	\$2,000	
		CENWO-PMA-A	64	\$9,600	\$1,000	
		CEERD-CHL	36	\$5,400	\$1,500	
		CENWK	36	\$5,400	\$1,000	
		External SMEs	100	\$15,000	\$5,000	
4	Economic Analysis	CENWO-PMA-B	160	\$16,000		
5	Environmental	CENWO-PMA	40	\$4,000		
6	Constraints	CENWO-EDH-F	8	\$1,200		
7.1	Draft Report Outline	CENWO-EDH-F	4	\$600		
		CENWO-PMA-B	4	\$600		
7.2	50% Draft Report	CENWO-EDH-F	20	\$3,000		
		CENWO-PMA-B	20	\$3,000		
7.3	90% Draft Report	CENWO-EDH-F	20	\$3,000		
		CENWO-PMA-B	20	\$3,000		
7.4	Final Report	CENWO-EDH-F	20	\$3,000		
		CENWO-PMA-B	20	\$3,000		
8.1	Kick-off Meeting (In-Person)	CENWO-EDH-F	12	\$1,800	\$500	
		CENWO-PMA-B	12	\$1,800		
		CENWO-PMA-A	12	\$1,800		
8.2	Initial Economic Analysis Results Meeting	CENWO-EDH-F	2	\$300		
		CENWO-PMA-B	2	\$300		
8.3	50% Report Draft Meeting	CENWO-EDH-F	4	\$600		
		CENWO-PMA-B	4	\$600		
		CENWO-PMA-A	4	\$600		
8.4	Second Economic Analysis Results Meeting	CENWO-EDH-F	2	\$300		
		CENWO-PMA-B	2	\$300		
		CENWO-PMA-A	2	\$300		
8.5	90% Draft Report Meeting (In-Person)	CENWO-EDH-F	12	\$1,800	\$500	
		CENWO-PMA-B	12	\$1,800		
		CENWO-PMA-A	12	\$1,800		
	Labor Subtotal			\$179,900		
9	Project Management Contingency (15% of PM-A)			\$2,715		
	Program Management			\$2,082		

	<b>SubTotal</b>			\$184,697	\$12,500
	<b>Contingency @10%</b>			\$18,470	
	<b>TOTALS</b>			<b>\$203,166</b>	<b>\$12,500</b>

## 5. PHASE THREE

### 5.1. PHASE THREE PURPOSE

The phase two report identified novel sediment management actions through the Solutions Workshop and included an economic analysis of benefits and impacts throughout the currently projected life of Lewis and Clark Lake.

Phase three will expand the engineering analysis of selected actions identified in the Solutions Workshop to include a wider range of sediment management methods that have not been extensively studied. These may include, but are not limited to: watershed improvements, reservoir bypass, off-channel reservoir storage, dam reconfiguration, dam raise, watershed check dams, autonomous dredging, and others.

A detailed economic analysis of the selected management methods, based on the economic analysis completed in phase two will be conducted. The analysis of the cost due to sedimentation will be extended past the 20 year analysis in phase two, to estimate future sedimentation impact costs, including easements/buyouts/mitigation, until decommissioning.

An expanded environmental analysis will be completed on all the sediment management methods and the no-project future.

The cumulative result of the engineering, economic, and environmental assessment will be the development of a Sediment Management Plan for Lewis and Clark Lake and the surrounding area. The plan intends to estimate the extent of benefits and impact that would be seen from implementing any, or a combination of many, sediment management methods.

The development of a Sediment Management Plan by the Corps' does not imply that implementation is imminent, but rather will provide the Corps' and the Sponsor a tool to examine the tradeoffs associated with action or inaction.

#### 5.1.1. STUDY FOOTPRINT

Gavin's Point Dam impounds Lewis and Clark Lake at River mile 811 of the Missouri River. The top of the flood control pool (elevation 1210.0 feet NVGD 1929) extends approximately 25 miles upriver, to just above Springfield, SD.

Sedimentation inputs from within and outside the study footprint combine to create the current conditions. Approximately 60% of the supply is from the Niobrara River, 30% from the Missouri River, and the remaining 10% from smaller tributaries (Ponca, Bazile creek etc.), bank erosion, and the local watershed. To create a more complete assessment of sediment impacts, the upstream study footprint will extend up the Missouri to Fort Randall Dam, to the lower 15 miles of the Niobrara River, and the lower reaches of Ponca and Bazile Creek.

The reach of the Missouri River below Gavin's Point Dam is not within the project boundary but is

heavily impacted by the lack of sediment delivery from upstream. The Missouri River to Ponca, NE (RM 753) and the lower reaches of the James River and Vermillion River will be included in the study footprint.

**5.1.2. STUDY SCHEDULE**

Approximately 24 month from kickoff

**5.1.3. KEY STUDY MILESTONES**

- Completion of engineering analysis
- Completion of economic analysis
- 50% draft review by sponsor
- 90% draft review

**5.1.4. GENERAL**

The Work Breakdown Structure (WBS) is a breakdown of the project into its component work tasks and products. At this time this section presents information on study responsibilities, in-kind services, and references to the scopes of work. Following negotiations on the in-kind services with the Sponsor this section and supporting documentation will be updated.

**5.1.5. STUDY RESPONSIBILITIES**

The study is being cost-shared 50% Federal and 50% non-Federal. The sponsor partnership will be undertaking several tasks to assist in completing the study, which are outlined in the study tasks table below.

Agencies performing work for the Federal Government are: USACE.

**5.1.6. TASK SCHEDULE**

**Table 11: Phase Three Task Schedule**

Task	Description	Performed By	Begin	End
1	Identify sediment management methods		01JAN22	31MAR22
2	Engineering analysis		01APR22	31DEC22
3	Engineering analysis: Detailed Assessment		01NOV22	31JUL23
4	Economic Analysis		01FEB23	30SEP23
5	Environmental Assessment		01FEB23	30SEP23
6	Environmental Assessment: No Action		01FEB23	30SEP23
7	Development of Sediment Management plan		01JAN22	31DEC23
8	Reports		01JUL22	31DEC23
9	Meetings		01JAN22	31DEC23
10	Project management		01JAN22	31DEC23

## 5.2. WORK IN-KIND SERVICES

## 5.3. PHASE THREE PROJECT TEAM (USACE)

**Table 12: Phase Three Project Team**

<b>Name</b>	<b>Org</b>	<b>Role</b>
Timothy Goode	USACE/PMA-A	Project Manager
Greg Johnson	USACE/PMA-A	Chief, Plan Formulation Section
Dan Pridal	USACE/EDH-F	Chief, River and Reservoir Engineering Section
Paul Boyd	USACE/EDH-F	Sr. Engineer, River and Reservoir Engineering
Drew Minert	USACE/PMA-B	Chief, Economics Section
Eric Laux	USACE/PMA-C	Chief, Env and Cultural Resources Section

## 5.4. STUDY SCOPE OF WORK WITH COSTS

### 5.4.1. STUDY SCOPE

The phase three study task are listed below.

#### **Task 1: Identify sediment management methods for engineering and economic analysis.**

There are numerous sediment management methods that can be applied to any reservoir. Some are clearly applicable, while others may have significant obstacles to implementation. Technological advances continually increase the number of sediment management option, and other environmental, economic, and social factors may prioritize some options. At the time of the Kickoff meeting for Phase Three, the Corps' will make a presentation to the Sponsors on the current state of the art among sediment management methods for reservoirs. The Sponsor, with Corps' input, will identify methods for analysis. It is expected that some or all of these methods will be identified in the phase two Solutions Workshop.

#### **Task 2: Engineering Analysis**

The sediment management methods will be applied to the study footprint. For each method an implementation plan will be developed. This plan will outline the general quantitative variables associated with implementation. This may include, size, speed, flow, trap efficiency, length of life, maintenance required, energy inputs, or other factors.

This will not be a detailed design, but will be more detailed than reconnaissance level assessment. Upon completion of this analysis, one or more of the methods may be considered viable for inclusion in the implementation recommendations in the Sediment Management Plan. Those methods will be developed more fully in the next task.

#### **Task 3: Engineering Analysis: Detailed Assessment of up to Two (2) Sediment Management Methods**

The two selected methods will be investigated further, and basic design parameters will be developed. This will in turn allow the methods to be assess for estimated implementation cost. Beneficial use of the sediment associated with these methods will also be evaluated.

#### **Task 4: Economic Analysis: Two Sediment Management Methods**

The selected management methods will have the same economic analysis as the three methods in phase two. This will include estimating implementation cost and determining the cost benefits and impacts from implementation as a permanent application.

### **Task 5: Environmental Assessment of Sediment Management Methods**

The sediment management methods will be assessed at implementation scale into perpetuity for the study footprint. The assessment will include water quality, threatened and endangered species, sport fisheries, aquatic and terrestrial habitat, invasive species, etc.

### **Task 6: Environmental Assessment of No-Action Future**

Without sediment management, the vast majority of the open pool at Lewis and Clark Lake will be lost in the next 100 years. In addition, upstream aggradation and downstream degradation will continue. This assessment will look at water quality, threatened and endangered species, sport fisheries, aquatic and terrestrial habitat, invasive species, etc., under the No-Action future.

### **Task 7: Development of a Sediment Management Plan for Lewis and Clark Lake**

The Sediment Management Plan Document will cover the following topics:

- 7.1 Project Background and Literature Review
- 7.2 Review of Sediment Management Methods
- 7.3 Economic Analysis of the Benefits provided
- 7.4 Economic Analysis of decay of benefits due to sedimentation
- 7.5 Economic Analysis of No-Action
- 7.5 B/C and Life-cycle analysis for implementation of management methods
- 7.6 Beneficial Uses of Sediment
- 7.7 Environmental Assessment with No-Action
- 7.8 Environmental Assessment of management methods
- 7.9 Constraints
- 7.10 Implementation Recommendations

### **Task 8: Reports**

#### **8.1 Draft Report Outline**

#### **8.2 50% Draft Report**

#### **8.3 90% Draft Report**

#### **8.4 Final Report**

### **Task 9: Meetings**

#### **9.1 Kickoff Meeting (In-person)**

#### **9.2 Engineering Analysis Results Meeting (5 methods)**

#### **9.3 Engineering Analysis Results Meeting (2 methods)**

#### **9.4 50% Draft Report Meeting (In person)**

#### **9.5 90% Draft Report Meeting (In person)**

### **Task 10: Project Management**



## **7.1. DISTRICT QUALITY CONTROL/QUALITY ASSURANCE**

All work products and reports, evaluations, and assessments shall undergo necessary and appropriate District Quality Control (DQC). The Omaha District shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the responsible Major Subordinate Command (MSC).

DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. Basic quality control tools include a QMP providing for seamless review, quality checks and reviews, supervisory reviews, PDT reviews, etc. The DQC process consists of two primary reviews: Interdisciplinary Review and Quality Check.

### **7.1.1. INTERDISCIPLINARY CHECK**

- Interdisciplinary Check is the first of the two phases of DQC. It is conducted by the PDT and uses Dr. Checks. Unless otherwise directed by the PM, the Interdisciplinary Review may follow the process outlined for the second phase, the Quality Check.
- The DQC covers both Quality Control Plan considerations for work produced internally, and Quality Assurance Plan considerations for work produced by outside resources such as by contract.
- The Interdisciplinary Review consists of review and certification by the PDT that the work of each member meets quality objectives, and that an Interdisciplinary Review has been conducted that demonstrated the work of the PDT meets quality objectives. In addition the certification attests that the decision document has been read in its entirety.
- The PDT will normally conduct at least one Interdisciplinary Review Meeting including all major PDT members.
- A Contract Quality Control Plan will be provided by A-E contractors for work contracted. PMs and PDTs will be responsible for Quality Assurance on deliverables.
- A record of Interdisciplinary comments and responses will be made available to Quality Check Reviewers for their review, along with the decision document.
- Review periods and meetings should be communicated and invited with sufficient lead time. Duration for Interdisciplinary Review and comment is typically 10 working days for GI, 8 for CAP, and 6 for Section 14, Section 22, and other Planning Products. Response to comments and back-checking should allow at least 5 days, more for large or complex documents, and more depending on availability of PDT members and the PM to complete the back check. Back checking should begin as soon as comments start being recorded in Dr. Checks.

### **7.1.2. QUALITY CHECK REVIEW**

- A Quality Check Review is the second of two DQC phases and is conducted by Supervisors and subject matter experts (SMEs).
- Omaha Planning Chief has directed that all Planning supervisors be included on all Planning Quality Check Reviews. In addition, there should be either or both an SME and/or a qualified supervisor to act as independent reviewer for each primary discipline involved on the PDT.
- All comments will be recorded in Dr. Checks and attempts to resolve each comment will be made by the PM and PDT with each of the Quality Check Reviewers providing comments, prior to a Quality Check Review Meeting. The meeting will then consist of a general survey by the PM of especially notable comments and their resolution, discussions of any unresolved

comments or issues, and signing the Quality Check Review Certification if possible. For most, if not all participants, this should normally be possible.

- Review periods and meetings should be communicated and invited with sufficient lead time. Duration for Interdisciplinary Review and comment is typically 10 working days for GI, 8 for CAP, and 6 for Section 14, Section 22, and other Planning Products. Response to comments and back-checking should allow at least 5 days, more for large or complex documents, and more depending on availability of PDT members and the PM to complete the back check. Back checking should begin as soon as comments start being recorded in Dr. Checks.
- Legal Review is suggested during Quality Check Review period and the reviewing attorney invited to the Quality Check meeting.
- Sponsor Review is suggested after DQC and coincident with Agency Technical Review (ATR) review.
- DQC signoff sheet templates should be used.

## **8. SAFETY PLAN**

USACE, the Sponsor and their contractors will comply with all local, State and Federal safety rules and regulations to protect the safety and health of employees engaged in official study activities. Appropriate safety reviews and considerations will be implemented throughout the life cycle of this project. During the study phases a major safety consideration is identifying potential hazards relative to site conditions, including water safety concerns, driving safety, climate related hazards, presence of dangerous wildlife, vectors, and plants, and needed safety equipment. Appropriate safety briefings prior to any field activity, such as site visits, will be conducted to apprise groups of any potential hazards. Initially the PM and the Sponsor will generate a list of potential hazards and conduct a Preliminary Hazard Analysis (PHA).

### **8.1. SAFETY REQUIREMENTS**

Team members will practice safety throughout the study. Travelers in passenger vehicles will always wear seatbelts, avoid dangerous travel conditions, adverse weather, pack safety gear, and carry cell phones. Team members will not use ATVs, horses, or other unconventional modes, or perform risk-related duties outside their normal duties.

## **9. CHANGE MANAGEMENT PLAN**

### **9.1. PMP CHANGES**

This PMP is a working document and is intended to be revised as needed throughout the study process. Changes to the PMP may be requested by either USACE or the sponsor. Other stakeholders may suggest PMP changes, but such changes will only be considered if both USACE and the sponsor decide to do so. USACE gives the sponsor the opportunity to review and comment on study products, but makes the final decision. Changes to the study approach and scope of work will be reflected in the PMP and agreed upon by USACE and the sponsor. Once PMP changes have been made, the updated version will be distributed to USACE PDT and the sponsor and will be made available to other stakeholders upon request.

### **9.2. STUDY CHANGES**

Changes to the study scope, schedule, or budget may be requested by either USACE or the Sponsor, or may be necessary for other reasons (e.g. higher level USACE direction, Federal funding constraints). Scope, schedule, or budget changes requested by USACE or the Sponsor will be made by USACE after they are discussed and agreed upon by both parties. Some changes may also require higher level USACE

approval. USACE will make changes necessitated for other reasons as needed and will notify the Sponsor of any such changes. Once USACE and the Sponsor have agreed upon the baseline scope, schedule, and budget for the study, both parties will attempt to minimize changes in order to help meet the objective of conducting an efficient and focused study process.

## **10. COMMUNICATION PLAN**

### **10.1. USACE AND SPONSOR COMMUNICATION**

The study will be conducted with full and open communications within USACE and between USACE and the Sponsors. Communication regarding all study activities, including work in-kind, will occur between the USACE PM and the Executive Director of MSAC and as otherwise agreed upon.

The PDT will hold periodic meetings, at least once per month, to discuss and resolve issues, update study status, and review study reports, etc. As appropriate, the Sponsor will be invited to participate via conference call. In addition to the PDT meetings, the Sponsor will be updated periodically on the status of the study and will be provided financial information consistent with public law, regulations, and good business practices. USACE upper management will also be kept informed of the study. The PM will discuss accomplishments of PDT, identify issues, and forecast changes to schedules and costs. Such internal briefings and meetings will be held monthly, quarterly, or annually, according to established District procedures. Fact sheets with condensed information about the project are maintained and updated periodically by the PM to provide background information to higher authority or to respond to other inquiries.

### **10.2. AGENCY COORDINATION**

USACE coordination on the project and report with other government agencies and non-governmental entities is ongoing and will continue. In general, coordination between USACE and other Federal agencies or state agencies will be conducted directly between USACE and the agencies. The Sponsor will be kept informed of this coordination and will be invited to participate as appropriate. In general, coordination between USACE and local agencies and Indian Tribes will be conducted in cooperation with the Sponsor to help foster collaboration between the Sponsor and the agencies and Tribes on the Project.

## **11. CLOSEOUT PLAN**

The PM is responsible for closeout. The closeout would also apply in situations where the project might be terminated. All outstanding obligations and commitments will need to be cleared. The Sponsor's PDT member responsible for keeping financial records will assist the PM in carrying out an audit of feasibility study cost expenditures, including funds used for contracted services and those for IKS. The PM shall also insure that all contracted services products have been accepted prior to making any final payments.

Omaha District procedures for closeout shall follow standard operation procedures. The amounts of Federal and non-Federal costs will be determined and a balancing of expenditures based on the approved study cost share ratio will be determined. The outcome will determine the direction and amount of any funds to be transferred between the Sponsor and the Federal Government.

The cost of the closeout has been included in Programs budget and Project Management budget in the PMP scope per guidance in the current model FCSA.

## 12. APPROVALS

The PMP is valid when it has been reviewed and signed by the Chief of the Omaha District Plan Formulation & Project Management Section and Sponsor Representative

---

Greg Johnson  
Chief, Plan Formulation & Project  
Management Section  
Omaha District, Corps of Engineers

---

**Sponsor Representative**