Town of Delavan

Mound Road Sediment Basin Dredging Study - DRAFT

Prepared by:

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PRELIMINARY

Town of Delavan
Mound Road Sediment Basin Dredging Study - DRAFT

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Executive Summary

The Town of Delavan plans to clean the engineered basins at Mound Road to improve the capture of sediment and thereby improve the water quality in Delavan Lake. The basins have not been dredged since 2007 and are no longer as efficient at capturing sediment.

The Town of Delavan retained Baxter & Woodman, Inc. (Baxter & Woodman) to outline a plan to either hydraulically or mechanically dredge the Mound Road basins. There are three basins including the North, West and East basin. A fourth alternative was considered with the goal of staying within the Town of Delavan's $750,000 initial capital budget. The alternatives reviewed include the following:

- Alternative 1 - Hydraulic dredging by contractors with sediment transport to a new drying basin adjacent to the site, sediment bags, and land disposal of the dredged waste. This option is based on the previous Berrini & Associates report dated June 26, 2017.

- Alternative 2 - Hydraulic dredging by contractors with sediment transport to mobile trailer mounted treatment units for removal and thickening of the sediment waste.

- Alternative 3 - Bypass each basin utilizing earthen berms and cut channels to the other basin(s) to reroute the water flow, and allow the sediment to dry. The sediment will be disposed of in an approved site.

- Alternative 4 - Direct purchase dredging equipment by the Town of Delavan with operation and disposal of the sediment at an approved site. DLSD would provide the labor for the periodic dredging of the basins.

Capital costs for the various alternatives ranged from just over $1,000,000 to over $3,000,000. These costs are in the ballpark of what was expected. Baxter & Woodman recommends Alternative 4, whereby the Town of Delavan would direct purchase several pieces of dredging equipment and would enter into an agreement with the Delavan Lake Sanitary District (DLSD) to provide labor for dredging operations. Recommended Alternative 4 is below:

1. The town has $750,000 allocated specifically to capital. The purchase of equipment qualifies as a proper use. This is in comparison to hiring a dredging company that is only providing a service.

Executive Summary (cont.)

2. DLSD will collaborate with the Town of Delavan and provide the labor for dredging the basins. DLSD has supposedly budgeted $250,000 annually for dredging. Maintenance dredging on a periodic basis is less labor intensive than one-time dredging.

3. Site preparation should be less since DLSD can flex their schedule and select dryer periods to perform the dredging work. This is in comparison to hiring a contractor that would work in wet weather during the scheduled time they plan on dredging. Additionally, better site improvements would therefore be required as well to handle wet weather and require additional road stabilization to work.

The proposed schedule is as follows:

1.	Permitting/Engineering Work	Begin May 15, 2021
2.	Equipment Purchase/Lease by Town of Delavan	Begin May 15, 2021
3.	Dredge Work (Dictated by Threatened/Endangered Herps)	Begin May 1, 2022

Introduction and Background

Baxter & Woodman was retained by the Town of Delavan to provide assistance with finalizing the existing engineering study to remove sediment from the Mound Road sediment basins. The appendix contains the grading plans for the original construction and the scope of this study. The intent of this study is to help the Town of Delavan determine the best use of $750,000 earmarked for capital.

The purpose of the basins is to capture sediment so that it doesn't flow into Delavan Lake. The sediment contains nutrients such as phosphorus and nitrogen, so removing the sediment prior to entering Delavan Lake will keep the lake cleaner for fish and residents and reduce algae growth. The existing basins have not been dredged since 2007 and have become shallower and less effective for sediment removal for Delavan Lake. Dredging will again increase sediment capture and improve nutrient removal from Delavan Lake. We expect the WDNR to allow for a 9-month dredging period annually and will require daily grab samples on the influent and effluent of the pond basins analyzed for ammonia, phosphorous and solids.

Overview of Alternatives

Feasibility and costs were compared. Permitting for the alternatives is discussed later in this report. Baxter & Woodman referenced the Berrini & Associates, LLC (Berrini & Associates) report named "An Assessment of the Mound Road Basins" dated June 26th, 2017. The following alternatives were reviewed.

- Alternative 1 - Hydraulic dredging by contractors with sediment transport to a new drying basin adjacent to the site, sediment bags, and land disposal of the dredged waste. This option is based on the previous Berrini & Associates report dated June 26, 2017. Thereafter, dredging would occur periodically to maintain the effectiveness of sediment removal for the basins.

- Alternative 2 - Hydraulic dredging by contractors with sediment transport to mobile trailer mounted treatment units for removal and thickening of the sediment waste. Thereafter, dredging would occur periodically to maintain the effectiveness of sediment removal for the basins.

- Alternative 3 - Bypass each basin utilizing earthen berms, cut channels to the other basin(s) reroute the water flow and allow the sediment to dry. The sediment will be disposed of in an approved site. Thereafter, dredging would occur periodically to maintain the effectiveness of sediment removal for the basins.

- Alternative 4 - Direct purchase dredging equipment by the Town with operation and disposal of the sediment at an approved site. DLSD would provide the labor for periodic dredging of the basins so that they can be adequately maintained and remain effective for sediment capture prior to Delavan Lake.

An examination and explanation of each of the above options is provided below. The advantages and drawbacks for each alternative are provided. Please refer to the Appendices for exhibits for the different alternatives as well as Tables for the alternative costs. All the alternatives would require some site preparation and restoration work at the end of the dredging project. Most of the dredging contractors that were contacted were busy and had at least a year of backlog.

Site Preparation and Restoration

Site preparation includes providing ramps for hydraulic dredging options to each basin so that the basins can be accessed. The maintenance drives will be improved to provide a working pad for a 50 ton crane. The small trees and shrubs that surround the basins will be removed to provide better access to the basins. More specific site preparation work will be discussed for each alternative.

Site restoration will entail providing topsoil as needed and native seeding in disturbed areas to match the native flora of the area.

Please refer to the Appendices for spreadsheets of capital costs for each alternative and accompanying annual operating costs. Also, refer to the Exhibits portion of the Appendices to view sketches of each of the alternatives. Note that the "Net Present Value Cost" indicates the present cost or more commonly referred to as "Life Cycle Cost" of the various alternatives. This cost includes capital expenditures, operating expenditures, salvage value, income streams and also the time value of money. The alternative with the lowest "Net Present Cost" is the least expensive alternative and therefore has the lowest "Life Cycle Cost". The costs are presented as a 20 year present worth comparison assuming the WDNR will extend the 10-year dredging plan. As an alternative, the comparison can be made on a 10 year present worth cost comparison.

Permitting Requirements

The following permits are required for all of the Alternatives discussed in this report:

- Wisconsin Department of Natural Resources Permit for Dredging.
- Wisconsin wastewater permit for discharging water. The current ammonia total nitrogen limit for the general Delavan Lake permit is 1.00 mg/L as a daily maximum and monthly average. Total phosphorus limit is 0.225 mg/L as a monthly average. The permittee can request site specific limits which could be different than these limits for this project.
- US Army Corp. Engineering – Usually WIDNR works with them but it is best to apply for this in tandem with the WIDNR permit for quicker speed on the permit process.
- Wisconsin Department of Natural Resources Storm Water Permit.
- Walworth County Sediment Control General Permit.
- Land Disposal Permit for Sediment.
- WDNR monitoring including grab samples on the influent and effluent at each pond analyzed for ammonia, phosphorus and solids.

Discussion

Alternative 1 - Hydraulic dredging option with sediment transport to a dewatering basin or sediment dewatering tubes.

This plan is similar to the Berrini & Associates plan originally proposed in 2017. This plan utilizes hydraulic dredging with a combination of dewatering tubes and new basin construction on an adjacent property to dry out the sediment. The drying process would occur on an adjacent site that would be purchased by the Town of Delavan. Due to the high cost of mobilizing and demobilizing for dredging contractors, costs for this option are provided for doing the work in one year. Our investigation determined that performing work over three years caused the price to increase by more than 50%. The hydraulic dredging contractors prefer to bid on projects for performing the work all at the same time as the mobilization/demobilization costs are too high to be competitive. Additionally, the dredging companies strongly preferred to use only one method of dewatering; either using only dewatering tubes for all dewatering or pumping everything to the drying basin on the adjacent property to be purchased by the Town of Delavan. They did not want to split between dewatering for the East and North Basins and pumping sediment to the drying basin for the East basin. If dewatering tubes are utilized, this sediment could potentially be left in place depending on Wisconsin Department of Resources (WIDNR) permitting requirements or moved to other areas outside the wetland area with permission.

Advantages:

1. The majority of the dredged material will remain in the local area thus reducing the costs of transportation and potentially landfilling.
2. This work would get done during one season.
3. The dewatering area may be reused in the future for further sediment dredging.

Drawbacks:

1. Land acquisition and basin construction on the acquired property would be required.
2. Hard packed sediment will be difficult to remove by the hydraulic dredging method which would impede the process and effectiveness of sediment removal. It is likely that several cutter heads will be required.
3. Polymer would be required for treatment of the geotextile tubes to contain the sediment.
4. The capital cost for this alternative is $2,435,250. The cost would exceed the Town of Delavan's budget.

Alternative 2 - Hydraulic dredging with sediment transportation to onsite mobile treatment.

This plan entails providing immediate treatment of the solids/water from hydraulic dredging utilizing trailer mounted treatment systems. Hydraulic dredging would be performed by contractors for this alternative. This option would treat to remove the suspended solids and ammonia from the water. At least two trailer mounted units and multiple holding tanks would be required for this option. Holding tanks (20,000 gallon steel tanks) would also be required to store hydraulic dredged material that couldn't be treated immediately. A portion of the sediment would be put on an adjacent property purchased by the Town of Delavan. The balance of sediment would be landfilled since farmers would not desire this material due to the polymer/chemical addition.

Advantages:

1. The majority of the dredged material will remain in the local area thus reducing the costs of transportation and potentially landfilling.
2. The sediment would be dealt with immediately and could be land applied immediately with minimal drying time.

Drawbacks:

1. Would need to add polymers and ammonia treatment to properly treat.
2. The capital cost for this alternative is higher at $3,397,750.
3. Farmers would not want treated solids due to polymer treatment.
4. Large power diesel generators would also be required for this system that would need to be rented for the duration of the project.
5. A dedicated operator is required for the treatment system.
6. Several holding and treatment tanks (20,000-gallon steel storage tanks) would be required as part of this process; they would offer little salvage value at completion.

Alternative 3 – Bypass each basin and allow sediment to dry and then mechanically dredge.

This plan entails building earthen berms around basin inlets and redirecting the flow around the basins. Channels would be cut to reroute the flow to the existing basins as needed. Extraction wells would likely be needed around the bermed basins to dewater the adjacent areas due to the high water table. One basin per year would be mechanically dredged. It was assumed that half the sediment would be land applied to an approved landfill and the other half would be applied to farmer's local fields.

Advantages:

1. This would simplify the dredging process as mechanical dredging-excavating is simpler than hydraulic dredging.
2. No land purchase is anticipated for this option.

Drawbacks:

1. Only one basin could be done per year.
2. As a result of having to do this work over three years, the mobilization/de-mobilization fees would be higher.
3. This method will be challenging to protect the targeted basins as heavy rain events and high ground water table would impact the drying process.
4. This method would require large pumps.
5. This would require heavier excavating equipment which would be challenging due to the location in a wet area. Further site improvement would be required for the access drives and excavating staging areas within this area. Wooden mats would need to be installed; these are costly.
6. The capital cost for this alternative is $2,091,000.

Alternative 4 - Hydraulic dredging by DLSD with purchased equipment into dewatering bags and into the constructed drying basin.

For this option the DLSD would work with the Town of Delavan to dredge the basins. The Town of Delavan would purchase dredging equipment for DLSD to operate. DLSD would provide the labor. Due to hard packed sediment both a dredge and a multifunctional amphibious machine are needed. The Sd-110 and Truxor would need to be utilized.

The Dredge is a floating, lightweight diesel powered pump and auger, manned, self-propelled, steerable propulsion by 40 hp outboard engine. This machine can process can process up to 85 cubic yards of sludge per hour and up to 1474 gallons per minute @ 123 feet discharge head. The dredge can reach depths of 8 to 12 feet of depending on the model. See the appendix for the machine of one manufacturer.

The multifunctional amphibious machine has a wide range of detachable tools. This machine utilizes a 50 hp diesel engine. It operates utilizing a track on land and floats like a boat on water. A detachable excavator will be very important for hard packed sediment that cannot be adequately hydraulically dredged. The excavator can dig in tight areas within soft sediment to 9.8 feet of depth. This machine can work with the dredge to remove harder packed sediment.

A track loader would move sediment on the site. The sediment would be disposed on the purchased adjacent property and on the site where the dewatering tubes would be located for the West and North basins. Any additional sediment could be applied to farmer's fields if polymer is not present. The sediment at the drying basin could be applied on farm fields as it will not contain any polymer. This would make room for more sediment dewatering from the drying basin in future years. Sediment dewatering tubes would be used for the North and West basins. The West basin sludge would be pumped to the dewatering basin on the adjacent property purchased by the Town of Delavan. A booster pump will transfer water from the dredge to the dewatering tubes.

Advantages:

1. This work can be performed at a lower cost due to DLSD providing the labor.
2. Less site preparation would be needed because DLSD could select dryer time periods in the year to perform this work. In contrast, a contractor would schedule for a specific time period regardless of wet weather issues.
3. Equipment would be owned by the Town of Delavan and could be utilized for a variety of local dredging projects.
4. The use of the multi-functional amphibious machine with the excavation attachment would allow excavation of hard packed sediment that can't be removed with hydraulic dredging.
5. The work would occur over years rather than months.
6. The estimated capital costs of this alternative is $1,145,673.

Drawbacks:

1. Relies on a working relationship to be cost effective.
2. The work would potentially take a longer period of time to complete.

Conclusions

1. Alternative 1 is expensive due to earth work.
2. Alternative 2 with trailer mounted treatment system expensive and required trailers and tanks.
3. Alternative 3 is expensive due to the high ground water table and the need for dewatering.
4. Alternative 4 provides the lowest capital present value cost; 19-percent less than the next alternative and 40 percent less than the highest alternative. In addition:
    a. The town has $750,000 allocated specifically to capital. The purchase of equipment qualifies as a proper use. This is in comparison to hiring a dredging company that is only providing a service.
    b. DLSD will collaborate with the Town of Delavan and provide the labor for dredging the basins. DLSD has supposedly budgeted $250,000 annually for dredging. Maintenance dredging on a periodic basis is less labor intensive than one-time dredging.
    c. Site preparation should be less since DLSD can flex their schedule and select dryer periods to perform the dredging work. This is in comparison to hiring a contractor

that would work in wet weather during the scheduled time they plan on dredging. Additionally, better site improvements would therefore be required as well to handle wet weather and require additional road stabilization to work.

Recommendation

Based upon the above alternatives we recommend that the Town of Delavan select Alternative 4 - Hydraulic dredging by DLSD with purchased equipment. This alternative makes use of budgeted money from DLSD and provides the Town of Delavan useful assets that can be utilized to dredge the basins and other areas in the future.

Implementation Schedule

The Town of Delavan will review the report and select the alternative they prefer. The report will be submitted to the Wisconsin Department of Natural Resources to begin the permitting process with the following preliminary schedule.

1.	Permitting/Engineering Work	Begin May 15, 2021
2.	Equipment Purchase/Lease by Town of Delavan	Begin May 15, 2021
3.	Dredge Work (Dictated by Threatened/Endangered Herps)	Begin May 1, 2022

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20 YEAR PRESENT WORTH COST SUMMARY

Mound Road Sediment Basin Dredging Project
Town of Delavan

ITEM	**Alternative 1** Hydraulic Dredging with Dewatering Tubes/Drying Pond	**Alternative 2** Hydraulic Dredging with Trailer Mounted Treatment	**Alternative 3** Bypass Ponds and Mechanical Dredging	**Alternative 4** DLSD Perform Dredging with Purchased
Construction Cost	$2,115,250	$2,957,750	$1,821,000	$995,673
Engineering, Legal, & Contingencies	$320,000	$440,000	$270,000	$150,000
Captial Cost	$2,435,250	$3,397,750	$2,091,000	$1,145,673
Present Worth Operation & Maintenance Cost	$3,669,388	$3,669,388	$3,669,388	$3,669,388
Present Worth of Replacement Costs	$18,207	$9,104	$9,104	$116,059
Present Worth Salvage Value	$0	$0	$0	$0
Total Present Worth Cost	$6,122,845	$7,076,242	$5,769,492	$4,931,120
Total Present Worth Cost	**$6,123,000**	**$7,076,000**	**$5,769,000**	**$4,931,000**
Ratio to Lowest Cost Alternative	**1.24**	**1.44**	**1.17**	**1.00**

Comparison Annual Interest Rate (%) = 4.000

	Alternative 1 Hydraulic Dredging with Dewatering Tubes/Drying Pond	**Alternative 2** Hydraulic Dredging with Trailer Mounted Treatment Systems	**Alternative 3** Bypass Ponds and Mechanical Dredging	**Alternative 4** DLSD Perform Dredging with Purchased Equipment
Construction Cost	$2,115,250	$2,957,750	$1,821,000	$995,673
Engineering, Legal, & Contingencies	$320,000	$440,000	$270,000	$150,000
Capital Cost	$2,435,250	$3,397,750	$2,091,000	$1,145,673
Present Worth Operation & Maintenance Cost	$2,650,900	$2,650,900	$2,650,900	$2,650,900
Present Worth of Replacement Costs	$12,837	$6,383	$6,383	$81,922
Present Worth Salvage Value	$0	$0	$0	-$24,229
Total Present Worth Cost	$5,098,987	$6,055,033	$4,748,283	$3,854,266
Total Present Worth Cost	**$5,099,000**	**$6,055,000**	**$4,748,000**	**$3,854,000**
Ratio to Lowest Cost Alternative	**1.34**	**1.60**	**1.24**	**1.00**

Comparison Annual Interest Rate (%) = 8.000

Alternative 1:Hydraulic Dredging with Dewatering Tubes/Pond

Interest Rate = 4.000%

1) INITIAL CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Site preparation	$215,000					
Shore/Tree Clearing	$3,500			$3,500		
Hydraulic Dredging	$1,282,250					
Land Disposal Costs	$322,000					
Purchase Land for Deposit of Sediment	$60,000					
Purchased Property Preparation	$165,000					
Silt Fencing	$7,500		$7,500	$7,750	$8,000	
Site Restoration	$60,000					
Subtotal =	**$2,115,250**		**$7,500**	**$11,250**	**$8,000**	**$0**

Mechanical Construction

						$0
Subtotal =	**$0**		**$0**	**$0**	**$0**	**$0**

Misc. Construction

Subtotal =	**$0**		**$0**	**$0**	**$0**	**$0**

Construction Cost =	**$2,115,250**
Engineering, Legal, & Contingencies (15%) =	**$320,000**
Project Cost =	**$2,435,250**

$7,500	**$11,250**	**$8,000**	**$0**
0.8219	**0.6756**	**0.5553**	**0.4564**
$6,164	**$7,600**	**$4,442**	**$0**

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Periodic Dredging via contractor	$250,000
Monitoring	$20,000

Annual O&M Cost =	**$270,000**
Present Worth Factor =	**13.5903**
Present Worth O&M Cost =	**$3,669,388**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	**$6,122,845**	**(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$2,115,250
Engineering, Legal, & Contg. (+)	$320,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$3,669,388
Total Replacement Cost (+)	$18,207
Total Salvage Value (-)	$0
Total Present Worth Cost	**$6,122,845**

BAXTER & WOODMAN

4/20/2021

Alternative 2: Hydraulic Dredging with Trailer Mounted Treatment

Interest Rate = 4.000%

1) INITIAL CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Site preparation	$215,000					
Shore/Tree Clearing	$3,500					
Hydraulic Dredging Including Trailer Mounted Treatmen	$2,213,750					
Land Disposal Costs (Assume 6000 tons landfilled)	$322,000					
Purchase Land for Deposit of Sediment	$60,000					
Purchased Property Preparation	$80,000					
Silt Fencing	$3,500		$4,000	$4,500	$5,000	
Site Restoration	$60,000					
Subtotal =	**$2,957,750**		**$4,000**	**$4,500**	**$5,000**	**$0**

Mechanical Construction

						$0
Subtotal =	**$0**		**$0**	**$0**	**$0**	**$0**

Misc. Construction

Subtotal =	**$0**		**$0**	**$0**	**$0**	**$0**

		$4,000	**$4,500**	**$5,000**	**$0**
		0.8219	**0.6756**	**0.5553**	**0.4564**
Construction Cost =	**$2,957,750**	**$3,288**	**$3,040**	**$2,776**	**$0**
Engineering, Legal, & Contingencies (15%) =	**$440,000**				
Project Cost =	**$3,397,750**				

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Periodic Dredging via contractor	$250,000
Monitoring	$20,000

Annual O&M Cost =	**$270,000**
Present Worth Factor =	**13.5903**
Present Worth O&M Cost =	**$3,669,388**

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost = $7,076,242 **(Project Cost + O&M Cost + Replacement Cost - Salvage Value)**

Construction Cost (+)	$2,957,750
Engineering, Legal, & Contg. (+)	$440,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$3,669,388
Total Replacement Cost (+)	$9,104
Total Salvage Value (-)	$0
Total Present Worth Cost	**$7,076,242**

Alternative 3:Bypass Basins and Mechanical Dredging

Interest Rate = 4.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Site preparation	$215,000					
Shore/Tree Clearing	$3,500					
Pond Bypasses and Channel Cutting	$265,000					
Mechanical Dredging	$800,000					
Land Disposal (Assume 8000 tons landfilled	$344,000					
Purchase Land for Deposit of Sediment	$0					
Dewatering Wells for three ponds	$45,000					
Purchased Property Preparation	$0					
Silt Fencing	$3,500		$4,000	$4,500	$5,000	
Site Restoration	$145,000					
Subtotal =	$1,821,000		$4,000	$4,500	$5,000	$0

Mechanical Construction						
Subtotal =	$0		$0	$0	$0	$0

Misc. Construction						
Subtotal =	$0		$0	$0	$0	$0

		$4,000	$4,500	$5,000	$0
Construction Cost =	$1,821,000	0.8219	0.6756	0.5553	0.4564
Engineering, Legal, & Contingencies (15%) =	$270,000	$3,288	$3,040	$2,776	$0
Project Cost =	$2,091,000				

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
Periodic Dredging via contractor	$250,000
Monitoring	$20,000

Annual O&M Cost =	$270,000
Present Worth Factor =	13.5903
Present Worth O&M Cost =	$3,669,388

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	$5,769,492	(Project Cost + O&M Cost + Replace Cost - Salvage Value)

Construction Cost (+)	$1,821,000
Engineering, Legal, & Contg. (+)	$270,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$3,669,388
Total Replacement Cost (+)	$9,104
Total Salvage Value (-)	$0
Total Present Worth Cost	**$5,769,492**

Alternative 4:DLSD Perform Dredging with Purchased Equipment

Interest Rate = 4.000%

1) CAPITAL CONSTRUCTION COST

General Construction	Initial Cost	Service Life (Years)	Replacement Cost Year 5	Replacement Cost Year 10	Replacement Cost Year 15	Salvage Value Year 20
Site preparation	$100,000					
Shore/Tree Clearing	$3,500					
Hydraulic Dredging	$0					
Land Disposal Costs	$0					
Purchase Land for Deposit of Sediment	$60,000					
Purchased Property Preparation	$165,000					
Equipment Purchases						
Rotomite SD110	$292,880	20				$0
John Deere 333G CTL Compact Loader	$66,933	20				$0
Truxor	$179,860	20				$0
G-R Diesel 1000 gpm Booster Pump	$20,000	20				$0
Hoses/Pipe 6"	$5,000	10		$5,000		$0
Geotextile Dredging Tubes/Polymer	$45,000	5	$45,000	$47,500	$50,000	$0
Silt Fencing	$7,500	0	$7,500	$7,750	$8,000	$0
Site Restoration	$50,000	0				
Subtotal =	$995,673		$52,500	$60,250	$58,000	$0

Mechanical Construction

Subtotal =	$0		$0	$0	$0	$0

Misc. Construction

Subtotal =	$0		$0	$0	$0	$0

Construction Cost =	$995,673
ngineering, Legal, & Contingencies (15%) =	$150,000
Project Cost =	$1,145,673

$52,500	$60,250	$58,000	$0
0.8219	0.6756	0.5553	0.4564
$43,151	$40,703	$32,205	$0

2) OPERATION & MAINTENANCE COST

Items	Annual Cost
DLSD Performs Periodicl Dredging	$250,000
Monitoring	$20,000

Annual O&M Cost =	$270,000
Present Worth Factor =	13.5903
Present Worth O&M Cost =	$3,669,388

3) 20 YEAR PRESENT WORTH COST

Present Worth Cost =	$4,931,120	(Project Cost + O&M Cost + Replacement Cost - Salvage Value)

Construction Cost (+)	$995,673
Engineering, Legal, & Contg. (+)	$150,000
Interest During Construction (+)	$0
Total O&M Cost (+)	$3,669,388
Total Replacement Cost (+)	$116,059
Total Salvage Value (-)	$0
Total Present Worth Cost	**$4,931,120**

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Baxter & Woodman Work Order

TOWN OF DELAVAN, WISCONSIN
MOUND ROAD PONDS DREDGING STUDY
WORK ORDER

ENGINEER'S PROJECT NO. 201636.30

Project Description:

Assist the Town with finalizing the existing engineering study of the following options to remove sediment from the Mound Road Ponds:

- Hydraulic dredging with sediment transport to new ponds or sediment bags, and land disposal of the dredged waste. This option requires land acquisition, a discharge permit, and a land disposal permit. The Engineer will review and modify the previous Berrini submittal for this option.
- Hydraulic dredging with sediment transport it to mobile treatment units for removal and thickening of the sediment waste. This option requires a discharge permit and land disposal permit.
- Bypass each pond, allow the sediment to dry, and dispose of the sediment at an approved site. This option requires a land disposal permit.

The study will include an estimate of the capital and yearly operational cost of each option with allowances for contingencies and engineering, a recommended alternative, and a project schedule for the recommended alternative. This study will allow for permitting, allow the Town to evaluate capital and operational costs and financing for the project, and to allow the Town to enter into an agreement with the Delavan Lake Sanitary District for the operations, the final design, municipality entity cost responsibility, and the preparation of the Certified Engineering Plan.

Engineering Services:

The general provisions of this Work Order are enumerated in the Engineering Services Agreement between the Owner and Engineer dated February 19, 2013. Engineer shall provide the services set forth in Attachment A, attached hereto.

Compensation:

Compensation for the services to be provided under this Work Order will be in accordance with the Engineering Services Agreement dated February 19, 2013. The Owner shall pay the Engineer for the services performed or furnished as specified in Attachment A of this Work Order a lump sum amount of **$10,000.**

Submitted by: **Baxter & Woodman, Inc.**	Approved by: **Town of Delavan, Wisconsin**
By: _____	By: _____
Louis D. Haussmann, PE, PTOE, PTP	John Olson
Title: Executive Vice-President/COO	Title: Administrator
Date: January 5, 2021	Date: _____
	Attest: _____
	Dixie Bernsteen, Clerk

Additional Comments and Conditions: The Scope does not include final engineering.

BAXTER & WOODMAN Consulting Engineers

Project Description

The Mound Road Ponds consist of North, East, and West ponds and are detailed in a recent preliminary plan prepared by Peter Berrini. The ponds were constructed in the 1990's in an effort to protect Delavan Lake. The Town retained Peter Berrini to prepare a preliminary plan for maintenance dredging; Mr. Berrini has halted services to the Town after the Town added the two additional options for consideration and requested costs and schedules for each option.

The intent of this project is to assist the Town with finalizing the existing engineering study of the following options to remove sediment from the Mound Road Ponds:

- Hydraulic dredging with sediment transport to new ponds or sediment bags, and land disposal of the dredged waste. This option requires land acquisition, a discharge permit, and a land disposal permit. The Engineer will review and modify the previous Berrini submittal for this option.
- Hydraulic dredging with sediment transport to mobile treatment units for removal and thickening of the sediment waste. This option requires a discharge permit and land disposal permit.
- Bypass each pond, allow the sediment to dry, and dispose of the sediment at an approved site. This option requires a land disposal permit.

The study will include an estimate of the capital and yearly operational cost of each option with allowances for contingencies and engineering, a recommended alternative, and a project schedule for the recommended alternative. This study will allow for permitting, allow the Town to evaluate capital and operational costs and financing for the project, and to allow the Town to enter into an agreement with the Delavan Lake Sanitary District for the operations, the final design, municipality entity cost responsibility, and the preparation of the Certified Engineering Plan. The report will be submitted to the Wisconsin Department of Natural Resources for their response with final permitting requirements.

The following project schedule is anticipated:

- **January 19, 2021** — **Authorization to Proceed**
- **April 7, 2021** — **Report Presentation to Lake Committee**
- **April 30, 2021** — **Submit Report to WDNR**

Scope of Services

The following scope of services details the anticipated tasks necessary to successfully complete this Project.

1. PROJECT COORDINATION AND DATA COLLECTION
   A. PROJECT MANAGEMENT
      1) Plan, schedule, and control activities to complete the Project. These activities include but are not limited to budget, schedule, and scope.

2) Submit a monthly status report via email describing tasks completed the previous month and outlining goals for the subsequent month.

B. PROJECT MEETINGS
1) Conduct a Project kick-off meeting with OWNER's staff and the Project team to establish clear lines of communication, introduce OWNER staff to the team members, and establish the OWNER's detailed needs, objectives, and goals for the Project.
2) The meeting will also be used to obtain information, drawings, plans, and other data to be supplied by the OWNER, and set schedules and guidelines for future design meetings.
3) Conduct one meeting with Owner staff before the final report is presented to clarify Owner staff preferences and answer questions regarding the proposed recommendations.
4) Public Meetings: Present the Report, including results and recommendations, to the OWNER at a Lake Committee meeting.

2. ENGINEERING ANALYSIS
A. Develop design criteria to clearly identify the goal(s) of the proposed improvements.
B. Develop up to 3 alternatives to address the identified project needs. Concept plans will be prepared for each viable alternative evaluated.
C. Determine if the proposed improvements can be designed and constructed using alternate methods or materials to reduce construction and operation and maintenance costs.
D. Prepare preliminary cost estimates and a project timeline of the various alternatives.

3. FINAL REPORT
A. Prepare a Final Report describing our findings and recommendations.
B. Assumptions and methodologies for each alternative will be documented, along with permitting requirements and potential funding opportunities, as applicable.
C. Exhibits will be prepared to support final recommendations, showing the location of the recommended improvements.
D. Alternatives will be ranked based on the cost of the improvements per property benefitting from the Project, along with other factors selected by OWNER staff.
E. The Final Report will include a systematic plan for implementing the recommended improvements.
F. Submit the Report to the Wisconsin Department of Natural Resources for their response with final permitting requirements.

Sample Dredge Machine

CRISAFULLI
Sludge Removal Systems

srsc@crisafulli.com
406-365-3393

Rotomite SD-110


SD-110 on site in the Phillipines

The SD-110 is diesel powered, light weight, and self propelled.

The SD-110 is Crisafulli's lightest self propelled dredge. The hydraulic thruster allows the SD-110 to dredge irregular shaped ponds, and manuever into boat slips, and other tight locations.

Portability. Weighting only 9,000 lbs, with an aluminum super structure, the SD-110 measures only 25 x 8.5 feet, can be lifted by almost any crane, and is transportable anywhere in the US without special permitting on a regular deck-over trailer. Custom trailers are available for easier installation and removal of the dredge on sites with boat ramps.

Easy to operate. Designed with the operator in mind, the dredge

has on-board storage in the operator's station and a 12 VDC power point for the operator's personal items - i. e., cell phone - with four additional 12V DC circuits, and an adjustable helm. A walkway behind the operator's station enables safe, easy operator movement from one side of the dredge to the other.

Available with an optional cab, with heat and A/C, to keep your dredge operator comfortable on the water.

Key Benefits of Rotomite SD-110 Ownership

- Light Weight
- Self Propelled
- Sophisticated instrumentation options measure dredging performance.
- High solids dredging performance with minimum turbidity
- Easily transported to multiple sites
- Simple to maintain
- Reliable and manufactured to last
- Superior after-sale support from Crisafulli worldwide

Dredge Rentals

Many domestic and Canadian customers rent Crisafulli's Rotomite and FLUMP dredges on short-term leases, and, after becoming familiar with the productive capabilities of the dredges, buy them.

SD-110	Shallow Draft 4" Dredge
Pump Flow Rate	1,400 GPM in water
Productivity	80 Cubic Yards per Hour of solids
Maximum Excavation Depth	12 Feet (3.7 M)
Maximum Excavation	

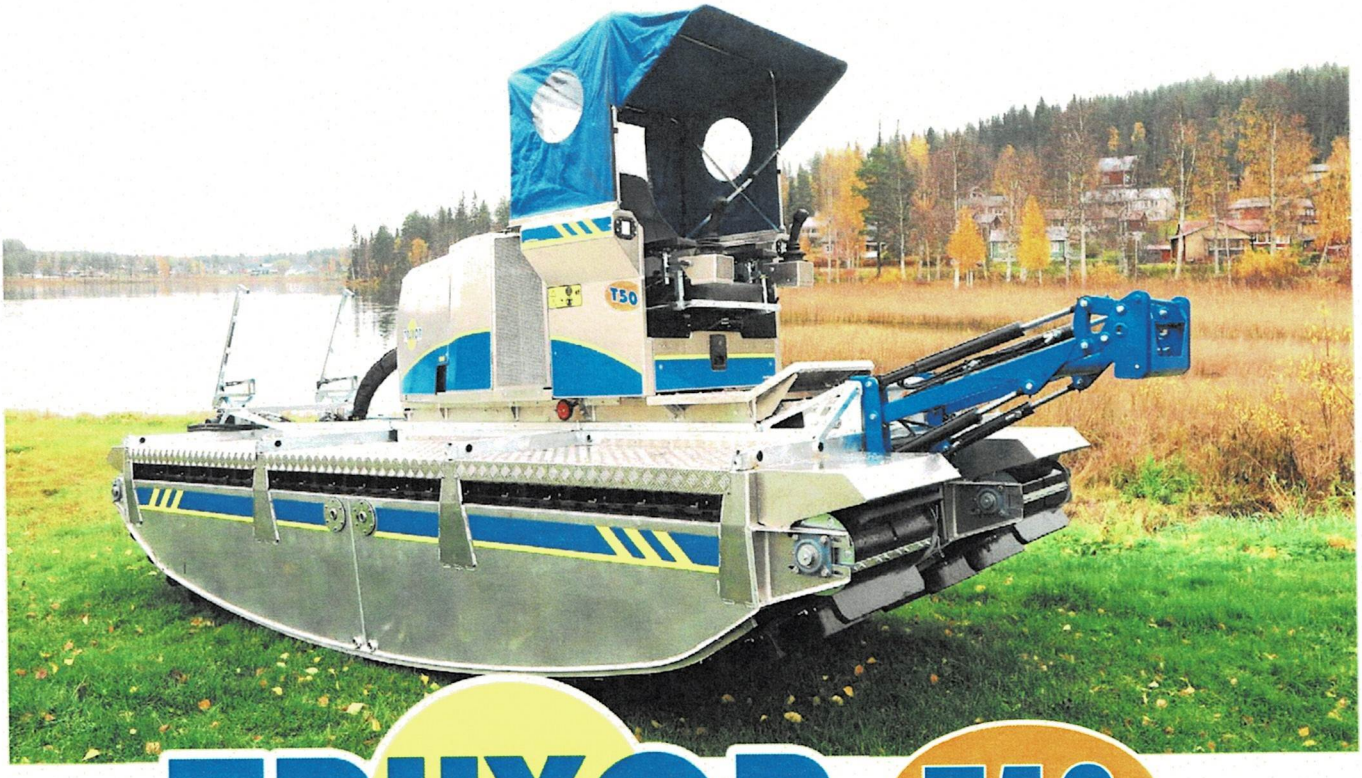
Speed	15 Feet Per Minute
Length	25 Feet (7.6 M)
Weight	9,000 lbs (4,082 Kg)
Engine HP (Continuous)	142HP @ 2200 RPM
Fuel Consumption (Maximum)	6.2 Gallons Per Hour
Cutterhead Width	8.5 Feet (2.6 M)
Instrumentation	Tachometer, engine oil pressure, engine temperature, hour meter, hydraulic pressure, volt meter, digital depth indicator, hydraulic oil level & temperature

Testimonial

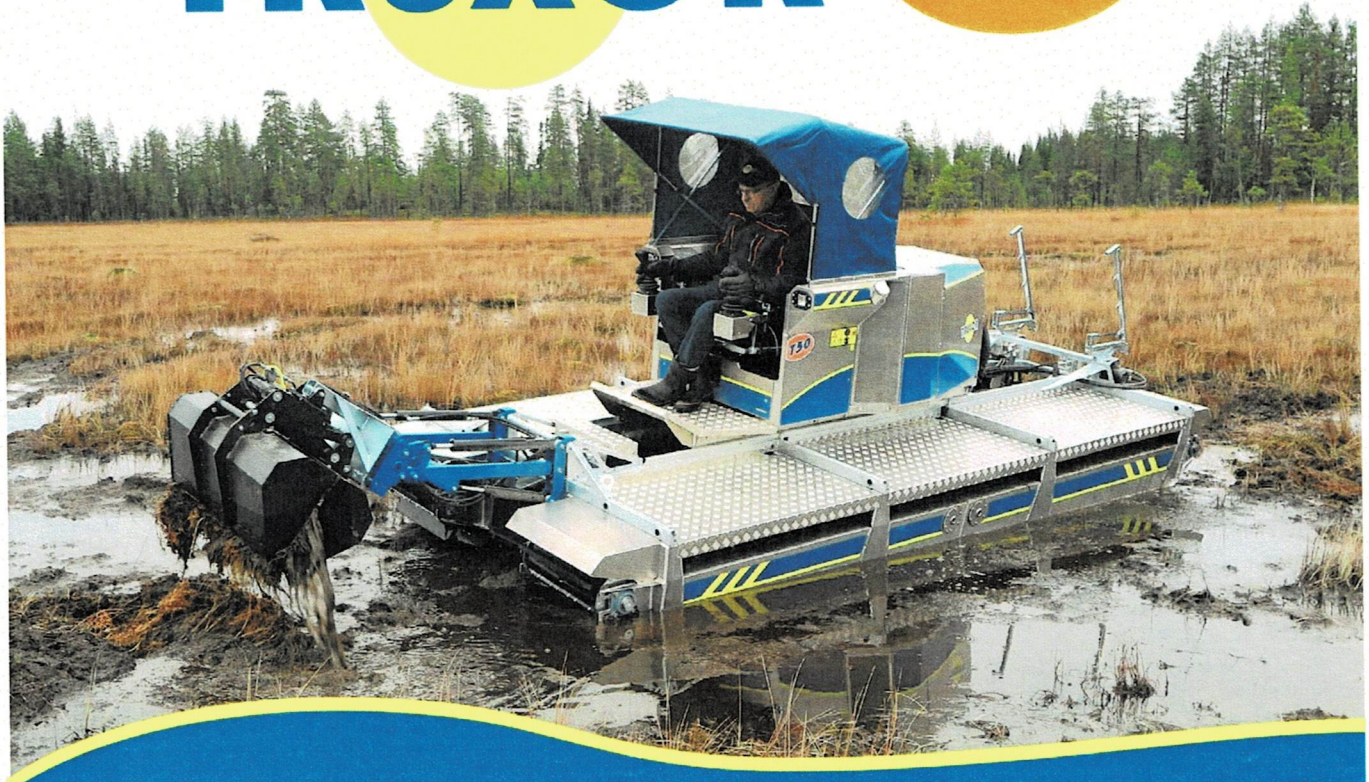
"We appreciate the job that Larry and Nick did while they were here. They were extremely helpful, answered every question we threw at them, and were a great asset in commissioning the dredge. We appreciated their helpfulness and the job they did. I also appreciate the help that you gave us along the way. You answered multiple questions since we ordered and received the dredge 2 years ago. I have never run into customer service equal that of Crisafulli. You have all done a great job, and keep up the good work!! Thanks again!"

Jeff McGriff, Project Engineer, Lion Oil Refinery Read more SD-110 Case Histories here

Sample Multipurpose Amphibious Machine



TRUXOR T50



TRUXOR T50

Truxor amphibious machines - since 1994

Our long experience of technology and product development as well as our close contact with customers and retailers around the world form the basis of the new generation of our Truxor machines. The T-series has been updated with several new features:

- **Lightweight chassis in high-tensile steel**
- **Lifting arm with parallel movement**
- **Quick bracket X4**
- **LED work lights**
- **Digital screen**
- **Digital technology that improves machine performance and facilitates service**

The digital screen provides information from the engine and other systems. Digital troubleshooting facilitates service and maintenance. The digital screen also makes it possible to adjust some of the machine's functions, such as drive band balance and speed, flow adjustment of hydraulic outlets, emergency operation etc.

Hydraulic system with thermostat

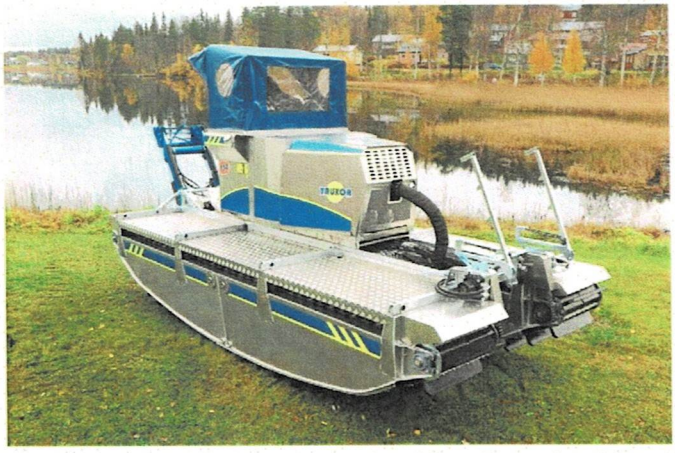
A modern hydraulic system increases the performance when the hydraulic oil temperature exceeds 40 degrees. To achieve optimum temperature, there is a thermostat controlling the minimum temperature. The right hydraulic oil temperature improves performance and ensures better operating economy.

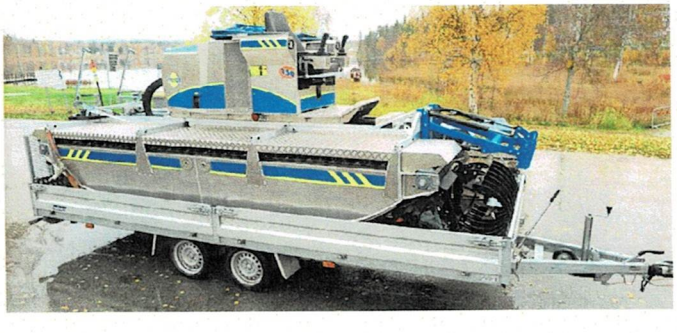
T50 - the most powerful Truxor for power-demanding tools

The Truxor T50 is the most powerful machine in the T-Series, equipped with a 50 hp diesel engine that meets the highest environmental class standards EU Stage V and EPA Tier 4.

The powerful engine and a new hydraulic system guarantees the highest levels of performance and operational reliability for your job. Truxor T50 easily operates in demanding environments with power-demanding tools.

Already at 1400 rpm, the machine has a high performance. The ability to work with the machine at low rpm reduces both fuel consumption and noise level.





TRUXOR T50 TECHNICAL INFORMATION

MOTOR: Hatz 3H 50 TICD dieselmotor Common Rail 37 kW 50 hp, Intercooler, Can-bus system, **EU Stage V and EPA Tier 4 final certified,** 2,400 rpm. Diesel Particulate Filter (DPF).Max torque 185 Nm **FUEL TANK:** 35 l **COOLING SYSTEM:** Combined engine/hydraulic/intercooler system. The air intake of the radiator is equipped with a filter (prevent dirt from entering the radiator cells). Thermostat controls the hydraulic oil temperature, improving machine performance. **ELECTRIC SYSTEM:** 12V/150 Amp, 60 ah battery. Automatic stop function if the engine overheats or the oil pressure is too low. Warning system for driving at maximum slope. 4 LED work lights.	**RIGHT JOYSTICK:** Lifting, tilting, move cabin forward and rear (weight distribution), control of hydraulic outlet 3 and hydraulic outlet 4. **Hydraulic outlet 1 (front):** Working pressure 140 bar. adjustable flow 0-20 l/min **Hydraulic outlet 2 (front):** Working pressure 130 bar. adjustable flow 0-11 l/min **Hydraulic outlet 3 (front):** Working pressure 200 bar. Adjustable flow 0-60 l/min **Hydraulic outlet 3 (rear):** Working pressure 200 bar. Adjustable flow 0-60 l/min **Hydraulic outlet 4 (rear):** Working pressure 130 bar. Adjustable flow 0-11 l/min.
HYDRAULIC SYSTEM: Hydraulic pump with variable displacement (Load sensing controlled), 65 cm^3/r. Hydraulic power: 26 kW/35hk. **Hydraulic tank:** 19 l, system 35 l. Cyclone technology forced ventilation. Environmentally friendly system with automatic stop of the engine if the oil level drops by more than 8 litres. (Minimises oil spills) **Hydraulic valve:** 9 functions. **Control system:** CAN bus based electronic control units with remote assistance.	**DIMENSIONS:** Total length max. 5030 mm, min 4700 mm. Total width 2080 mm. Total height max 2600, min 2020 mm. Set weight : 1470 kg **DRIVING SPEED:** 0-100 m/min **FRONT LIFT:** Lifting power 400 kg, X4 bracket for fast change of tools. Semi-automatic locking of tools.
DRIVERS SEAT: Ergonomically adjustable driver's seat with thermostatically controlled electric heated seat. Folding cab. Adjustable controls.	**MATERIAL:** Drive band (paddle track) of rubber. Paddles and slide rails in strong plastic. Pontoons manufactured of saltwater-resistant aluminium. Heat galvanised steel structure.
DASHBOARD: Digital high resolution display for speed, engine temperature, oil pressure engine, timer, fuel gauge, hydraulic oil temperature, hydraulic pressure, hydraulic flow, emergency operation, on board diagnostics, clock etc.	**ITEM NO: 94-T50** **LIMITED WARRANTY TERMS:** 24 months or 1000 hours of operation
LEFT JOYSTICK: Driving forward/backward/right/left. Speed is controlled by a joystick and with precision driving controls. Control for hydraulic outlet 1, hydraulic outlet 2.	**OPTIONS:** Hydraulic oil environmentally friendly. Panolin replaces standard hydraulic oil. 36 litre **Item no: 94-T50E**

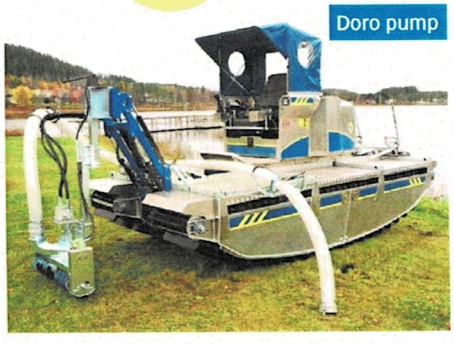
The engine is equipped with a diesel oxidation catalyst system and requires the following fuel specifications :

Europe: EN 590
UK: BS 2869 A1 / A2
USA: ASTM D 975-09a 1-D S15 or 2-D S15
Japan: JIS K 2204

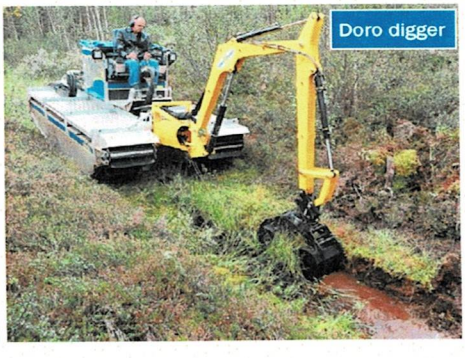
The use of fuel that does not meet the specifications can lead to engine damage.

Truxor T50 can be equipped with engine options suitable for lower quality diesel fuel. For further information, please contact Dorotea Mekaniska AB.

TRUXOR T50 TOOLS


Doro pump


Doro cutter D30


Doro digger