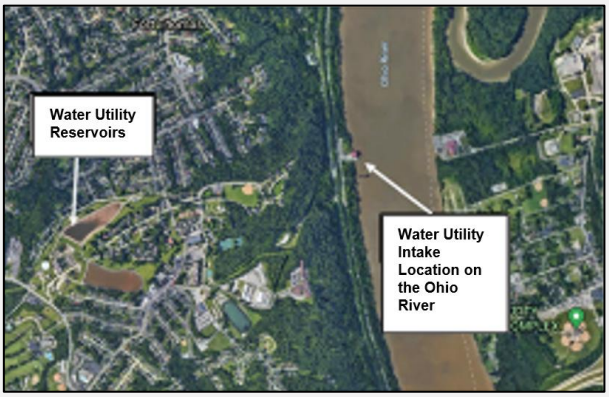
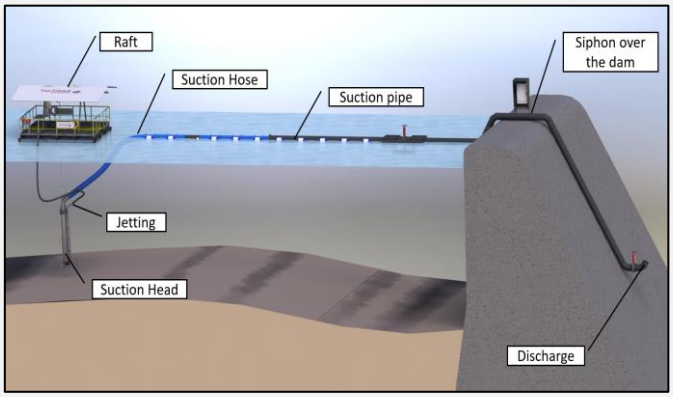
SediCon®
Removing sediments

Drinking water project - case of study

Bluegrass Water Consultants (BWC), from the University of Cincinnati, evaluated different solutions for sediment handling in a project, concluding that the SediCon Dredge is the best alternative.



Project overview



SediCon Dredge

Project overview

The drinking water utility has two reservoirs at their main treatment plant with a storage capacity of app. 318,000 m^3, to produce an average of 200,000 m^3 of drinking water per day. However, an estimated sediment accumulation of 110,000 tons in the reservoir has caused significant loss in their storage capacity.

Objective of the study

- Evaluate different sediment control options using an alternative analysis to determine the best suited method for the water utility.
- Design the selected sediment control method for the water utility while considering flow capacity, solids capacity, solids disposal, and run time.

Potential solutions

The methods analyzed included aeration, hydraulic dredging, dredging with a SediCon dredge, concrete weirs for reservoir partitioning, lamella plate settle ring, and periodic draining and excavating.
The alternatives were compared by cost, performance, operation, neighborhood impact, lifecycle, and proven effectiveness.

Conclusion

The SediCon Dredge was selected as the alternative to be developed into a final design.

SediCon Dredge

The SediCon Dredge is a hydrosuction dredge designed by SediCon, which powered by gravity alone and can operate when there is a sufficient energy gradient. BWC focused on determining how to implement the SediCon Dredge with the existing infrastructure at the treatment plant, for which, a customizable Excel model to optimize the integration of the SediCon Dredge into the existing plant operations was developed.

SediCon is the leading supplier of sediment handling worldwide and provides reliable solutions with low water consumption and uninterrupted power production.

Reservoir Sedimentation Control in Drinking Water Storage Reservoirs

Cameron Atha[1], Claire DeForest[1], David Grigger[1], Aaron Organiscak[1], David Orth[1]

1. Department of Chemical and Environmental Engineering, University of Cincinnati

Background

Many drinking water utilities rely on storage reservoirs to retain water before it is treated and sent to customers. Storage reservoirs provide a critical role in maintaining clean drinking water for all customers. Often these reservoirs experience reservoir sedimentation. Reservoir sedimentation occurs when the velocity of water slows down in a reservoir and the suspended sediment in the water settles. Over time, reservoir sedimentation decreases the overall storage capacity of a reservoir.

A senior capstone team at the University of Cincinnati named the Bluegrass Water Consultants (BWC) worked with a local water utility in Kentucky to find a solution to their reservoir sedimentation problem. The utility's two reservoirs at their main treatment plant store 70 million gallons of water which is drawn from the Ohio River. The water utility produces 44 million gallons of drinking water per day on average. Reservoir sedimentation has caused significant loss in capacity in the two reservoirs and it is estimated that over 110,000 tons of sediment have accumulated in the North Reservoir alone since the last full cleaning in 1965.

Figure 1. Overview Water Utility

Objectives

- Evaluate different sediment control options using an alternative analysis to determine the best suited method for the water utility.
- Design the selected sediment control method for the water utility while considering flow capacity, solids capacity, solids disposal, and run time.

Alternative Analysis

- The methods analyzed included aeration, hydraulic dredging, dredging with a SediCon dredge, concrete weirs for reservoir partitioning, lamella plate settlering, and periodic draining and excavating.
- The criteria used to compare these alternatives were cost, performance, operation, neighborhood impact, lifecycle, and proven effectiveness.
- Criteria were given weights for the analysis based on input from the water utility.

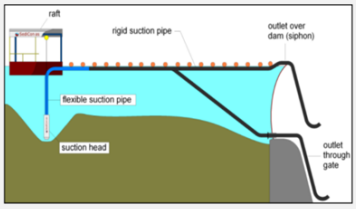


Figure 2. SediCon Dredge Section View. Image from Sedicon

SediCon Dredge Overview

The SediCon Dredge is a hydraulically powered dredge designed by SediCon. SediCon is a Norwegian company that specializes in hydraulically powered dredging. It is powered by gravity alone and can operate when there is a sufficient energy gradient. The advantages to this system include:

- The reservoir can remain in service during dredging
- The dredge can be used in multiple reservoirs owned by the water utility
- Little to no energy requirement to operate the dredge
- Low neighborhood impact
- Dredge has a long useful life

Additional Design Considerations:

BWC focused on determining how to implement the SediCon Dredge with the existing infrastructure at the treatment plant. BWC's goal was to optimize the sediment's path through the water treatment plant.

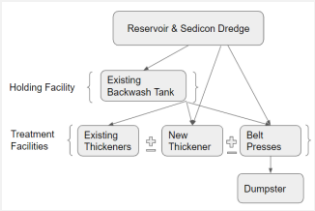


Figure 3. Sediment Path

Final Design

- BWC designed a customizable Excel model to optimize the integration of the SediCon Dredge into the existing plant operations.

Inputs	Outputs
• Which holding and treatment options to use • What percent of reservoir solids go to each holding and treatment option • Sediment characteristics • Holding and treatment option capacities • Amount of sediment to be removed from reservoir	• Hours required to dredge • Operational demands for holding and treatment options • Dumpsters required for sediment removal

Figure 5. Proposed Pipe Layout