

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

<b>Contact Information:</b> Jerry Kurtz, P.E., Principal Project Manager					<b>Date of Submittal:</b> November 5, 2012		
<b>Name of Project:</b> North Belle Meade Spreader Swale					<b>Org and Rank:</b> Collier County, Florida		
<b>Project Description:</b> <p>This project includes planning, design and construction of appropriate infrastructure to divert up to 1,000 cubic feet per second (cfs) of surface water flow from the Golden Gate Main canal south into the Northern Belle Meade area. (Attachment 1 - project graphic incorrectly indicates a 100 cfs diversion.) Different flow diversion amounts will be considered and could be phased in over time. This facility would be used primarily during the rainy season to reduce flow in the Golden Gate Main Canal currently going west to the Gordon River and Naples Bay. Diverted surface water would flow south through the Northern Belle Meade area toward South Belle Meade and Rookery Bay. Project considerations are still being conceptually evaluated. Possible scenarios to be considered include a pump station to assist the diversion, a spreader swale, an overland flowway, and conveyance through existing and future quarry mining lakes.</p> <p>The project is predicted to reduce the volume of discharge to Naples Bay by 10 percent and will provide treatment of the diverted water in the wetland systems. The project is also predicted to increase freshwater discharge to Rookery Bay by 19 percent. Full design would need to consider the conveyance capability of the culverts under I-75 and the affect of the existing borrow excavation areas on the north and south side of I-75.</p>							
<b>Project Location:</b> Collier County, Northern Belle Meade, Rookery Bay Watershed							
<b>Responsible Party:</b> Collier County Natural Resources Department				<b>Partners:</b> Collier County, SFWMD, USACE			
<b>NEP:</b> CHNEP		<b>Project Cost:</b> \$7,000,000 (Attachment 2)			<b>Dollars Needed:</b> \$7,000,000		
<b>Start:</b> 2014				<b>Completion:</b> 2018			
<b>Status of Project Design and Permitting:</b> This project has been conceptually designed by several partners including the SFWMD and in the Collier County Watershed Management Plan							
<b>What Date or Year could Construction Feasibly Begin:</b> 2015							
<b>Your Proposed Timing of Funding (given permits, phasing, staging, etc.)</b>							
<b>FY</b>	<b>12/13</b>	<b>13/14</b>	<b>14/15</b>	<b>15/16</b>	<b>16/17</b>	<b>17/18</b>	<b>Total</b>
		\$500,000	\$500,000	\$2,000,000	\$2,000,000	\$2,000,000	\$7,000,000
<b>Quantify Environmental Results and How to Measure Them:</b> Environmental benefits will be measured in freshwater discharge reduction to Naples Bay and improvements to the hydroperiods of wetlands in North and South Belle Meade.							
<b>Economic Benefits (including ecosystem services):</b> <p>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 to experience improvements. Based on the ecosystem</p>							

service values derived in Costanza et. Al. (1996), 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 according to 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: 70** (estimate based on 1 job per \$100,000)

**How much Habitat will be restored and conserved?:**

Flowway easements for the discharge area may be preserved, but the exact size and location is subject to final design considerations. Both Naples Bay (1066 surface acres) and Rookery Bay (1034 surface acres) will experience hydrologic restoration in the form of freshwater discharges. Wildlife habitat will be improved as the North and South Belle Meade Areas include wildlife habitat for animals like the Florida black bear and the Florida panther. Acreage of wildlife habitat to be preserved will depend on the land acquisition scenario utilized to create the discharge flowway.

**Quantify pollutant reductions:**

Preliminary calculations have been completed based on two different scenarios show below. The first (Water Quality Losses Portion) assumes diversion directly into a spreader swale system, based on a 200 cfs diversion. This indicates a large reduction to Naples Bay pollutant loading. The second (Water Quality Wetland Treatment Portion) estimates the load removed by the flow through the North Belle Meade Area.

Water Quality (Losses portion)	GGCAT951 (Median "wet season")	Complete Removal	Flow before losses	From GG Canal	
Pollutant loadings to the wetland	Pollutant Loading (mg/L)	Removal Efficiency	Flow volume (ft <sup>3</sup> /yr)	Load Removed (lbs/yr)	
	N	0.73	50%	725,760,000	16533
	P	0.031	50%	725,760,000	702
	TSS	2	50%	725,760,000	45296
<b>Water Quality (Wetland Treatment Portion)</b>					
Detention Time = Shallow Concentrated TC					
Flow length = 18000 ft					
Total hydraulic drop = 2.5 ft (11.0 to 8.5)					
TC = 26.29 hrs (1.1 days)					
Detention Time / 14 Days * Wet Detention Removal = Efficiency	N	0.73	0.024	725,760,000	779
	P	0.031	0.051	725,760,000	72
	TSS	2	0.063	725,760,000	5694

**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 in this case from the dry-season deficit of freshwater discharge. This diversion project will result in similar improvements to coastal/marine resources resulting from the increase of freshwater flow by about 19 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 ultimately allowing for further restoration of natural resources in Naples Bay. This diversion will improve seasonal freshwater shortages to the Rookery Bay Estuary by 19 percent.

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 flowing to Rookery Bay. As a result, Naples Bay receives significantly too much water and Rookery Bay receives too little water, thus negatively affecting both receiving estuary systems. Additionally, the reduction of stormwater runoff to the south has decreased wetland hydroperiods in areas where sheetflow used to occur. This project is part of a larger program to restore the hydrology of the entire Belle Meade Flowway which extends from the Golden Gate Main Canal north of I-75 in the north, U.S. 41 and the Ten Thousand Islands in the south, and reaching from the Picayune Strand CERP Restoration Project to the east and urban development and C.R. 951 to the west. The entire Belle Meade Flowway encompasses several thousand acres of wildlife habitat and wetlands that have been severely altered by development, as well as a canal system sending water west to Naples Bay (Attachment 4).

There are several conceptual plans for this project which provide for alternative development scenarios. The construction of the planned Wilson Blvd Extension could provide for alternative land acquisition scenarios in which the diversion canal could be located along Wilson Blvd and funded through the road construction. Another alternative scenario includes dedicating the flowway through the development process in the lands south of the spreader swale. This would subject the dedication of the flowway to sporadic or delayed development of the area. The proposed project includes increased land acquisition budgeting to account for a scenario in which acquisition is required for flowway easements in addition to the diversion canal and spreader swale however, conditions and permitting may require a combination of project scenarios.

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

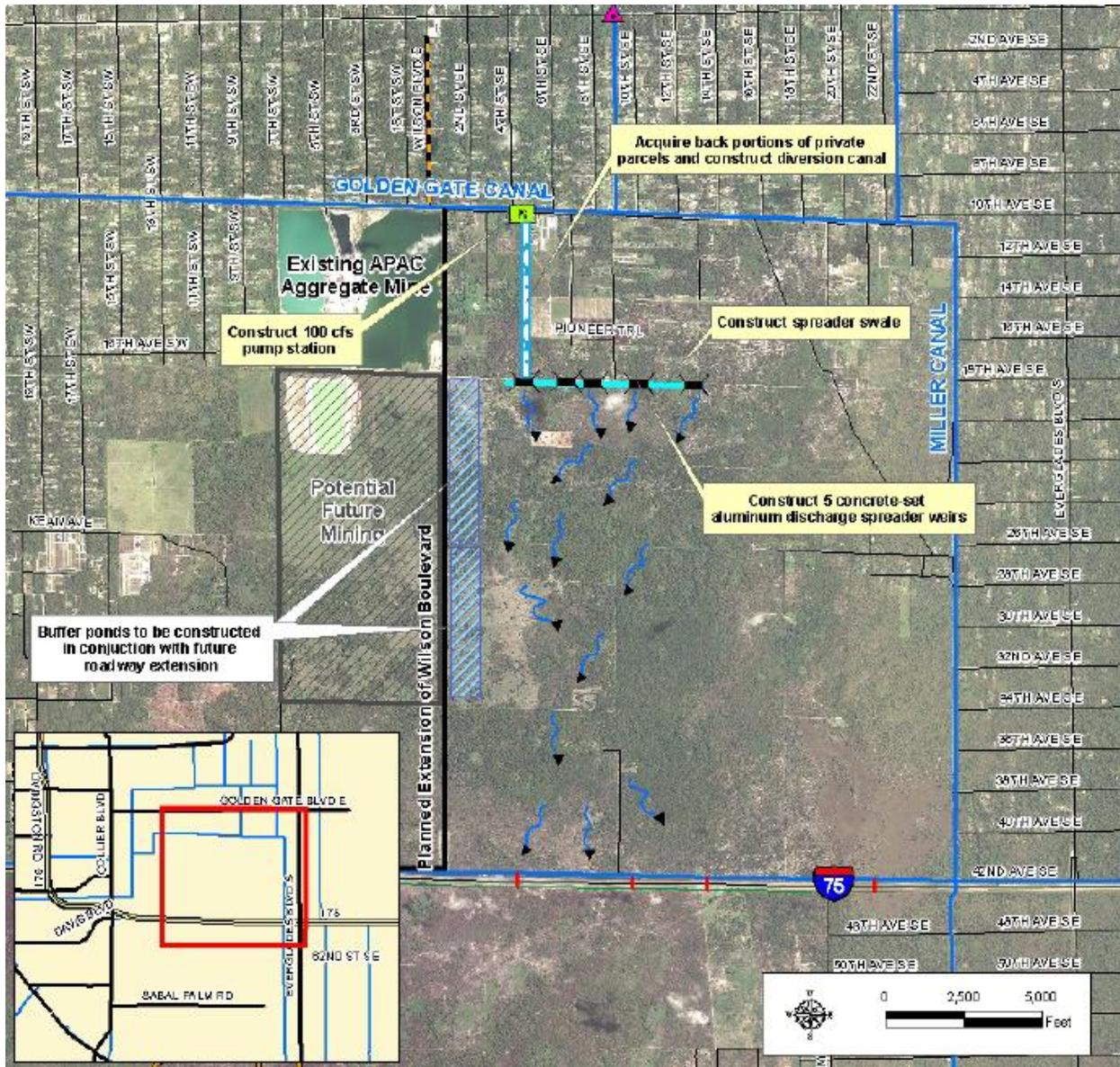


Image source: <http://www.colliergov.net/Modules/ShowDocument.aspx?documentid=38448>



### Attachment 3: Ecosystem Service Values Supported by Hydrologic Restoration of Naples and Rookery Bay

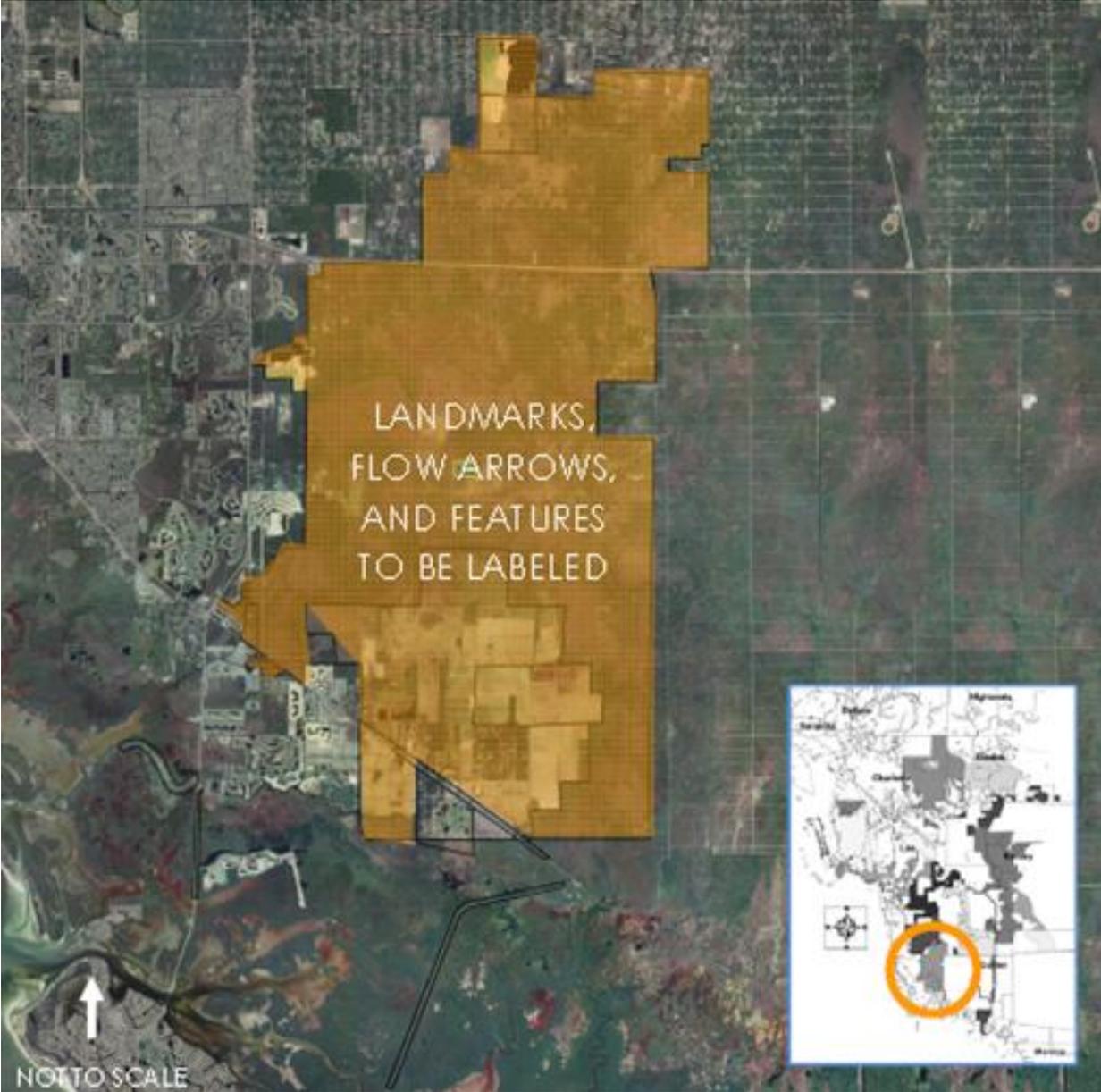
Estuary Name	Costanza Biome	Costanza Value (\$ ha <sup>-1</sup> yr <sup>-1</sup> )	Approximate Acres	Approximate Hectares	Adapted Ecosystem Services Values
Naples Bay	Estuary	\$22,832	1066	426.4	\$9,735,565
Rookery Bay	Estuary	\$22,832	1034	413.6	\$9,443,315
<b>Total</b>			<b>2100</b>	<b>840</b>	<b>\$19,178,880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

**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>>

**Attachment 4: Overall Project Area for the Belle Meade Flowway**



*Image courtesy: Jim Beaver*