Appendix 2-A

Capital Improvement Program
Recommended Projects

Corkscrew Regional Ecosystem Watershed

ATKINS

Collier County Watershed Management Plan

Collier County

Cocohatchee Watershed

STATEMENT OF PROBLEM

These lands are partially located within the Corkscrew Regional Ecosystem Watershed. Development of residential areas included construction of drainage ditches and swales. These ditches and swales interconnect with stormwater management systems in downstream sub-divisions before discharging into the Cocohatchee Canal.

The man-made ditches and swales contribute to a modified wetland system with shorter hydroperiod.

PROJECT BENEFITS

(1) The project provides local benefits in restoring wetland hydrologic characteristics. The improvement is predicted to provide an average annual watershed wetland hydrology performance measure lift of 0.03.

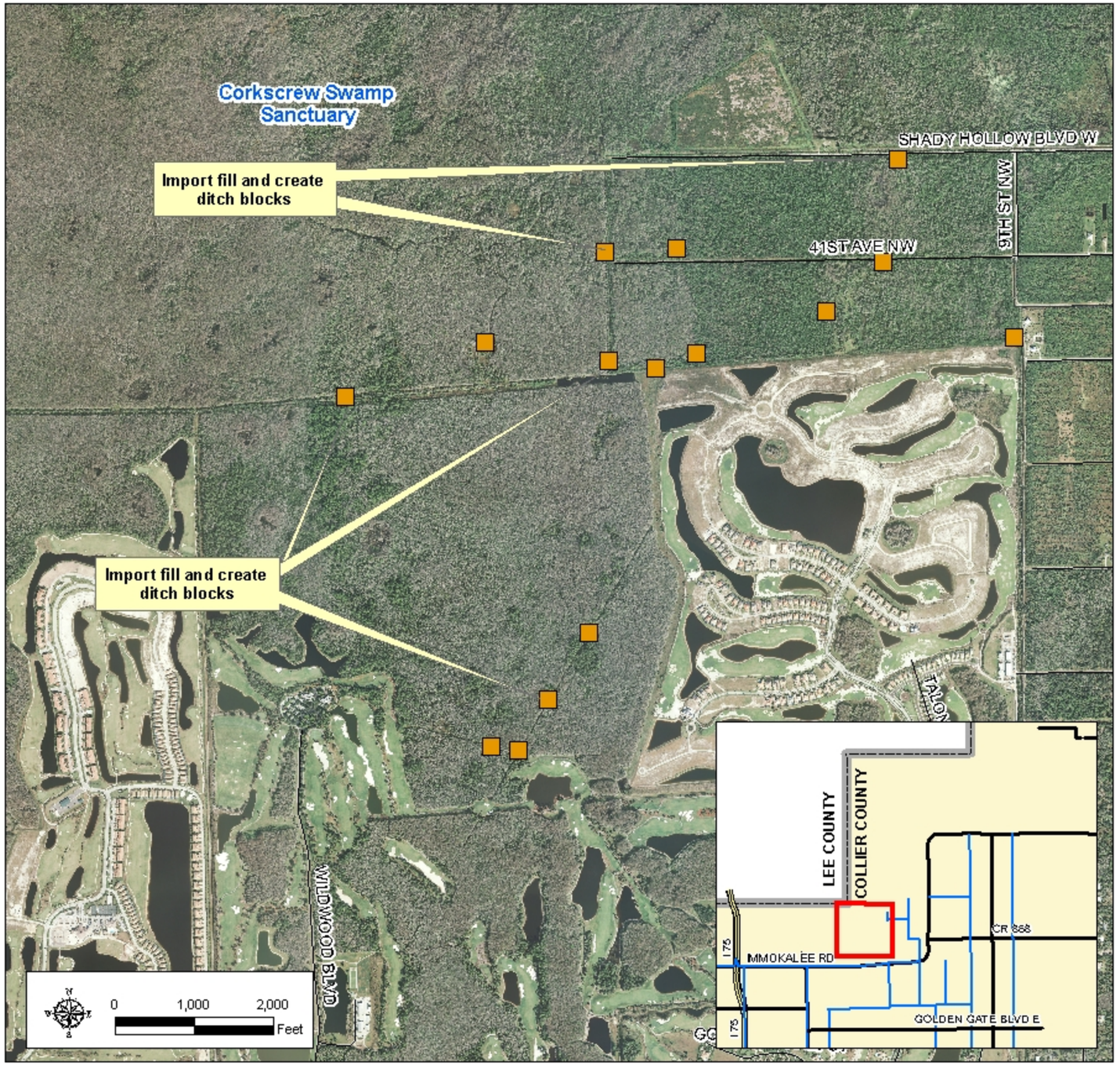
(3) Increased groundwater recharge

PROJECT DISADVANTAGES

(1) Local improvements provide little benefit to the watershed as a whole.

(2) Changed depth of overland water could affect golf courses and residential communities.

(3) Portions of project area along 41st Ave NW are privately held and outside Rural Fringe Sending Area.



SOLUTION

- Southern portion of project is located within existing Rural Fringe Sending Area. Use incentive programs to encourage property owner to implement local wetland restoration activities

- Import material and backfill man-made drainage ditches at wetland outfall locations

DESIGN CONSIDERATIONS

- Coordination with CREW

- Potential impacts to golf courses and surrounding residential communities

- Potential presence of exotic species

- Equipment access

- Investigate availability of potential onsite material

North Golden Gate Estates Flowway Restoration Project

ATKINS

Collier County Watershed Management Plan

Collier County

Golden Gate and Faka Union Watersheds

STATEMENT OF PROBLEM

Construction of the Golden Gate Main Canal network and construction of residential roads fractured the connectivity of wetland systems in the north Golden Gate Estates areas. Roadside drainage swales, coupled with a lack of culverts underneath the roads now divert runoff directly into the canal system.

The result is a loss of wetland hydrology and an increased volume of discharge to Naples Bay. The effect also includes less recharge to the surficial aquifer system that is a primary source of drinking water in the northern Golden Gate Estates.

PROJECT BENEFITS

(1) Improves wetland hydrology in the proposed flowway. Predicted to provide an average annual watershed performance measure lift of 0.12.

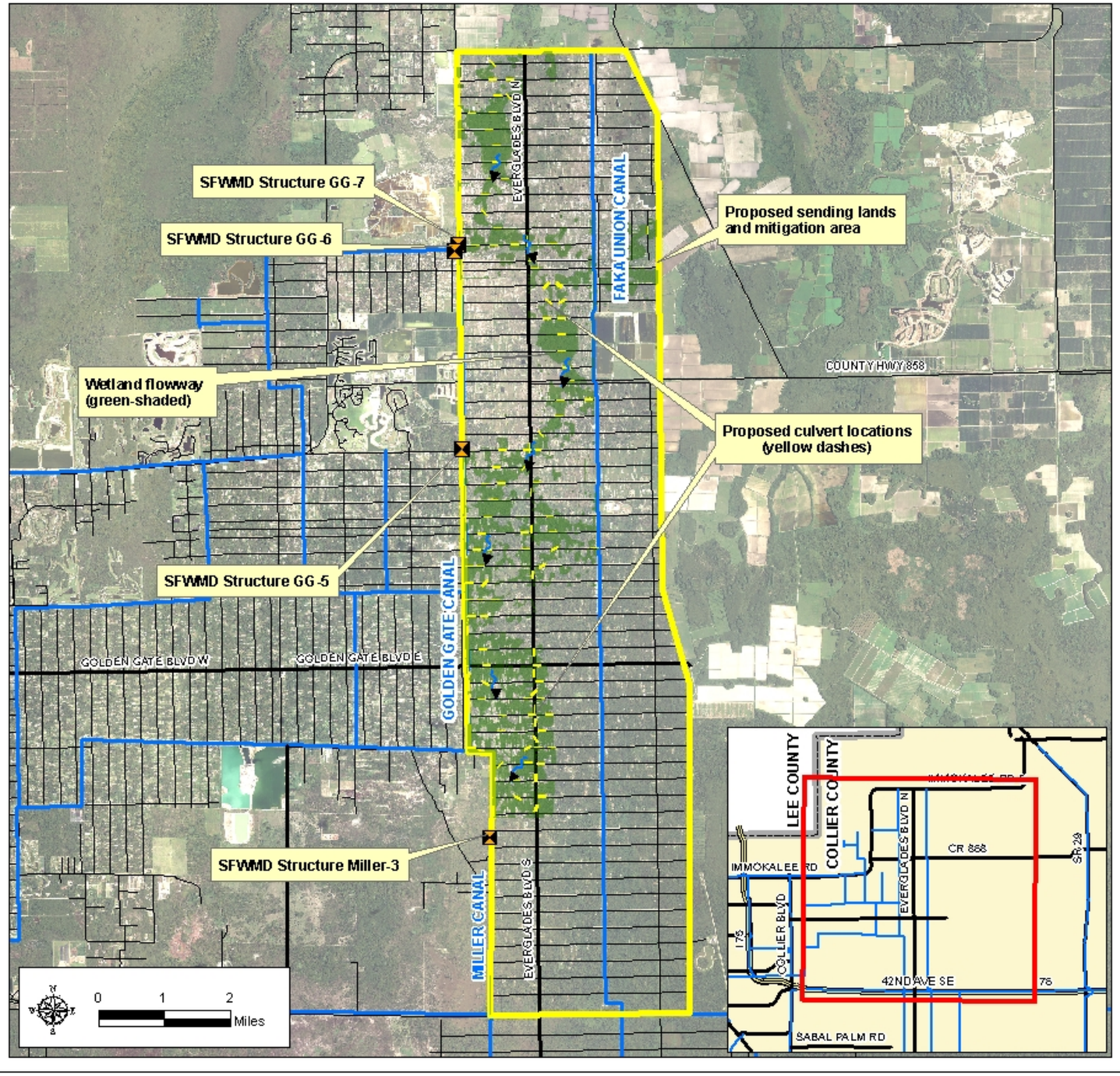
(2) Provides additional water quality treatment resulting in a annual average performance measure lift of 0.68 across the watershed.

(3) The project also increases groundwater recharge and helps maintain groundwater elevations in the Collier County well field.

PROJECT DISADVANTAGES

(1) Elevated groundwater level may affect septic leach fields or increase flood risk for residential properties near the project.

(2) May require purchase of private properties within the primary flowway



SOLUTION

- The Northern Golden Gates Estates Flowway Restoration Project would utilize ditch blocks and equilization culverts to provide connectivity within the wetland system and help re-establish historical flow patterns.

- Recommend designation of area as a mitigation area and use TDR incentive programs to obtain properties and to generate funds to implement the project.

DESIGN CONSIDERATIONS

- Evaluate the presence of roadside berms that restrict sheet flow.

- Determine the maximum groundwater elevation that is allowed for proper function of septic systems in the immediate vicinity.

- Consider the affects of increased sheetflow on downstream properties.

- Evaluate flow rates and storage capacities within the system and size culverts accordingly

COST ESTIMATE

Construction:	$1,691,000
Land Acquisition:	$0
Engineering and Contingency:	$677,000
TOTAL	$2,368,000

North Belle Meade Spreader Swale

ATKINS

Collier County Watershed Management Plan

Collier County

Rookery Bay Watershed

STATEMENT OF PROBLEM

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, nagatively 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.

PROJECT BENEFITS

(1) Predicted to reduce freshwater discharges to Naples Bay by 10 percent resulting in an annual performance measure lift of 0.89.

(2) Predicted to increase freshwater discharge to Rookery Bay by 19 percent, resulting in an annual performance measure lift of 1.25.

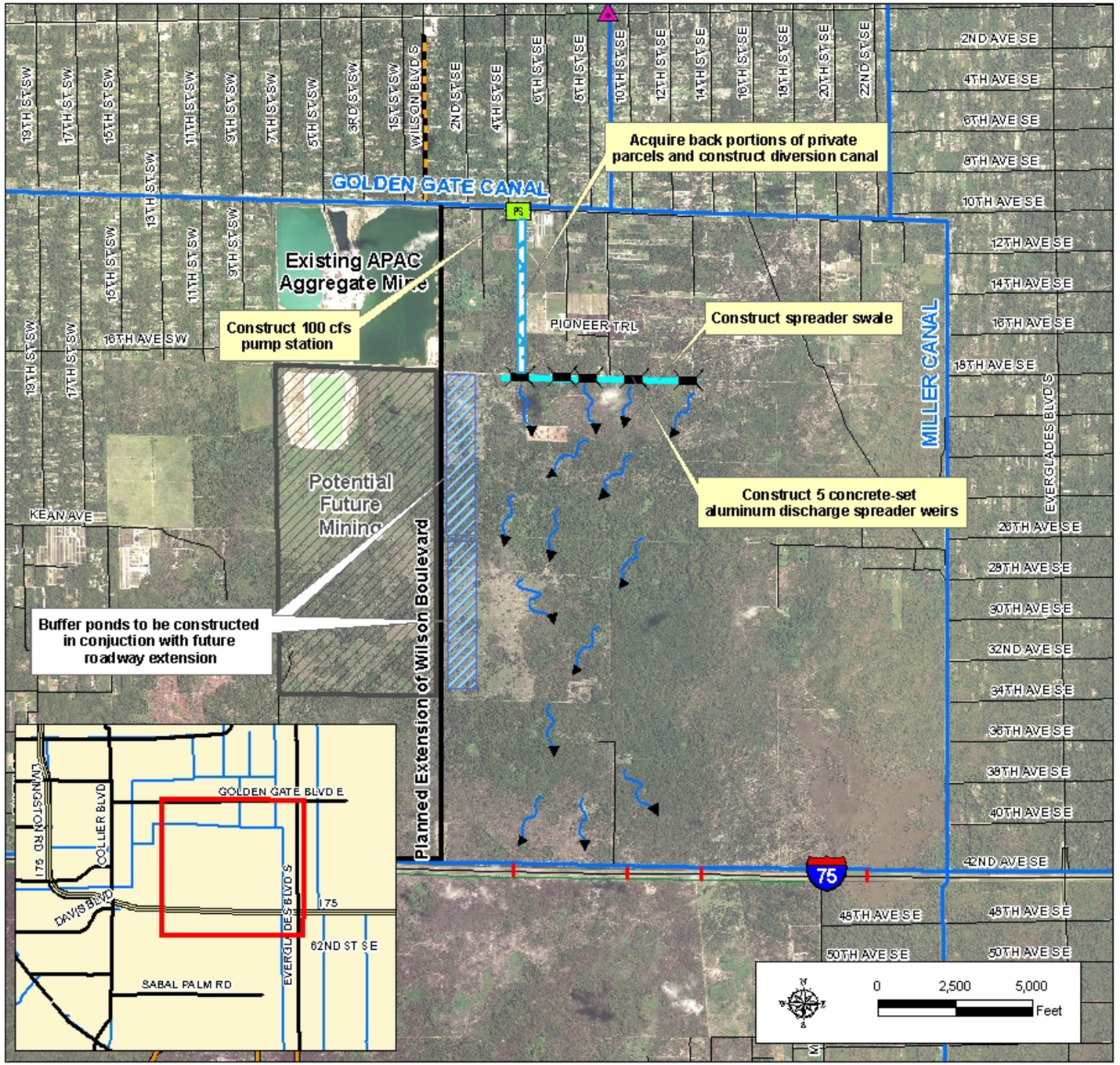
(3) Increases wetland hydrology in North Belle Meade with predicted performance measure lift of 0.04.

(4) Project reduces nutrient load to Naples Bay but does not significantly increase load to Rookery Bay.

PROJECT DISADVANTAGES

(1) Primary concept is dependant on acquisition of privately-owned property for the diversion canal construction.

(2) Project implementation may be tied to construction of Wilson Boulevard Extension or to proposed mining permits in the area.



SOLUTION

- Construct a 100 cfs pump station to divert water south from the Golden Gate Main Canal

- Construct a spreader swale with weir structure to promote overland flow into wetland areas in North Belle Meade

DESIGN CONSIDERATIONS

- An alternative design would be to build the diversion canal in conjunction with and adjacent to the Wilson Blvd extension. Water would be pumped from the diversion canal to the spreader swale.

- Flows north of the constructed spreader swale may need to be graded slightly east to the constructed finger canal.

- Project discharge area lies with a Rural Fringe Sending area, the development rights for this area would need to be obtained prior to construction. This could be tied to the proposed mining permits in the area.

COST ESTIMATE

Construction:	$4,788,000
Land Acquisition:	$322,000
Engineering and Contingency:	$1,916,000
TOTAL	$7,026,000

South I-75 Canal Spreader Swale

ATKINS

Collier County Watershed Management Plan

Collier County

Rookery Bay Watershed

STATEMENT OF PROBLEM

Construction of the Golden Gate Main Canal interrupted the historical sheet flow pattern to the south toward Rookery Bay. The water is now diverted west toward the Naples Bay estuary. Due to the redirection of flow and the impedence to overland flow caused by I-75, the wetland area south of I-75 in the Rookery Bay watershed has a decreased hydroperiod and a change in wetland habitat.

PROJECT BENEFITS

(1) Increases hydrology of the wetland areas in the Rookery Bay portion of the Picayune Strand State Forest. Predicted to provide an annual average watershed performance measure lift of 0.10.

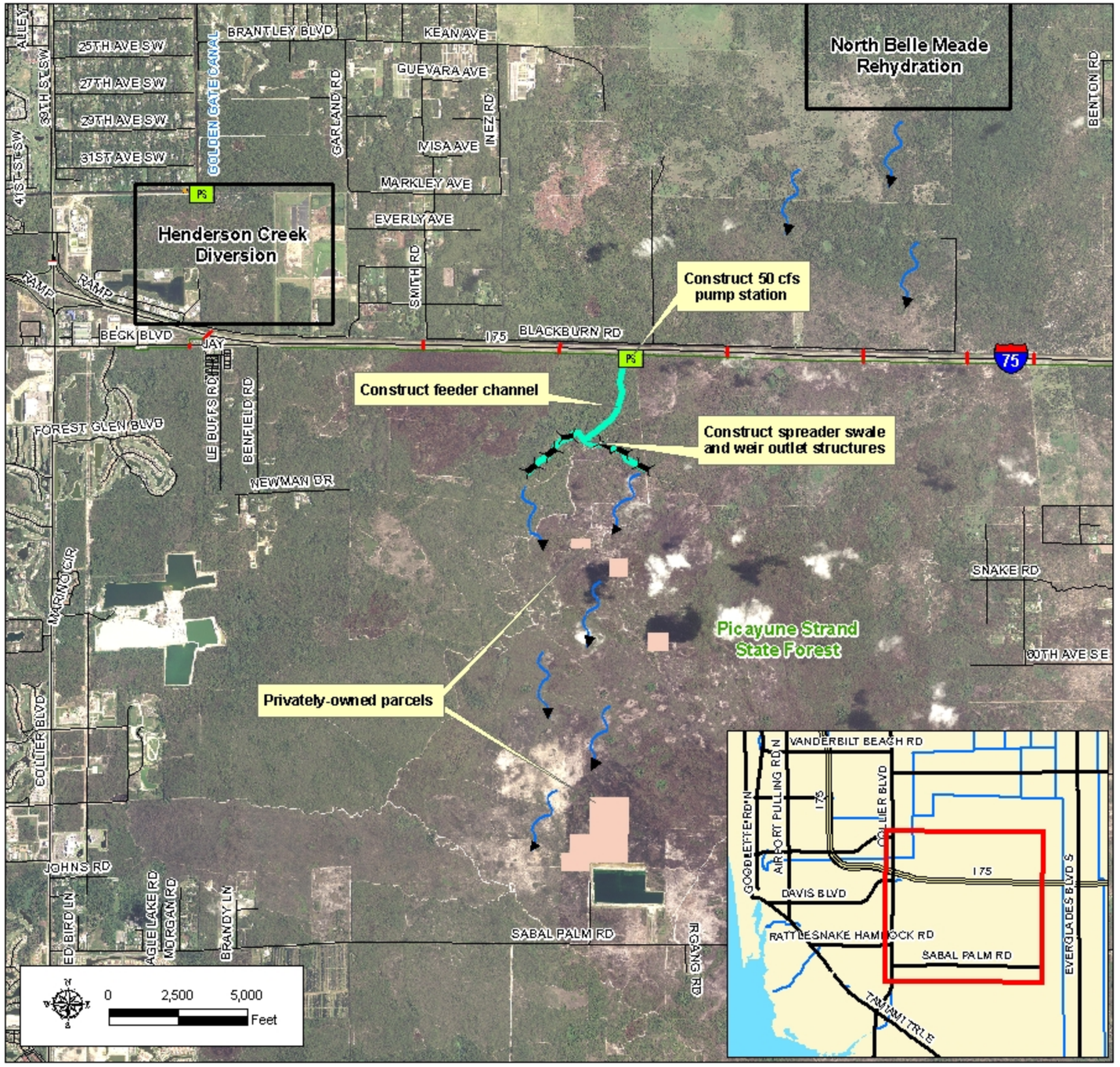
(2) Provides water quality treatment to diverted flows. The average annual watershed performance measure lift is predicted to be 0.18.

PROJECT DISADVANTAGES

(1) Project implementation would depend on agreement with the managers of the Picayune Strand State Forest .

(2) Additional culverts or other crossing would likely be required under Sabal Palm Rd.

(3) Privately owned out-parcels exist in the Picayune Strand State Forest. Conservation easements may be required, or the properties may have to be purchased.



SOLUTION

- Construct a 50 cfs Pump Station to pump water from the interconnected I-75 Canal Network into the to feeder channel.

- Construct spreader swale with outfall weirs that discharge at topographic lows.

DESIGN CONSIDERATIONS

- Consider the effect of increased sheet flow on out-parcels in the Picayune Strand State Forest

- Availability of water to divert to the spreader system may be dependent upon contributions from other recommended projects.

- Culverts under I-75 will require regular maintenance to convey water from areas north of I-75.

- Culverts and crossings under Sable Palm Rd may not have capacity to manage additional flow.

COST ESTIMATE

Construction:	$2,328,000
Land Acquisition:	$0
Engineering and Contingency:	$932,000
TOTAL	$3,131,000

Henderson Creek Diversion Pump Station

ATKINS

Collier County Watershed Management Plan

Collier County

Golden Gate Watershed

STATEMENT OF PROBLEM

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 water and Rookery Bay receives too little water, negatively affecting both receiving water estuary systems.

PROJECT BENEFITS

(1) Predicted to reduce freshwater discharges to Naples Bay by 10 percent resulting in an annual performance measure lift of 0.89.

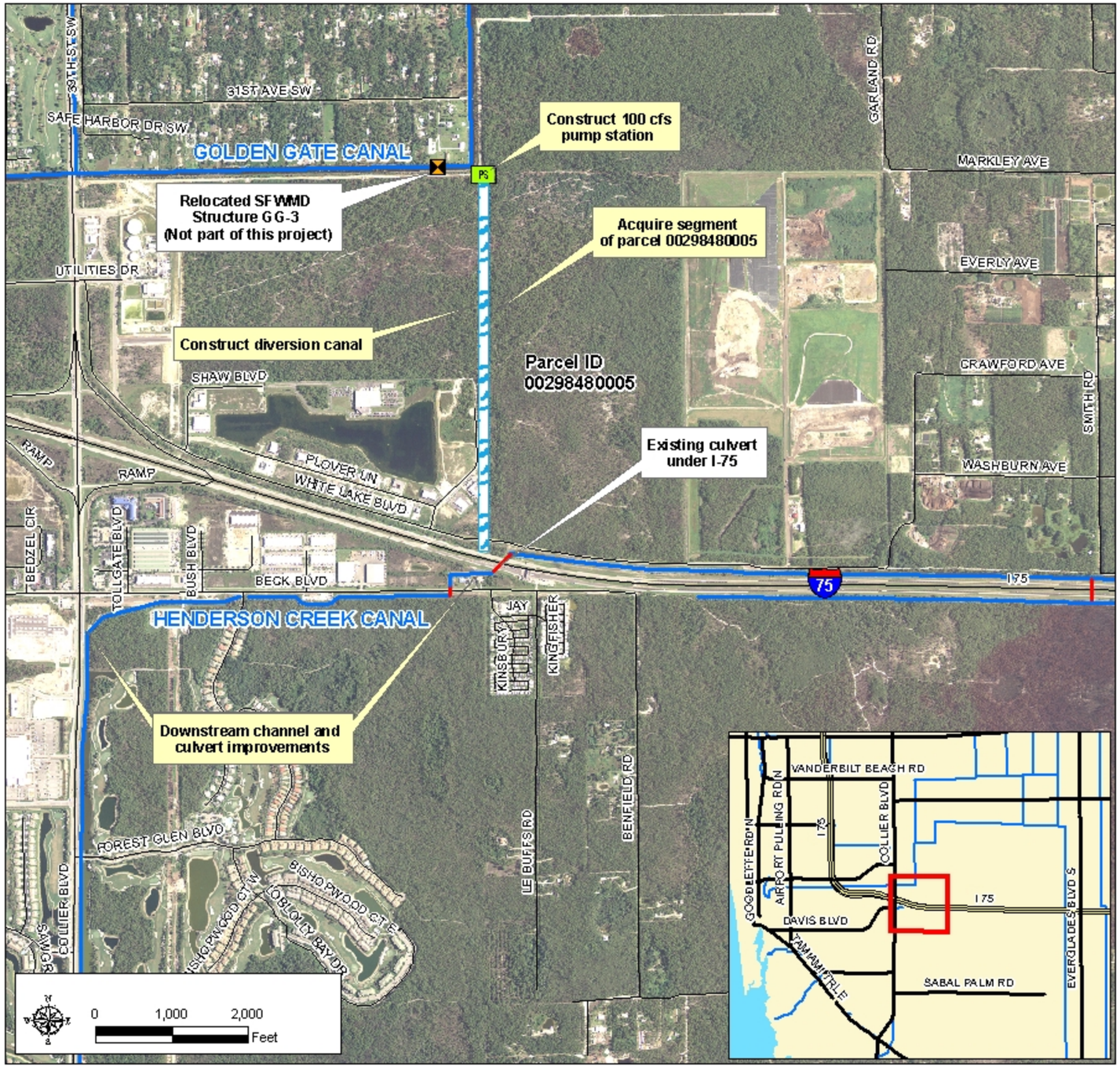
(2) Predicted to increase freshwater discharge to Rookery Bay by 33 percent, resulting in an annual performance measure lift of 1.67.

(3) Provides additional water to Henderson Creek that may be available to augment future supply needs for the Marco Island Water Treatment Plant.

PROJECT DISADVANTAGES

(1) The project would be dependant on the purchase of a portion of private property required to construct diversion canal.

(2) Project reduces total nutrient load to Naples Bay, but potentially increases total load to Rookery Bay.



SOLUTION

This project has been conceptualized by the South Florida Water Management District and seeks to divert water from the Golden Gate Main Canal into Henderson Creek.

- Plans call for construction of a 100 cfs pump station to divert flows from the Golden Gate 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.

- Channel and Culvert improvements will be required in Henderson Creek downstream I-75 to convey the additional flows.

DESIGN CONSIDERATIONS

- Evaluate alternative pumping strategies to determine optimal operation.

- Inclusion of a water quality treatment system would reduce the potential increase in total pollutant load to Rookery Bay.

COST ESTIMATE

Construction:	$4,065,000
Land Acquisition:	$423,000
Engineering and Contingency:	$1,220,000
TOTAL	$5,708,000

Atkins Light Blue Horizontal Logo.png

Wolfe Road Wetland Treatment System

ATKINS

Collier County Watershed Management Plan

Collier County

Golden Gate Watershed

STATEMENT OF PROBLEM

Urban runoff and pollutant loading to stormwater ponds. In this area, runoff from upstream areas is routed through the Island Walk subdivision and contributes to elevated nutrient concentrations in the stormwater ponds.

PROJECT BENEFITS

(1) The project utilizes existing features.

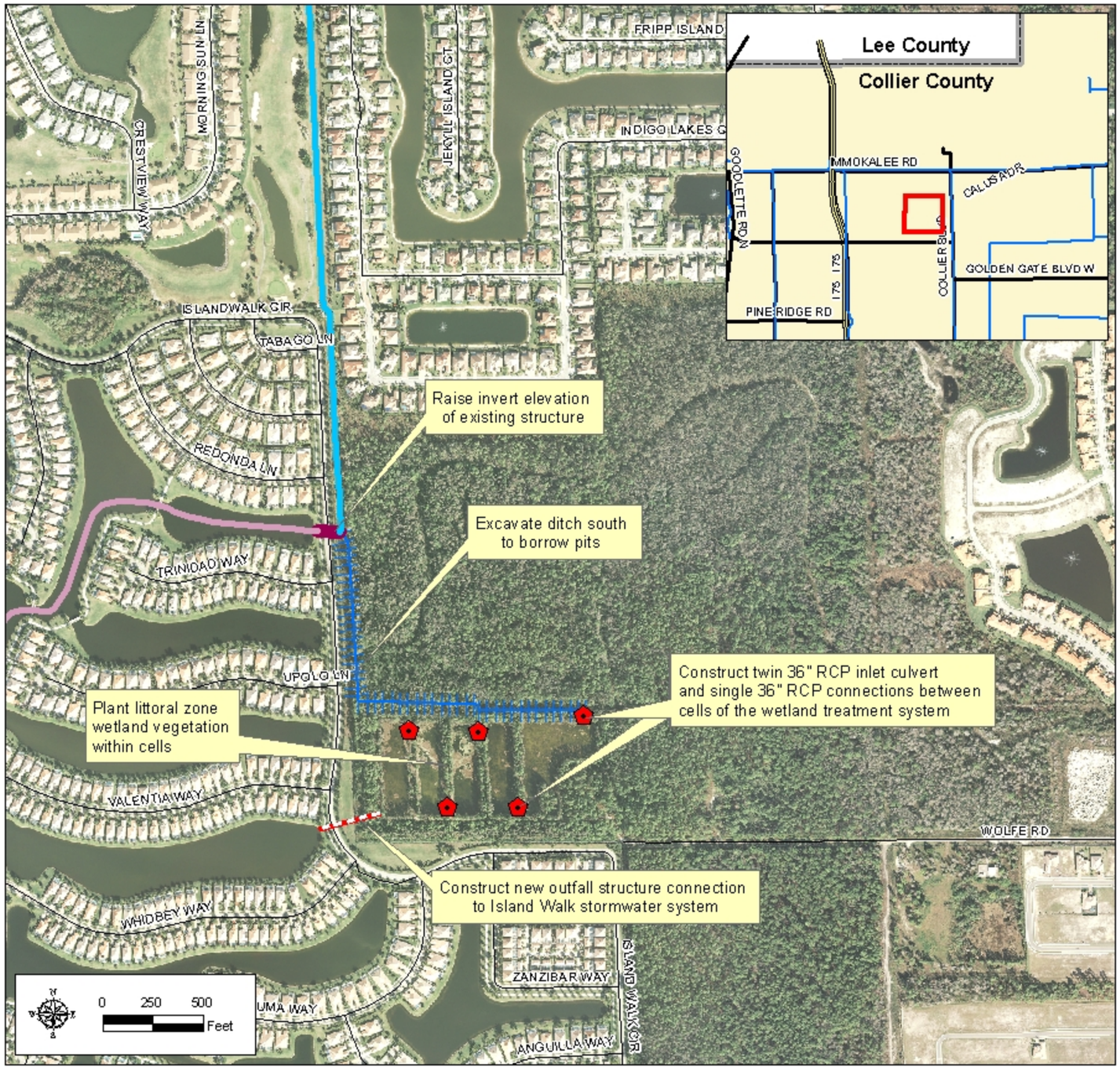
(2) The project will reduce the volume of outside flow entering the Island Walk stormwater management system.

(3) The project will provide water quality treatment of runoff before it enters the Island Walk system. The average annual watershed performance measure lift is predicted to be 0.008.

PROJECT DISADVANTAGES

(1) The required property (approximately 20 acres) is privately owned and permits have been requested for urban development

(2) The existing permit for the Island Walk Subdivision would have to be modified to change the inflow characteristics



SOLUTION

- Raise the invert of the existing structure that controls discharge from the drainage ditch into the Island Walk stormwater system.

- Extend the drainage ditch south and to the east into the series of existing borrow pits

- Install culverts to convert the borrow pits into interconnected wetlands with sediment sumps and littoral shelf planting.

- Construct new control structure to release treated stormwater back into the Island Walk stormwater system

DESIGN CONSIDERATIONS

- Evaluate stage and volume of stormwater flowing through the existing structure into Island Walk.

- Determine maximum volume that can be treated in the proposed wetland treatment system

- Consider requirements to change the Island Walk permit

COST ESTIMATE

Construction:	$353,000
Land Acquisition:	$921,000
Engineering and Contingency:	$142,000
TOTAL	$1,416,000

Henderson Creek Off-Line Storage Reservior

ATKINS

Collier County Watershed Management Plan

Collier County

Rookery Bay Watershed

STATEMENT OF PROBLEM

The Henderson Creek Canal discharges to the south, directly to Rookery Bay. Rookery Bay experiences a freshwater inflow surplus during the wet season (June -September) and freshwater deficit during the dry season. These flow deficits/surpluses have a negative impact on the salinty levels within the receiving water estuary.

PROJECT BENEFITS

(1) Project is used to modify the timing of flow to Rookery Bay. The reservoir would capture excess wet season flow that may be released water during the dry season.

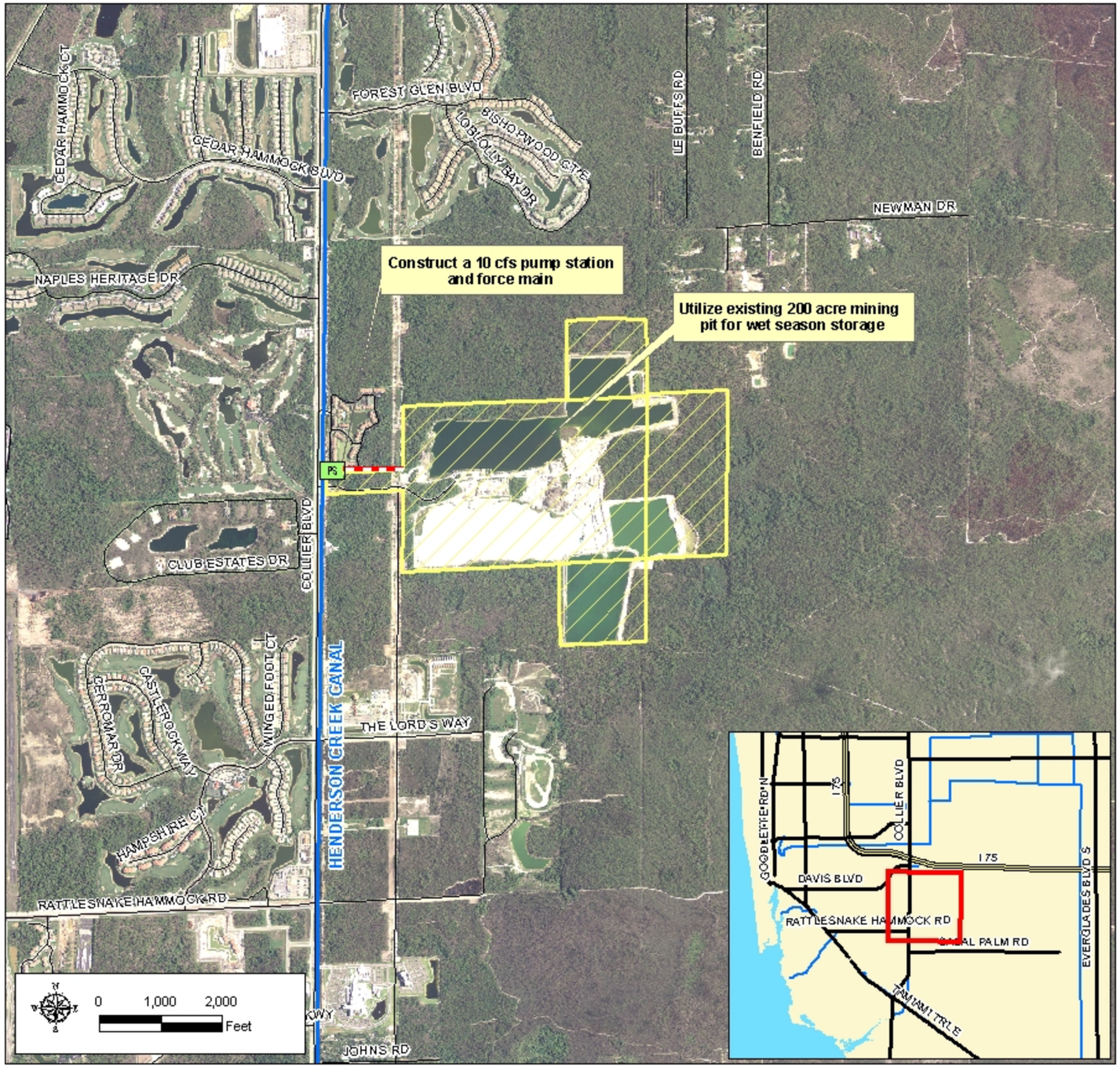
(2) Would increase groundwater recharge from the mining pit which would affect the timing of flows from the watershed.

(3) Predicted to provide average annual performance measure lift of 0.32 in the discharge to estuary scores.

PROJECT DISADVANTAGES

(1) Property is currently private-owned and is actively mined. Project may not be viable for many years.

(2) A large portion of diverted water would likely be lost to groundwater recharge. If the rock is fractured, groundwater may rapidly migrate back into the canal as baseflow.



SOLUTION

- Obtain the rights to the mining property after the mine is closed

- Utilize storage volume in the abandoned mine by constructing a 10 cfs pump station to divert excess wet season flows (August-September) into the reservoir.

DESIGN CONSIDERATIONS

- Pumping operation will be based on stage and flow in the Henderson Creek Canal.

- Determine the leakage rate through the bed of the mining pit to the canal

- Re-evaluate storage/pump capacity when mining operations are completed.

- Consider potential affects on private or public potable water supply wells in the vicinity of the project site.

COST ESTIMATE

Construction:	$671,000
Land Acquisition:	$1,989,000
Engineering and Contingency:	$269,000
TOTAL	$2,929,000

Upper Golden Gate Estates Canal Operable Weir Installation

ATKINS

Collier County Watershed Management Plan

Collier County

Golden Gate Watershed

STATEMENT OF PROBLEM

Construction of the Golden Gate Main Canal significantly increased the size of the watershed draining to Naples Bay. The result is that the discharge to Naples Bay is more than five times the historic volume. This has negatively affected the Naples Bay estuary system.

In additional, the canal network and use of shallow groundwater sources for potable water supply has contributed to lower groundwater elevations in the Golden Gate Estates.

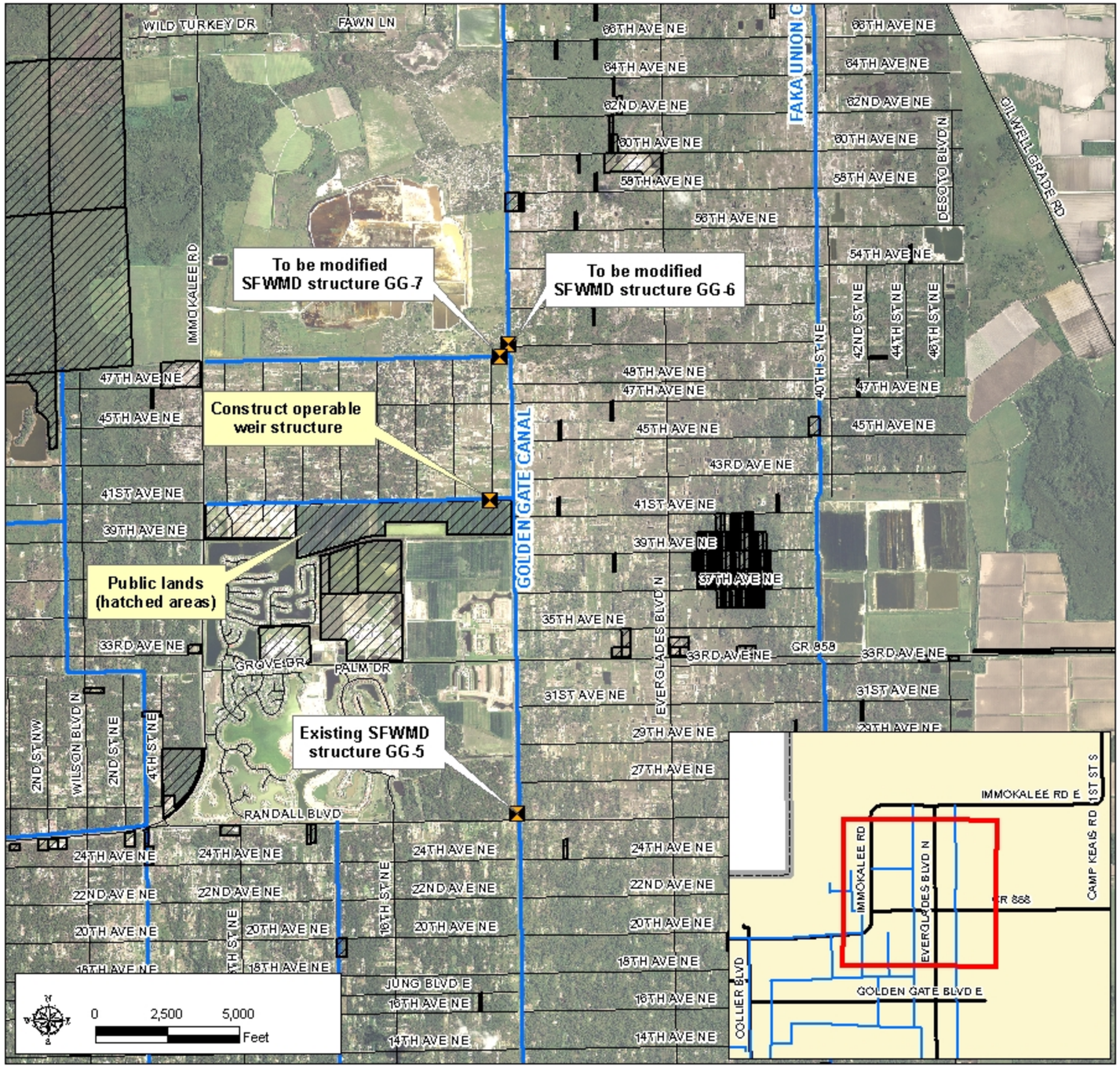
PROJECT BENEFITS

(1) Provides more flexibility to increase the volume of runoff stored, and decrease the volume of water released during storm events. The direct benefit is a lift in the Discharge to Estuary perfomance measure score of 0.0001.

(2) The proposed operable weir provides flexibility to manage groundwater and surface water elevations effectively. Indirect benefits includee reduced baseflow and an increase in available groundwater.

PROJECT DISADVANTAGES

(1) Increased groundwater elevations may affect septic leach fields or increase flood risk for residential areas near the canal.



SOLUTION

- In conjuction with SFWMD projects to replace GG-6 and GG-7 with operable structures, construct an additional operable structure on the finger canal south of the GG-7 canal. The structure will allow the canal to be used as water storage feature and to reduce baseflow in the Golden Gate Canal network.

DESIGN CONSIDERATIONS

- Design and operational protocol would be coordinated with SFWMD projects to replace the GG-6 and GG-7 structures.

- Construction and operational access may require construction easement on the north side of the canal.

- Permits for upstream water detention facilty may have to be modified.

COST ESTIMATE

Construction:	$394,000
Land Acquisition:	$0
Engineering and Contingency:	$158,000
TOTAL	$552,000

Orange Tree Canal Control Structure Installation

ATKINS

Collier County Watershed Management Plan

Collier County

Project GG-7 Golden Gate Watershed

STATEMENT OF PROBLEM

Construction of the Golden Gate Main Canal significantly increased the size of the watershed draining to Naples Bay. The result is that the discharge to Naples Bay is now more than five times the historic volume. This has negatively affected the Naples bay estuary system.

In addition, the canal network and use of shallow groundwater sources for potable water supply has contributed to lower groundwater elevations in the Goden Gate Estates.

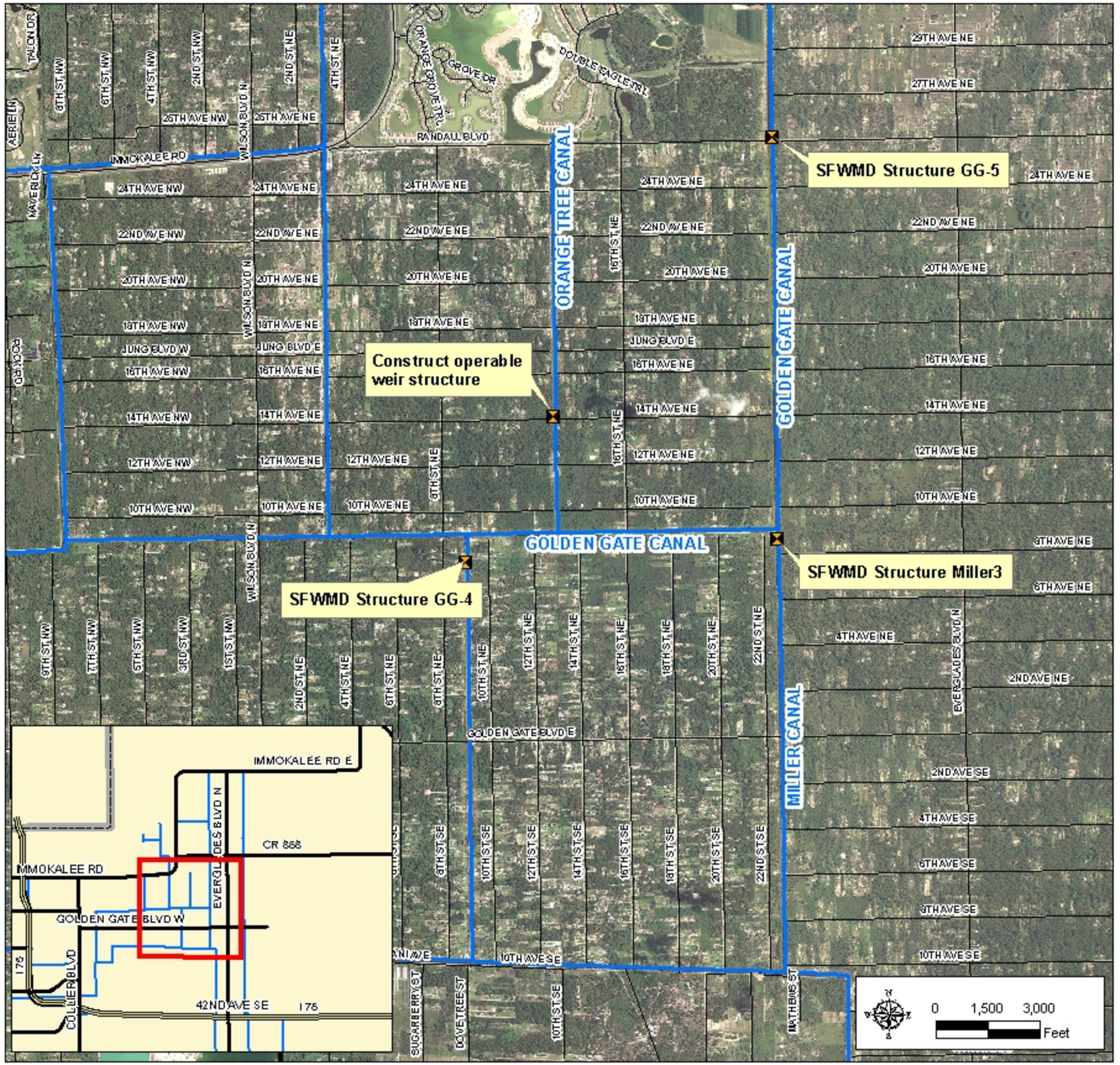
PROJECT BENEFITS

(1) Provides more flexibility to increase the volume of runoff stored, and decreases the volume of water released during storm events. The direct benefit is a lift of 0.0001 in the Discharge to Estuary annual average performance measure score.

(2) The proposed operable weir provides flexibility to manage groundwater and surface water elevations effectively. Indirect benefits include reduced baseflow and an increase in available groundwater.

PROJECT DISADVANTAGES

(1) Elevated groundwater level may affect septic leach fields or increase flood risk in developed areas near the canal.



SOLUTION

- Construct an operable weir structure near the intersection of the Orange Tree Canal and 14th Avenue NE to increase storage capacity and better manage baseflow.

- Properties on either side of the canal near the structure location may be required to provide construction and maintenance access.

DESIGN CONSIDERATIONS

- Coordinate operational protocols with SFWMD Structure GG-4

- Evaluate the effect of increased stage in the canal upstream of the structure. Evaluation should include changes in groundwater elevation and potential changes in flood risk.

COST ESTIMATE

Construction:	$394,000
Land Acquisition:	$0
Engineering and Contingency:	$158,000
TOTAL:	$552,000

US Highway 41 Stormwater Treatment Area

ATKINS

Collier County Watershed Management Plan

Collier County

Rookery Bay Watershed

STATEMENT OF PROBLEM

The Rookery Bay watershed is identified as impaired for nutrients and dissolved oxygen. In addition, this wetland area was identified as having a reduced hydroperiod relative its pre-development condition

PROJECT BENEFITS

(1) The project will provide water quality treatment to remove nutrients from the US Highway 41 canal system. Watershed average performance measure list is predicted to be 0.035.

(2) The project will rehydrate this wetland area during the wet season by extending the depth and length of the hydroperiod. Watershed average performance measure list is predicted to be 0.11.

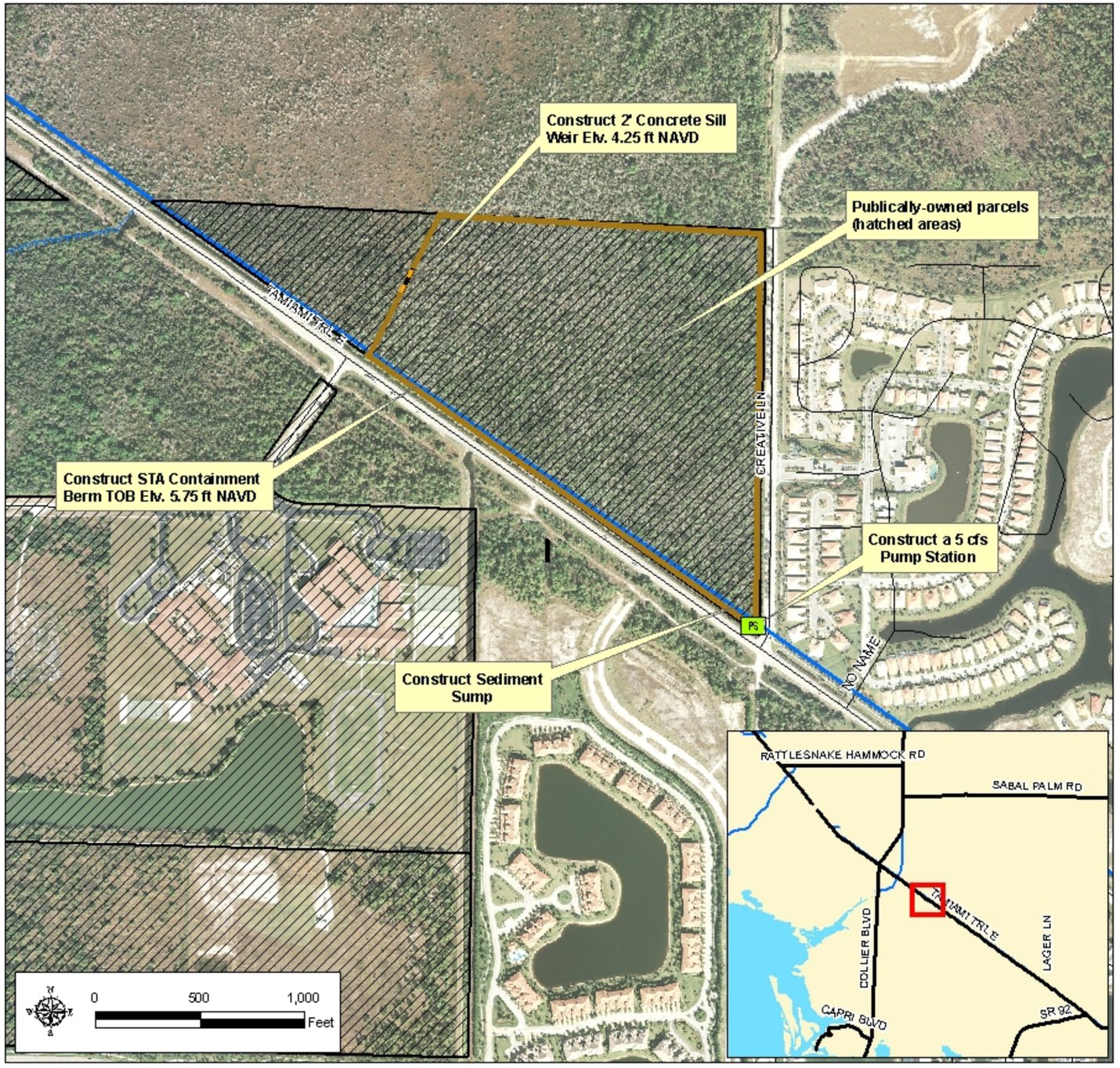
(3) The lands are publically-owned

PROJECT DISADVANTAGES

(1) The project is relatively small and may not provide a large water quality benefit.

(2) Flow analysis in the US41 Canal suggests that the operational period for the system would likely be limited to a three month period during the wet season.

(3) The increased groundwater elevations could affect adjacent residential areas.



SOLUTION

- Construct a 52-acre wetland stormwater treatment area (STA) on publicly owned land on the north side of US Highway 41. A pump station will divert water from the US 41 canal into the STA for treatment during the wet season

- The STA will include a sediment sump.

- Treated water would be released into the wetland downstream via gravity flow over a concrete spillway to optimize detention time.

DESIGN CONSIDERATIONS

- Determine wetland characteristics to determine final wetland inundation depth.

- The location of the outfall from the STA must be carefully selected to ensure that treated water is drawn back into the wetland system.

- Consider installing a manual stop-log structure on the concrete sill to retain the last pumped cycle and further extend the STA wetland hydroperiod.

COST ESTIMATE

Construction:	$388,000
Land Acquisition:	$0
Engineering and Contingency:	$156,000
TOTAL	$544,000