

**Progress Report #3  
January 13, 2023**

Project: 22-01-184  
Odland Dam Sediment Removal Project

Brosz Engineering, Inc.  
Shannon Hewson  
Project Engineer

REPORTING PERIOD: December 16, 2022 to January 13, 2023

**ITEMS COMPLETED:**

Brosz Engineering, Inc. (Engineer) was hired by the Golden Valley County Waterboard (Owner) on June 15, 2022 to design the Odland Dam Sediment Removal Project. Final plans were approved and the Invitation to Bid was signed by the Owner on September 26, 2022. Bid Opening was held on October 20, 2022 at 10:00 A.M. in the Golden Valley County Courthouse.

OneCor Services, LLC (Contractor) was hired by the Golden Valley County Waterboard on October 20, 2022 to complete the Odland Dam Sediment Removal Project. The Contractor was awarded Schedules 1, 2, 3, and 4. A preconstruction meeting was held at the Golden Valley County Courthouse on November 2, 2022. The Contractor mobilized onsite and began construction on November 7, 2022. To date the following work has been completed:

- **Item I-2:** Disposal areas were stripped of topsoil and stockpiled to form a berm around the perimeter of the disposal areas. Bid Item I-2 "Topsoil" is 50% complete. The stockpiled topsoil will be replaced prior to the completion of the project and remaining payment shall be completed.
- **Item I-5:** Rock Checks were installed on the downstream side of dam at the pump outlet prior to beginning dewatering. Contractor will remove rock checks and reclaim area prior to the completion of the project. Bid Item I-5 "Rock Check" is 100% complete.
- **Item I-6:** Silt fence was then installed around the perimeter of the disposal area and topsoil stockpile berms. Bid Item I-6 "Silt Fence Unsupported" is 87% complete.
- **Item I-8:** Contractor began dewatering of Odland Dam on November 9, 2022 at 5:00pm. The Contractor installed a trench in the northwest corner of the lakebed to drain the water toward the pump. Pumping commenced and continued until November 21, 2022 completing the initial dewatering process. Bid Item I-8 "Dewatering" is 100% complete.
- **Item I-9:** Additional Dewatering was required due to precipitation occurring during the project. The pump was in operation November 25-28, November 29-December 5 and December 27-29 totaling 197 Acre-Feet of "Additional Dewatering".

- **Item II-1:** Excavation of Schedule 2 began on December 8, 2022 at 1:00pm. Contractor began excavation in the center of Schedule 2 and dredged out to the site 2 excavation limits from there. Contractor completed the majority of Schedule 2 excavation thru January 12, 2023, less the NE corner where the haul road crosses to Schedule 1. The remaining material from Schedule 2 will be completed upon completion of Schedule 1. To date 99% of plans quantity sediment has been removed from Schedule 2.

The overall project completion is 35%. Pay Application No. 3 was prepared on January 20, 2023. The Contractor plans to continue constructing haul roads as required and continue excavation through January. Additional dewatering may be required but is dependent upon rainfall or snow melt.

**From:** Ronald M. Koth  
**Sent:** Thursday, December 2, 2021 5:36 AM  
**To:** 'janel ordahl'  
**Cc:** Ronald M. Koth; Jon D. Ausdemore; BJ Siljenberg  
**Subject:** Odland sediment removal memo 2018

Bud, attached is the Barr memo on sediment removal that was developed in 2018.  
Thanks Ron

Ronald M. Koth

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## Technical Memorandum

**To:** Golden Valley County Water Resource Board  
**From:** Matt Peterson, PE and Ron Koth  
**Subject:** Sediment Removal In the Odland Dam Reservoir  
**Date:** February 8, 2018  
**Project:** 34171001.00

This memorandum provides high-level descriptions and costs for two options to remove accumulated sediment in the Odland Dam reservoir: mechanical excavation and hydraulic dredging.

### Background and Introduction

Sediment and organic material have accumulated in the Odland Dam since its construction in 1936. Over the years, there have been ongoing discussions about possibilities of removing sediment or raising the dam to provide a deeper reservoir. Motivations for sediment removal include improved recreation, fish habitat, and water quality.

In April 1987, the North Dakota State Water Commission (NDSWC) issued a Preliminary Engineering Report, which presented four alternatives for excavating the accumulated sediment from the reservoir. All of the alternatives assumed the dam would be breached, the reservoir drained, and the sediment would be excavated in dry conditions. The alternatives assumed sediment would be excavated from portions of the reservoir such that any area with water depths greater than four feet deep would be at least eight feet deep following excavation. Each alternative considered excavation in different portions of the reservoir. Volumes of removed sediment ranged from 18,000 cubic yards to 124,900 cubic yards, and costs ranged from \$46,000 to \$203,500 (1987 dollars).

The North Dakota Game and Fish Department (NDGF) conducted a bathymetric survey of the Odland Dam reservoir in 2003. Results of the survey are shown in attached **Figure 1**. This is the most recent bathymetric survey data we are aware of, and it is likely that additional sediment has accumulated in the reservoir in the 15 years since this survey. However, the rate of sedimentation in recent years (2009-current vs mid-1990's) is presumed to have decreased due to changes in watershed management, as evidenced by a downward trend of nitrogen and phosphorus concentrations in reservoir water (Wax and Ell 2011).

Both options evaluated in this memorandum assume 27,000 cubic yards of sediment would be removed from the reservoir. We assumed sediment would be removed from portions of reservoir shown as greater than 12 feet deep in **Figure 1**. The sediment removal concentrates on making the deepest parts of the reservoir deeper, which provides the greatest benefit to fish habitat by providing deeper portions of the

To: Golden Valley County Water Resource Board  
From: Matt Peterson, PE and Ron Kofh  
Subject: Sediment Removal in the Odland Dam Reservoir  
Date: February 8, 2018  
Page: 2

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reservoir to reduce the potential for winterkill, especially during years when the reservoir freezes with lowered water surface elevations due to precipitation patterns. We have assumed that two feet of sediment would be removed from portions of the reservoir currently 12-15 feet deep and four feet of sediment would be removed from areas currently greater than 15 feet deep. The assumed sediment removal extents are shown in attached **Figure 2**.

Alternatively, if the primary emphasis were to provide deeper water areas to support recreational boating and boat access, the sediment removal could be adjusted to create deeper water areas in the areas of the reservoir currently between 3 and 9 feet deep. Areas for sediment removal and associated quantities should be further refined as the project moves forward, balancing costs while meeting the project objectives.

#### **Option 1 – Mechanical Excavation**

Option 1 involves removing accumulated sediment with mechanical excavation in a drained reservoir. Because the sediment removal is planned for the deepest parts of the reservoir, the reservoir would need to be completely or nearly completely dewatered. The reservoir would need to be drained in a controlled manner over time to prevent flooding downstream of the dam and prevent bank caving upstream of the dam. This option and associated costs have been developed as an independent action from Alternative 2 for spillway replacement (Barr 2017). A complete reservoir drawdown is unnecessary to replace the existing spillway since the spillway sits on natural ground at a higher elevation than the reservoir bottom. Some overall cost savings would likely be achieved by doing both projects in concurrently due to economy of scale and shared costs for contractor mobilization.

The reservoir could be dewatered using a variety of methods, but for the basis of our cost estimate, we have assumed draining the reservoir would involve the following steps:

- Lower the water surface elevation in the reservoir as low as possible using pumps and/or siphons.
- Install a temporary cofferdam upstream of the portion of the embankment that will be breached.
- Breach the dam by excavating the portion of the embankment to be removed down to the base elevation of the reservoir.
- Install a temporary pipe at the bottom of the excavation. Equip the pipe with a gate or similar device to control the flow rate through the pipe.
- Backfill and compact the pipe and temporarily restore the embankment.
- Excavate drainage channels upstream and downstream of the pipe.
- Remove the temporary cofferdam and allow flow to pass through the pipe. Control flow rates using the gate to lower the reservoir elevation in a controlled fashion.

After the reservoir is mostly dewatered, the sediment would be removed using excavators and front-end loaders. Some water control during excavation of the material would likely be necessary, as it is unlikely the reservoir would be completely drained due to localized low spots, and there would still be inflow into

To: Golden Valley County Water Resource Board  
From: Matt Peterson, PE and Ron Kohl  
Subject: Sediment Removal in the Odland Dam Reservoir  
Date: February 8, 2018  
Page: 3

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the reservoir. Performing the work in winter and/or allowing the sediment to dewater for a lengthened amount of time are options to minimize the amount of water control necessary. The temporary pipe would continue to pass flows through the dam during construction.

The excavated material would be placed into off-road haul trucks and hauled to a nearby disposal site. The material would be graded out and seeded to restore the disposal site.

Following excavation of the sediment, the temporary pipe passing through the embankment would be removed, and the embankment would be restored. The natural inflows to the reservoir would refill the reservoir over time.

Draining the reservoir is a significant downside of mechanical excavation, as most fish and other aquatic biota will be killed. Reservoir drawdown should ideally be scheduled immediately following a naturally occurring winterkill to avoid disruption of viable recreational fishing opportunity. Coordination with NDGF will be important to reduce adverse impacts on recreational fishing and to plan for re-stocking following sediment removal. There is also risk involved with breaching the embankment – if not executed carefully, it could lead to an uncontrolled release of the remaining water in the reservoir.

#### **Option 2 – Hydraulic Dredging**

The second option considered is removal of the accumulated sediment via hydraulic dredging using a barge. The reservoir would not be dewatered for hydraulic dredging. Hydraulic dredging includes the use of pumps and piping for removing (pumping) a mixture of dredged material and water from the reservoir bottom. A typical pipeline hydraulic dredge sucks the mixture (slurry) of sediment and water through one end and pumps the material through the discharge pipeline (approximately 8 to 12 inch diameter) directly to a sediment dewatering area. A mechanical cutting head, consisting of rotating blades, is often included at the intake pipe to agitate and loosen bottom sediments so they can be pumped through the dredge pipeline system. Hydraulic dredging typically requires a larger dewatering area than mechanical excavation because of the significant volume of water that must be managed. Typically, hydraulically dredged material consists of a sediment/water slurry that ranges from 5% to 20% solids (by volume).

We have assumed that the slurry would be pumped directly to its disposal site in the immediate vicinity of the reservoir. Ring dykes would be constructed in the disposal site to create a dewatering area. The water in the sediment slurry would be allowed to drain out by gravity over time. The amount of dewatering time varies depending on the makeup of the sediment – sands and gravels dewater more quickly than silts and clays. Alternatively, other dewatering methods could be used, such as pumping the material into geotextile dewatering bags or using a dewatering polymer, but these options would likely be more expensive than the gravity draining method described above. After the material has dewatered, material would be graded out and seeded to restore the disposal site.

To: Golden Valley County Water Resource Board  
From: Matt Peterson, PE and Ron Kolh  
Subject: Sediment Removal In the Odland Dam Reservoir  
Date: February 8, 2018  
Page: 4

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The major benefit of hydraulic dredging over mechanical excavation is that the reservoir would not need to be drained. Locally generated turbidity from dredging activities would not likely be detrimental to fisheries.

#### **Key Assumptions**

The following key assumptions have been made in preparation of this memorandum and the associated cost estimates:

- We have assumed the sediment in the reservoir is not contaminated. We have no reason to believe the sediment is contaminated, however, this assumption should be confirmed through testing of the sediment if the project is pursued. If the sediment is contaminated, the cost to remove and dispose of the sediment would increase.
- We have assumed that the removed sediment could be placed in an upland area adjacent to the reservoir. Specific disposal sites have not been identified. Costs associated with obtaining land for the sediment disposal have not been included.

#### **Costs**

Cost estimates by task for the two options are included in the attached cost estimate tables. The concept level five percent design mid-range cost estimates are \$492,000 for mechanical excavation and \$805,000 for hydraulic dredging including a ten percent construction contingency, engineering, and permitting.

#### **Conclusions and Next Steps**

Hydraulic dredging is a more expensive option for removal of sediment in the Odland Dam Reservoir than mechanical excavation; however, a significant advantage to hydraulic dredging is that the reservoir would not need to be drained to remove the sediment. Costs presented in this memorandum depend heavily on the volume of sediment assumed to be removed. Sediment removal quantities should be further refined as the project moves forward, balancing costs while meeting the project objectives.

If the sediment removal project is pursued, updated bathymetric mapping of the reservoir bottom should be performed and sediment core samples should be obtained. Updated reservoir bathymetry will allow scheduling of sediment removal to derive the most project benefits and future use priorities as identified by reservoir users. The sediment samples should be tested both for contaminants and for physical characteristics, including particle size distribution and soil classification. Coordination with permitting and funding agencies/partners is also a key next step.

#### **References**

1. North Dakota State Water Commission, 1987. Preliminary Engineering Report - Odland Dam Restoration, Golden Valley Co., North Dakota, April 1987.
2. Wax, Peter N. and Michael J. Ell, 2011. 2008-2011 North Dakota Lake Water Quality Assessment Reports, Division of Water Quality, North Dakota Department of Health, June 2011.

To: Golden Valley County Water Resource Board  
From: Matt Peterson, PE and Ron Kolh  
Subject: Sediment Removal in the Odland Dam Reservoir  
Date: February 8, 2018  
Page: 5

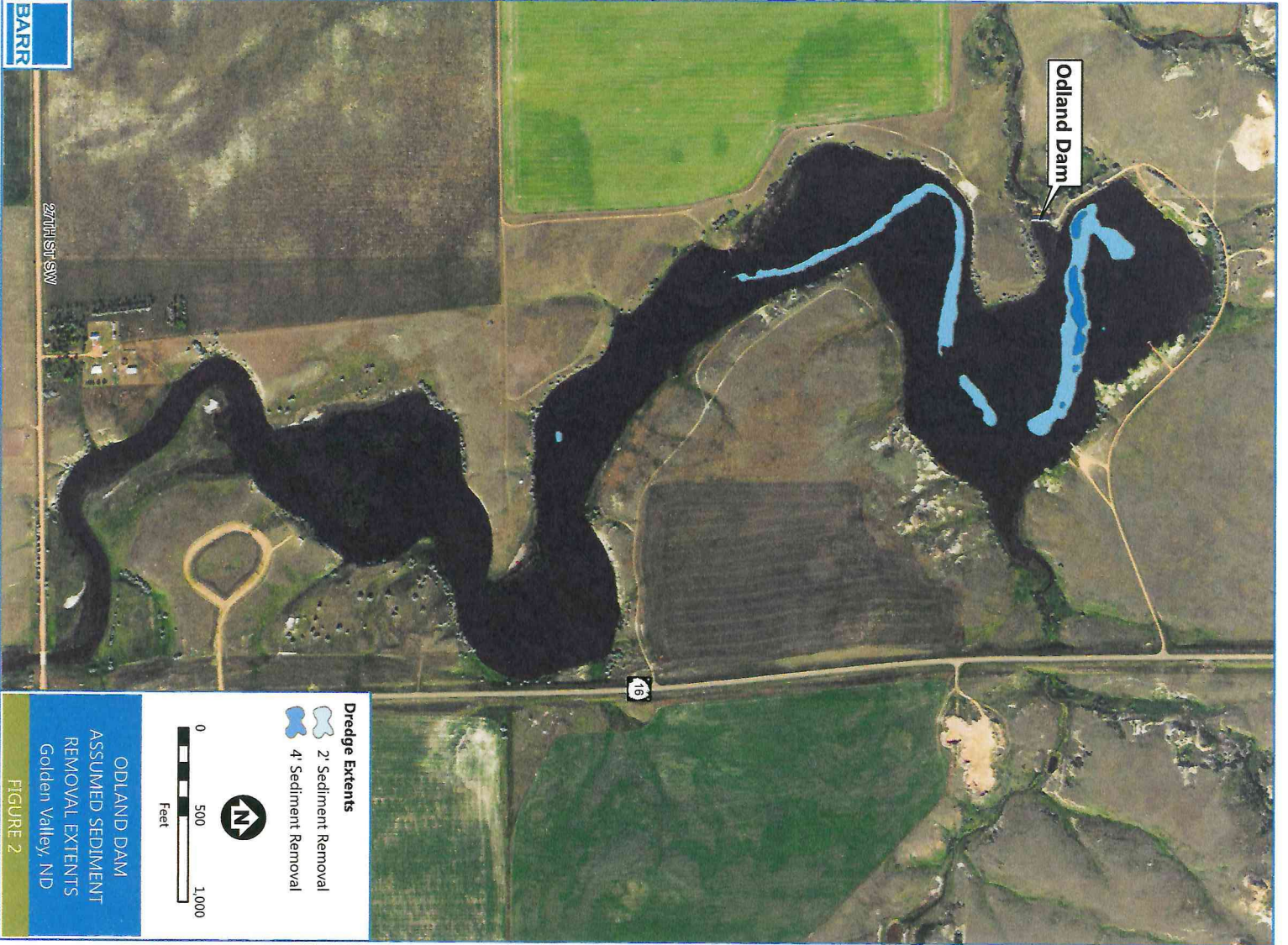
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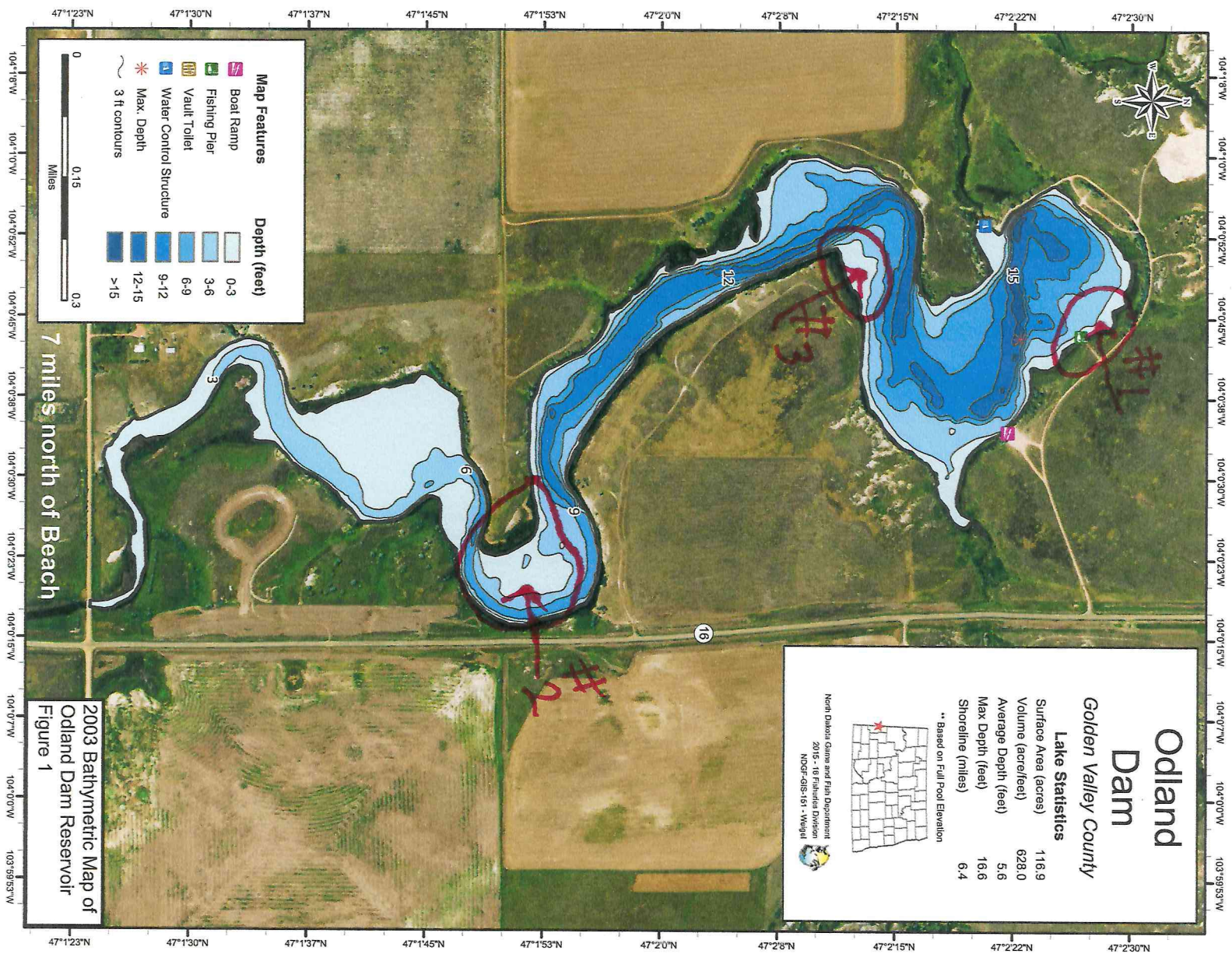
3. Barr Engineering, 2017. Odland Dam Spillway Repair/Replacement Evaluation, November 2017.

**Attachments**

- Figure 1 – 2003 Bathymetric Map of Odland Dam Reservoir by North Dakota Game and Fish Department
- Figure 2 – Assumed Sediment Removal Extents
- Cost Estimate Table: Option 1 – Mechanical Excavation
- Cost Estimate Table: Option 2 – Hydraulic Dredging







**Map Features**

- Boat Ramp
- Fishing Pier
- Vault Toilet
- Water Control Structure
- Max. Depth
- 3 ft contours

**Depth (feet)**

- 0-3
- 3-6
- 6-9
- 9-12
- 12-15
- >15

0 0.15 0.3  
Miles

7 miles north of Beach

2003 Bathymetric Map of Odland Dam Reservoir  
Figure 1

## Odland Dam

Golden Valley County

**Lake Statistics**

Surface Area (acres)	116.9
Volume (acre/feet)	628.0
Average Depth (feet)	5.6
Max Depth (feet)	16.6
Shoreline (miles)	6.4

\*\* Based on Full Pool Elevation

North Dakota Game and Fish Department  
2015  
2015 Fisheries Division  
NODF-03S-151-109M

PREPARED BY: BARR ENGINEERING COMPANY

BARR

Option 1 - Mechanical Excavation

Concept Design Level

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Odland Dam Spillway Repair/Replacement Evaluation  
 LOCATION: Golden Valley County, North Dakota  
 PROJECT #: 34171001.00  
 February 2018

ESTIMATED COSTS						
Item No:	Item Description	Quantity	Units	Unit Cost	Total Cost	
1	Mobilization	1	LS	\$40,000	\$40,000	
2	Breach embankment and install temporary dewatering pipe and gate	1	LS	\$35,000	\$35,000	
3	Water Control During Excavation	1	LS	\$15,000	\$15,000	
4	Mechanical Excavation	27,000	CY	\$9	\$243,000	
5	Temporary Erosion Control at Disposal Site	1	LS	\$5,000	\$5,000	
6	Disposal Site Restoration	1	LS	\$15,000	\$15,000	
7	Remove temporary dewatering pipe and restore embankment	1	LS	\$20,000	\$20,000	
	Construction Cost Subtotal				\$373,000	
	10% Construction Cost Contingency				\$37,000	
	Engineering and Permitting (assumed 20% of construction cost)				\$82,000	
	TOTAL PROJECT COST (Mid Range Estimate)				\$492,000	
	Low Range Estimate (-25%)				\$370,000	
	High Range Estimate (+50%)				\$740,000	

Notes:

- Limited Design Work Completed (5% concept level).
- This concept-level (Class 4, 5% design completion per ASTM E 2516-11) cost estimate is based on concept-level designs, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -25% to +50%. The accuracy range is based on professional judgment considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance and Construction Administration costs are not included.
- Engineering and Permitting are assumed to be 20% of the combined sum of the Construction Cost Subtotal and Construction Cost Contingency.
- Cost estimate assumes sediment is not contaminated and can be disposed of in an upland area adjacent to reservoir.

PREPARED BY: BARR ENGINEERING COMPANY

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Option 2 - Hydraulic Dredging

Concept Design Level

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: Odland Dam Spillway Repair/Replacement Evaluation  
 LOCATION: Golden Valley County, North Dakota  
 PROJECT #: 34171001.00  
 February 2018

ESTIMATED COSTS						
Item No.	Item Description	Quantity	Units	Unit Cost	Total Cost	
1	Mobilization - Dredge	1	LS	\$100,000	\$100,000	
2	Hydraulic Dredging	27,000	CY	\$15	\$405,000	
3	Construct Dewatering Berms at Disposal Site	1	LS	\$75,000	\$75,000	
4	Disposal Site Restoration	1	LS	\$30,000	\$30,000	
	Construction Cost Subtotal				\$610,000	
	10% Construction Cost Contingency				\$61,000	
	Engineering and Permitting (assumed 20% of construction cost)				\$134,000	
	TOTAL PROJECT COST (Mid Range Estimate)				\$805,000	
	Low Range Estimate (-25%)				\$600,000	
	High Range Estimate (+50%)				\$1,210,000	

Notes:

- 1 Limited Design Work Completed (5% concept level).
- 2 This concept-level (Class 4, 5% design completion per ASTM E 2516-11) cost estimate is based on concept-level designs, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The estimated accuracy range for the Total Project Cost as the project is defined is -25% to +50%. The accuracy range is based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. The contingency and the accuracy range are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency. Operation and Maintenance and Construction Administration costs are not included.
- 3 Engineering and Permitting are assumed to be 20% of the combined sum of the Construction Cost Subtotal and Construction Cost Contingency.
- 4 Cost estimate assumes sediment is not contaminated and can be disposed of in an upland area adjacent to reservoir.

Updated #15 12/2/21

- 1 # 50,000.<sup>00</sup> MOBILIZATION
- 2 # 40,000.<sup>00</sup> BREACH EMBANKMENT & INSTALL DEWATERING ~~PIPE~~ PIPE & GATE
- 3 # 20,000.<sup>00</sup> WATER CONTROL DURING EXCAVATION
- 4 # 810,000.<sup>00</sup> MECHANICAL EXCAVATION 81,000 YDS @ 10<sup>00</sup>/YD
- 5 # 6,000.<sup>00</sup> TEMPORARY EROSION CONTROL AT RESP. SITE
- 6 # 20,000.<sup>00</sup> DISPOSAL SITE RESTORATION
- 7 # 25,000.<sup>00</sup> REMOVE TEMPORARY DEWATERING PIPE & RESTORE EMBANKMENT

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# 971,000.<sup>00</sup> CONSTRUCTION COST SUBTOTAL  
97,100.<sup>00</sup> 10% CONSTRUCTION COST CONTINGENCY  
213,620.<sup>00</sup> ENGINEERING & PERMITTING 20%

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1,281,720.<sup>00</sup>


APPROX \$5,000.<sup>00</sup>

THERE IS THE POSSIBILITY OF A FUEL SURCHARGE BECAUSE OF RISING FUEL PRICE AND WILL BE SOME MINIMAL ROAD RESTORATION WHEN PROJECT IS COMPLETED

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# 1,296,720.<sup>00</sup>

The Heartland's Bank<sup>SM</sup>

**METROPOLITAN**  
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A FEDERAL SAVINGS BANK FDIC INSURED