

RESTORE Act Ecosystem Restoration Project Proposals
for consideration in the Gulf Coast Ecosystem Restoration Council's Comprehensive Plan
2012

Contact Information: Jerry Kurtz, P.E., Principal Project Manager						Date of Submittal: November 5, 2012	
Name of Project: Henderson Creek Diversion Pump Station						Org and Rank: Collier County, Florida	
Project Description: This project would utilize a 100 cfs pump station constructed near the new GG-3 structure to divert water from the Golden Gate Main Canal to the Henderson Creek Canal. Diverted water will move south through a new 5200 LF dredged canal, 30' wide and 10' deep and water will flow into Henderson Creek through an existing box culvert under I-75. The project is predicted to reduce the volume of discharge to Naples Bay by about 10 percent. The project will also increase the volume of water entering Rookery Bay by about 33 percent.							
Project Location: Collier County. Rookery Bay Watershed							
Responsible Party: Collier County Natural Resources Department				Partners: Collier County, USACE, SFWMD			
NEP: CHNEP		Project Cost: \$5,700,000			Dollars Needed: \$5,700,000		
Start: 2014				Completion: 2018			
Status of Project Design and Permitting: Project has been conceptually designed.							
What Date or Year could Construction Feasibly Begin: 2014/15							
Your Proposed Timing of Funding (given permits, phasing, staging, etc.)							
FY	12/13	13/14	14/15	15/16	16/17	17/18	Total
			\$700,000	\$1,000,000	\$2,000,000	\$2,000,000	\$5,700,000
Quantify Environmental Results and How to Measure Them: Results will be measured by volume of freshwater diverted from Golden Gate Main Canal to the Henderson Creek Canal.							
Economic Benefits (including ecosystem services): The project will improve water quantity conditions to both the Naples Bay and Rookery Bay. While the value of the seasonal changes in discharge rates is difficult to quantify, the ecosystem service value can be estimated of the areas which will experience improvements. Based on the ecosystem service values derived in Costanza et. Al. (1997), this project will benefit areas with combined ecosystem services values of approximately \$19,000,000 per year (Attachment 3). This figure represents the value of services provided by the surface area of the estuaries which will receive a benefit as a result of the diversion. Additional economic benefits will be realized as a result of the future seagrass restoration projects which will only be possible once freshwater discharge imbalances have been improved.							
Estimated number of Jobs Created or Preserved: 57 (Estimate based on 1 job per \$100,000)							
How much Habitat will be restored and conserved?: Freshwater flow will be improved in both Naples Bay and Rookery Bay as a result of this project. Naples Bay has a surface area of about 1066-acres and Rookery Bay encompasses a surface area of about 1,034-acres. Since the 1950's, Naples Bay has seen a reduction in seagrass bed acreage from about 68-acres to about 4-acres today. These remaining seagrass beds will experience restored water quantity and quality through restored freshwater discharge rates to Naples Bay which will allow for							

significant increases in seagrass bed acreage through future restoration projects anticipated by the City of Naples and the South Florida Water Management District.

Quantify pollutant reductions:

This project is primarily designed for water quantity benefits. Pollutant loads from Golden Gate Canal into Naples Bay will be reduced insomuch as freshwater flows are reduced. However, increased freshwater discharges may increase pollutant load to Rookery Bay.

Water Quality	GGCAT951 (Median "wet season")	Average Removal	Removed from GGC
Pollutant loadings to the wetland	Pollutant Loading (mg/L)	Removal Efficiency	Load Removed (lbs/yr)
N	0.725	50%	16420
P	0.019	50%	430
TSS	2	50%	45296

What living coastal/marine resources will be improved and by how much?:

In Naples Bay, the reduction in freshwater flow will improve habitat for seagrasses, improve salinity and reduce nutrient levels in the freshwater flowing from the Golden Gate Canal. These improvements will be enhanced in proportion to the freshwater flow reduction of 10 percent. Rookery Bay has experienced similar impacts to natural resources resulting from dry-season freshwater discharge deficits. This diversion project will result in similar improvements to coastal/marine resources resulting from the increase of freshwater flow by about 33 percent. Furthermore, as estuaries and seagrass beds provide habitat for a variety of fish and invertebrate species, the diversion of freshwater discharge will in turn result in marine life habitat improvements in both bay systems.

How will community resilience be enhanced

Improving the seasonal excess freshwater flow to Naples Bay and the deficiency in Rookery Bay will improve the resilience of these two important estuary systems in Collier County, both of which are currently threatened by seasonal variability in freshwater discharges.

Over the past 50 years, Naples Bay has experienced significant development which has altered not only the direct shorelines and natural resources within the bay, but also the entire watershed through dredge-and-fill operations and channelization projects. These projects have expanded the watershed of Naples Bay from what was once about 10 square miles to about 120 square miles today. The 10 percent reduction of freshwater flows anticipated by this project will improve freshwater discharges, and therefore also the salinity and nutrient load. This will ultimately allow for further restoration of natural resources in Naples Bay. This diversion will improve seasonal freshwater shortages to the Rookery Bay Estuary by 33 percent. Furthermore, this project provides additional water to Henderson Creek which may be available to augment future water supply needs for the Marco Island Water Treatment Plant.

As described here, the diversion of freshwater discharge from Naples Bay to Rookery Bay will result in regained and repaired habitat, improved salinity levels, and will improve the health, balance and resilience of the estuaries.

Additional Justification:

Construction of the Golden Gate Main Canal significantly increased the size of the watershed draining to Naples Bay and reduced the size of the watershed draining to Rookery Bay. As a result, Naples Bay receives significantly too much freshwater and the Henderson Creek Watershed and the Rookery Bay estuary are starved of freshwater; these negative affects to both receiving water estuary systems will likely only worsen as Collier County continues to grow. This project would improve the freshwater discharges to both Naples Bay and Rookery Bay.

One of the ecosystems most severely impacted by the freshwater flowing into Naples Bay includes oysters and seagrasses. Most of the seagrasses that once existed in Naples Bay are now gone. While there are in fact some areas of Naples Bay where seagrasses can be found, the seasonal pattern of excessive freshwater flows to Naples Bay has hindered the expansion and restoration of seagrass beds as natural salinity patterns are critical to restoring estuarine habitat. Reducing those freshwater flows to the Bay will improve conditions which will allow seagrasses to recover and also allow for supplemental plantings to be attempted.

Though Collier County is outside the study area of the CHNEP CCMP, this project would support several of the quantifiable objectives and priority actions identified in the plan (pg 86), including:

- HA-2...[to] restore, enhance and improve where practical historic watershed boundaries and natural hydrologies...
- HA-G: Reestablish hydrologic watersheds to contribute flows to their historic receiving water bodies.
- HA-J: Build and restore water conveyances to have shallow, broad, vegetated and serpentine components that also restore floodplains.

Add any photos or maps that explain project:

Attachment 1: Conceptual Design from the Collier County Watershed Management Plan

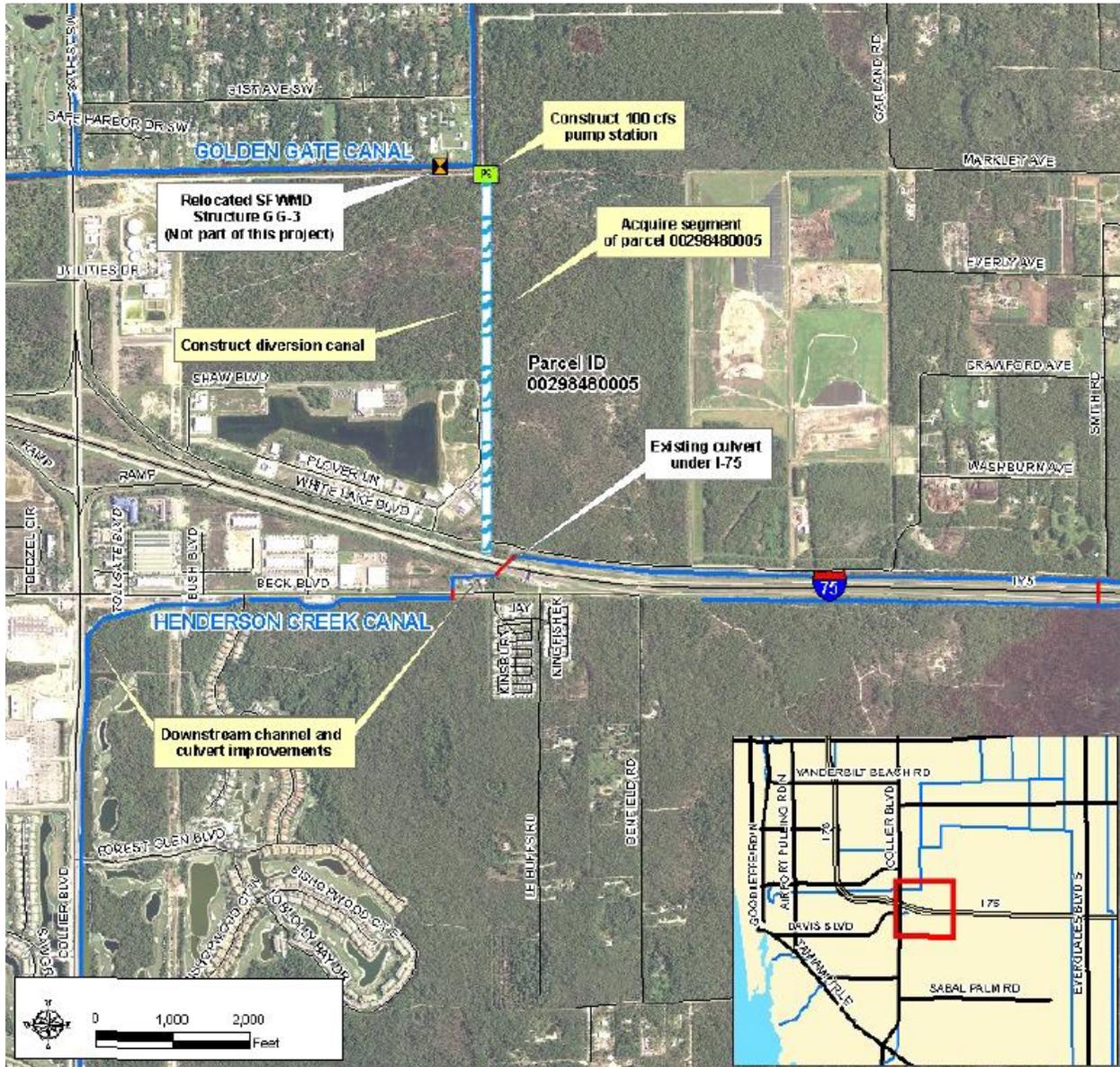


Image source: <http://www.colliergov.net/Modules/ShowDocument.aspx?documentid=38448>

Attachment 3: Ecosystem Values from Costanza, et. Al. (1997)

Estuary Name	Costanza Biome	Costanza Value (\$ ha ⁻¹ yr ⁻¹)	Approximate Acres	Approximate Hectares	Adapted Ecosystem Services Values
Naples Bay	Estuary	\$22,832	1066	426.4	\$9,735,565
Rookery Bay	Estuary	\$22,832	1034	413.6	\$9,443,315
Total			2100	840	\$19,178,880

Sources -

Economic values: Costanza, R., et. Al. (1997). "The value of the world's ecosystem services and natural capital". *Nature* 387:253-260.

Estuary Surface Area Acreage: "A 20 Year Plan for the Restoration of Naples Bay". City of Naples. 2012. Access <<http://www.naplesgov.com/DocumentCenter/Home/View/385>> and "Fact and Figures". Rookery Bay National Estuary Research Reserve Website. 2011. Access <<http://www.rookerybay.org/about-us/facts-and-figures>>