

3. PROJECT GOALS, OBJECTIVES, AND POTENTIAL FEATURES

3.1 Problems and Opportunities

The lake has the typical water quality and fishery problems associated with aging artificial impoundments, including sedimentation, turbidity, lack of aquatic plant diversity, excessive nutrients, algal blooms, and rough fish.³ The Sugar River, which currently flows through the lake, has experienced degradation of water quality, an increase in rough fish populations, and a reduction of smallmouth bass populations since the lake was formed.

Significant opportunities exist to improve and enhance habitat for aquatic, riverine, and wetland species by increasing the lake depths, separating the river from the lake, and enhancing the existing wetland areas. The Sugar River supports both cold- and warm-water fisheries, with several miles of cold-water fisheries upstream of Lake Belle View. Marshall and Stewart (1993)⁴ sampled the upstream fishery and found 28 species. Common carp populations in the lake are high and have increased upstream into the Sugar River. Carp populations are not only a result of, but contribute to, the water quality problems in the lake through resuspension of bottom sediments when scavenging. The river was once known for its smallmouth bass population, which seems to have been diminished. In addition to fisheries and water quality issues within the millpond, the WDNR states that the Belleville dam impedes fish passage and free fish movement between upstream and downstream river habitats.⁵ Therefore, the dam is potentially limiting the quality of fisheries resources, particularly upstream of the existing dam and contributing to reduced populations of smallmouth bass and other species upstream.

3.2 Future Without Project

Lake Belle View will likely exist into the foreseeable future. Without any improvements, lake habitat will continue to be degraded. It is unlikely that lake habitat would naturally improve from being shallow, turbid, and without structural complexity. It is possible that the millpond area could slowly convert to wetland habitat. However, this has yet to happen after over 80 years of impoundment. Moreover, because the Village generally prefers open water habitat, it is likely they would operate the dam to minimize development of wetland vegetation, keeping the millpond as shallow, open water habitat that has limited habitat value.

The public is strongly opposed to dam removal. The Village has recently made improvements to the dam and therefore its stability should remain into the future. Currently, there is no Federal or state regulatory requirement forcing private dam owners to implement fish passage or dam removal. Thus, without this project, it is likely the dam will continue to limit connectivity for aquatic resources between the lower river and the upper watershed.

Outside of the project area, some habitat improvement may continue upstream of the lake. Future work on the upper watershed will continue to be challenged by urban growth as the Madison area experiences urban growth. This urban growth could result in changes in both physical stream habitat, as well as water quality. However, the resource is generally considered to be of high value, and future efforts will be made at the municipal, county, and state levels to protect the quality of the upper watershed (see Figure 3.1).

³ Kenneth W. Potter, et al., Institute for Environmental Studies, University of Wisconsin – Madison, "Lake Belle View: Research Findings and Alternatives for the Future" 1995 Water Resources Management Workshop.

⁴ Marshall, D., and S. Stewart. 1993. *Sugar River Classification Survey*. Wisconsin Department of Natural Resources-Southern District.

⁵ 1994 WDNR report.

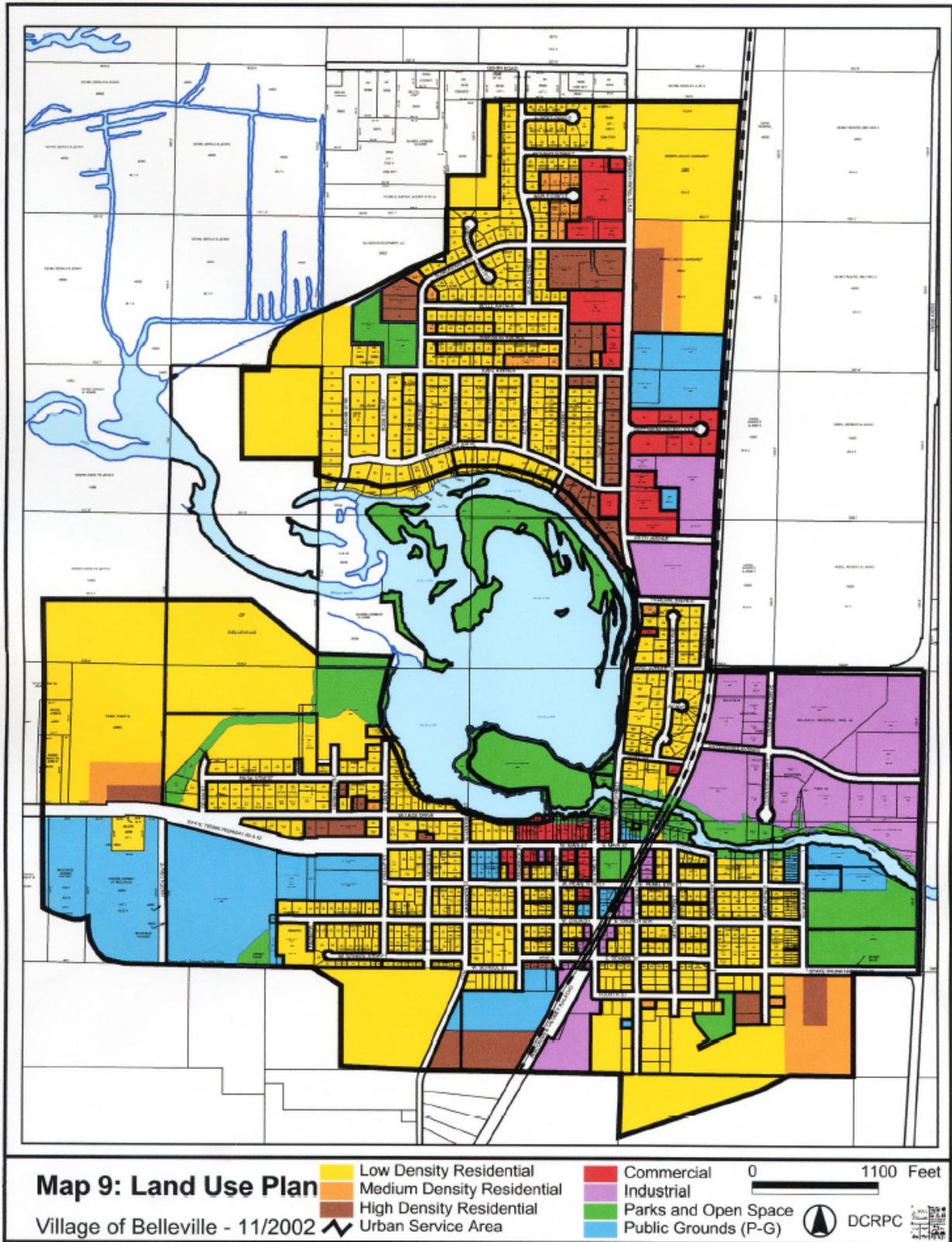


Figure 3.1. Land Use Plan, Village of Belleville.

3.3 Resource Significance

Settlement and development have caused the ecosystem in the project area to degrade. However, according to the WDNR, high quality resources still exist throughout the Upper Sugar River watershed. The Sugar River is considered to be an exceptional cold-water resource. The Upper Sugar River watershed is the focus of many environmental improvement, educational, and recreational projects. The lake is considered to be a unique resource, providing many recreational opportunities for the public. The lake is the hallmark of the Village. The view looking west from Highway 69 is considered to be a valuable asset, drawing residents and those interested in recreation. In addition, the citizens of Belleville take great pride in the dam as it symbolizes the Village’s heritage.

3.4 Management Goals and Constraints

In addition to the Sponsor and the Corps, this project has other stakeholders. The WDNR acts as the state regulatory agency for this area and is actively engaged in solving the resource problems in the Belleville area. Dane County and the Township of Montrose are project partners as well. The management goals of the stakeholders panel are as follows:

Stakeholder	Goal
Corps of Engineers	Implement aquatic restoration of the Lake Belle View area
Village of Belleville	Increase the depth of the lake, restore the Sugar River, preserve the viewshed ¹
WDNR	Restore the river to a more natural condition, allow uninterrupted movement of fish and other aquatic life
Dane County	Separate the river and the lake, restore and create wetland habitat
Township of Montrose	Avoid exacerbation of upstream flooding, restore the river and lake, avoid upstream sedimentation

¹ Viewshed is defined as the look, view, or aesthetic condition of the landscape.

In addition to the above goals, general criteria were considered when formulating restoration features and alternatives:

Flood Heights	Features cannot negatively impact the 100-year flood profile.
Infrastructure	Features should not impact the function of infrastructure such as bridges, drainage outlets, sewer lines, etc. The Sponsor must accomplish any relocation of infrastructure.
Operation and Maintenance	Features should be designed to have minimal operation and maintenance requirements.
Real Estate	The Sponsor must own all lands required for the project. Features should be designed to minimize the amount of land the Sponsor needs to acquire.
Aesthetics	Due to the urban nature of the project area, features should be designed to minimize negative impact on aesthetics.
Stream Stability	Features should be designed to maintain stream stability and should not negatively impact upstream or downstream reaches.
Hazardous, Toxic, and Radioactive Waste (HTRW)	Features cannot cause disturbance of HTRW to minimize and prevent Federal liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

3.5 Project Goals, Objectives, and Features

Based on the identified problems and the management goals of the Sponsor and stakeholders, the following goals, objectives, and potential project features were considered, as detailed in Table 3.1.

Table 3.1. Project goals, objectives, and potential features.

Goals	Objectives	Potential Features
Improve aquatic habitat Enhance wetland habitat	1. Improve water quality in Lake Belle View and the Sugar River 2. Increase lake depths 3. Increase diversity of aquatic habitat 4. Improve diversity and quality of wetland habitat	River diversion Wetland enhancement Periodic drawdown Fish passage structures Rough fish control Sediment removal Chemical treatment Island creation

The project involves improving aquatic habitat and enhancing wetland habitat. The following objectives have been 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.

3.6 Proposed Features

In order to accomplish the outlined objectives, potential features were proposed. These features are river diversion, wetland restoration/enhancement, periodic drawdown, fish passage structures, rough fish control, sediment removal, chemical treatment, and island creation. Table 3.2 outlines the method of objective accomplishment by feature.

Table 3.2. Objective accomplishments by feature.

Features	Objectives			
	1	2	3	4
River Diversion	X		X	
Wetland Enhancement	X			X
Periodic Drawdown	X		X	X
Fish Passage Structures			X	
Rough Fish Control	X		X	X
Sediment Removal	X	X	X	
Chemical Treatment	X			
Island Creation	X			

3.6.1 River Diversion. This feature would create separation of the lake and river channel. Directing the river into a channel would allow it to maintain its velocity and not drop sediments and nutrients into the lake. It also would reduce the warming effect that the lake has on the river and potentially extend the cool-water fishery downstream. The reduction of sediment and nutrients entering the lake would have water quality benefits and would benefit the warm-water fishery as well. By diverting the river around the lake, fish would be able to access habitat upstream of the lake. This feature would meet the objectives of improving water quality in Lake Belle View and effecting an increase in aquatic habitat diversity.

3.6.2 Wetland Enhancement. This feature would create depth diversity through dredged material placement. The addition of dredged material would add a variation of depth to the wetland, allowing different wetland species to thrive. The existing forested wetland and wet prairie/sedge meadow would be enhanced by the creation of additional wetlands throughout the lake. A diversity of habitat types would be beneficial to the fishery and to the wildlife utilizing the area. Wetlands also have the ability to remove nutrients from the water and thus improve water quality. Urban runoff enters the lake from the west, and creation of wetlands would provide a “filter” for that runoff prior to its entering the lake and river. This feature would meet the objectives of water quality improvement in Lake Belle View and effect an increase in wetland habitat diversity.

3.6.3 Periodic Drawdown. This feature would consist of lowering lake levels by 6 inches to promote emergent vegetation growth in the shallow areas of the lake area. It also would consolidate sediments in the shallow regions of the lake. This feature would have the environmental benefits of reducing turbidity, increasing aquatic and wetland habitat, and reducing potential algal blooms (UW 1995). This feature would meet the objectives of water quality improvement in Lake Belle View and effect an increase in wetland habitat diversity.

3.6.4 Fish Passage Structures. This feature would provide a structural means of connecting upstream and downstream fisheries in the Sugar River. This feature would meet the objective of effecting an increase in aquatic habitat diversity.

3.6.5 Rough Fish Control. This feature would include structural and nonstructural methods of reducing the rough fish population, primarily carp, in the lake. Rough fish resuspend fine sediments and destroy aquatic vegetation through foraging activities. This feature would meet the

objectives of water quality improvement in Lake Belle View, effecting increases in both aquatic and wetland habitat diversity.

3.6.6 Sediment Removal. This feature would increase the amount of depth diversity and reduce the amount of nutrient-rich sediment within the lake. In addition, it would decrease average lake temperatures by increasing depth. This feature would meet the objectives of water quality improvement in Lake Belle View, effecting an increase in both lake depths and aquatic habitat diversity.

3.6.7 Chemical Treatment. This feature would involve adding a phosphorus-binding agent, such as alum, to the lake. This agent traps dissolved phosphorus into a non-soluble solid form, which settles to the bottom of the lake. Since the phosphorus is bound in with the agent, it would not be resuspended should the lake sediments be disturbed. This feature would meet the objective of water quality improvement in Lake Belle View. However, this feature was dropped from further consideration because it was not a long-term, sustainable solution. Concerns were raised over potential negative effects to organisms living in the lake. In addition, chemical treatment is contrary to the Section 206 premise of building naturally functioning systems.

3.6.8 Island Creation. The creation of islands within the lake would use dredged material to create island habitat throughout the lake. While decreasing the amount of storage needed for excess dredged material, it also would create additional terrestrial habitat and decrease wind fetch, a cause of turbidity. This feature would meet the objective of water quality improvement in Lake Belle View. However, this feature was dropped from further consideration after preliminary analysis revealed that wave wash does not substantially contribute to lake turbidity. In addition, more terrestrial habitat is not needed in the area. Creation of the islands also would impact the viewshed of the lake and reduce the amount of area available for dredging.