

**DEFINITE PROJECT REPORT  
WITH INTEGRATED ENVIRONMENTAL ASSESSMENT**

**SECTION 206  
LAKE BELLE VIEW  
AQUATIC ECOSYSTEM RESTORATION PROJECT**



**PUBLIC REVIEW DRAFT**

**JUNE 2003**



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING - P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004

<http://www.mvr.usace.army.mil>

**CEMVR-PM-M**

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## EXECUTIVE SUMMARY

Lake Belle View is a shallow millpond located approximately 20 miles southwest of Madison on the Sugar River in the Village of Belleville, Dane County, Wisconsin. The lake itself averages 2 feet in depth and has a surface area of approximately 93 acres. The Sugar River drains approximately 172 square miles of land upstream of Lake Belle View. Two river channels (Sugar River and West Branch Sugar River) converge several miles upstream of Lake Belle View. The Sugar River watershed is highly agricultural and experiencing rapid urban growth.

The Lake Belle View Section 206 project area includes a lake, floodplain forest, and various wetland communities totaling 133 acres. Bordering the project area are a park, residences, roads, and farmland. In a letter dated March 31, 1998, the Village of Belleville, the owner of the dam impounding Lake Belle View, expressed an interest to act as the non-Federal sponsor for a Section 206 Aquatic Ecosystem Restoration project.

Two main goals were identified to accomplish this restoration effort—improvement of aquatic habitat and enhancement of wetland habitat. The following objectives were identified to meet these goals: (1) improve water quality in Lake Belle View and the Sugar River, (2) increase lake depths, (3) increase diversity of aquatic habitat, and (4) improve diversity and quality of wetland habitat.

In order to meet the objectives set out for this project, the following features were proposed:

### **A. River Diversion -**

1. Eastern Diversion - Diverting the Sugar River around the Lake Belle View impoundment to the east, bypassing the dam. This would be accomplished by constructing a diversion berm to separate the impoundment from the newly formed river channel.
2. Western Diversion - Diverting the Sugar River along the western shore of Lake Belle View, exiting over the existing dam.

**B. Wetland Enhancement** - Includes placing fine-grained dredged material in shallow areas of the lake to promote wetland species growth.

**C. Periodic Drawdown** - Lowering the impoundment of Lake Belle View for sediment compaction.

### **D. Fish Passage -**

1. Riffle Structures - Constructing shallow rock ramps made to simulate natural rapids in streams. Allows for fish movement upstream and downstream.
2. Rock Ramp Structure - Constructing a rock riffle structure along the north side of the dam.
3. Bypass Channel - Constructing a small channel, designed to simulate a natural stream, connecting the impoundment to the downstream portion of the dam.
4. Dam Removal and Riffle Structures - Removing the dam and placing pool and riffle structures constructed of riprap along a newly created channel, following the Western Diversion.

**E. Rough Fish Control -**

1. Carp Gate - Installing a carp gate adjacent to the water intake structures. The carp gate would allow boat traffic but limit the movement of carp into Lake Belle View.
2. Carp Nets - Using carp nets to eliminate the rough fish population in Lake Belle View.
3. Periodic Drawdown - Completing a partial or complete drawdown of Lake Belle View to promote effective rough fish removal.

**F. Sediment Removal -**

1. Hydraulic Dredging - Removing sediment from the lakebed by using hydraulic dredging technology. The sediment would be used to create wetlands or placed in an adjacent disposal facility.
2. Mechanical Dredging - Removing the sediment from the lakebed using traditional mechanical equipment, such as a backhoe.

The proposed features were then combined into alternatives. Each alternative must meet the project goals and be constructible. Once infeasible features were discarded, 27 alternatives were identified. These alternatives were then analyzed for cost and environmental benefit. Because there is no recognized monetary value of improved habitat or species diversity, a traditional benefit-cost analysis was not feasible. Therefore, it was essential to quantify the amount of environmental benefit each alternative produces for alternative comparison.

Environmental benefits were determined by examining both site-specific benefits and systemic benefits. Site-specific benefits were limited to benefits gained only in the project area, Lake Belle View, and the immediate vicinity. Benefits gained in areas outside of the study area were considered to be systemic benefits.

Site-specific benefits were identified as improvement of aquatic and wetland benefits in the project site. These benefits were quantified using Habitat Evaluation Procedures (HEP), a collaborative effort designed to quantify the quality of improvement between the current conditions and the proposed “with-project” conditions. Both quantitative and qualitative values were combined to form Habitat Units (HUs).

By implementing fish passage at Lake Belle View, the entire Sugar River system would benefit from increased movement of aquatic organisms upstream and downstream. Fish downstream of Lake Belle View would have access to 218 miles of main stem and tributary habitat previously unavailable due to the dam. Systemic environmental benefits were quantified by assessing the amount of upstream habitat made available through implementation of the project.

Once systemic and site-specific benefits were determined, they were combined to reach an overall annualized habitat benefit. These benefits were then compared against the annualized cost of each alternative. This analysis was done in order to determine the Best Buy alternatives. Five Best Buy alternatives were identified through incremental analysis. Two of the Best Buy alternatives were selected as preferred alternatives based on the amount of dredging contained in each proposal, as directed by the sponsor. These two alternatives were presented in a referendum held in the Village of Belleville. The referendum, the sponsor, and the local stakeholders all indicated support of one of the

preferred alternatives. This alternative was selected as the Recommended Plan. Refer to Figure ES-1 for a diagram of the Recommended Plan.

The Recommended Plan consists of the following features:

1. Routing the Sugar River along the Eastern Diversion by constructing a diversion berm and excavating a new channel.
2. Accomplishing fish passage through riffle structures placed at the southern end of the newly created channel.
3. Dredging 15 acres of lakebed to a depth of 8 feet.
4. Restoring wetland areas using fine-grained dredged material.
5. Removing carp and other rough fish from the system with a carp gate, carp nets, and periodic drawdowns.

The Recommended Plan accomplishes all of the project goals. Rerouting the Sugar River around Lake Belle View improves aquatic habitat by lowering downstream temperatures and regaining a balanced sediment transport rate that was previously interrupted by the impoundment. Adding riffle structures for fish passage restores the connectivity of the Sugar River system, opening 218 miles of streambed to fish downstream of Lake Belle View. Riffle structures also serve as habitat for other aquatic organisms. Dredging restores aquatic habitat in the lake by reintroducing a variety of lake depths, allowing for a greater variety of fish habitat. Restoring the wetlands improves wetland habitat. It is anticipated that 22 acres of wetland habitat will be added to the Lake Belle View project area as a result of this project. Controlling the rough fish population causes gains both in wetland habitat and aquatic habitat. When feeding, carp and other rough fish disturb sediments while looking for edible plant material. This causes increased turbidity and a decrease in the amount of aquatic plants in the lake. By removing the rough fish from Lake Belle View, water quality should increase and submerged wetlands should emerge.

The Village of Belleville, the non-Federal sponsor, would accomplish the project operation and maintenance, at an estimated \$16,268 per year.

In accordance with the Water Resources Development Act of 1996, a 35% non-Federal cost sharing will be required of the general design and construction costs for the project. A Project Cooperation Agreement (PCA) will be executed consistent with this requirement.

The District Engineer has reviewed the project outputs and determined that implementation of the Recommended Plan is justified and in the Federal interest. Therefore, construction approval for the Lake Belle View Section 206 project is recommended by the Rock Island District Engineer at an estimated Federal expense, including general design, of \$4,123,100. The total non-Federal cost share is estimated at \$2,220,100.



Figure ES-1. The Recommended Plan.