

FREEDOM PARK KEEPS IMPROVING WATER QUALITY

Johnson Engineering's water quality monitoring efforts throughout the last ten years have helped to demonstrate that Freedom Park in Collier County is successfully improving the quality of stormwater prior to reaching the Gordon River.

When the Fred W. Coyle Freedom Park in Collier County was constructed over a decade ago, it was known as the Gordon River Water Quality Park. This popular recreation area's primary purpose was to serve as a water quality treatment system, diverting stormwater runoff through a pond and a series of created wetlands, to remove pollutants and improve water quality prior to reaching the Gordon River.



Freedom Park incorporates raised boardwalks and pathways for recreation, scenic outlooks for wildlife, and educational information about the multi-functioning 50-acre water quality park.

More than just an aesthetically pleasing stormwater runoff treatment facility, Freedom Park, along with the adjacent natural wetland area, incorporates raised boardwalks and pathways for recreational walkers, scenic outlooks for wildlife and bird enthusiasts, and an educational learning center that hosts classes and displays exhibits of the plants and animals that thrive in this functional ecosystem.

The Freedom Park constructed wetland system consists of a stormwater pond that has been interconnected with a series of planted wetland cells. The submerged and emergent plants selected for the cells, along with the limestone baffles along the bottom of the cells, are designed to remove pollutants and excess nutrients (nitrogen and phosphorus) from the stormwater that runs off the residential and commercial developments to the north, east, and west. Following heavy rain events, the stormwater A quarterly publication by:



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Educational signage throughout the park help make the community aware of the how the park's various features help to remove pollutants and improve water quality.

PEOPLE & PROJECTS: ON THE MOVE

Guy Adams, P.S.M. has joined our Fort Myers surveying and mapping team. He brings more than 30 years of surveying experience on large projects for both the public and private sector.



development design technician who began his employment with Johnson Engineering in 1979, has retired after working in Johnson Engineering's development group for 38 years.



David Robson, P.E. water resource engineer, who primarily worked with Community Development Districts (CDDs), has retired after working for Johnson Engineering for the last 13 years.

is pumped into the pond, where heavy particles settle out. This series of natural-looking pond areas, complete with lily pads and reptiles, acts as a filtration system for the stormwater before it discharges to a natural wetland area through a structure that mimics a bubbling brook. From there, the treated water sheetflows into the Gordon River, which has been deemed an impaired water body by Florida Department of Environmental Protection (FDEP) and now has a restriction on how much nitrogen it can receive. Prior to the construction of Freedom Park, the nutrient-rich stormwater used to flow directly into Gordon River and Naples Bay downstream, creating potential algal blooms and related water quality issues.

When the park was first constructed, Collier County asked Johnson Engineering to provide the environmental and water use monitoring services. Although the water quality monitoring required by the original permits consisted only of testing samples of water flowing out of the park, Collier County and Johnson Engineering saw the opportunity to monitor the pollutant removal efficiency of this beautifully constructed wetland system.

By collecting water quality samples from where water entered the park via a stormwater pump, in addition to the samples collected from the outfall structure where water flowed out of the park, our environmental scientists were able to demonstrate the effectiveness of the constructed wetlands as a water quality treatment system. We also began monitoring the volume of flow into and out of the park.

The inflow and outflow water quality monitoring and reporting that we have conducted at Freedom Park since 2008 have helped to demonstrate that this wetland treatment system successfully removes 48% of the total nitrogen and 80% of the total phosphorus from the stormwater inflow. In 2016,

graduate students from Florida Gulf Coast University (FGCU) installed automated water quality samplers and other monitoring instruments at Freedom Park to further document the water quality benefits of this wetland system as part of a master's thesis study. Johnson Engineering scientists collaborated with the students conducting the research by providing monthly flow data and access to annual water quality monitoring reports. Results from the first year of the two-year study corroborate removal of total nitrogen and total phosphorus throughout the rainy season and in conjunction with individual storm events.

In 2017, Collier County installed dataloggers outfitted with cellular communication at both pump stations that provide inflow to the water quality park. Johnson Engineering configured digital output from flowmeters at those stations to the dataloggers so that the flow data could be continuously recorded and accessed in real-time, along with outflow water level data already being recorded by FGCU. We also installed



This cascading rock structure is where stormwater is



Water quality sampling of the wetlands began during the park's construction.

continuous recording water level sensors at both inflow pump stations. Collier County and FGCU hope this additional instrumentation will help further refine estimates of the park's nutrient removal efficiency under various hydrological conditions.

This collaborative effort between Collier County, FGCU, and Johnson Engineering will continue to assess the effectiveness of the Freedom Park treatment system, which may help in the design of similar projects throughout southwest Florida, with the ultimate goal of improving the long-term health of Naples Bay and quality of life for local residents.

For more information, contact Tim Denison at 239.334.0046 or tdenison@



Monitoring equipment at the park's outfall structure measures water level and flow.



This pump station along Goodlette-Frank Road draws stormwater from the holding pond where it pools.

CREATING A GARDEN OF ACCEPTANCE

Johnson Engineering's principal landscape architect, Jeff Nagle, RLA, had the pleasure of working with a Ms. Lewter's 4th grade students at Babcock Neighborhood School to create a Garden of Acceptance.

The class assignment was to create a school environment that was accepting of all students and their diverse traits. The students brainstormed and decided on a garden. They envisioned this garden to be a place that anyone could visit to feel safe and not be judged. The students came up with a layout and overall design, then requested Johnson Engineering's help determining appropriate plant selections, location, and planting arrangement.

Jeff prepared a presentation to help teach the children basic landscape design and plant cultural considerations. He explained how they needed to consider the surroundings, the soil, irrigation, orientation of the garden for shade/sun, spacing, plant growth habits, etc. After reviewing photos and discussing each potential plant type, voting

by show of hands, the class narrowed down the list of plants that could live





CITY OF FORT MYERS DOWNTOWN BASIN RECOGNIZED FOR IMPROVING THE ENVIRONMENT

The City of Fort Myers has been recognized as a winner in the Florida League of Cities' 9th Annual Florida Municipal Achievement awards, as the co-winner of the League's Environmental Stewardship Award for the Downtown Basin. The award recognized the City's efforts for improvement to environmental water quality.

Once a waterfront parking area, this 1.5-acre wet detention area has now become an appealing focal point in downtown Fort Myers. The basin was designed to combine a unique mix of waterfront pathways, aesthetically appealing architecture, and landscaping, while inconspicuously collecting and treating stormwater from the City's historic downtown area before discharging to the impaired Caloosahatchee River.



Stormwater traverses Freedom Park through a pond and a series of created wetlands and then natural wetlands before entering Gordon River.



and grow in their garden. Together, they came up with a final design and a plan of action to get the supplies, plants, and how to maintain it.





The Johnson Engineering landscape architectural team has volunteered to assist the class with the planting process, which will give our team the opportunity to demonstrate proper planting techniques that will help contribute to the success of the garden and teach the students how to be good stewards of the environment.

The students, as well as all who visit the Babcock Ranch Neighborhood School, will soon be able to sit in The Garden of Acceptance, look around, and feel a sense of accomplishment



that they created this very special space. It's a rewarding experience to be part of watching children grow and learn about the environment around them and how it can make you feel.

For more information, contact Jeff Nagle, RLA, at 239.334.0046 or jnagle@johnsoneng.com. 🗖

Our team monitored the water quality for the first year following construction and received positive results. The report we submitted to the FDEP showed the basin was working as designed, reducing the nutrient loads before discharging into the river. As the civil engineer responsible for the design and permitting of the basin, it's rewarding to see this project being recognized for what it was designed to do.

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JOHNSON ENGINEERING DEVELOPS CITY-WIDE WASTEWATER HYDRAULIC MODEL

In 2016, Johnson Engineering worked with the City of Naples to develop and calibrate a city-wide model of the wastewater pumping station and force main system. The hydraulic model included 123 pump stations and 310,000 feet of 2-inch to 42-inch diameter pipes as identified from geographic information system (GIS) data provided by the City. The model utilizes extended period simulation

that includes 24 hours of average-day conditions and 24 hours of peak-day conditions that occur during wet weather. Extended period simulation allows real-world system behavior to be modeled and interactions between various facilities to be studied. This provides greater insight into operations compared to a static analysis.

Using timestamped supervisory control and data acquisition (SCADA) data provided by the City, individual diurnal wastewater flow patterns were developed for 122 existing pump stations. The extensive SCADA data provided by the City were analyzed using software developed in-house. Average-day and peak-day diurnal flow patterns specific to each pump station were integrated into the model. Combined with pump float settings and wetwell dimensions, the model enables true system behavior to be simulated. Modeled flow to the wastewater treatment plant (WWTP) totals 4.8 million gallons per day (MGD) for the average-day period and 7.6 MGD for the peak-day period. Good calibration with observed conditions was obtained, with 98 lift stations calibrated to within plus or minus 6% of the pumping rates calculated from SCADA data.

This project included using the hydraulic model to make recommendations for priority improvements. These recommendations included pump upgrades at two stations and upsizing approximately 9,000 feet of force main. Recommendations for enhancement improvements that improve system reliability were also made. These recommendations included identifying areas for stormwater inflow and infiltration remediation and providing alternative flow routing for a large master pump station.

Municipalities and service providers continue to integrate data collection capabilities and make their wastewater systems smarter. These efforts can be leveraged to develop robust hydraulic models and extended period simulations that provide insight into transient system behavior. These tools are useful for proactively identifying issues, making coordinated system upgrades, and developing focused capital improvement programs.

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