The George W. Shannon Wetlands Water Recycling Facility (GWSWWRF) is a wastewater treatment facility located in Texas, USA. Its primary function is to provide 115,500 acre-feet/year (103 MGD average) of additional raw water supply to reservoirs (Richland-Chambers and Cedar Creek Reservoirs) that will swell to over 3.8 million by the year 2060. In order to meet this future demand, pipeline connections have been constructed, currently spanning across ten counties in North Central Texas.

Introduction

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Program Research

Wetlands are considered as a unique resource and have been valued for their valuable ecosystem services, including water purification, carbon sequestration, and habitat for various species. The George W. Shannon Wetlands Water Recycling Facility (GWSWWRF) was designed to provide a sustainable source of water for the local community. The facility was constructed as part of the Tulane Regional Water District's (TRWD) water supply program. It is a low-impact treatment system that provides a reliable and sustainable source of water for the region.

System Performance

The wetland system demonstrated effective removal rates for various parameters, including TSS, TN, and TP, with removal efficiencies above 85%. The wetland cells were designed to achieve a balanced flow distribution and minimize short-circuiting, ensuring even treatment across the system. The wetland design also included features for sediment management, with sedimentation basins to capture settled materials.

Design Components

The wetland system is divided into two phases: Phase I and Phase II. Each phase consists of multiple wetland cells, with Phase I expanded in Phase II to accommodate increased water treatment requirements. The wetland cells are designed with internal baffles and flow control structures to promote even flow distribution and minimize short-circuiting. The wetland system also includes sedimentation basins to capture settled materials and prevent them from being carried into the downstream river system.

Wetland Vegetation

The wetland system is designed to support a diverse range of vegetation. The initial seeding included a mix of native and introduced species to promote a balanced ecosystem. Over time, the vegetation has evolved, with native species becoming more dominant. The wetland system has also been managed to promote the growth of emergent vegetation, which provides additional benefits in terms of water quality improvements.

Conclusions

The George W. Shannon Wetlands Water Recycling Facility (GWSWWRF) has been successful in providing a reliable and sustainable source of water for the local community. The wetland system demonstrates effective removal rates for various parameters, including TSS, TN, and TP, with removal efficiencies above 85%. The wetland system also includes features for sediment management, with sedimentation basins to capture settled materials and prevent them from being carried into the downstream river system. The wetland system has been managed to promote the growth of emergent vegetation, which provides additional benefits in terms of water quality improvements.

Outdoor Conditions

Both flood events resulted in backwater flooding into the same cells and a major flooding event that overtopped the perimeter levees in July 2011. The subsequent high flows resulted in significant vegetation regrowth and colonization of the deeper marsh areas within 3 months. Natural and accelerated vegetation from available seed banks could be unabated to the regrowth of vegetation requirements. However, initial results such as vegetation abundance and growth were poor with several of the native species not developing as expected. The growth of dense emergent vegetation across the marsh zones of the wetland system was improved as well as colonization from the seedbank, open water areas, and edges of existing plantings. The wetland system demonstrated effective removals of TSS, TN, and TP, with removal efficiencies above 85% overall for the combined system.

Effective removal of suspended sediments and nutrients. However, design considerations focused on the importance of sustainable management practices and the need to minimize environmental impacts. Although several management activities were conducted throughout the field trials, the wetland system demonstrated effective removals of suspended sediments and nutrients. However, design considerations focused on the importance of sustainable management practices and the need to minimize environmental impacts. Although several management activities were conducted throughout the field trials, the wetland system demonstrated effective removals of suspended sediments and nutrients. However, design considerations focused on the importance of sustainable management practices and the need to minimize environmental impacts.