Technical Memorandum

To: **Mac Hatcher, PM Collier County**

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Re: **Watershed Model Update and Plan Development**
Contract 08-5122, PO 4500106318
Element 4, Task 1: Identification of Potential Projects, Future Watershed Stressors, and Policies

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1.0 Objective

This document describes the methodology used to identify potential watershed improvement projects. These projects are being evaluated based on the previously identified performance measures to develop the Watershed Management Improvements Plan.

2.0 Future Watershed Stressors

Watershed stressors are driven by population growth and the needs of urban developemnt. The Collier Interactive Growth Model (CIGM) (Van Buskirk, 2008) predicts that the population of Collier County at full build-out will be approximately 950,000. The additional development will occur primarily east of Collier Boulevard and north of I-75. The Van Buskirk model suggests that the Golden Gate Estates area will be the first area to be more densely developed. Properties that are currently designated as Rural Lands Stewardship Areas are also predicted to convert to highly urbanized areas in the next 50 – 60 years.

The Lower West Coast Water Supply Plan (LWCWSP) (SFWMD, 2005-2006) evaluated issues related to water supply and environmental issues based on projections out to the year 2025. According to the LWCWSP, there are three primary issues to be considered when planning for the future in Collier County:

- Saltwater intrusion, wetland protection, and interference with existing land uses will significantly limit increased usage of existing groundwater and surface water supplies.
- Freshwater high-flow discharges from altered surface water systems in the planning area are impacting coastal resources and estuaries. Capturing some of the excess surface and storm water for water supply purposes would improve water supply availability and benefit the environment.
- Additional water storage is needed to create opportunities to fully use reclaimed water and seasonal surface water resources to meet urban irrigation needs.

Understanding of these issues provides the framework for identifying policies and projects to be considered in the Collier County Watershed Management Plans.

3.0 Methodology for Identifying Potential Projects

This section addresses the methodology used to identify potential projects in Collier County. The process is divided into the steps described in detail below. These steps include the following:

1. Review completed studies to identify previously proposed projects.
2. Identify new improvement projects
3. Recommend new County-wide watershed management approaches

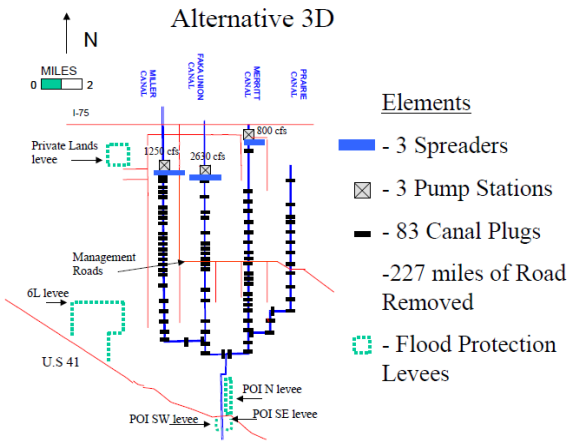
3.1. Review Completed Studies to identify Previously Proposed Projects

Many studies have been completed to identify potential projects within specific areas of Collier County. Because the description of the projects vary widely from specific detailes togeneral concepts, our approach was to provide definition to the projects that so require so as to be able to define their implementation feasibility. Following is a description of the identified projects.

3.1.1. Picayune Strand Restoration Project

The Picayune Strand Restoration Project (PSRP) was designed by the United States Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD) to restore the wetlands of the Picayune Strand located in Collier County south of I-75. The projects calls for the installation of ditch blocks in four (4) canals and the construction of three (3) pump stations to move water into the overland flow plain. Figure 1 shows the components of the PSRP. This project is under construction and will be included in the "with project" evaluation as part of the alternative scenarios.

Figure 1. Components of the Picayune Strand Restoration Project



3.1.2. Southwest Florida Feasibility Study

The Southwest Florida Feasibility Study (SWFFS) is an ongoing project funded by the USACE and the SFWMD. This project considers projects that will improve water quality, restore wetland habitat, improve estuary systems, and remove exotic species in the Cocohatchee, Estero, and Big Cypress Basins. Several projects were proposed in Collier County. These are described below.

- Okaloacoochee Flowway Restoration – This project provides little detail in the SWFFS documentation. The concept is to improve the wetland system by improving the flowway by removing man-made impediments. PBS&J has proposed specific projects to support this concept.
- Camp Keais Strand Flowway Restoration – This project provides little detail in the SWFFS documentation. The concept is to improve the wetland system by improving the flowway by removing man-made impediments. PBS&J has proposed specific projects to support this concept.
- Corkscrew Swamp Flowway Restoration - This project provides little detail in the SWFFS documentation. The concept is to improve the wetland system by improving the flowway by removing man-made impediments. PBS&J has proposed specific projects to support this concept.
- Off-Line Storage Reservoirs – The SWFFS identified several potential off-line storage reservoir locations in the Golden Gate – Naples Bay, and FakaUnion watersheds. These proposed projects are described in more detail in the watershed specific projects section.
- SR-29 Restoration – This project calls for the SR-29 Canal to be plugged with ditch blocks at regular intervals. Culverts underneath SR-29 will be used to divert water to the west into Fakahatchee Strand. Other components include the construction of spreader canal and pump stations to divert water into wetland systems north of I-75.

3.1.3. Belle Meade Stormwater Management Master Plan

This Belle Meade Stormwater Management Plan was completed in 2006 and describes a number of projects to rehydrate wetlands and restore historical flow patterns to Rookery Bay. These projects are shown in **Figure 2**. Conditions have changed since thes report was published; however, most proposed projects are still relevant. Updates and detailes have been added as needed. For example, a series of flow way restoration projects were identified through the agricultural area in the southeast portion of the Rookery Bay watershed. These lands are now part of the "Receiving Areas" for development credits, which limits current restoration opportunities. Recommendations are made to facilitate restoration of the flowways when urban development occurs in the future.

3.1.4. North Golden Gate Estates Flowway Restoration Project

This project is sponsored by the Collier Soil and Water Conservation District (CSWCD). The concept is to link the wetland systems in the Northern Golden Gates Estates (NGGE) that were fragmented by construction of the Golden Gate Canal network and the residential road network. PBS&J will coordinate with the CSWCD and will include projects defined as part of the project in the alternative scenario simulations.

3.1.5. Lely Area Stormwater Improvement Project

This project focused primarily on stormwater management issues in the Lely area of the Rookery Bay watershed. Projects include, but are not limited to, culvert and structure upgrades, spreader swales, removal of exotic species, and expansion of stormwater ponds. Many of the projects have been built and are included in the existing conditions model. Other components are scheduled for construction over the next 3 – 5 years and all will be included in the alternative scenarios simulations.

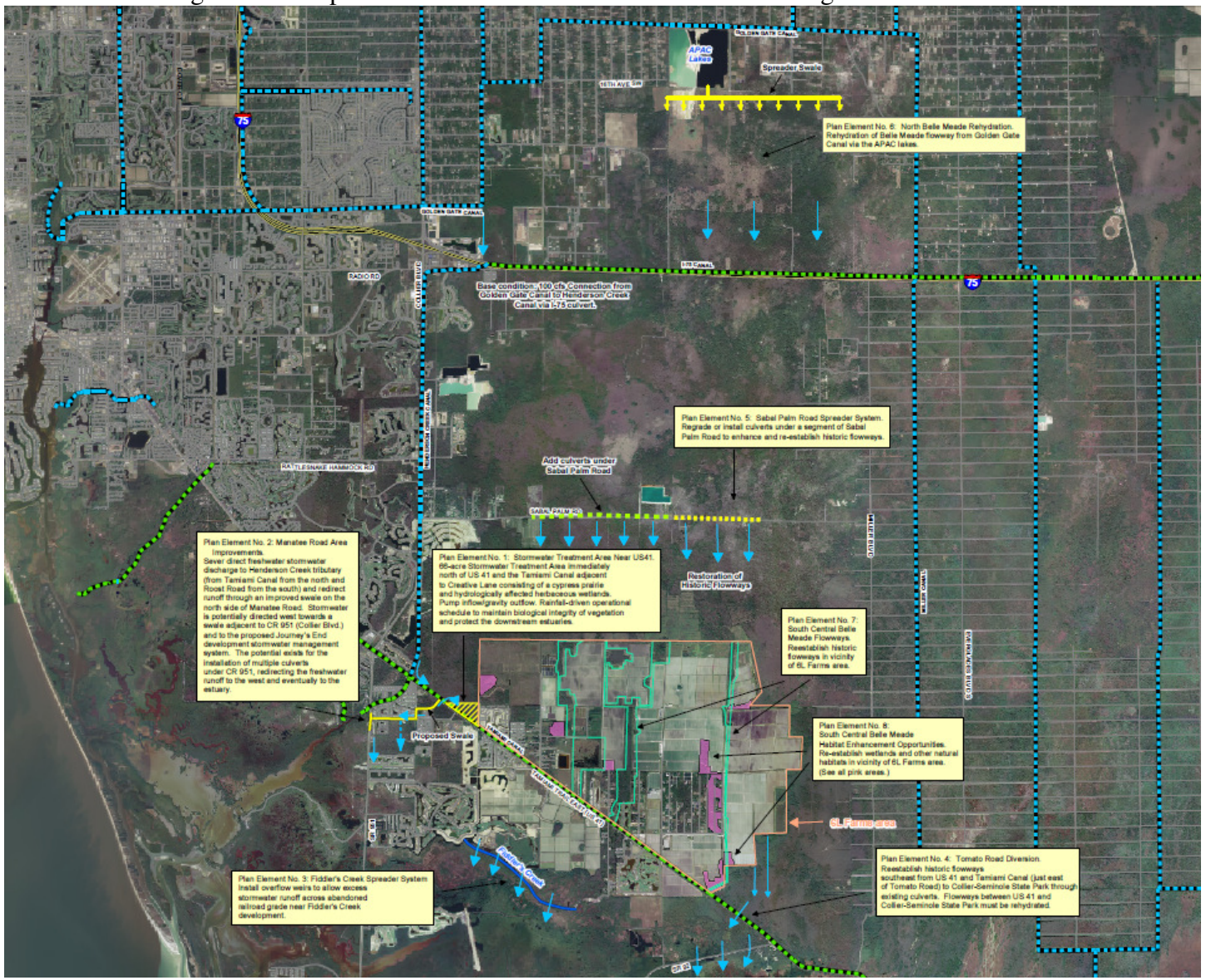
3.1.6. Immokalee Stormwater Master Plan

This project focused primarily on stormwater management issues in the Immokalee area of the Okaloacoochee – SR 29 watershed. Projects include, but are not limited to, culvert and structure upgrades, rapid infiltration trenches, and spreader swales. It is assumed that all of the projects will be constructed and they will be included in the alternative scenario simulations.

3.1.7. Gordon River Improvements

This project focused on stormwater and wetland restoration projects in the Gordon River Extension. Projects included culvert upgrades along the Gordon River corridor and the development of water quality parks. The parks have been built and it is assumed that the upgraded culverts will be installed in the near future. All will be included in the alternative scenario simulations.

Figure 2. Components of the Belle Meade Stormwater Management Master Plan



3.1.8. Other South Florida Water Management District (SFWMD) Projects

The SFWMD has several projects in process. Most of the projects include redesign of existing structures to improve management capability. The redesigned GG-3 structure is under construction in a new location. In addition, the SFWMD plans to replace the GG-6, GG-7, and Miller3 structures in the near future. PBS&J will provide recommended operation criteria and include these features in the alternative scenario simulations.

In addition, the SFWMD is considering a project to divert water from the Golden Gate Main Canl to the Henderson Creek Canal. Specific conceptual characteristics of this project have been identified to assess its potential benefits and disadvantages.

3.2. Identify locations for projects that have not been previously identified

PBS&J conducted desktop and field level investigations to refine potential projects identified by others and to identify potential new improvements. To complete this task, PBS&J considered several key factors when identifying potential project locations:

3.2.1. Estuary freshwater surplus/deficit

The status of the receiving estuary is important in determining the types of projects to be identified. If the estuary receives a surplus, it is necessary to identify projects that will store or divert, or otherwise reduce the volume of flow released to the estuary. Similarly, if the estuary has a flow deficit, projects must be identified that will increase flow to the estuary at the appropriate time.

3.2.2. Changes in hydrology

If the hydrologic analysis indicates that the hydrology of a wetland area has changed, then the projects' objective will be to restore the hydroperiod or depth of water to a more desireable condition.

3.2.3. Future roadway improvements

This issue will help determine the location of future projects or how a project will be configured to accommodate the footprint of future roadways.

3.2.4. Property ownership

Projects can be implemented on publicly owned lands more readily and at less cost that on privately owned lands. Publicly owned lands include properties that have existing conservation easements or are within the Rural Fringe Sending Areas. Properties that fall within the "Receiving Areas" are assumed to be unavailable for implementation of specific projects.

3.3. Recommend New County-Wide Watershed Management Approaches

From a county-wide perspective there are a number of projects that could provide benefits related to additional groundwater recharge, reduced runoff, and improved water quality. These items are discussed below.

3.3.1. Retrofit of County facilities

Many Collier County facilities were built more than 20 years ago. The drainage system configuration at these facilities could be improved to incorporate Low Impact Development (LID) techniques. For example, many school parking lots include raised islands and acres of impervious paving i.e. **Figure 3** shows the parking area at Golden Gate High School.

Figure 3. Parking Lot at Golden Gate High School

Projects could be implemented at many of the Collier County schools as well as at the government center and other facilities to utilize LID features like drainage swales, infiltration islands, pervious pavement, rain gardens and other techniques that would reduce stormwater runoff volume and improve water quality in the receiving streams.

3.3.2. Aquifer Storage and Recovery

The SFWMD completed a study called the Master Plan for Regional Irrigation Distribution Systems for the Lower West Coast Region in 2002. The project identified several locations around the county where ASR wells could be installed. Currently, the City of Naples is pumping water taken from the Golden Gate Main Canal and is injecting it below the level of the Underground Source of Drinking Water (USDW). Although the rate of recovery for this ASR system is expected to be less than 50 percent, recovered water will be used to supplement reuse water for irrigation purposes during the dry season this reducing the potable water demand.

3.3.3. Agricultural Containment

Many of the agricultural areas in the northeastern portion of the county are designated as Agricultural Containment Areas and store rainfall during the wet season and release it as they prepare for the growing season. The expanded useof this practice is recommended.

In addition, coordinated cwork between the County and SFWMD is being analyzed to promote the use of Recyclable Water Containment Areas (RWCA). RWCAs are a relatively new concept proposed by the University of Florida, Southwest Florida Research and Education Center as a means of gaining the agricultural community's cooperation into regional environmental restoration efforts (Hanlon 2005). RWCAs are temporary shallow water impoundments constructed on private crop lands that provide ecosystem benefits in exchange for compensation. Water stored in the RWCAs would not be available for municipal water supply or agricultural irrigation. The goal is 100 percent loss of stored water to both evapotranspiration (ET) and infiltration for groundwater recharge. An RWCA would also provide a nutrient removal benefit and would be extablished via a contractual agreement between government agencies and members of the private sector.

3.3.4. Structure Operations

As mentioned earlier, the operation protocol of individual and groups of structures should be constantly reevaluated to ensure maximum benefit. Currently, the SFWMD is replacing the GG-3 structure and has plans to replace the GG-6, GG-7, and Miller3 structures. New operation protocols for these structures will be evaluated during the Alternative Scenario analysis. PBS&J will also evaluate the capacity of structures that have been identified as restriction points with the drainage network.

4.0 Project Characteristics

A total of 30 individual projects have been identified for further evaluation. This includes

- Three projects in the Cocohatchee-Corkscrew watershed,
- Ten projects in the Golden Gate – Naples Bay watershed,
- Seven projects in the Rookery Bay watershed, and
- Ten projects in the Faka Union, Fakahatchee, and Okaloacoochee-SR29 watersheds.

Appendices A – D include diagrams that describe individual projects that will be evaluated within each watershed.

- Appendix A – Cocohatchee Corkscrew Watershed Project Sheets
- Appendix B – Golden Gate – Naples Bay Watershed Project Sheets
- Appendix C – Rookery Bay Watershed Project Sheets
- Appendix D – Faka Union, Fakahatchee, and Okaloacoochee – SR29 Watershed Project Sheets

5.0 References

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Hanlon, E.A. 2005. Using Recyclable Water Containment Areas (RWCAs) to Treat Agricultural Stormwater Runoff for Watersheds: A Concept Paper. EDIS document SL227. Soil and Water Science Department. Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida.

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Appendix A

Cocohatchee Corkscrew Watershed Project Sheets

Appendix B

Golden Gate –Naples Bay Watershed Project Sheets

Appendix C

Rookery Bay Watershed Project Sheets

Appendix D

Faka Union, Fakahatchee, and Okaloacooche – SR29 Watershed Project Sheets