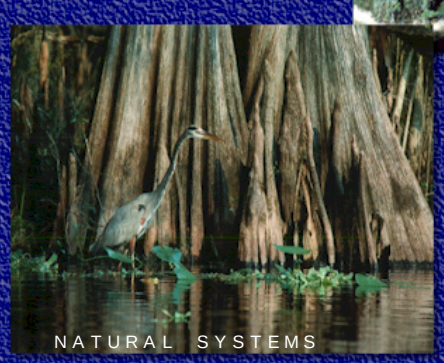
August 2001

# Hillsborough River Watershed Management Plan







**Submitted to:**

Hillsborough County
Stormwater Management Section

**Submitted by:**

AYRES ASSOCIATES

VOLUME 5
Chapters 13-14

# Hillsborough River Watershed Management Plan

Volume 5 ♦ Chapters 13-14

**Submitted to:**

**Hillsborough County**
Stormwater Management Section
601 East Kennedy Boulevard
Tampa, Florida 33601

**Submitted by:**

AYRES ASSOCIATES

**August 2001**

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CHAPTER 13
# ALTERNATIVES ANALYSIS

## 13.1 Overview

This chapter describes a series of alternatives that were developed for flooding, water quality, natural systems, and, if applicable, water supply issues that were identified in Chapters 2-11. A series of analyses were performed using GIS to strategically locate water quality and natural systems alternatives – the methods used to identify these projects are also described. This chapter also describes the existing condition performance of the major conveyance systems with potential and documented flood level of protection deficiencies as well as level of service deficiencies for water quality and natural systems. Potential flooding problem areas for existing conditions as presented in Chapter 6 will be discussed according to the major regions and subwatersheds in the study area (Figure 13.1.1). These regional areas are as follows:

**Hillsborough River Near Crystal Springs Region**

- Hillsborough River Above Crystal Springs Subwatershed
- Big Ditch Subwatershed
- Indian Creek Subwatershed

**Blackwater Creek Region**

- Blackwater Creek Subwatershed
- Itchepackesassa Creek Subwatershed
- Eastside Canal Subwatershed
- Tiger Creek Subwatershed

**Central Tributaries Region**

- Two Hole Branch Subwatershed
- Clay Gully East Subwatershed
- Hollomans Branch Subwatershed

**Tampa Bypass Canal and Tributaries Region**

- Depressions Subwatershed
- Vandenburg Subwatershed
- Williams Subwatershed
- Mango Subwatershed
- Falkenburg Subwatershed
- Tampa Bypass Canal/Harney Subwatershed

**Northwest Tributaries Region**

- New River Subwatershed
- Basset Branch Subwatershed
- Clay Gully West Subwatershed
- Trout Creek Subwatershed

**Hillsborough River Region**

- Hillsborough River Below S-155 Subwatershed
- Hillsborough River Above S-155 Subwatershed

Problem areas related to water quantity (flooding) in each of the subwatersheds listed above have been identified by analyzing the results of model simulations for the existing conditions with respect to the County's adopted flood level of service criteria (LOS). Water quality conditions were also evaluated using the County's Water Quality Treatment Level of Service criteria and associated Pollutant Loading and Treatment Model. The natural systems evaluation matrix developed in Chapter 8 was also used to make qualitative evaluations of individual projects within each of the

# Region and Subwatershed Divisions in the Hillsborough River Watershed

**Legend:**

- Major Streams
- Major Lakes
- County Boundaries
- Major Roads
- Subwatershed Boundaries
- Tampa Bypass Canal and Tributaries Region
- Northwest Tributaries Region
- Hillsborough River near Crystal Springs Region
- Hillsborough River Region
- Central Tributaries Region
- Blackwater Creek Region

New River
Trout Creek
Clay Gully West
Basset Branch
Indian Creek
Hillsborough River above Crystal Springs
Polk County
Big Ditch
Blackwater Creek
Pasco County
Hillsborough County
Hillsborough River above S-155
Clay Gully East
Two Hole Branch
Holloman's Branch
Tiger Creek
East Canal
Itchepackesassa
Hillsborough River below S-155
Depressions
Vandenburg
Williams
Tampa Bypass Canal
Mango
Falkenburg

N
W E
S
N.T.S.

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**Figure 13.1.1**

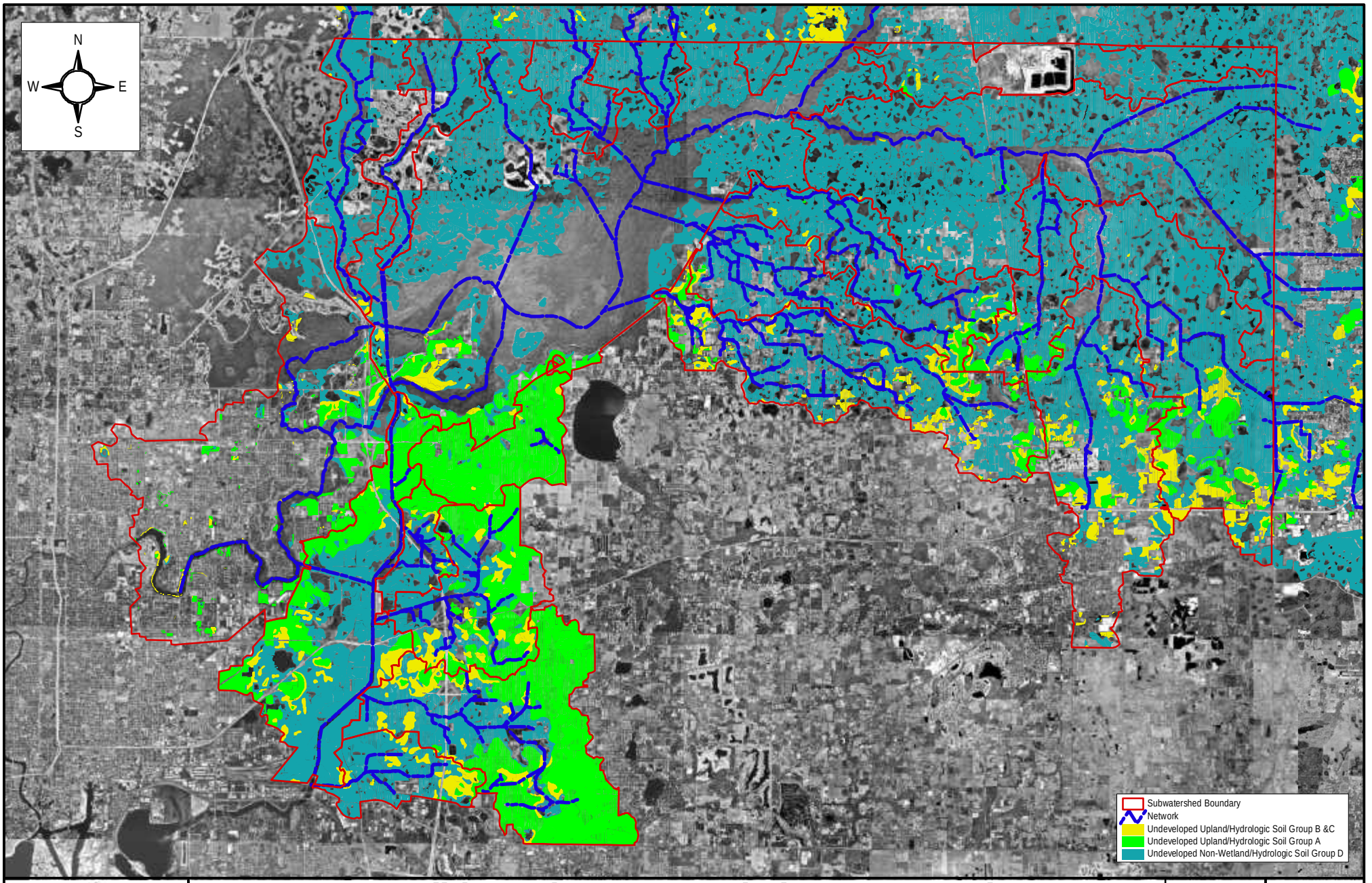
subwatersheds. At this time, the water quality level of service criteria has not been officially adopted by the County, nor has a natural systems level of service been developed. However, the alternatives developed to improve water quality and natural systems address the goals and objectives of the County's Comprehensive Plan, the SWFWMD's Surface Water Improvement and Management (SWIM) Program, the SWFWMD's Hillsborough River Comprehensive Watershed Management Plan, and the Tampa Bay Estuary Program.

Known flooding and water quality problems in the study area were also evaluated based on a review of complaint information compiled from Hillsborough County staff and from public meetings presented and summarized in Chapter 12. The model results of the existing conditions and the flooding complaint records were identified and combined to create a set of LOS deficiencies addressed in this management plan. Also, maintenance needs were identified from field observations and reports from County Maintenance Units and identified for each of the regions.

## 13.2 Methods to Identify Flooding, Natural Systems and Water Quality Alternatives

To facilitate locating undeveloped/open lands for construction of flood storage and water quality treatment ponds, GIS land use and soils data were used to identify the most suitable and cost-effective sites within each subwatershed. During this process, the undeveloped land, excluding water bodies and wetlands were intersected with hydrologic group A, B, C, and D soils. A map showing the intersected polygons is presented in Figure 13.2.1. Using the maps and known flood problem areas, specific locations of storage ponds were identified and evaluated in the field.

A similar methodology to the above was used to identify potential wetland restoration areas within the Hillsborough River watershed. Since a large portion of the northeastern region of the watershed (including the Cone Ranch area) is relatively undeveloped, opportunities for riparian, wetland, and upland restoration of existing agricultural areas are extensive. Restoration and conservation activities in these areas are expected to be more cost-effective and viable than in urbanized regions such as the Tampa Bypass Canal area. For this analysis, agricultural and undeveloped land, excluding water bodies and wetlands, were intersected with hydrological group D soils (shown in Figure 13.2.2) to identify those areas most conducive to wetland restoration. These areas were further refined to identify potential riparian buffer restoration within 731.66 feet (223 meters) of the existing stream network (shown in green). This 731.66-foot (223-meter) buffer was originally recommended by work performed by Dr. Mark Brown at the University of Florida for protecting water supplies, wildlife, and water quality in several Florida watersheds. In addition, existing wetlands greater than 10 acres (4.05 hectares) (1995 SWFWMD land use) were intersected within a 98.43-foot (30-meter) buffer of the stream network to identify potential hydrologic restoration of wetlands (Figure 13.2.3). Actual restoration site locations were refined through the collection of ecological data, field verification, and ownership information. A list of recommended vegetation species for restoration of uplands and wetlands for various alternatives is presented in Table 13.2.1.




Hillsborough River Watershed Management Plan

**Potential Flood Storage Areas**
**Based on Land Use and Hydrologic Soil Group**

**Figure 13.2.1**

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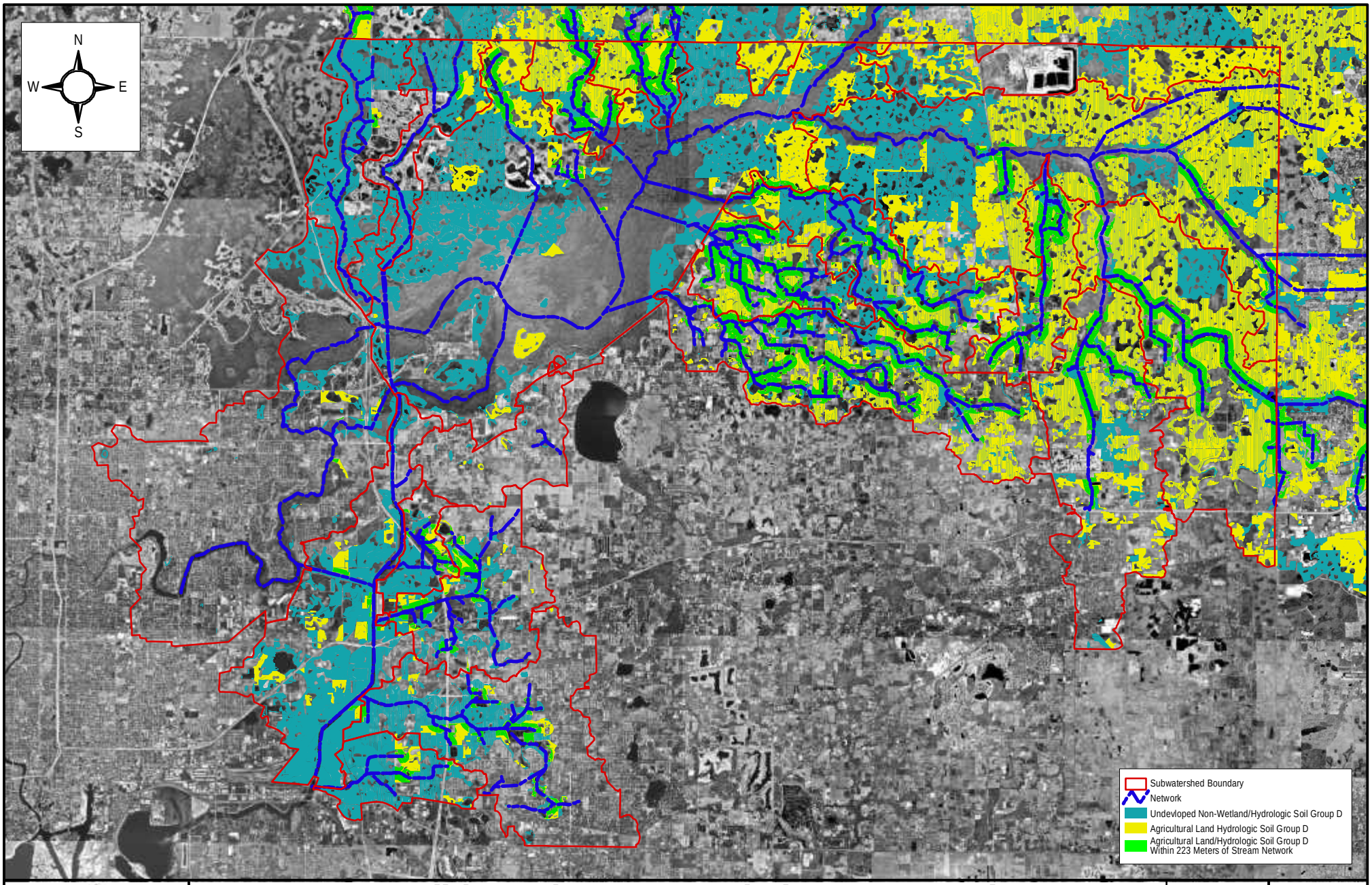


Hillsborough River Watershed Management Plan

**Potential Natural Systems Restoration Areas**
**Based on Land Use and Hydrologic Soil Group**

**Figure 13.2.2**

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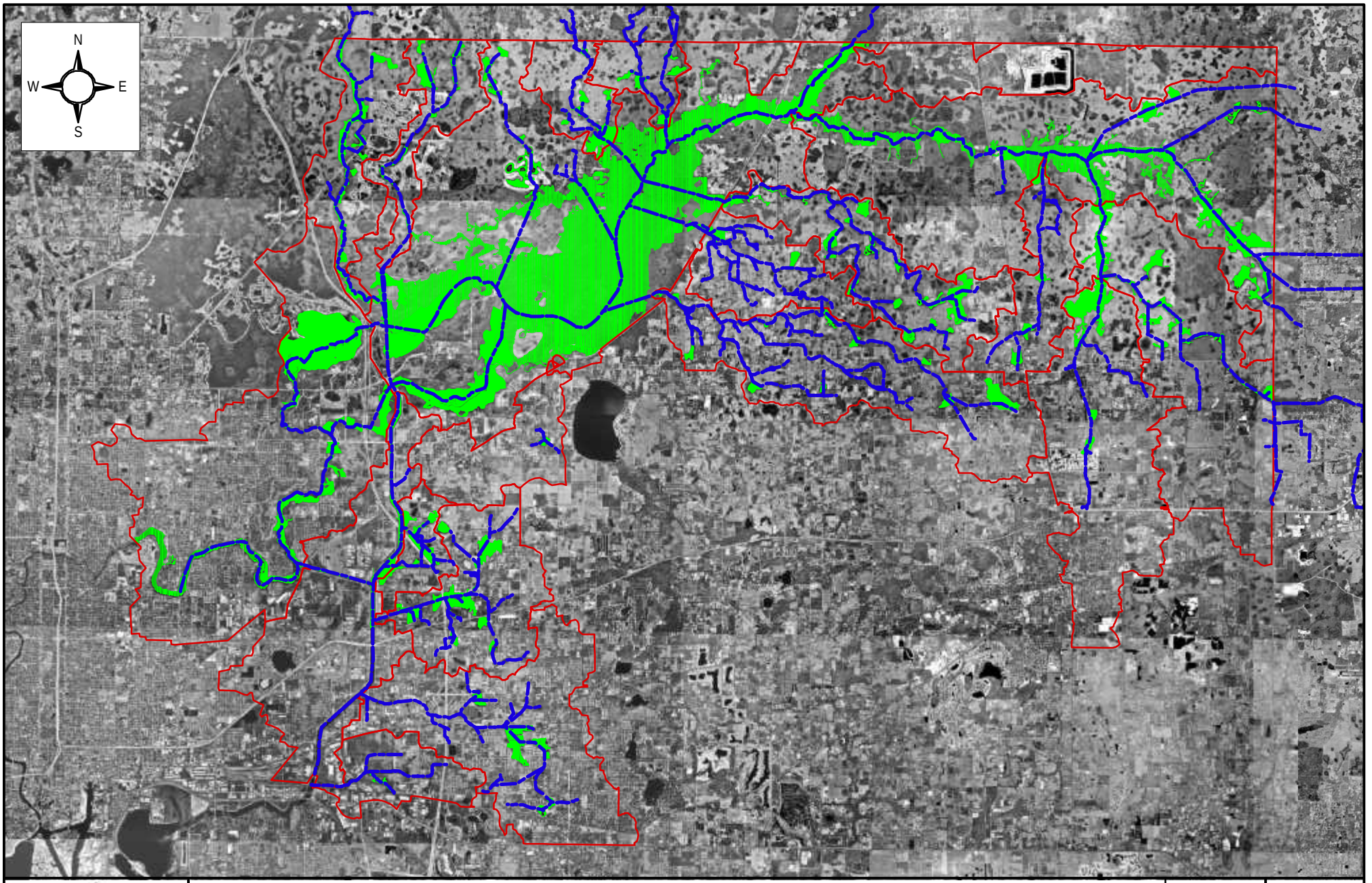


Hillsborough River Watershed Management Plan

**Existing Wetlands Intersected by the Stream Network**

**Figure 13.2.3**

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**Table 13.2.1. Recommended plant species for Hillsborough River Natural Systems Restoration Projects.**

| COMMON NAME | SCIENTIFIC NAME | Acceptable Planting Areas | | | |
|---|---|---|---|---|---|
| **Trees** | | **Uplands** | **Transitional** | **Emergent** | **Submerged/ Floating** |
| Red maple | *Acer rubrum* | | x | x | |
| Pine | *Pinus spp.* | x | x | | |
| Cypress | *Taxodium spp.* | | x | x | |
| Laurel oak | *Quercus laurifolia* | x | x | | |
| Water oak | *Quercus nigra* | x | x | | |
| Live oak | *Quercus virginiana* | x | x | | |
| Dahoon holly | *Ilex cassine* | | x | | |
| Cabbage palm | *Sabal palmetto* | x | x | | |
| **Shrubs** | | | | | |
| Wax myrtle | *Myrica cerifera* | x | x | | |
| Buttonbush | *Cephalanthus occidentalis* | | x | x | |
| Marsh elder | *Iva imbricata* | | x | | |
| Saw palmetto | *Serenoa repens* | x | x | | |
| **Herbs** | | | | | |
| Arrowhead | *Sagittaria spp.* | | x | x | |
| Pickerelweed | *Pontedaria spp.* | | x | x | |
| Arrowroot | *Thalia geniculata* | | x | x | |
| Yellow pond lily | *Nuphar luteum* | | | | x |
| Fragrant water lily | *Nymphea odorata* | | | | x |
| Blue flag | *Iris virginica* | | x | | |
| Smartweed | *Polygonum hydropiperoides* | | x | x | |
| Lizard's tail | *Saururus cernuus* | | x | x | |
| Golden canna | *Canna flaccida* | | x | x | |
| **Ferns** | | | | | |
| Royal fern | *Osmunda regalis* | | x | x | |
| Cinnamon fern | *Osmunda cinnamomea* | | x | x | |
| **Grasses, Sedges, Rushes** | | | | | |
| Soft rush | *Juncus effusus* | | x | x | |
| Bullrush | *Scirpus validus* | | x | x | |
| Maidencane | *Panicum hemitomon* | | x | x | |
| Sawgrass | *Cladium jamaicense* | | x | x | |
| Sand cordgrass | *Spartina bakeri* | | x | x | |

**Note: this list is not exhaustive, a number of other native species can be substituted or added, depending on specific site conditions*

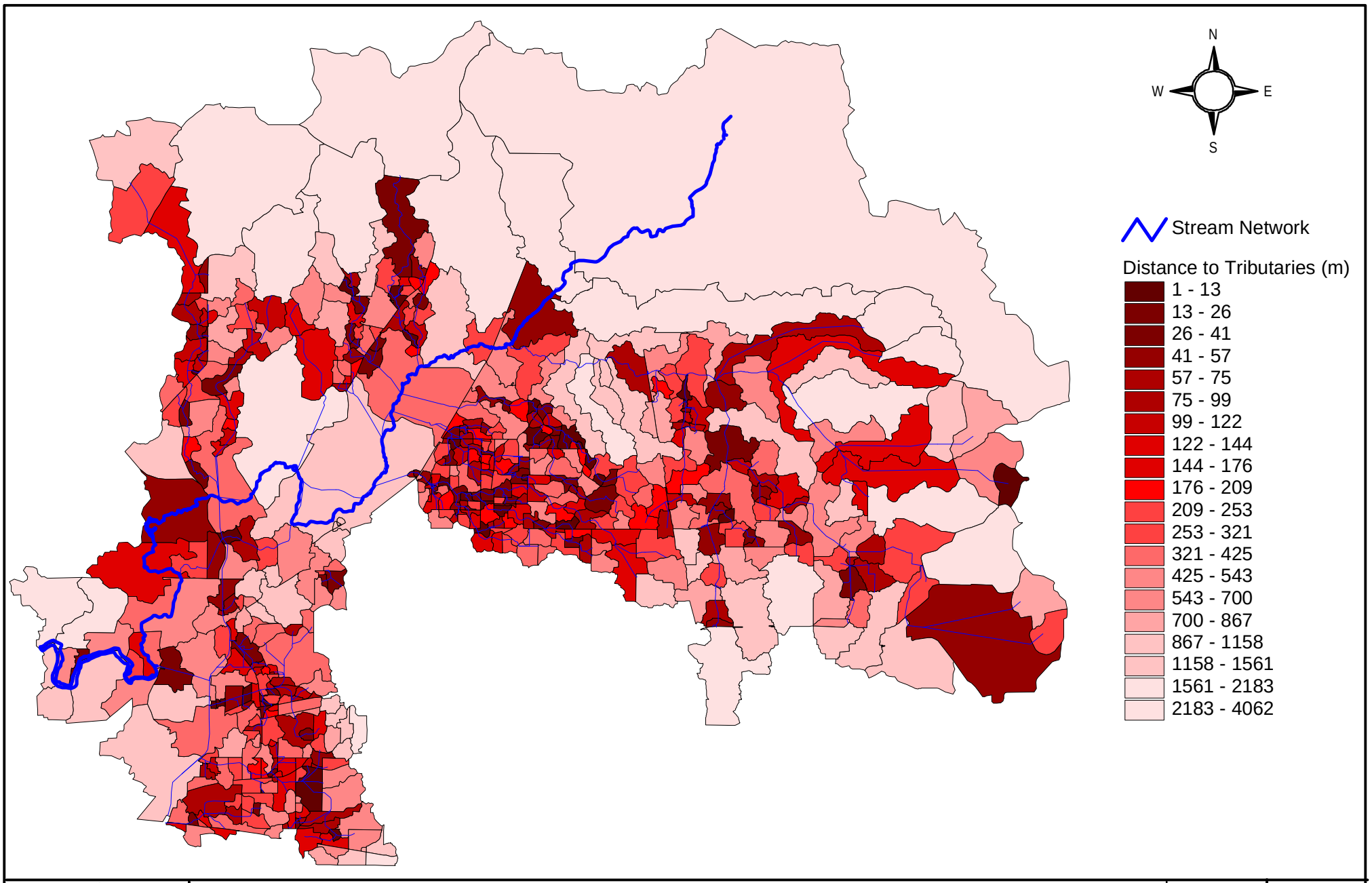
The results from the pollutant loading model (described in Chapters 10 and 11) were integrated with a spatial analysis to further refine and prioritize areas of the watershed most in need of water quality improvement. To facilitate this process, a series of GIS analyses were developed to prioritize those subbasins within the watershed in need of stormwater treatment. The first step of this process was to identify those subbasins that were in close proximity to the main stem and major tributaries of the river and canal using a centroid analysis in Arc/Info (Figure 13.2.4). Subbasins closest to a tributary were scored higher than those farther away.

This data was combined with the LOS output data that had identified subbasins having relatively high loading values (poor level of service scores) for total nitrogen, total phosphorus, and total suspended solids. The resulting output of the combined proximity/loading map is presented in Figure 13.2.5. Those subbasins identified in red are the highest priority areas for stormwater treatment, followed by areas in yellow, green, blue, and white. A number of stormwater treatment alternatives have been developed for these priority areas to reduce pollutant loads. To simulate the potential water quality treatment improvements that could occur with each alternative, the pollutant loading model described in Chapters 10 and 11 was re-run after identifying the subbasins that drain to each BMP (Figure 13.2.6), and then modifying the BMP table to reflect the proposed treatment. Based on the results of the model, implementation of all the alternatives developed below for water quality improvement would result in significant reductions of annual pollutant loads for a number of subwatersheds (Table 13.2.2).

**Table 13.2.2. Reductions in pollutant loads (lbs/acre/year) by subwatershed with implementation of water quality improvement alternatives in the Hillsborough River watershed.**

| Subwatershed | BOD5 | TSS | TKN | NO3 +NO2 | TN | TP | TDP | Oil and Grease | Cd | Cu | Pb | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackwater Creek | 2.461 | 9.402 | 0.172 | 0.342 | 0.600 | 0.436 | 0.049 | 0.000 | 0.000 | 0.005 | 0.002 | 0.010 |
| Clay Gully East | 5.891 | 14.542 | 0.329 | 0.685 | 1.163 | 0.987 | 0.108 | 0.000 | 0.000 | 0.009 | 0.003 | 0.015 |
| East Canal | 4.615 | 29.444 | 0.417 | 0.667 | 1.371 | 0.788 | 0.092 | 0.000 | 0.000 | 0.012 | 0.022 | 0.040 |
| Falkenburg | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Hollomans Branch | 8.341 | 24.785 | 0.508 | 1.005 | 1.769 | 1.412 | 0.159 | 0.000 | 0.000 | 0.014 | 0.006 | 0.026 |
| Indian Creek | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Itchepackasassa | 8.345 | 42.296 | 0.581 | 1.046 | 1.976 | 1.270 | 0.140 | 0.000 | 0.000 | 0.018 | 0.043 | 0.061 |
| Mango | 3.222 | 33.191 | 0.407 | 0.815 | 1.426 | 0.903 | 0.096 | 0.000 | 0.000 | 0.015 | 0.011 | 0.047 |
| Two Hole Branch | 0.339 | 0.946 | 0.020 | 0.042 | 0.071 | 0.057 | 0.006 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 |
| Vandenburg | 5.992 | 32.469 | 0.381 | 0.653 | 1.273 | 0.644 | 0.082 | 0.000 | 0.000 | 0.011 | 0.044 | 0.039 |
| Williams | 9.198 | 107.254 | 0.659 | 1.238 | 2.272 | 0.974 | 0.121 | 0.000 | 0.000 | 0.024 | 0.186 | 0.139 |

*Note: Wet detention systems were used in all load reduction calculations*

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**Proximity of Subwatersheds to Main River Connects**

**Figure 13.2.4**

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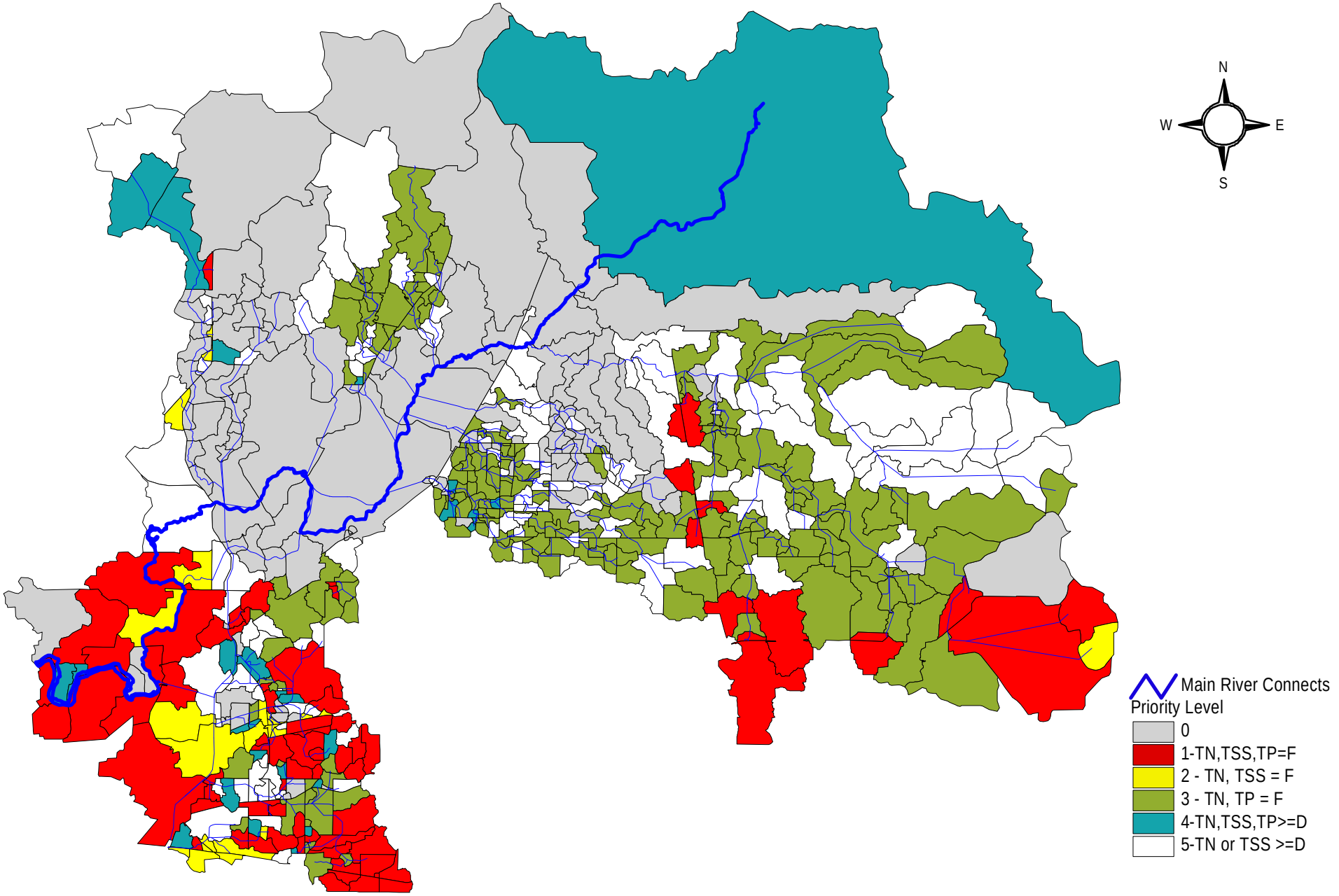


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**Priority Subbasins for Water Quality Alternatives**

**Figure 13.2.5**

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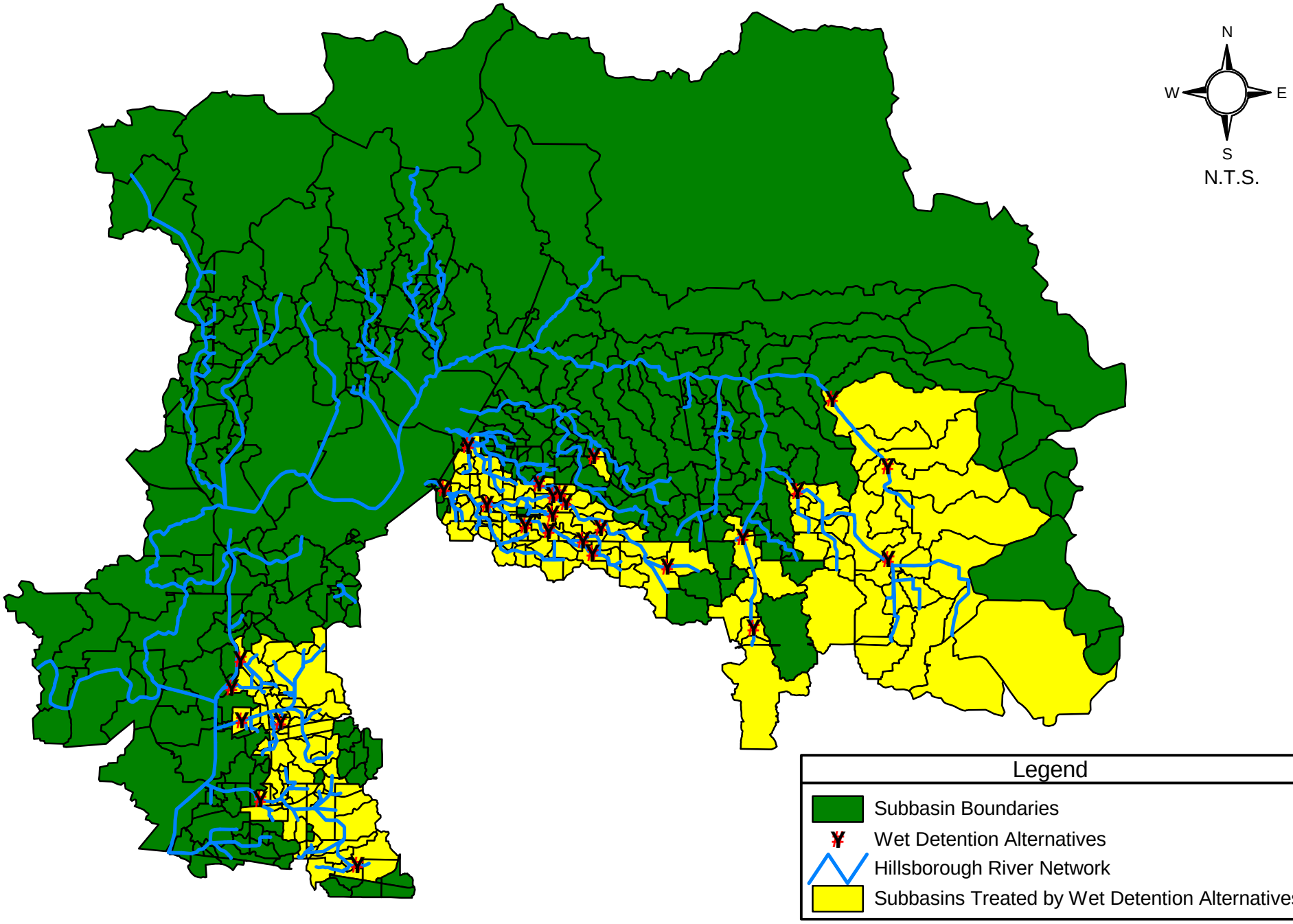


# Hillsborough River Watershed Management Plan

**Subbasins Receiving Treatment From Wet Detention Alternatives**

**Figure 13.2.6**

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Cost estimates for flooding and water quality alternatives were calculated based on a cost per item basis for each. Excavation quantities were determined as the volume of storage needed. For alternative items that are not listed as individual pay items, such as channel maintenance, a cost per unit was calculated as a product of its constituent pay items. Land values were calculated from a GIS layer created from the Hillsborough County Property Appraisers property boundaries map joined to the Hillsborough County Real Estate database of just market values. The just market value of each parcel was divided by the size (acres) of each parcel to develop a cost per acre GIS layer. The cost per acre layer was intersected with undeveloped lands on hydrologic group A, B, and C soils and clipped within a one-quarter mile radius of each node location requiring a stormwater pond. Cost estimates for potential habitat restoration and water quality projects excavation were estimated with GIS by calculating the volume of soil above the low range of the groundwater table within a given area. Land values were estimated from the cost per acre GIS layer referenced above. The cost of potential restoration of existing wetlands through rehydration was estimated as a cost per acre of the wetland area delineated in the SWFWMD 1995 land use GIS layer. Since the total just market value accounts for all land uses and structures within a specific piece of property, the actual value of a particular wetland may be less than that reflected in the cost per acre GIS layer.

## 13.3 Descriptions of Alternatives

Alternatives presented in this chapter were designed to address the LOS Deficiency for each problem area described in Chapter 6. These alternatives include structural and non-structural improvements as well as maintenance needs. Cost estimates were developed for each flooding alternative and are included in Appendix H-1. Cost estimates for select water quality/natural systems alternatives are presented in Appendix H-2. Load reductions for total suspended solids, total nitrogen, and total phosphorus by individual alternative are presented in Appendix H-3.

### 13.3.1 Hillsborough River Near Crystal Springs Region

#### 13.3.1.1 Hillsborough River Above Crystal Springs Subwatershed

Water Quantity LOS Deficiency

The majority of this subwatershed lies outside of Hillsborough County in southern Pasco County. This subwatershed was modeled utilizing the hydrologic portion of the model only since detailed data for hydraulic analysis was limited to only a few small areas within Hillsborough County. Since no hydraulic analyses were performed, no LOS designations can be provided.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these mostly rural basins are designated as LOS-F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

Only the portion of the subwatershed within Hillsborough County was evaluated for natural systems. The natural systems evaluation score was D since a portion of the subwatershed remains as natural habitat, however much of it is fragmented and is not protected through public ownership.

#### 13.3.1.2 Big Ditch Subwatershed

Water Quantity LOS Deficiency

Access to obtain detailed survey information was denied by local landowners and so this subwatershed was modeled utilizing the hydrologic portion of the model only. Since no hydraulic analyses were performed, no LOS designations can be provided.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these mostly rural basins are designated as LOS F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. The largest single source of potential pollution in this basin is CF Industries' phosphate facility.

Natural Systems Deficiency

The portion of the subwatershed within Hillsborough County received a natural systems evaluation score of F. Although there is remaining natural habitat in public ownership, much of it is highly fragmented.

#### 13.3.1.3 Indian Creek Subwatershed

Water Quantity LOS Deficiency

Due to the limitations of the study area, as well as the access problem, this subwatershed was modeled utilizing the hydrologic portion of the model only. Since no hydraulic analyses were performed, no LOS designations can be provided.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these rural residential basins are designated as LOS F and have a high potential as a source of pollutants. Much of the subwatershed lies outside of Hillsborough County and also receives little to no water quality treatment. Limited areas exist within Hillsborough County to provide significant treatment of flows originating from the upstream basin.

Natural Systems Deficiency

Only the portion of the subwatershed within Hillsborough County was evaluated for natural systems. This subwatershed received a natural systems evaluation score of F. Although there is some remaining natural strategic habitat, much of it is highly fragmented and lacks conservation or preservation status.

### *Water Quality/Natural Systems Alternatives*

The majority of the water quality deficiencies for this region are caused by urban development and agricultural activities in Pasco County. Greater intergovernmental coordination will be required between Hillsborough County, Pasco County and the SWFWMD to address these issues. A number of watershed planning and stormwater improvement projects have been proposed for future years in this area which, if implemented, should result in water quality and natural systems improvements.

## 13.3.2 Blackwater Creek Region

### 13.3.2.1 Blackwater Creek Subwatershed

Water Quantity LOS Deficiency

Results from the EXTRAN model for the 25-year storm event resulted in a LOS D for the Blackwater Creek Watershed. The LOS designation results from one location in the watershed on just west of the Hillsborough and Polk County boarder. The predicted flooding site is within a high density mobile home development at Canaan Avenue (Figure 13.3.2.1.1).

Water Quality LOS Deficiency

Based on pollutant loading modeling, these basins are designated as LOS F and have a high potential as a source of pollutants and increased runoff. Much of the watershed lies in Polk County, extending into the heart of Lakeland and includes older developments that do not include on-site stormwater treatment facilities.

Natural Systems Deficiency

This subwatershed received a natural systems evaluation rating of C. The stream network is buffered along much of its length, however much of the remaining natural habitat is fragmented. There is minimal land classified as strategic habitat conservation areas or protected by public ownership.

### *Flooding Alternatives*

*Canaan Avenue*

The impetus for the project at this site was an effort by SWFWMD, Polk County and Hillsborough County to participate in a jointly funded multi-solution project. To address local flooding, Polk County notified Hillsborough County Early in 2001 of the need to discharge an additional peak flow of 129 CFS generated by upstream ditch improvements to Blackwater Creek. The development of a Storage Treatment Area (STA) near Canaan Avenue was decided to be the most suitable solution to address poor water quality and flooding problems. The SWFWMD encouraged joint participation in a multipurpose project and thus this conceptual alternative was developed to respond to the various objectives of those agencies involved.

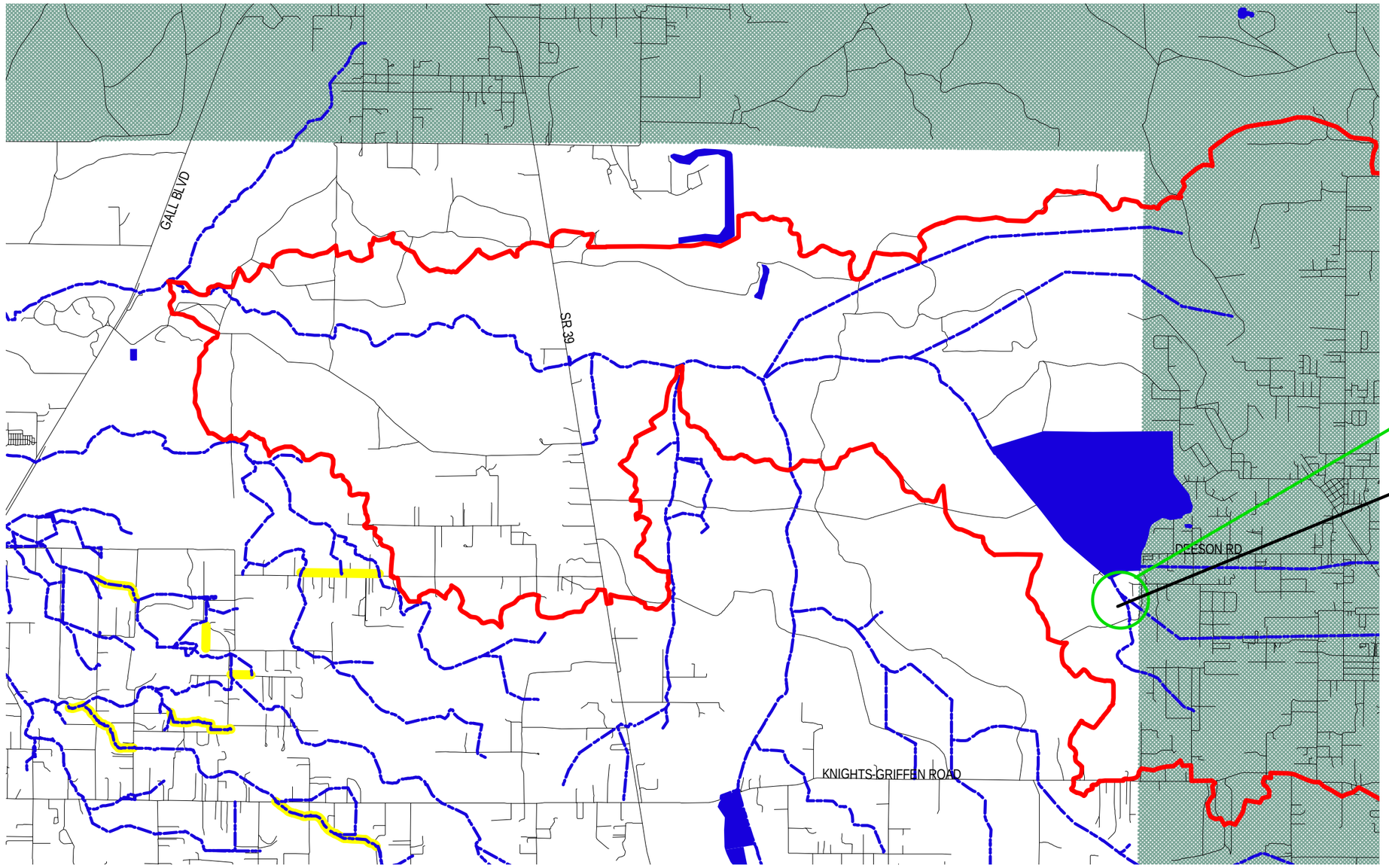


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**Figure 13.3.2.1.1**
**Blackwater Subwatershed Alternatives Location Map**

The EXTRAN model predicts flood depths of 0.67 feet (0.20 m) over the road for the 25-year event. All of the flooding occurs in the area on the western edge of the development where there is encroachment into the natural floodplain. Residents and property managers report repetitive street flooding at this location. The conveyance system is in relatively good condition. The in-bank portion is free of vegetation and the outer banks can be described as a forested floodplain without a dense understory. In general flood levels are not caused by any structural or unusual aspect of the conveyance system, but are in direct relation to the significant contributing watershed area that extends upstream into Polk County.

**Alternative BLK 1**

The alternative developed for this site includes the creation of a 30-acre (12.14-hectare) offline STA (Figure 13.3.2.1.1). If planned channel improvements are conducted by Polk County upstream of this site, a 50-acre (20.24-hectare) or greater STA will be required. A diversion structure will also be required upstream of the development. The structure will route flood discharges into a channel that will begin at the creek, through the floodplain forest, ending at the STA. Discharge from the STA can be over a spillway to eliminate potential impacts caused by a return channel back to the creek. Numerous existing wetlands adjacent to the floodplain forest, with some excavation and berming, may be adequate for use as STAs.

**Water Quantity Issues**

Virtually all of the lands west of the creek are vacant and suitable for construction of an STA. The lands around the existing wetlands slope steeply up-gradient and are cleared, allowing room for numerous configurations for an STA.

**Water Quality Issues**

The construction of one or a series of flood storage areas in the cleared pasture west of Blackwater Creek could provide a significant water quality benefit by providing increased detention times during storm events. Sampling performed by Ayres Associates in 2000 at several locations upstream of this alternative revealed some of the highest concentrations of fecal coliform bacteria, nitrogen, and phosphorus of any of the subwatersheds sampled in the Hillsborough River watershed. If designed to meet a 14-day detention period, this alternative should result in significant load reductions in bacteria, TSS, TN, and TP (Table 13.2.2).

Additional survey information and field investigations will be necessary to properly site this alternative. Portions of the open land identified for flood storage ponds are currently being used by the mobile home park as recreational space and also as spray fields for disposal of wastewater treated at a small package plant adjacent to Blackwater Creek. Other open areas lie at much higher elevations than the creek and would require significant excavation to provide adequate storage and treatment volume.

**Natural Systems Issues**

This alternative could provide significant forested and emergent wetland habitat for this subwatershed by creating shallow littoral shelves along the fringes of a series of created ponds. In addition, several existing wetlands, which have been hydrologically altered through ditching, could be restored through ditch blocks and routing flows through drained floodplain areas.

| **Alternative: BLK 1** | |
|---|---|
| Construction | $1,158,700.00 |
| Land Acquisition | $141,285.90 |
| Design/Permitting | $188,805.00 |
| **Total:** | **$1,488,790.90** |

| **Alternative: BLK 1 (With Polk Co. Project)** | |
|---|---|
| Construction | $1,826,018.13 |
| Land Acquisition | $235,476.50 |
| Design/Permitting | $288,902.72 |
| **Total:** | **$2,350,397.35** |

***Water Quality/Natural Systems Alternatives***

**Alternative BLK A**

If a suitable site cannot be found adjacent to the existing mobile home park identified in Alternative BLK 1, a similar water quality improvement alternative could be constructed at a location further downstream (Figure 13.3.2.1.2). This alternative would be identical to Alternative BLK 1 in scope and objectives, but would be constructed on open lands currently used as pasture. This area has also been targeted for acquisition for preservation purposes by the SWFWMD. If purchased, this alternative could be constructed in conjunction with FDOT mitigation funds or as a cooperative project with the SWFWMD SWIM Program.

N
W E
S
1 0 1 Miles

1 Blackwater Creek - Habitat Restoration/Water Quality Enhancement (BLK A)
2 Clay Gully East - Wetland Hydrologic Restoration (CGE A)
3 Clay Gully East - Wetland Hydrologic Restoration (CGE B)
4 Eastside Canal - Fish Farms Stormwater Treatment (ECN A)
5 Eastside Canal - McIntosh Park Water Quality Enhancement
6 Eastside Canal - Water Quality Enhancement (ECN B)
7 Falkenberg - SWIM StormwaterTreatment Facility
8 Hillsborough Below S-155 - Riverhills Drive Restoration
9 Hillsborough Below S-155 - Rogers Park Golf Course (HRB A)
10 Hillsborough Below S-155 - SWIM Broadway Outfall Retrofit
11 Hillsborough Below S-155 - SWIM Stormwater Retrofit
12 Hollomans Branch - Habitat Restoration/Water Quality Enahancement (HBA C
13 Hollomans Branch - Habitat Restoration/Water Quality Enhancement (HBA D)
14 Hollomans Branch - Habitat Restoration/Water Quality Enhancement (HBA E)
15 Hollomans Branch - Water Quality Enhancement (HBA A)
16 Hollomans Branch - Wetland Hydrologic Restoration (HBA B)
17 Itchepackasassa - Habitat Restoration/Water Quality Enhancement (IPC B)
18 Itchepackasassa - Habitat Restoration/Water Quality Enhancement (IPC C)
19 Itchepackasassa - Upland Restoration of Pasture (IPC A)
20 Itchepackasassa - Wiggins Prairie Habitat Restoratation
21 Lake Thonatossassa Wetland Restoration
22 Mango - Lake Preservation/Restoration (MGA B)
23 Mango - Sinkhole Protection (MGA C)
24 Mango - Stormwater Treatment Facility (MGA A)
25 Tampa By-Pass Canal - Eastlake Stormwater Retrofit
26 Tampa By-Pass Canal - Land Limited BMP for Dairy Farm
27 Tiger Creek - Cone Ranch Restoration
28 Two Hole Branch - Plant City Reclaimed Water Pipelne Project
29 Two Hole Branch - Wetland Hydrologic Restoration (TWH A)
30 Vandenburg - Stormwater Treatment Facility (VBA A-1)
31 Vandenburg - Stormwater Treatment Facility (VBA A-2)
32 Williams - Habitat Restoration/Water Quality Enhancement (WRA A)
33 Williams - Stormwater Treatment at I-75 (WRA B)

Alternative Project Locations
Existing
New
Wetland Preservation in 223m Riparian Buffer (Excluding Public Lands)
Potential Wetland Restoration/Creation in 223m Riparian Buffer
Subwatershed Boundaries
Stream Network
Existing Public Land

Hillsborough River Watershed Management Plan

**Figure 13.3.2.1.2**
**Existing and Proposed Natural Systems & Water Quality Alternatives**

AYRES ASSOCIATES

| Alternative: BLK A | |
|---|---|
| Construction | $951,460.00 |
| Land Acquisition | $0 |
| Design/Permitting | $252,865.00 |
| **Total:** | **$1,204,325.00** |

### 13.3.2.2 Itchepackesassa Creek Subwatershed

Water Quantity LOS Deficiency

Modeling results do not indicate any LOS Deficiencies in the Itchepackesassa Creek subwatershed.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these are designated as LOS F and have a high potential as a source of pollutants. The subwatershed extends east into Polk County and includes much of the western side of the City of Lakeland. The majority of the industrial, commercial and residential developments predate any requirements for stormwater treatment. In Hillsborough County, the land use is primarily rural residential. The channelization of the conveyance system throughout the subwatershed results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

Although some natural riparian buffer remains in this subwatershed, the natural habitats are extremely fragmented due to extensive agricultural development. Therefore, the natural systems evaluation score for this subwatershed was D.

***Water Quality/Natural Systems Alternatives***

**Alternative IPC A (Upland Restoration)**

There are a number of open fields within publicly owned parcels in the Cone Ranch area which are fallow (Figure 13.3.2.1.2). Efforts to expedite replanting these areas with native upland vegetation should be pursued since the restoration of these upland parcels will take several decades given the slow growth rate of larger tree species.

**Water Quantity Issues**

Because this alternative will not alter the flows or stages of the river or any tributary, there are no water quantity issues associated with it.

**Water Quality Issues**

This alternative should result in the preservation of water quality within this area since additional tree canopy will be provided to reduce erosion and excess runoff from cleared pasture areas.

**Natural Systems Issues**

Wetland preservation and restoration activities have typically been a higher priority during the past few decades due to the significant rate of loss of critical aquatic habitats. However, the need for upland restoration has also become a significant issue, especially in southwest Florida where ecologically important uplands are preferentially converted to developed lands to avoid impacting wetlands. Since a large portion of the Cone Ranch property was converted from uplands to pasture during the last several decades, these areas should be targeted for pine flatwood restoration to provide additional wildlife habitat and a buffer to the remaining wetlands within the parcel.

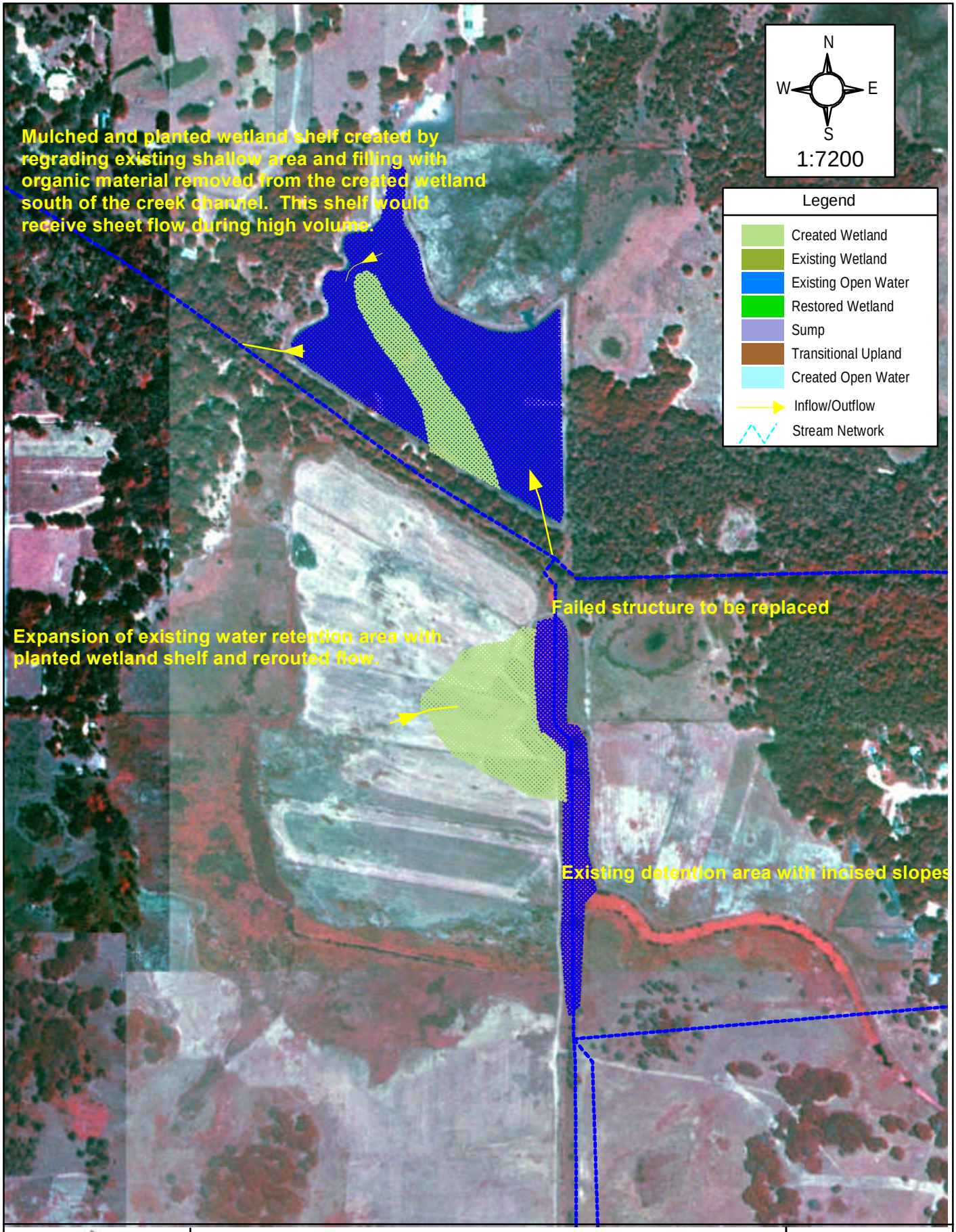
| **Alternative: IPC A** | |
|---|---|
| Construction | $2,620,000.00 |
| Land Acquisition | $0 |
| Design/Permitting | $10,000.00 |
| **Total:** | **$2,630,000.00** |

**Alternative IPC B**

Immediately south and west of where the main channel of Itchepackesassa Creek crosses into Hillsborough County, there is an existing retention area in which the control structure has failed due to erosion (Figure 13.3.2.2.1). This area consists of a long excavation that is approximately 3000 feet (914 m) long and approximately 40 feet (12 m) wide from top of bank to top of bank at its widest point with side slopes that are 4:1 or somewhat steeper. The control structure was made of a concrete-filled pillow fabric with some concrete bracing.

The alternative would involve two phases. The first phase would include the creation of a large marsh in the existing hydric soils immediately west of the existing excavation. This may require a significant lowering of the overall grade of the adjacent area in order to provide hydration without impacting flooding conditions upstream. Some of the on-site organic soils could be used as mulch for the wetland area to improve the success of vegetation growth. Excess organic soils could be used for mulching the planting areas described in the second phase below.

There is an existing pond on the north side of the creek channel across from the area described above. According to adjacent property owners, the pond was excavated as part of a failed residential development plan. As the second phase to this alternative, a portion of the flow from the main channel of Itchepackesassa Creek could be routed through the pond by constructing a




# Natural Systems and Water Quality Conceptual Alternatives

**Figure 13.3.2.2.1. Itchepackasassa Subwatershed, IPC B**

AYRES ASSOCIATES

diversion channel in the eastern end of the pond and an outfall channel near the western end. There is an existing shallow area across the center of the pond that could be regraded to provide an area for planting desirable wetland species. Excess organic soils from the wetland creation effort described in phase one could be used as mulch on the wetland area to improve the success of vegetation growth.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

Replacement of the existing, non-functional control structure, construction of an adjacent wetland area, and routing of the creek through the existing pond will result in increased detention times and increase the rate and amount of nutrient uptake and pollutant removal. These proposed activities are anticipated to improve water quality. In order to maximize pollutant removal, the design should include a combination of unvegetated deep pools and littoral shelves planted with a mixture of native marsh vegetation. The species planted should be appropriate for the design water elevations and should be those known to be successful for those conditions. This alternative represents one of the few opportunities for treatment of the heavily polluted flows that enter Hillsborough County from Polk County. This alternative is strategically located to treat a large percentage of the urbanized portion of the Itchepackesassa subwatershed, which has a poor LOS confirmed by recent sampling indicating high nutrient and fecal coliform bacteria concentrations. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2).

**Natural Systems Issues**

The creation of a functional, hydrated wetland will greatly improve the wildlife habitat as compared to the existing conditions. The proposed created wetland will be located in an area dominated by hydric soils and will most likely be claimed as wetlands. These conditions may present some permitting issues. Given the extreme, long-term permanent alteration of the area and its low functionality as a wetland, it should be possible to propose this project as a restoration activity.

| **Alternative: IPC B** | |
|---|---|
| Construction | $263,740.00 |
| Land Acquisition | $530,000.00 |
| Design/Permitting | $94,122.00 |
| **Total:** | **$887,862.00** |

**Alternative IPC C**

This alternative could be implemented in addition to Alternative IPC B above. A water quality treatment area could be constructed either in-line or off-line and adjacent to the creek on existing publicly-owned lands further upstream of IPC B. Although this alternative would not take advantage of an existing pond feature as in IPC B, it could be expedited since no land acquisition would be necessary to begin design of the project.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

This alternative would treat a larger area of the subwatershed than IPC B and could have a greater effect on pollutant load reductions. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2).

**Natural Systems Issues**

In conjunction with the creation of open water and shallow littoral shelves for emergent wetlands, restoration of forested riparian habitat could be accomplished with this project. This area of the subwatershed has undergone conversion from natural upland and riparian habitat to pasture – additional riparian habitat creation will provide greater wildlife corridor connectivity within this conservation area.

| **Alternative: IPC C** | |
|---|---|
| Construction | $1,820,300.00 |
| Land Acquisition | $0 |
| Design/Permitting | $288,045.00 |
| **Total:** | **$2,108,345.00** |

### 13.3.2.3 Eastside Canal Subwatershed

Water Quantity LOS Deficiency

Results from the EXTRAN model for the 25-year storm event resulted in a LOS D for the Eastside Canal Watershed. The LOS designation results from one location south of Knights Griffin on N. Wilder Road and Terrace Drive.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these urban and rural residential basins are designated as LOS F and have a high potential as a source of pollutants. The subwatershed extends into the center of Plant City where most of the development pre-dates requirements for stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

This subwatershed received a natural systems evaluation rating of D. A small portion of natural habitats remains relative to the size of the subwatershed that is extremely fragmented, and only a small portion is under public ownership.

### *Flooding Alternatives*

*N. Wilder Road*

The EXTRAN model predicts a flood depth of 0.8 feet (0.24 m) over N. Wilder Road for the 25-year storm event (Figure 13.3.2.3.1). The flooding was reported by the Hillsborough County Maintenance Department and confirmed by a resident living adjacent to the location where the road is overtopped. The resident reported vehicle hydroplaning and numerous incidences of vehicle extrication from the bottom of the road shoulder.

**Alternative ECA 1**

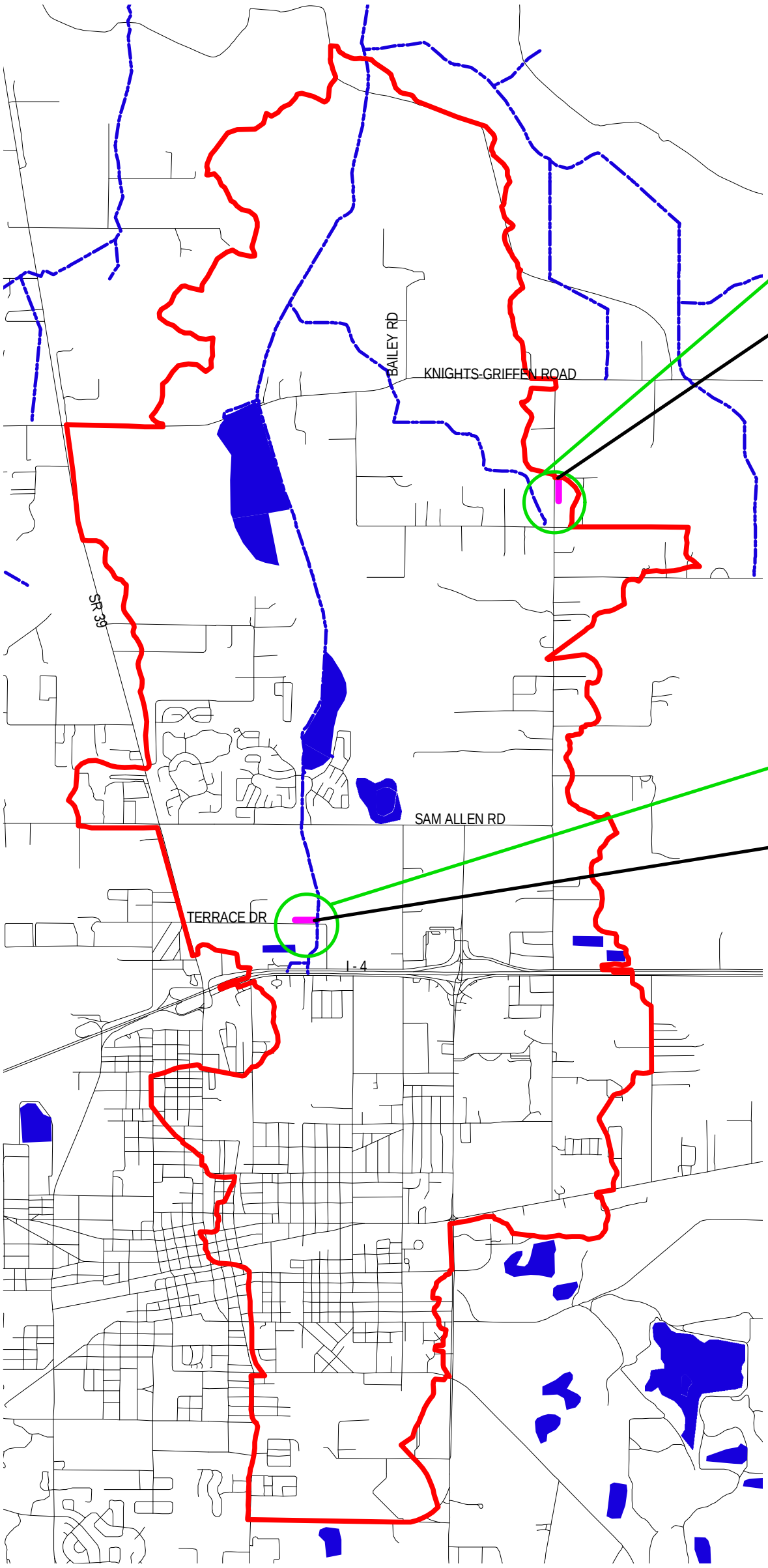
The alternative developed for this site includes the construction of a roadside ditch system having a 4-foot bottom and 4:1 side slopes, extending from the location of the flooding 1100 feet (335 m) north along N. Wilder Road to an existing cypress wetland, and the installation of 4 sets of double 29” x 45” RCPs with mitered end sections under existing driveways.

This alternative breaches the divide between Itchepackesassa Creek and Eastside Canal. The EXTRAN model shows minimal impact in water surface elevation from the additional discharge. The County recommends 4-foot bottoms and 4:1 side slopes in the Hillsborough County Stormwater Manual (1993). However, the amount of necessary right-of-way can be reduced with 3:1 side slopes.

**Water Quantity Issues**

The County may wish to maintain 4:1 side slopes for the swale. The priority of maintaining the County design standard should be based on detailed right-of-way and elevation surveys of the roadside.

An Environmental Resource Permit (ERP) will be required to construct this project and model results will be required to demonstrate that there are no adverse offsite impacts to Itchepackesassa Creek as a result of the proposed conveyance system.




# Hillsborough River Watershed Management Plan

**Figure 13.3.2.3.1**

**Eastside Canal Subwatershed Alternatives Location Map**

**Water Quality Issues**
Channelization of this area will increase the rate of runoff leaving the flood problem area and may result in the transport of TSS and nutrients downstream. However, if designed properly and vegetated, the swale could also act as stormwater treatment system during the more common, small rain events that occur in the area.

**Natural Systems Issues**
Construction of the ditch may impact a small wetland at the north end of the project area. Efforts to avoid and minimize wetland impacts should be undertaken during the design and permitting phases of the project.

| **Alternative: ECA 1** | |
|---|---|
| Construction | $102,844.03 |
| Land Acquisition | $0 |
| Design/Permitting | $56,137.61 |
| **Total:** | **$158,981.64** |

*Terrace Drive*
The EXTRAN model predicts a flood depth of 1.8 feet (0.54 m) over Terrace Drive for the 25-year storm event. The flooding was reported by the Hillsborough County Maintenance Department and was pumped during El Nino.

**Alternative ECA 2**
The alternative developed for this site includes the construction of a 5-foot (1.52 m) deep roadside ditch, with a 4-foot (1.21 m) wide bottom and 4:1 side slopes, extending from the location of the flooding 990 feet (301 m) east along Terrace Drive to its intersection with East Canal, and the installation of a 43" x 68" elliptical RCP with mitered end section at one driveway crossing. After researching the right-of-way, the actual number of driveway culverts required can determine and factored into the final design.

Based on the depth of the roadside ditch of 4 feet (1.21 m), approximately 36 feet (10.9 m) of right-of-way will be required to construct this alternative. Existing unused right-of-way may be available, reducing the need to purchase of all 36 feet (10.9 m). A 1-foot (0.30 m) high ditch block can be placed at the downstream end of the ditch to provide detention after small rainfall events for water quality treatment. Based on an analysis of the modeling results there is very little increase in water surface elevations downstream as a result of the addition of the ditch.

**Water Quantity Issues**

An ERP will be required to construct this project and model results will be required to demonstrate that there are no adverse offsite impacts to Eastside Canal as a result of the proposed conveyance system.

**Water Quality Issues**

Channelization of this area will increase the rate of runoff leaving the flood problem area and may result in the transport of TSS and nutrients downstream. However, if designed properly and vegetated, the swale could also act as stormwater treatment system during the more common, small rain events that occur in the area.

**Natural Systems Issues**

Construction of the ditch may impact a small wetland at the north end of the project area. Efforts to avoid and minimize wetland impacts should be undertaken during the design and permitting phases of the project.

| **Alternative: ECA 2** | |
|---|---|
| Construction | $46,950.93 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$81,950.93** |

***Water Quality/Natural Systems Alternatives***

**Alternative ECA A**

This alternative involves the creation of an off-line wet treatment facility in the existing fish farm located east of the main channel of East Canal just south of Knights Griffin Road (Figure 13.3.2.1.2). This facility could be between 10 and 15 acres (4.05 and 6.07 hectares) in size with flow entering at the southwest corner of the site and discharging back to the creek in the northwest corner. The existing configuration of the fish farm should minimize the excavation needs of the design. A water quality improvement project has already been designed for an ELAPP-owned parcel west of the canal at McIntosh Park. The fish farm east of the canal has also been identified by SWFWMD as an additional feature that would further enhance water quality in this subwatershed. The inclusion of this alternative in this plan formalizes the identification and need for additional improvements for this area of the watershed.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

The proposed flow diversion and planting of a littoral shelf will provide additional water quality enhancements in addition to the planned water quality improvement project across the canal at McIntosh Park. In addition, the removal of the fish farm from production will eliminate a potential source of nutrients. In order to maximize pollutant removal, the design should include a combination of unvegetated deep pools and littoral shelves planted with a mixture of native marsh vegetation. The species planted should be appropriate for the design water elevations and should be those known to be successful for those conditions.

This project will need to be closely coordinated with the SWFWMD since a number of ongoing activities are planned for implementation in the area, including a water conservation project that may be linked to the existing fish farm.

**Natural System Issues**

The planting of a wetland community in the reconfigured fish farm will increase the viable wetland habitat in the area and will improve the highly fragmented and degraded riparian habitat along this stream corridor.

| **Alternative: ECA A** | |
|---|---|
| Construction | $348,056.88 |
| Land Acquisition | $70,642.95 |
| Design/Permitting | $119,417.06 |
| **Total:** | **$538,116.89** |

**Alternative ECA B**

This alternative involves the diversion of a portion of the flow in East Canal through an existing borrow pit south of Sam Allen Road (Figure 13.3.2.1.2). The pond is approximately 15 acres (6.07 hectares) in size and is located immediately east of the channel. The steep slopes of the pond preclude the development of significant wetland vegetation. A 2 to 5-acre (0.81 to 2.02-hectare) marsh could be constructed at the outfall from this pond. The site might also be amenable to alum injection treatment.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

The proposed flow diversion and planting of wetland vegetation will provide some level of water quality enhancement. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2). The species in the marsh area should be appropriate for the design water elevations and should be those known to be successful for those conditions.

**Natural System Issues**

The planting of a wetland community in the existing borrow pit will increase the viable wetland habitat in the area. Although the created wetlands within the borrow pit will be claimed as jurisdictional by some of the agencies, this is not expected to be a major permitting issue due to the poor quality of the site.

| **Alternative: ECA B** | |
|---|---|
| Construction | $216,335.00 |
| Land Acquisition | $70,635.00 |
| Design/Permitting | $101,534.00 |
| **Total:** | **$388,504.00** |

### 13.3.2.4 Tiger Creek Subwatershed

Water Quantity LOS Deficiency

Modeling results do not indicate any LOS Deficiencies in the Tiger Creek Subwatershed.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these mostly rural basins are designated as LOS F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the upstream areas results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

Although a portion of this subwatershed is publicly owned, there is minimal remaining natural habitat relative to the subwatershed size, most of which is highly fragmented. Therefore, this subwatershed received a natural systems evaluation rating of D. Additional efforts to replant native riparian vegetation should be implemented within the publicly owned Cone Ranch property to provide greater riparian corridor connectivity.

***Water Quality/Natural Systems Alternatives***

Recognizing the water quality, water supply, and natural systems improvement opportunities for portions of this subwatershed, Hillsborough County, SWFWMD, and FDEP recently completed the design and construction of a significant water quality and natural systems improvement project at the downstream end of Tiger Creek on the County-owned Cone Ranch property. The Cone Ranch Restoration Project involved the diversion of flows from a channelized portion of Tiger Creek through a series of created open water and shallow wetland features that had historically been cleared and used as cattle pasture. The created wetlands now provide water quality treatment (through increased detention), recharge of groundwater, and improved habitat through planted native wetland vegetation. A second phase of this project is planned for an adjacent parcel that should also result in water quality, groundwater recharge, and habitat improvements for the area.

## 13.3.3 Central Tributaries Region

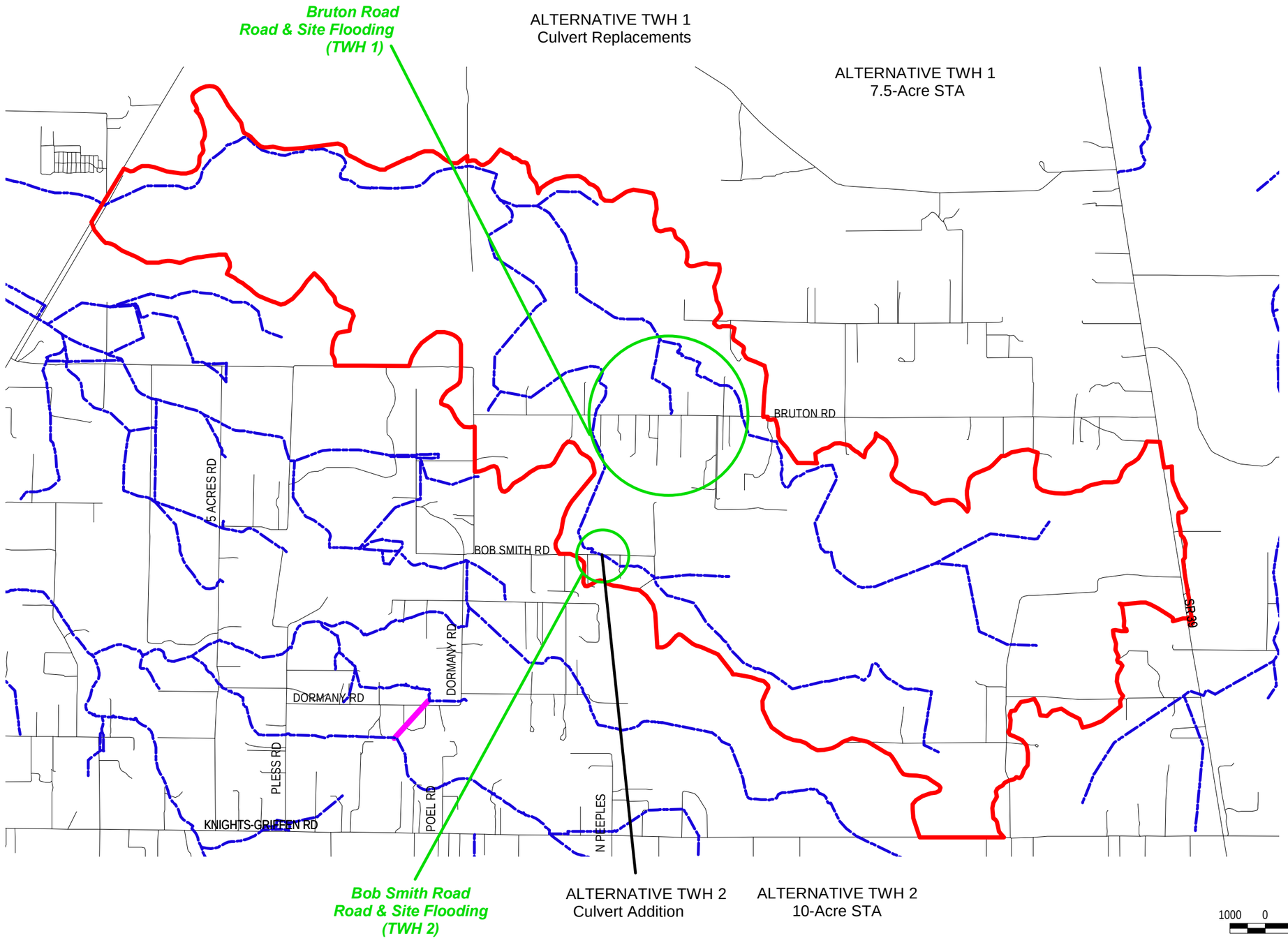
### 13.3.3.1 Two Hole Branch Subwatershed

Water Quantity LOS Deficiency

The flooding LOS is D for the 25-year storm event within the Two Hole Branch Subwatershed. There are two significant locations within the watershed where road and site flooding result from the 25-year event. The locations are illustrated in Figure 13.3.3.1.1 and will generally be referred to as the Middle and East Bruton Road locations, and the Eastern Bob Smith Road location. There are other instances of site and structure flooding within the watershed but they are individual, low-density home sites and cannot be addressed within the scope of this watershed study. Also, there were instances of flooding that occurred during the 1997/1998 El Nino event. In some locations, the 25-year flood and the El Nino flooding were similar in magnitude. In those locations where they were not similar, the scope of this watershed study did not permit further investigation and alternative development primarily because the El Nino event is considered to be an anomaly.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these mostly rural basins are designated as LOS F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.




# Hillsborough River Watershed Management Plan

**Figure 13.3.3.1.1**

**Two Hole Branch Subwatershed Alternatives Location Map**

Natural Systems Deficiency

The Two Hole Branch subwatershed received a natural systems evaluation score of C, the highest rating in the Central Tributaries Region. Although there are no publicly owned lands and much of the natural habitat is fragmented in this subwatershed, some natural land and riparian buffers exist which have also been classified as significant habitat conservation areas.

### *Flooding Alternatives*

*Middle and East Bruton Road Crossings*

The EXTRAN model predicts site flooding at the western location, and road flooding of 0.36 feet (0.1 m) and 0.34 feet (0.1 m) at the middle and eastern locations respectively. Hillsborough County Maintenance staff confirmed the eastern crossing flooding, and several longtime residents confirmed the middle crossing flooding during El Nino.

#### Alternative TWH 1

This alternative consists of adding two like kind culverts (3" diameter CMPs) at both the middle and eastern crossings of Bruton Road and construction of a 7.5-acre STA for attenuation north of Bruton Road.

This is a conventional conveyance system improvement with attenuation downstream of the improvements, to offset any increases in peak water surface elevations.

#### Water Quantity Issues

This alternative will require an ERP. The conceptual design as described above is intended to be located just north of Bruton Road on vacant land. Based on the 1"=200' aerial contour maps, the design assumes an overflow of 77.5 feet (23.9 m) NGVD. The exact location of the STA will dictate the type and elevation of the bleed down orifices that will be sized to maintain hydration of both the STA and the downstream system. The exact configuration and design of all of the components of the STA will be very site specific, and can only be finalized during the final design and plans development, when the exact site of the STA is known.

#### Water Quality Issues

The increased detention time and the planting of native wetland vegetation will improve water quality. In order to maximize pollutant removal, the STA design should include a combination of unvegetated deep pools and littoral shelves planted with a mixture of native marsh vegetation. The species planted should be appropriate for the design water elevations and should be those known to be successful for those conditions. This alternative also has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**
The planting of a wetland community will increase the viable wetland habitat in the area.

| **Alternative: TWH 1** | |
|---|---|
| Construction | $205,084.00 |
| Land Acquisition | $41,244.00 |
| Design/Permitting | $91,905 |
| **Total:** | **$338,233.00** |

*Bob Smith Road*
The EXTRAN model predicts the 25-year event will result in overtopping of Bob Smith to a depth of 0.1 feet (0.05 m). Hillsborough County Maintenance staff and several residents confirmed repetitive road and site flooding at this location.

**Alternative TWH 2**
This alternative consists of construction of an offline 10-acre (3.1-hectare) STA, and two additional like kind culverts under Bob Smith Road.

**Water Quantity Issues**
This alternative will require an ERP. The conceptual design as described above is intended to be located on vacant land and based on the 1"=200' aerial contour maps.

**Water Quality Issues**
As in the previous alternative, the increased detention time and planting of native wetland vegetation will improve water quality for this portion of the subwatershed and downstream receiving waters. In order to maximize pollutant removal, the STA design should include a combination of unvegetated deep pools and littoral shelves planted with a mixture of native marsh vegetation. The species planted should be appropriate for the design water elevations and should be those known to be successful for those conditions. This alternative also has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**
The planting of a wetland community will increase the viable wetland habitat in the area.

| **Alternative: TWH 2** | |
|---|---|
| Construction | $398,577.00 |
| Land Acquisition | $54,990.00 |
| Design/Permitting | $134,573.00 |
| **Total:** | **$588,140.00** |

***Water Quality/Natural Systems Alternatives***

**Alternative TWH A**

This alternative involves the restoration of the hydrology of a group of wetlands ranging from 2 acres to over 40 acres (0.81 hectares to 16.19 hectares) in size (Figure 13.3.3.1.2). These wetlands are dominated by cypress and are located in a working ranch. A system of ditches has been excavated to speed drainage. Although these ditches are only 2 to 3 feet (0.60 to 0.91 m) deep, they reduce the hydroperiod of these wetlands and result in runoff reaching downstream areas more quickly. Ditch blocks should be designed to simulate the historic normal pool water elevations and to retain water below the historic seasonal high elevations.

**Water Quantity Issues**

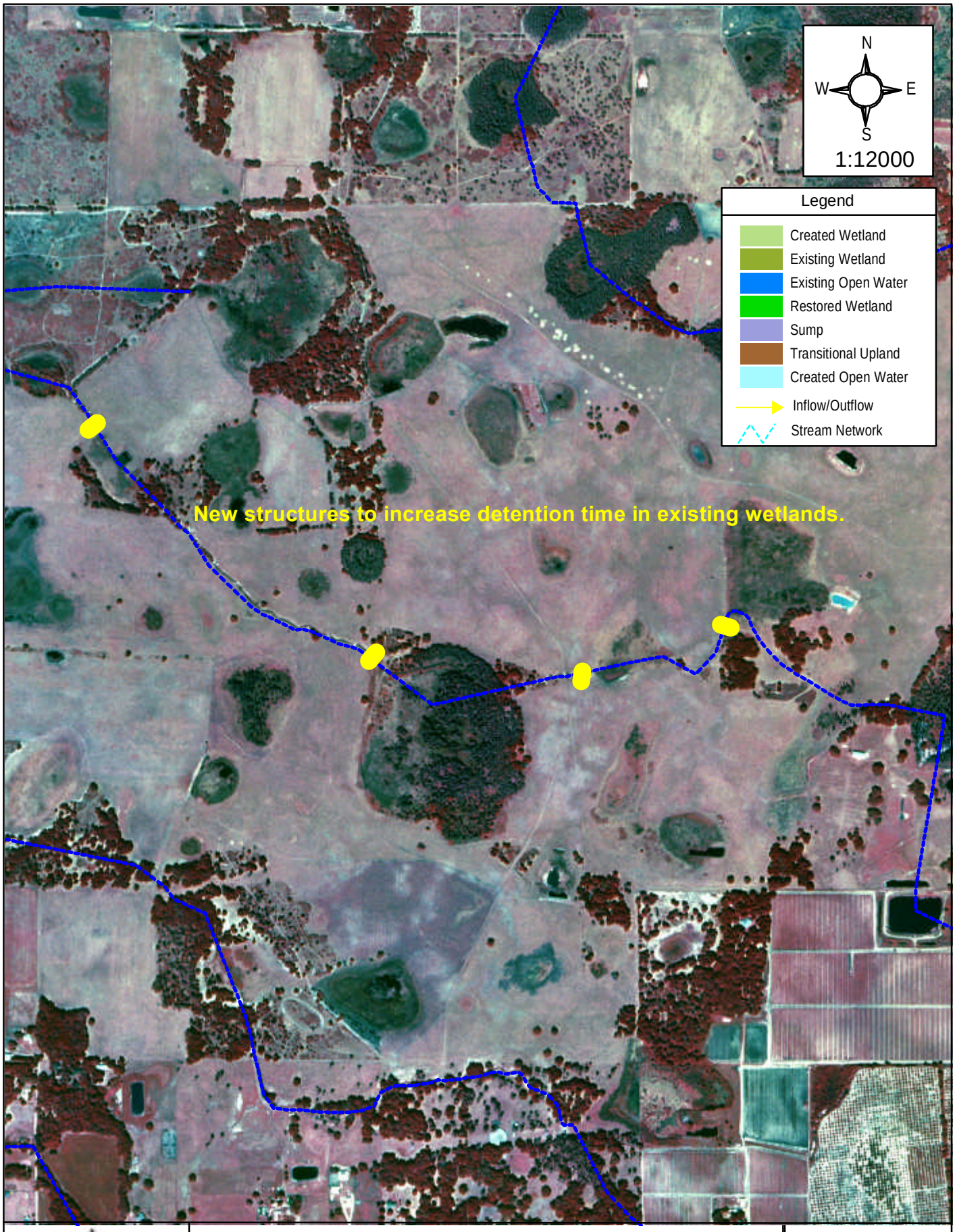
The expected changes in water quantity for this alternative may result in minor changes in downstream flooding, however, during extreme flood events (i.e. El Nino) the amount of storage available in these shallow wetland systems may not be significant. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.

**Water Quality Issues**

The detention of water within the wetland limits will provide the opportunity for pollutant removal. There is also the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**

The restoration of the historic hydroperiod to these wetlands will improve the aquatic habitat functions of the system. In addition, the existing overstory should benefit from increased water availability.




Natural Systems and Water Quality
Conceptual Alternatives

**Figure 13.3.3.1.2. Two Hole Branch, TWH A**

AYRES ASSOCIATES

| Alternative: TWH A | |
|---|---|
| Construction | $2,320.50 |
| Land Acquisition | $225,672.00 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$262,992.50** |

### 13.3.3.2 Clay Gully East Subwatershed

Water Quantity LOS Deficiency

The flooding LOS is D for the 25-year storm event within the Clay Gully East Subwatershed. There are six locations where various combinations of road, site and structure flooding result from the 25-year event. The locations are illustrated on Figure 13.3.3.2.1.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these mostly rural basins are designated as LOS D and have a moderate potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

This subwatershed had a relatively poor natural systems evaluation rating of D. This subwatershed also has little remaining natural habitat except for fragmented sections of riparian habitat along the existing stream channel as well as scattered isolated wetlands that have been altered by drainage.

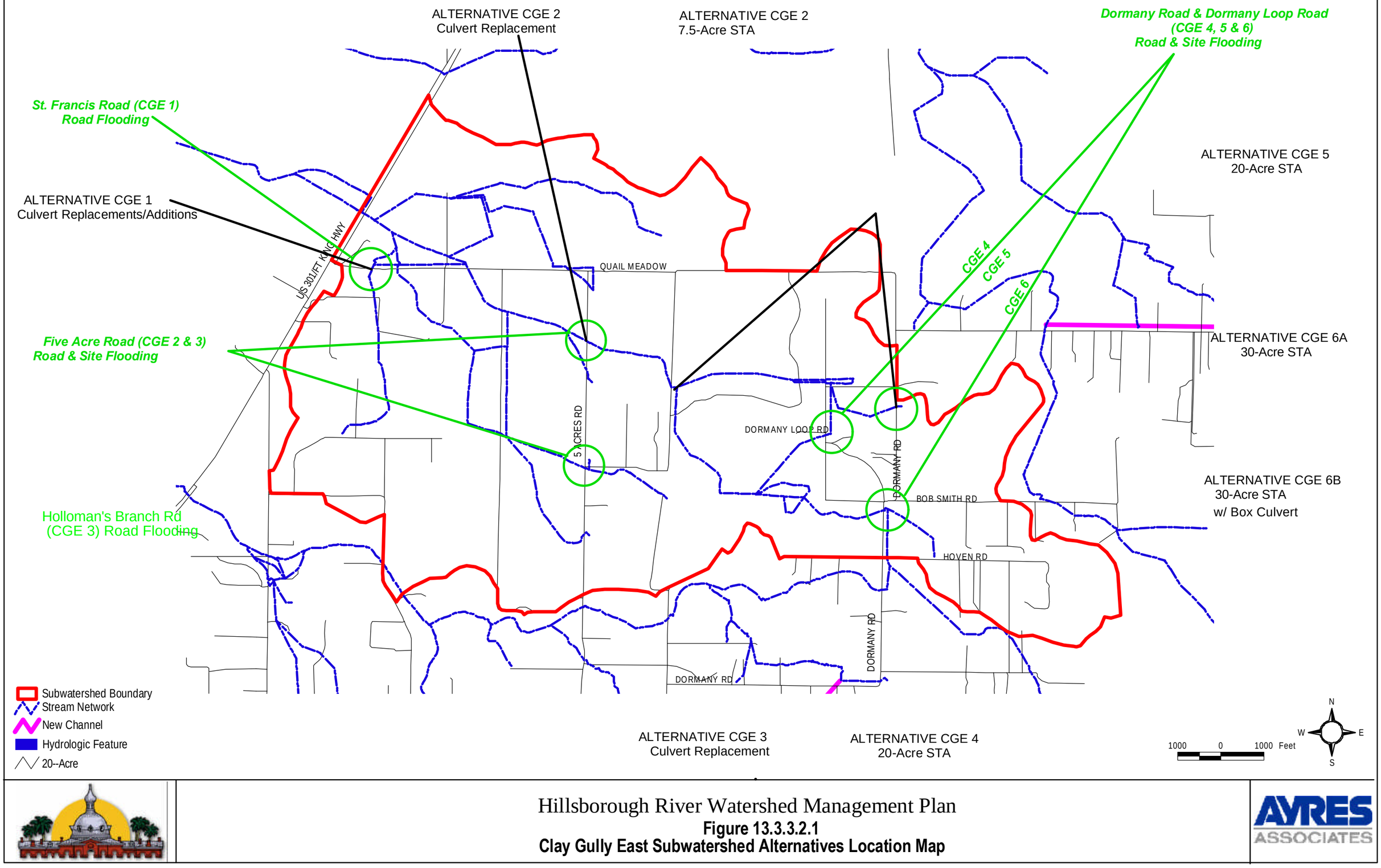
#### *Flooding Alternatives*

*St. Francis Road CGE 1*

For the 25-year storm event the EXTRAN model predicted flooding to a depth of 1.7 and 0.96 feet respectively, over the East and West crossings of St. Francis Road. The flooding was not field verified. The flooding can be eliminated by culvert upsizing at St. Francis Road to U.S. 301.

#### Alternative CGE 1

This alternative consists of replacing the existing 2.5' CMP's with three 4' x 8' box culverts at the west crossing, and replacement of the existing 3' diameter CMP's with three 4' x 8' box culverts at the east crossing of St. Francis Road. The culverts downstream on private property, which were not accessible at the time of this watershed study, will also require replacement. The replacement is expected to consist of approximately three 4' x 10' box culverts. The conveyance at the U.S. 301 crossing will also have to be improved with a 10' x 10' box culvert.




# Hillsborough River Watershed Management Plan

**Figure 13.3.3.2.1**

**Clay Gully East Subwatershed Alternatives Location Map**

This alternative is a relatively straight forward, consisting of conveyance improvements. Given the relatively large size of the recommended box culverts, detailed surveys and subsequent hydraulic modeling should be performed in conjunction with final design.

**Water Quantity Issues**

There will be downstream impacts from the increased conveyance and an ERP will be required. Typically, the off-site impacts would have to be addressed by attenuation. However, given the project location and the relatively small amount of traffic over the road, it is not cost effective to attenuate the flow from the 25-year event. Increasing conveyance without attenuation may be possible because the impacts (increased downstream water surface elevations) will occur on public lands and can be approved by the landowner agency. As compensation and to maximize the public benefit, the conveyance system between the culvert crossings can be treated with environmental enhancements such as erosion control measures and replacement of nuisance vegetation with indigenous species. Also, the culvert crossing between St. Francis Road and U.S. 301 is on private property and an easement will have to be acquired from the landowner.

In lieu of compensation through environmental enhancement, the project could be combined under the same ERP as another project upstream that includes attenuation. SWFWMD permitting staff have advised that benefits from one project can be tied to another one, but they must be contained in the same ERP application and be constructed within the effective life of the permit.

| **Alternative: CGE 1** | |
|---|---|
| Construction | $465,475.00 |
| Land Acquisition | 0.0 |
| Design/Permitting | $139,642.00 |
| **Total:** | **$605,117.00** |

*Five Acres Road*

The EXTRAN model predicted flooding to a depth of 1.5 feet (0.46 m) over Five Acres Road for the 25-year storm event. Hillsborough County Maintenance staff reported that this location floods to edge of pavement every summer.

**Alternative CGE 2**

This alternative consists of replacement of the existing culverts under Five Acres Road with a double barrel 4' x 8' box culvert and construction of a 7.5-acre STA on open land downstream of the crossing.

**Water Quantity Issues**

This alternative is a conventional conveyance improvement and downstream attenuation project. The conceptual design, as described above, is intended to be located on vacant land and based on the 1"=200' aerial contour maps. The exact location of the STA will dictate the type and elevation of the bleed down orifices that will be sized to maintain hydration of both the STA and the downstream system. The exact configuration and design of all of the components of the STA will be very site specific and can only be finalized during the final design and plans development when the exact site of the STA is known.

| **Alternative: CGE 2** | |
|---|---|
| Construction | $397,651.00 |
| Land Acquisition | $45,900.00 |
| Design/Permitting | $134,300.00 |
| **Total:** | **$577,851.00** |

*Hollomans Branch Road*

The EXTRAN model predicted site flooding to a depth of 0.62 feet (0.19 m) at this location for the 25-year storm event.

**Alternative CGE 3**

This alternative consists of a culvert upgrade and addition at the road crossing. The existing 15" diameter culvert should be replaced with two 24" RCPs.

**Water Quantity Issues**

The EXTRAN model predicts negligible downstream peak water surface elevation impacts. Accordingly no attenuation is recommended and the project should qualify for a permit exemption.

| **Alternative: CGE 3** | |
|---|---|
| Construction | $12,720.00 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$47,720.00** |

*Dormany Loop Road*

The EXTRAN model predicted road flooding to a depth of 0.84 feet (0.25 m) from the 25-year event at this location.

**Alternative CGE 4**

This alternative consists of a 20-acre (8.06-hectare) offline STA located in the area around Lady Ashley Road and Dormany Loop, and improved conveyance to the STA.

**Water Quantity Issues**

This alternative will require an ERP. The conceptual design, as described above, is intended to be located on vacant land based on the 1"=200' aerial contour maps. The exact location of the STA will dictate the type and elevation of the bleed down orifices that will be sized to maintain hydration of both the STA and the downstream system. The exact configuration and design of all of the components of the STA will be very site specific, and can only be finalized during the final design and plans development, when the exact site of the STA is known.

| **Alternative: CGE 4** | |
|---|---|
| Construction | $753,992.00 |
| Land Acquisition | $83,110.00 |
| Design/Permitting | $180,958.00 |
| **Total:** | **$1,018,060.00** |

*Dormany Road near Sandy Oaks Drive Intersection*

The EXTRAN model predicted road flooding to a depth of 0.46 feet (0.14 m) at this location on Dormany Road for the 25-year storm event. Local residents verified the flooding during field visits.

**Alternative CGE 5**

This alternative consists of a 20-acre (8.06-hectare) online STA located east of Dormany Road. It will not have an overflow and will thus, except for bleed down orifices, retain all flow discharging into it.

**Water Quantity Issues**

This alternative will require an ERP. The conceptual design, as described above, is intended to be located on vacant land and based on the 1"=200' aerial contour maps. The exact location of the STA will dictate the type and elevation of the bleed down orifices that will be sized to maintain hydration of both the STA and the downstream system. The exact configuration and design of all of the components of the STA will be very site specific and can only be finalized during the final design and plans development when the exact site of the STA is known.

| Alternative: CGE 5 | |
|---|---|
| Construction | $753,992.00 |
| Land Acquisition | $122,580.00 |
| Design/Permitting | $180,958.00 |
| **Total:** | **$1,057,530.00** |

*Dormany Road near Bob Smith Road Intersection.*
The EXTRAN model predicted road flooding to a depth of 0.9 feet (0.27 m) at this location on Dormany Road for the 25-year storm event. Local residents verified the flooding during field visits.

**Alternative CGE 6 A**
This alternative involves the construction of a diversion structure and a 30-acre (12.14-hectare) offline STA in the area around the Bob Smith Road intersection of Dormany Road. This storage area is not conceptualized to have an overflow and will thus, except for bleed down orifices, retain all flow discharging into it.

| Alternative: CGE 6-A | |
|---|---|
| Construction | $1,176,234.90 |
| Land Acquisition | $124,665.00 |
| Design/Permitting | $191,435.24 |
| **Total:** | **$1,492,335.14** |

**Alternative CGE 6 B**
The alternative for this site involves the construction of a 30-acre (12.14-hectare) offline STA in the area around Hovan Avenue and Dormany Road, the replacement of the existing culverts under Dormany Road near the intersection of Bob Smith Road with box culverts.

**Water Quantity Issues**
The alternative will require an ERP. The conceptual design, as described above, is intended to be located on vacant land and based on the 1"=200' aerial contour maps. The exact location of the STA will dictate the type and elevation of the bleed down orifices that will be sized to maintain hydration of both the STA and the downstream system. The exact configuration and design of all of the components of the STA will be very site specific, and can only be finalized during the final design and plans development, when the exact site of the STA is known.

| **Alternative: CGE 6-B** | |
|---|---|
| Construction | $1,176,234.00. |
| Land Acquisition | $183,895.80 |
| Design/Permitting | $205,133.33 |
| **Total:** | **$1,565,232.00** |

***Water Quality/Natural Systems Alternatives***

**Alternative CGE A**

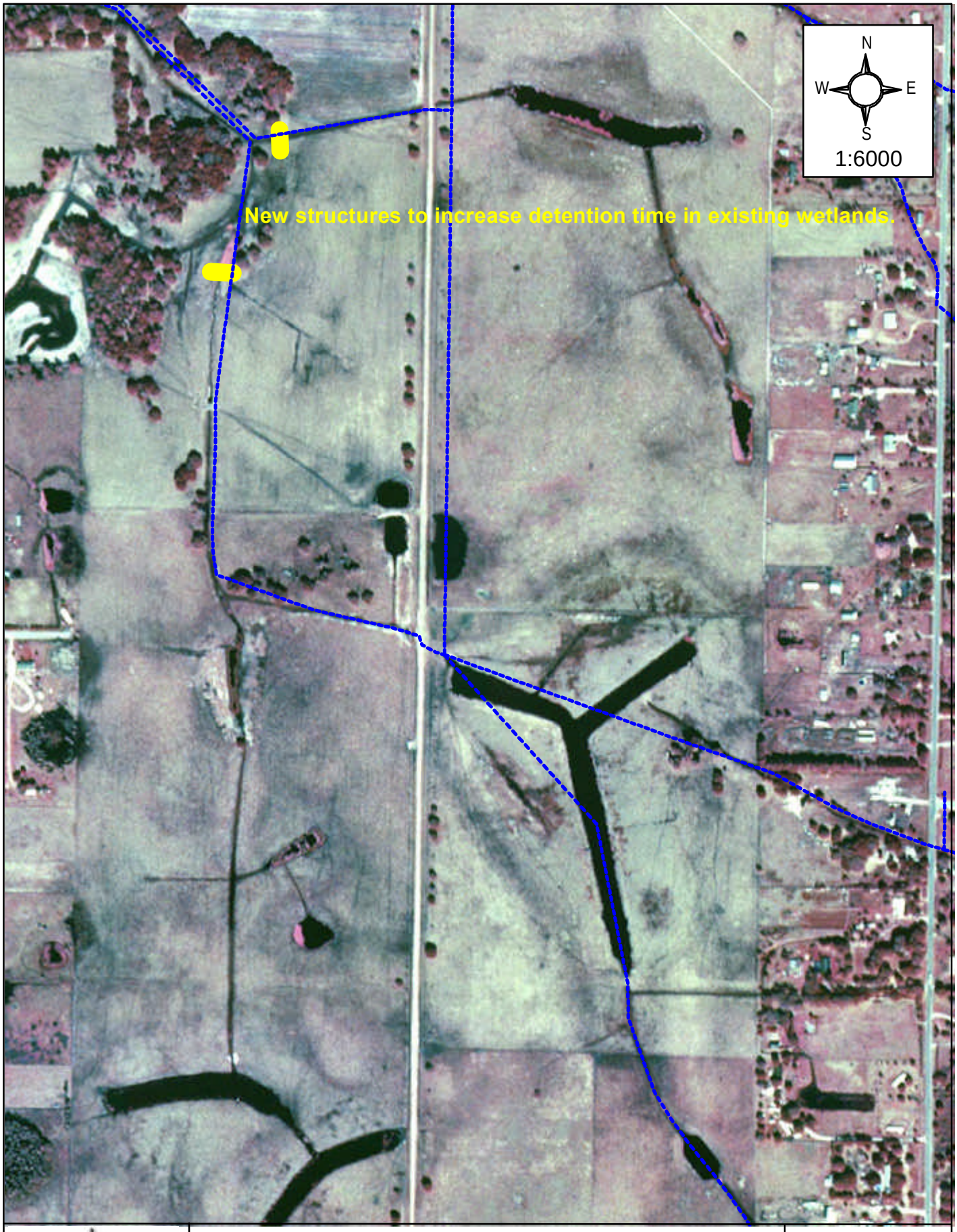
There is a large area of hydric soils to the west of Five Acres Road near its intersection with Hollomans Branch Drive (Figures 13.3.2.1.2 and 13.3.3.2.2). This area has been ditched and portions have been converted to open water areas for cattle ponds. The largest single hydric soil unit is approximately 50 acres (20.24 hectares) in size and this could be used as minimal target restoration acreage. If detailed analysis of the flows and pollutant loadings at this location suggest the need for a larger wetland area or if wetland mitigation can be provided for other CIP projects in the vicinity, the surrounding wet pastures and other previously impacted hydric soil areas could be graded and planted as wetlands. To maximize the treatment efficiency of the area, plantings should be mainly herbaceous with scattered trees.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

The restoration of wetland vegetation and the extended residence time in the area will result in improved water quality for the downstream reach of Clay Gully East. The removal of grazing activity from the area will remove a potentially significant contributor to reduced water quality. This location represents an excellent opportunity to provide water quality enhancement for a significant portion of the subwatershed. The design should include a sedimentation basin prior to the discharge into the restoration/creation area. It would be preferable to site this basin in upland soils adjacent to the restoration area.




Natural Systems and Water Quality
Conceptual Alternatives

**Figure 13.3.3.2.2. Clay Gully East, CGE A**

AYRES ASSOCIATES

**Natural Systems Issues**

The area of the proposed wetland restoration/creation includes numerous areas of hydric soils that have been altered by ditching and draining as well as intense grazing. Most of the existing vegetation consists of grass species such as bahiagrass (*Paspalum notatum*) and big carpet grass (*Axonopus furcatus*) which can tolerate the combination of wet conditions and grazing pressure. Despite their impacted state, most of these areas will be claimed as wetlands for which mitigation will be required. Due to the severely altered conditions of the area, this is not expected to be a major permitting issue and the project should be developed primarily as a restoration of wetland function and habitat. Planting and the removal of grazing will provide greatly improved wildlife habitat as compared to existing conditions. Depending on the size of the constructed wetland, it may be possible to utilize it as a mitigation bank for impacts associated with other CIP projects in the vicinity.

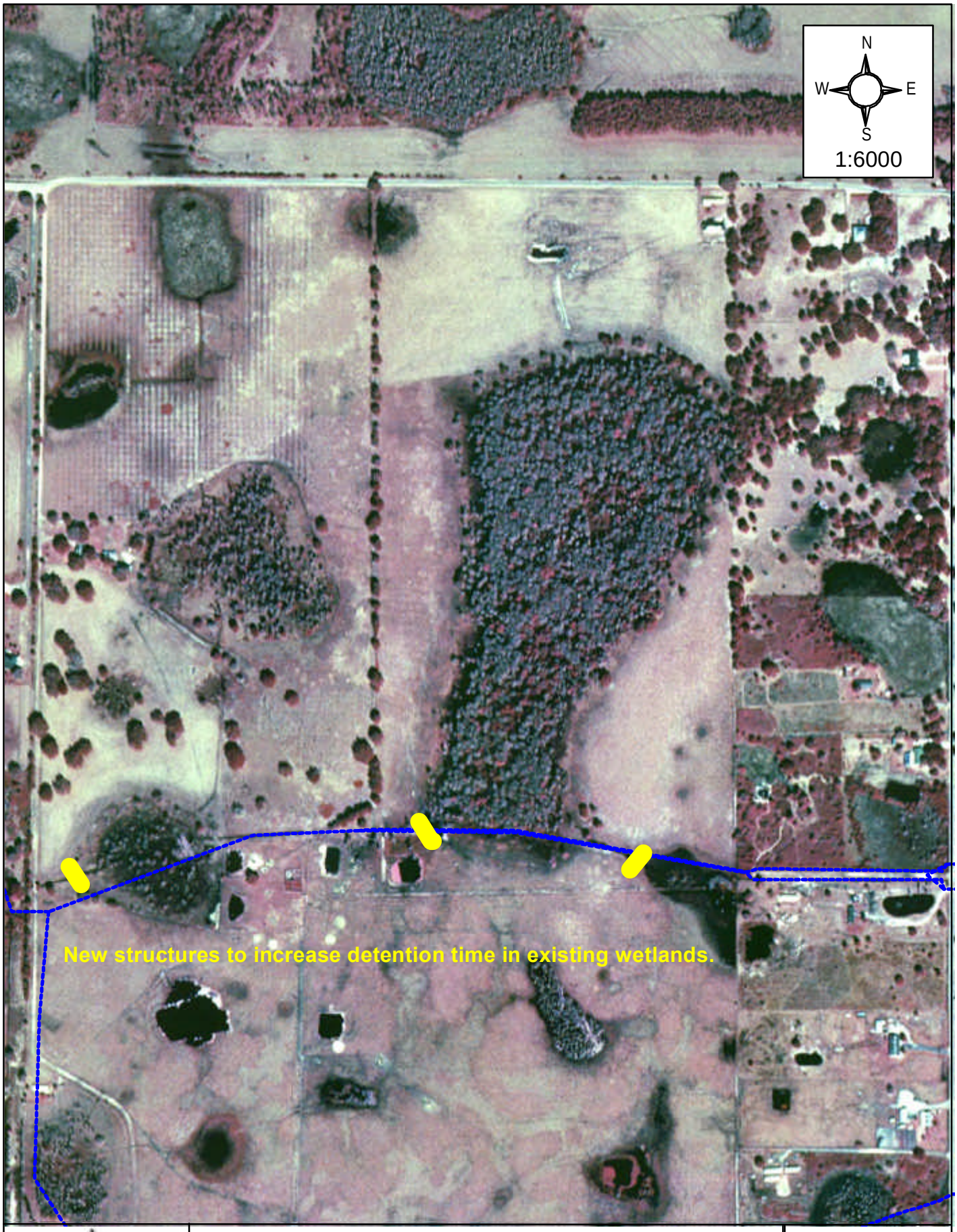
| **Alternative: CGE A** | |
|---|---|
| Construction | $2,097.75 |
| Land Acquisition | $1,429,317.00 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$1,466,414.75** |

**Alternative CGE B**

There are two forested wetlands located between Five Acres and Dormany Roads that are traversed and drained by the main channel of Clay Gully East (Figure 13.3.3.2.3). These wetlands encompass approximately 45 and 6 acres (18.21 and 2.43 hectares), respectively and are dominated by cypress and other hardwood trees, with limited understory and groundcover due to the closed canopy. The construction of ditch blocks on the channel as it exits these wetlands would serve to improve wetland habitat functions. Additional data collection during the design phase will be necessary to confirm existing wetland boundaries and elevations and to refine the design of ditch block elevations such that a defined area is re-flooded during modeled storm events.

**Water Quantity Issues**

The expected changes in water quantity for this alternative may result in minor changes in downstream flooding, however, during extreme flood events (i.e. El Nino) the amount of storage available in these shallow wetland systems may not be significant. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.




Natural Systems and Water Quality
Conceptual Alternatives

**Figure 13.3.3.2.3. Clay Gully East, CGE B**

AYRES ASSOCIATES

**Water Quality Issues**
The increased detention time resulting from the construction of ditch blocks will allow for increased removal of pollutants. This alternative also has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**
Any wetland impacts associated with construction of these ditch blocks is expected to be a minor permitting issue given the improvements in wetland function which can be presented as mitigation.

| **Alternative: CGE B** | |
|---|---|
| Construction | $2,209.13 |
| Land Acquisition | $480,864.00 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$518,073.13** |

### 13.3.3.3 Hollomans Branch Subwatershed

Water Quantity LOS Deficiency
The flooding LOS is D for the 25-year storm event within the Hollomans Branch Watershed. There are numerous locations within the watershed that flood from the 25-year event. Six locations were identified where road, site and structures flood. These locations are identified in Figure 13.3.3.3.1 as McIntosh and Groom Road, Pless and Knights Griffin Road, Dormany Road, Poel Road, North and South Peeples Road, and McGee Road. There were other instances of site and structure flooding within the watershed but, like other subwatersheds in this region, they consist of individual low-density home sites and cannot be addressed within the scope of this watershed study.

Water Quality LOS Deficiency
Based on pollutant loading modeling, these mostly rural basins are designated as LOS F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency
The natural systems evaluation score is F for the Hollomans Branch Subwatershed. This area has minimal remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas.

Figure 13.3.3.3.1

### *Flooding Alternatives*

*McIntosh Road*

The EXTRAN model predicts flooding of McIntosh Road south of the bridge crossing of Hollomans Branch, structure flooding, site flooding, driveway flooding, and inundation of excavated ponds that are the remnants of a fish farm operation. The model does not predict bridge deck overtopping. The most severe flooding predicted by the model are water depths of 0.8 feet (0.24 m) over McIntosh Road and 2.0 feet (0.6 m) in structures. Local residents have confirmed that flooding occurs in this area and that flooding was more severe during the El Nino than that predicted by the 25-year event. The flooding is partially caused by excessive sediment deposition and dense vegetation in the channel, extending from upstream of McIntosh Road to US 301. Sediment islands in the middle of the channel are vegetated by trees that are as much as 10 inches (25.40 cm) in diameter. The extent of the sediment deposition/islands is shown in the channel cross section in Figure 13.3.3.3.2. Although the culverts on the west side of McIntosh Road were not modeled in detail, it is the size the culverts are undersized relative to the surrounding drainage system.

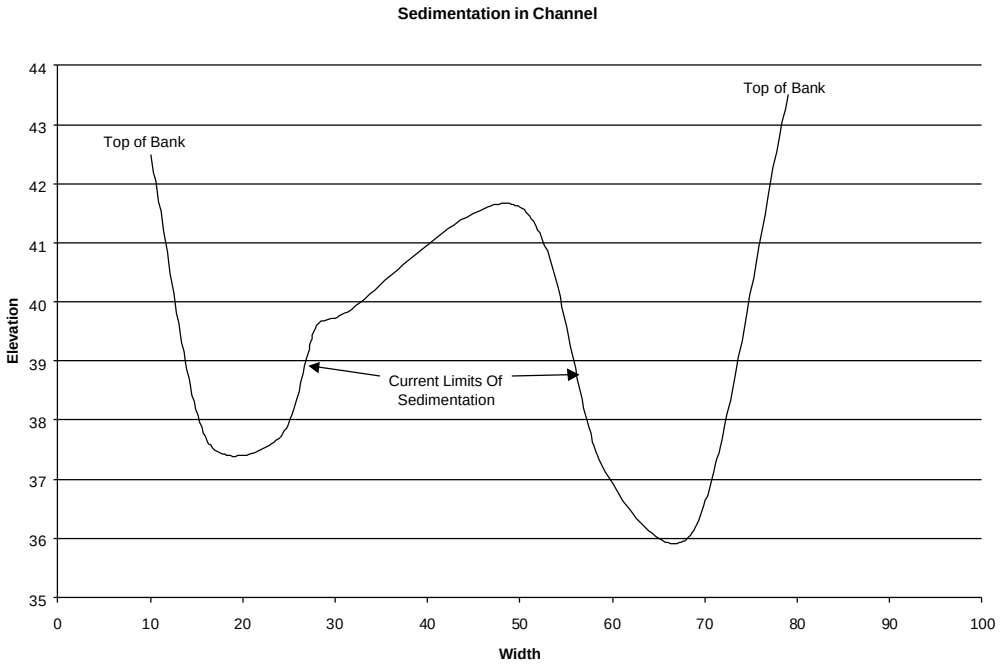



**Figure 13.3.3.3.2. Cross section showing channel sedimentation in Hollomans Branch.**

**Alternative HBA 1-A**

This alternative includes clearing and grubbing and excavation in Hollomans Branch from 900 feet (274 m) upstream of the McIntosh Road Bridge downstream to the US 301 bridge, including removing sediments from under both of the bridges. After the channel maintenance is complete, mitigation using Geoweb sills and excavation below the watertable, described in more detail in the Natural Systems section, should be constructed. Other channel maintenance would include clearing and snagging Hollomans Branch from downstream of the 301 bridge to the confluence with the Hillsborough River, and maintaining 372 feet (113 m) of ditch from Hollomans Branch to Groom

Road and 657 feet (200 m) of ditch from upstream of Groom Road to the McIntosh Road roadside ditch. Culvert replacements would include replacing the side drains (driveway culverts) on the west side of McIntosh Road with 48" RCPs both north and south of the bridge, replacing the existing culvert under Groom Road with four 66" CMPs and raising and regrading Groom Road to 44 feet (13.4 m) NGVD, replacing the existing side drains at the beginning of the east roadside swale system with two 36" culverts, and replacing the existing culverts draining a the depressional area/abandoned fish ponds with 54" RCPs.

**Water Quantity Issues**

The alternative consists of addressing all of the problems identified in the LOS deficiency. Clearing and grubbing, as opposed to routine maintenance, is required due to the severity of the sedimentation and vegetation growth in the channel. Clearing and snagging is required from the US 301 bridge to the confluence with the Hillsborough River. These reaches downstream of 301 are less obstructed by sediments and vegetation and thus require less intensive maintenance.

The results from the model indicate that the existing side drains (driveway culverts) west of McIntosh Road are undersized, ranging from 18 to 24 inches in diameter, and cause driveway overtopping. The driveway overtopping is eliminated by replacement of the existing culverts with 48" RCPs. The replacements should be located north and south of the McIntosh Road bridge and throughout the entire roadside ditch system.

Two separate reaches collect runoff originating at Knights Griffin Road, flow north and join at the upstream side of a 24" CMP side drain, which is undersized and causes flooding behind the driveway. This side drain may be located outside of the County right-of-way; therefore the County is not responsible for replacing the existing culverts. However, replacement with 36" RCPs should be considered to insure efficient flows through the roadside system to Hollomans Branch so that this portion of the watershed (McIntosh Road) has passed its peak and there is sufficient freeboard in Hollomans Branch to accommodate the flood wave from the upper portions of the watershed.

The ditch beginning at McIntosh Road and flowing northwest to Groom Road is overgrown with vegetation and requires maintenance. The maintenance should consist of clearing, snagging and sediment removal. The model also predicts overtopping where a 3' culvert crosses Groom Road. This crossing should be improved with the installation of four 5.5' CMPs at the current flowline, and regrading of the road to 44 feet (13.4 m) NGVD will compensate for the increase in the diameter of the culverts, and prevent road overtopping. This crossing is located between several residences and McIntosh Road where overtopping would prevent passage or emergency vehicle access during a flood event.

The structures within the depressional area and abandoned fish ponds located east of McIntosh Road are separated from the roadside ditch system by 30" culverts. Model results indicate that these culverts are undersized and inlet control impounds water behind them. The replacement of the existing culverts with 54" CMPs will alleviate the impoundment. Although improvements to private property may be a policy issue, increasing conveyance to pass the peak created by local runoff should be a priority. Passing local runoff will provide time for the freeboard in Hollomans Branch to recover so that it can accommodate the flood wave from the upper portions of the watershed.

An ERP will be required for this alternative due to the scope of the improvements to the system. All of the elements of the recommendation should go to final design and permitting as one submittal so that the sediment removal and clearing and grubbing in Hollomans Branch proper are credited against upstream impacts or improvements from cross drains and fish pond culverts.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. Given that this alternative is located near the confluence with the river, the potential for such effects is even more significant. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The design may also include a series of pools separated by Geoweb sills for stability. These pools would provide some water quality enhancement of low flows through the area.

**Natural Systems Issues**

The Hollomans Branch channel from upstream of McIntosh Road to the US 301 bridge is heavily vegetated with various hardwood trees including laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), cypress (*Taxodium* sp.), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*) and sweetbay (*Magnolia virginica*). The majority of these trees are growing on mounds of sandy sediments that have been deposited there over perhaps several decades. Many of these individual trees are greater than 12 inches (30.48 cm) in diameter with an average diameter of approximately 8 to 10 inches (20.32 to 25.40 cm). There is field evidence to indicate that the entire system was channelized at one time. Despite this fact, the removal of the sediment mounds and the trees and other vegetation growing on them will be considered a forested wetland impact by regulatory agencies. The inclusion of a series of pools in the channel created by sills constructed of grouted Geoweb will provide some wetland acreage but it will not be viewed as a replacement for forested habitat that will need to be removed. Planting the required forested wetland acreage in one or more of the upstream stormwater treatment areas or wetland restoration sites could provide mitigation for these impacts.

| Alternative: HBA 1-A | |
|---|---|
| Construction | $415,908.77 |
| Land Acquisition | $0 |
| Design/Permitting | $139,772.63 |
| **Total:** | **$555,681.40** |

**Alternative HBA 1-B**

This alternative is limited to routine maintenance (clear and snag) of Hollomans Branch from 900 feet (274 m) upstream of McIntosh Road Bridge to the confluence with Hillsborough River, including maintenance under the bridges. This alternative will limit improvements to McIntosh Road for the 25-year event. Groom Road, some driveways, and some structures will still flood.

**Water Quantity Issues**

This alternative is of limited scope and no water quantity issues are expected.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during clearing and snagging of the channel. Given that this alternative is located near the confluence with the river, the potential for such effects is even more significant. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**

The project area for this alternative is the same as for Alternative HBA 1-B and the site description can be found in above. Even though the stated goal of this alternative is to remove vegetation but not sediments, the extent and size of the forest that will have to be removed will be viewed as wetland impacts by most regulatory agencies. Planting the required forested wetland acreage in one or more of the upstream stormwater treatment areas or wetland restoration sites could provide mitigation for these impacts.

| Alternative: HBA 1-B | |
|---|---|
| Construction | $8,194.60 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$43,194.60** |

*Dormany Road and Red Hawk Trail Flooding*

Several residents confirm that there is road, site and structure flooding in this area of the subwatershed. Frequent shallow flooding indicates that the system is highly flood prone, but flat topography and other local hydraulic features of the system prevent significant flood depths. Flow from the upper subwatershed collects in wetlands upstream of Dormany Road and then flows north to Clay Gully East and west across Dormany Road. The depth of flooding at the lowest segment of Dormany Road is 0.6 feet (0.18 m) (see clay for check). After crossing Dormany Road flow is impounded behind driveway culverts until it overtops the driveways and continues towards Hollomans Branch and north across Red Hawk Trail and into the Clay Gully East subwatershed.

**Alternative HBA 2**

This alternative consists of excavation of approximately 30 acres (12.14 hectares) around an existing 30-acre (12.14-hectare) wetland to create a 60-acre (24.28-hectare) STA. Existing driveway culverts should be replaced in Hollomans Branch downstream of Dormany Road with two 29" x 45" oval RCPs. In addition, an easement or some equivalent agreement should be secured over the berm on the upstream side of Pless Grove to insure that the berm and culverts that failed in 1998 are not replaced or restored to their previous size and flowline inverts.

This alternative retains flow from upstream, thus removing it from the downstream system where it causes flooding. It can also be classified as a multipurpose alternative because it can be designed with a residence time sufficient for water quality treatment. The current conceptual design is based on the 1"=200' aerial contour maps and assumes berming without any overflow. The final design of each of the STAs should include bleed down orifices to maintain hydration of the downstream system during low flow periods and diversion structures if the STA is offline

**Water Quantity Issues**

Within the scope of this watershed study, the STA is conceptual and its final location cannot be known. Eminent domain is not used in stormwater projects and thus the exact location of the STA cannot be determined as acquisition of a parcel of land depends on a willing seller. The STA is an inline system in the model, but could be constructed as an offline system also. The final site of the STA will also dictate whether the STAs need to be bermed or excavated and finished on grade. To address all of these issues, final engineering and design should include a careful evaluation of the hydrology and hydraulics of the site to insure that the project can be designed to meet the assumptions on which the conceptual STA is based.

Replacing culverts under private driveways with public funds may introduce public policy issues, however it is critical to increasing conveyance immediately downstream of Dormany Road to eliminate the shallow but widespread flooding. The addition of driveway culverts normally requires attenuation to compensate for increased downstream water levels. However, flow from upstream has been virtually eliminated by the STA and can serve as compensation for the increased peak flow rates that would normally be induced by culvert additions.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these

effects. Following construction, the increased detention time and the planting of native wetland vegetation should improve water quality. In order to maximize pollutant removal, the design should include a combination of unvegetated deep pools and littoral shelves planted with a mixture of native marsh vegetation. The species planted should be appropriate for the design water elevations and should be those known to be successful for those conditions.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

| **Alternative: HBA 2-A** | |
|---|---|
| Construction | $519,994.38 |
| Land Acquisition | $141,285.90 |
| Design/Permitting | $144,998.59 |
| **Total:** | **$806,278.87** |

*Dormany/Pless Road*

The model predicted 0.51-foot (0.16-m) deep flooding over Dormany Road and 0.85-foot (0.26-m) deep flooding over Pless Road. Several residents confirm that there is repetitive road, site and structure flooding in this area of the watershed, and it has received considerable attention from the County in an effort to quantify and correct the flooding problems. A large contributing sub-basin area is the primary cause of flooding, which is exacerbated by overflow from the most northern branch in the watershed during flood events. Water collects east of the 90 degree bend of Dormany Road and flows west over the road causing site flooding, and south into Hollomans Branch severely increasing structure, site and road flooding at the Hollomans Branch/Pless Road crossing.

**Alternative HBA 3-A**

This alternative consists of creation of a 10-acre (4.05-hectare) STA located in close proximity to the location where Dormany Road bends and heads north. There are sufficient vacant lands that would be suitable south and east of the bend.

This alternative also retains flow from upstream, removing it from the downstream system where it causes flooding. It can also be classified as a multipurpose alternative because it can be designed with a residence time sufficient for water quality treatment. The current conceptual design is based on the 1"=200' aerial contour maps and assumes berming without any overflow. The surrounding habitat is primarily uplands therefore an STA at or near the location, shown on Figure 13.3.3.3.1, will likely not require a bleed down orifice to maintain hydration of the downstream system although one may be beneficial in recovering volume between storms.

**Water Quantity Issues**

Like the adjacent recommended STA at Dormany Road and Red Hawk Trail, the STA is conceptual and its final location cannot be known. Eminent domain is not used in stormwater projects and thus the exact location of the STA cannot be determined as acquisition of a parcel of land depends on a willing seller. The conceptual STA is an inline system but could be constructed as an offline system depending on the land acquired by the County. The current design is based on the 1"=200' aerial contour maps and assumes berming without any overflow however, the final site selection will dictate if berming is necessary or the STA can be finished on grade.

| **Alternative: HBA 3-A** | |
|---|---|
| Construction | $272,450.00 |
| Land Acquisition | $47,095.30 |
| Design/Permitting | $96,735.00 |
| **Total:** | **$416,280.30** |

**Alternative HBA 3-B**

This alternative consists of the replacement of the existing CMPs under Pless Road with two 5' x 8' box culverts, construction of a 30-acre (12.14-hectare) STA referred to as the Central Hollomans Branch STA, channel improvements from Pless Road to the STA, replace a wooden bridge with box culverts, and rehabilitation and maintenance of the channel from the Dormany Road bend to the upstream side of Pless Grove.

This alternative differs from Alternative HBA 3-A in that it is based on improving conveyance downstream from where the flooding occurs and then attenuates for the adverse offsite impacts (increased downstream water surface elevations) with storage, moving the flooding downstream.

**Water Quantity Issues**

This alternative has several engineering problems that will need to be addressed including significant environmental impacts resulting from the recommended channel improvements. The two major channel systems to be improved are from Dormany Road to the confluence with Hollomans Branch (marked in magenta on Figure 13.3.3.3.1) and from downstream of Pless Road to the STA site.

In addition to the environmental impacts, there will be significant civil design problems associated with alignment and available easements. It is likely that protracted negotiations with multiple owners will be required before any of channel reaches can be improved. In the case of Dormany Bend to Hollomans Branch, the existing system meanders through several home sites and livestock pens.

The access issues between Dormany Road bend and Pless Grove should not be as problematic. The reach requiring the greatest amount of improvement is a 200-foot (60.96-m) long section beginning at the roadside system on the north side of Dormany Road and extending due north to the

beginning of the existing system. This reach has been filled in by an adjacent resident and can be re-excavated under a maintenance exemption as an existing system. The remainder of the system from the end of the 200-foot (60.96-m) reach, described above, to the upstream side of Pless Grove, requires maintenance that can also be performed under a permitting exemption.

Issues related to the STA are identical to those related to the STAs on Dormany Road. Within the scope of this watershed study, the STA is conceptual and its final location cannot be known. Hillsborough County does not invoke eminent domain for stormwater projects and thus the exact location of the STA cannot be determined as acquisition of a parcel of land depends on a willing seller. The current conceptual design is based on the 1"=200' aerial contour maps and assumes berming without any overflow. The final design of each of the STAs should include bleed down orifices to maintain hydration of the downstream system during low flow periods and diversion structures if the STA is offline.

| **Alternative: HBA 3-B** | |
|---|---|
| Construction | $772,534.18 |
| Land Acquisition | $94,190.60 |
| Design/Permitting | $208,133.54 |
| **Total:** | **$1,074,858.32** |

### Alternative HBA 3-C

A third alternative to solve flooding problems in this area of the watershed is to improve the existing channel from the Dormany Road bend to Hollomans Branch, replacing the existing CMPs under Pless Road with a double barrel 5' x 8' box culvert, and purchase flood easements over the existing channel between Pless Road and the STA.

This alternative differs from Alternative HBA 3-B in that it would require the purchase of a flood easement instead of a fee simple purchase of the channel and overbanks as a way of reducing the cost of the alternative.

### Water Quantity Issues

A flood easement is defined as an agreement in which the property owner accepts the additional property flooding or impacts that result from improvements upstream (i.e., box culverts). It is estimated for this alternative that several acres will flood without the channel improvements. The negotiation for the easement purchase would be based on the additional land area that is flooded by virtue of the box culvert installation.

| Alternative: HBA 3-C | |
|---|---|
| Construction | $772,534.18 |
| Land Acquisition | $65,651.00 |
| Design/Permitting | $208,133.54 |
| **Total:** | **$1,046,318.00** |

*Pless & Knights Griffin Road*

The deficiency consists of road and site flooding to a depth of 0.52 feet (0.15 m) at the corner of Knights Griffin Road and Pless Road. The flooding was confirmed by several area residents. The flooding extends from the intersection and into the parking lot of a convenience store on the northeast corner of the intersection.

Several area residents remembered the existence of culverts under Pless Road, approximately 100 feet (30.48 m) north of the intersection of Pless and Knights Griffin Roads, that flowed west to a ditch behind the convenience store. The remnants of the ditch were evident during the site visit but there were no culverts under the road.

**Alternative HBA 4-A**

The alternative for this site involves the installation of two 24" RCPs under Pless Road, and the rehabilitation, clearing and snagging the ditch behind the convenience store to a 4' bottom width.

This alternative can be viewed as a reestablishment of the historic or existing system.

**Water Quantity Issues**

The existence of the ditch behind the convenience store is evidence that there were culverts under Pless Road. Computed water surface elevations from the EXTRAN model demonstrate that the alternative does not cause adverse downstream impacts. The ERP issues should be limited to a request for an exemption, under the assumption both elements of the alternative are part of the existing condition.

| Alternative: HBA 4-A | |
|---|---|
| Construction | $47,501.70 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$82,501.70** |

*Poel Road*

The EXTRAN model predicted flooding to a depth of 0.82 feet (0.249 m) over North Poel Road for the 25-year storm event. Residents confirmed the road overtopping. The upstream side of the culverts is partially clogged with sediments and vegetation. An abandoned concrete bridge is immediately downstream of the road crossing but does not contribute to the road overtopping.

**Alternative HBA 5-A**

This alternatives consists of the construction of a 30-acre (12.14-hectare) STA in the area around Knights Griffin Road and South Peeples Road, the replacement of the existing double barrel 30" CMPs with three 48" RCPs, and raising N. Poel Road from 76.96 feet (23.4 m) NGVD to 77.75 feet (23.6 m) NGVD.

The critical component of this alternative is the 30-acre (12.14-hectare) STA. It is necessary to attenuate the increased discharge induced by recommended 48" culverts. Comparison of the existing and proposed water surface elevations computed by the model demonstrates that the STA provides the necessary attenuation to install the culverts without causing adverse downstream impacts.

**Water Quantity Issues**

The alternative is predicated on construction of the 30-acre (12.14-hectare) STA included in Alternative HBA 6-B. SWFWMD permitting staff have advised that benefits from one project can be tied to another one but they must be contained in the same ERP application and be constructed within the effective life of the permit.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Following construction, the increased detention time and the planting of wetland vegetation will provide some level of water quality enhancement for the flows that enter the stormwater treatment area.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

| **Alternative: HBA 5-A** | |
|---|---|
| Construction | $48,793.84 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$83,793.84** |

**Alternative HBA 5-B**

This alternative involves the replacement of the existing double barrel 30" CMPs with three 48" RCPs, the construction of a 1-acre (0.40-hectare) STA downstream of North Poel Road, and raising N. Poel Road from 76.96 NGVD to 77.80 feet (23.7 m) NGVD.

This alternative will provide downstream attenuation of increased discharge resulting from additional culverts under Poel Road. It is a more flexible alternative because attenuation is not tied to construction of the multipurpose STA upstream in the Peeples Road area.

**Water Quantity Issues**

The current conceptual design, based on the 1"=200' aerial contour maps, assumes an overflow of 77.5 feet (23.6 m) NGVD. Because the surrounding habitat is preliminary uplands, an STA at or near the location on Figure 13.3.3.3.1 will probably not require a bleed down orifice to maintain hydration of the downstream system, although one will be desirable to recover the volume in the system between storm events. Like the other STAs proposed for other locations in the subwatershed, the exact configuration and design of all of the components of the STA will be very site specific and can only be finalized when the exact site of the STA is known.

| **Alternative: HBA 5-B** | |
|---|---|
| Construction | $224,016.84 |
| Land Acquisition | $6,979.67 |
| Design/Permitting | $104,606.74 |
| **Total:** | **$335,603.24** |

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Following construction, the increased detention time and the planting of wetland vegetation will provide some level of water quality enhancement for the flows that enter the stormwater treatment area.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

*Peeples Road*

Flood depths of 1.3 feet (0.39 m) over N. Peeples Road, 0.6 feet over S. Peeples Road, and 1.7 feet (0.51 m) over Fraizer Road result from the 25-year storm event in this area of the subwatershed. Residents have confirmed both road and site flooding at all three locations.

Flooding on S. Peeples Road is caused by a lack of channel maintenance. The vegetation in the channel between Platt Road and Knights Griffin Road is extremely dense and overgrown and obstructs flow during storm events. There is no single item that can be identified as the cause of flooding on N. Peeples Road. During the 25-year storm event the contributing flow is from a 4' x 10' box culvert under Knights Griffin Road and a relatively large contributing sub-basin area that cannot be contained by the existing storage within the sub-basin. The flow direction is west through a culvert under N. Peeples Road including road overtopping, through the roadside drainage system and then into Hollomans Branch.

**Alternative HBA 6-A**

The alternative for this site consists of the construction of a 15-acre (6.07-hectare) STA in the area around Knights Griffin Road and North Peeples Road, and maintenance of the channel between Platt Road and Knights Griffin Road including entrance of double barrel 44" x 72" CMPs under S. Peeples Road.

Channel maintenance is the simplest and means of reducing the flood levels on South Peeples Road and, with no other structural improvements, will relieve flooding on S. Peeples Road. The 15-acre (6.07-hectare) STA must be located in an area of the basin such that all of the existing flow under Knights Griffin Road can be diverted to it. Currently, the STA is conceptualized as a 15-acre (6.07-hectare), 3 feet (0.91 m) deep, offline system. The current design is based on the 1"=200' aerial contour maps and assumes an overflow of 86.1 feet (26.2 m) NGVD, roughly on grade. Because the surrounding habitat is primarily uplands, an STA at or near the location on Figure 13.3.3.3.1 will probably not require a bleed down orifice to maintain hydration of the downstream system, although one will be desirable to recover the volume in the system between storms. The topography and depth to watertable will dictate the final area and depth of the STA, either of which could decrease or increase the area required for the STA to function.

**Water Quantity Issues**

In addition to determining if the STAs are on or offline, the particular sites the County is able to acquire will determine whether the STAs will have to be bermed or excavated and finished on grade. Like the other STAs proposed for the subwatershed, the exact configuration and design of these elements will be very site specific, and can only be finalized when the exact site of the STA is known.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Following construction, the increased detention time and the planting of wetland vegetation will provide some level of water quality enhancement for the flows that enter the stormwater treatment area.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

| **Alternative: HBA 6-A** | |
|---|---|
| Construction | $527,963.80 |
| Land Acquisition | $70,642.95 |
| Design/Permitting | $146,990.95 |
| **Total:** | **$745,597.70** |

**Alternative HBA 6-B**

The alternative for this site includes the maintenance of culverts under S. Peeples Road, the construction of a 30-acre (12.14-hectare) offline STA in the area south of Knights Griffin Road between S. Peeples Road and Platt Road, a fee simple or flood easement acquisition of an existing 50-acre (20.24-hectare) wetland south of Knights Griffin Road between South Peeples Road and Platt Road, and blocking the flow in 4'x 10' box culvert under Knights Griffin Road.

This alternative is developed in the event that maintenance easements are not obtainable from private property owners, or a priority is placed on water quality improvement in Hollomans Branch. The proposed STA replaces the 15-acre (6.07-hectare) STA proposed in Alternative HBA 6-A and is conceptualized as a 30-acre (12.14-hectare) offline STA with diversion of flow beginning at Platt Road. This alternative depends on the ability to obtain a fee simple ownership or an easement that would allow raising peak water surface elevations approximately 2 feet (0.6 m), corresponding to 31 acres (12.55 hectares) within the 50-acre (20.24-hectare) wetland that borders Knights Griffin Road south of Peeples Road. Based on the 1"=200' aerial contour maps, raising the peak from 86.28 to 88.46 feet (26.2 to 26.3 m) NGVD still maintains the peak within the jurisdictional wetland limits. The

current conceptual design also assumes that the wetland will be bermed at least on one side with a top of berm elevation of 90.5 feet (27.5 m) NGVD. The final design of each of the STAs will have to include bleed down orifices to maintain hydration of the downstream system during low flow periods and diversion structures located in an appropriate location downstream of Platt Road.

**Water Quantity Issues**

Like all of the other STAs, the exact configuration of these elements will be very site specific and can only be finalized when the exact site of the STA is known. Obtaining an ERP for this option may be problematic and will require a substantial effort to demonstrate that there are no offsite impacts.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Following construction, the increased detention time and the planting of wetland vegetation will provide some level of water quality enhancement for the flows that enter the stormwater treatment area.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

| **Alternative: HBA 6-B** | |
|---|---|
| Construction | $817,350.00 |
| Land Acquisition | $141,285.90 |
| Design/Permitting | $219,337.50 |
| **Total:** | **$1,177,973.40** |

**Alternative HBA 6-C**

This alternative consists of maintaining culverts under S. Peeples Road, acquiring and partially berming an existing 50-acre (20.24-hectare) wetland south of Knights Griffin Road between South Peeples Road and Platt Road, and blocking flow in a 4'x 10' box culvert under Knights Griffin Road.

This alternative is based on acquisition of all lands within the 50-acre (20.24-hectare) wetland bordering Knights Griffin Road. It will have to be partially bermed to function as an STA. A buffer area around the 50 acres (20.24 hectares) would be necessary as well. The alternative is very similar to Alternative 6-B in that it is based on blocking the flow under Knights Griffin Road and diverting flow into a STA. The primary difference is that it uses an existing wetland for storage and treatment versus creating one out of uplands.

**Water Quantity Issues**
Obtaining an ERP for this option may be problematic and will require a substantial effort to demonstrate that there are no offsite impacts

| **Alternative: HBA 6-C** | |
|---|---|
| Construction | $643,918.13 |
| Land Acquisition | $460,371.00 |
| Design/Permitting | $175,979.53 |
| **Total:** | **$1,280,268.66** |

*McGee Road*
As Figure 13.3.3.3.1 illustrates, the deficiency occurs where McGee Road bends from south to east. Runoff collects at the roadside and without any positive outfall, overflows onto McGee Road. The model predicts a water surface depth of 0.52 ft (0.16 m) over the road during the 25-year storm event and a resident confirmed repeated flooding at this site. Due to the super-elevation of the corner, the depth of flooding is greater in one lane.

**Alternative HBA 7**
The alternative solution for flooding at this site is to install a type E ditch bottom inlet and a 24" CMP. Some minor excavation and sculpting to create a depression area where the water currently collects should also be performed to provide water quality treatment before discharging under the road. Planting should be limited to sod for ease of maintenance.

**Water Quantity Issue**
This is a simple local flooding solution and no water quantity issues are anticipated.

**Water Quality Issues**
This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Following construction, the increased detention time and the planting of wetland vegetation will provide some level of water quality enhancement for the flows that enter the stormwater treatment area.

**Natural Systems Issues**

The planting of a portion of the stormwater treatment area will increase the acreage of viable wetland habitat in the project area. This acreage should provide compensation for the minor wetland impacts associated with inflow and outflow structures and channels.

| **Alternative: HBA 7** | |
|---|---|
| Construction | $20,522.79 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$55,522.79** |

***Water Quality/Natural Systems Alternatives***

**Alternative HBA A**

This alternative involves the diversion of some part of the flow in the Hollomans Branch channel through a created wetland at the downstream end of the subwatershed (Figure 13.3.2.1.2). Several large open areas exist adjacent to the main tributary channel that could be regraded to deeper emergent marsh and open water wetland depths.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The diversion of flow through the existing pond and the created littoral shelf will provide some degree of treatment for the low flows within the creek.

**Natural Systems Issues**

The impacts associated with the diversion and discharge of water through the existing pond will be a minor permitting matter. The creation of a littoral marsh across the outfall will offset these impacts. The connection of the existing pit to the stream channel will improve the aquatic aspects of the habitat and the planted littoral area will provide additional marsh habitat.

| Alternative: HBA A | |
|---|---|
| Construction | $2,153,025.00 |
| Land Acquisition | $348,950.00 |
| Design/Permitting | $337,953.15 |
| **Total:** | **$2,839,928.75** |

**Alternative HBA B**

This alternative involves the construction of ditch blocks on existing wetlands located in the Cypress Reserve subdivision located south of the intersection of Five Acres Road and Knights Griffin Road (Figure 13.3.3.3.3). These wetlands range from approximately 5 to 50 acres (2.02 to 20.24 hectares) in size and are dominated by cypress and other hardwood trees. The seasonal high water elevation of these wetlands will have to be maintained at the elevation used in the construction permit for the surrounding residential development, but the duration of the seasonal high and the normal pool elevations could be extended.

**Water Quantity Issues**

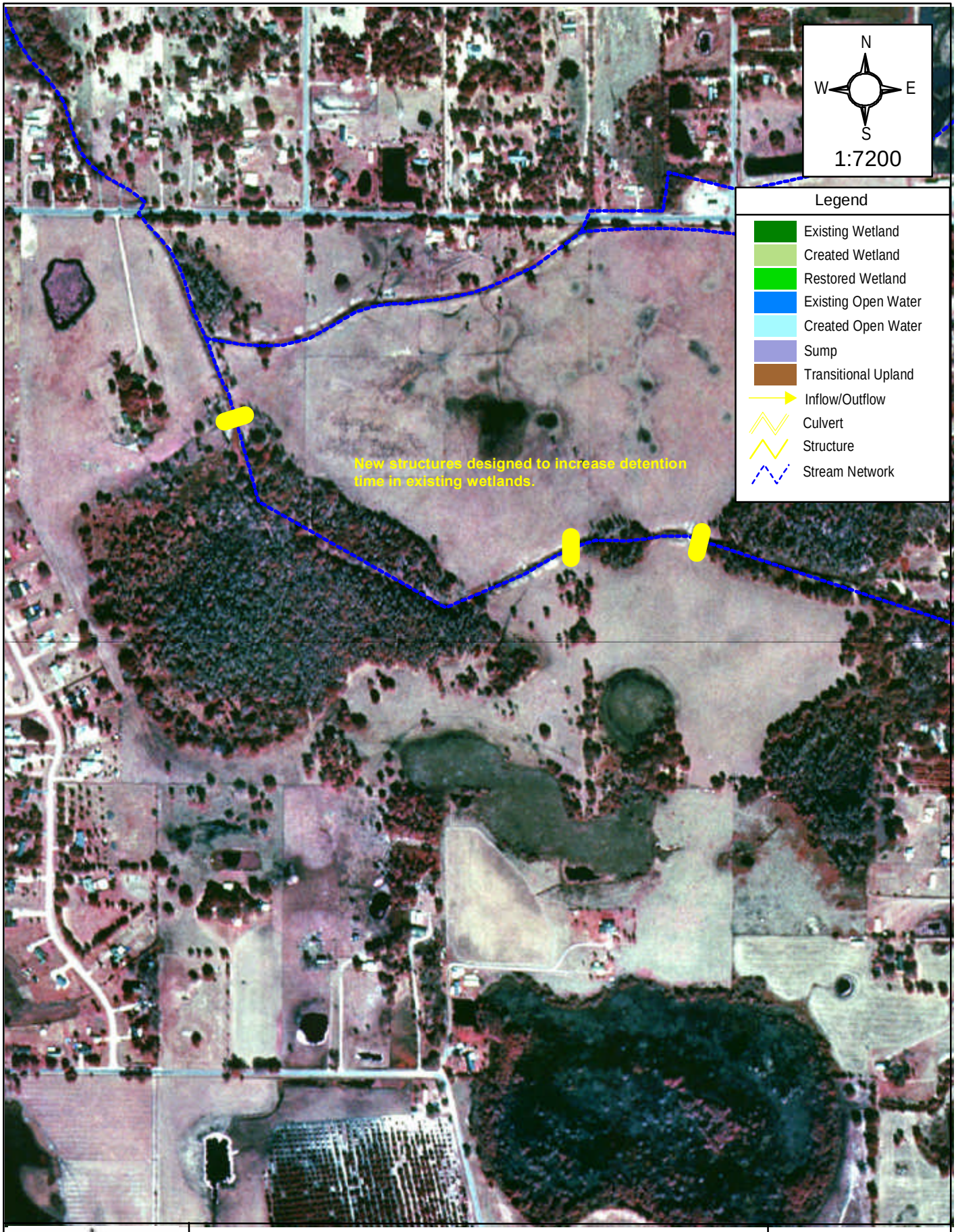
The expected changes in water quantity for this alternative may result in minor changes in downstream flooding, however, during extreme flood events (i.e. El Nino) the amount of storage available in these shallow wetland systems may not be significant. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.

**Water Quality Issues**

The detention of water within the wetland limits will provide the opportunity for pollutant removal. There is also the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**

The restoration of the historic hydroperiod to these wetlands will improve the aquatic habitat functions of the system. In addition, the existing overstory should benefit from increased water availability.




# Natural Systems and Water Quality Conceptual Alternatives

**Figure 13.3.3.3.3 Hollomans Branch Subwatershed, HBA B**

AYRES ASSOCIATES

| Alternative: HBA B | |
|---|---|
| Construction | $2,209.13 |
| Land Acquisition | $772,181.00 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$809,390.13** |

**Alternative HBA C**

This alternative involves the diversion of a portion of the flow in the Hollomans Branch channel through an existing borrow pit located north of Knights Griffin Road at the commercial dairy operation (Figure 13.3.3.3.4). A diversion structure and channel could be designed near the northeast corner of the pit and a discharge structure and channel at the northwest corner. Because of the size of the existing pit compared to the size of the upstream watershed, it is likely this system will provide treatment primarily for low flow conditions. Some portion of the area around the outfall could be regarded and planted with native wetland species.

**Water Quantity Issues**

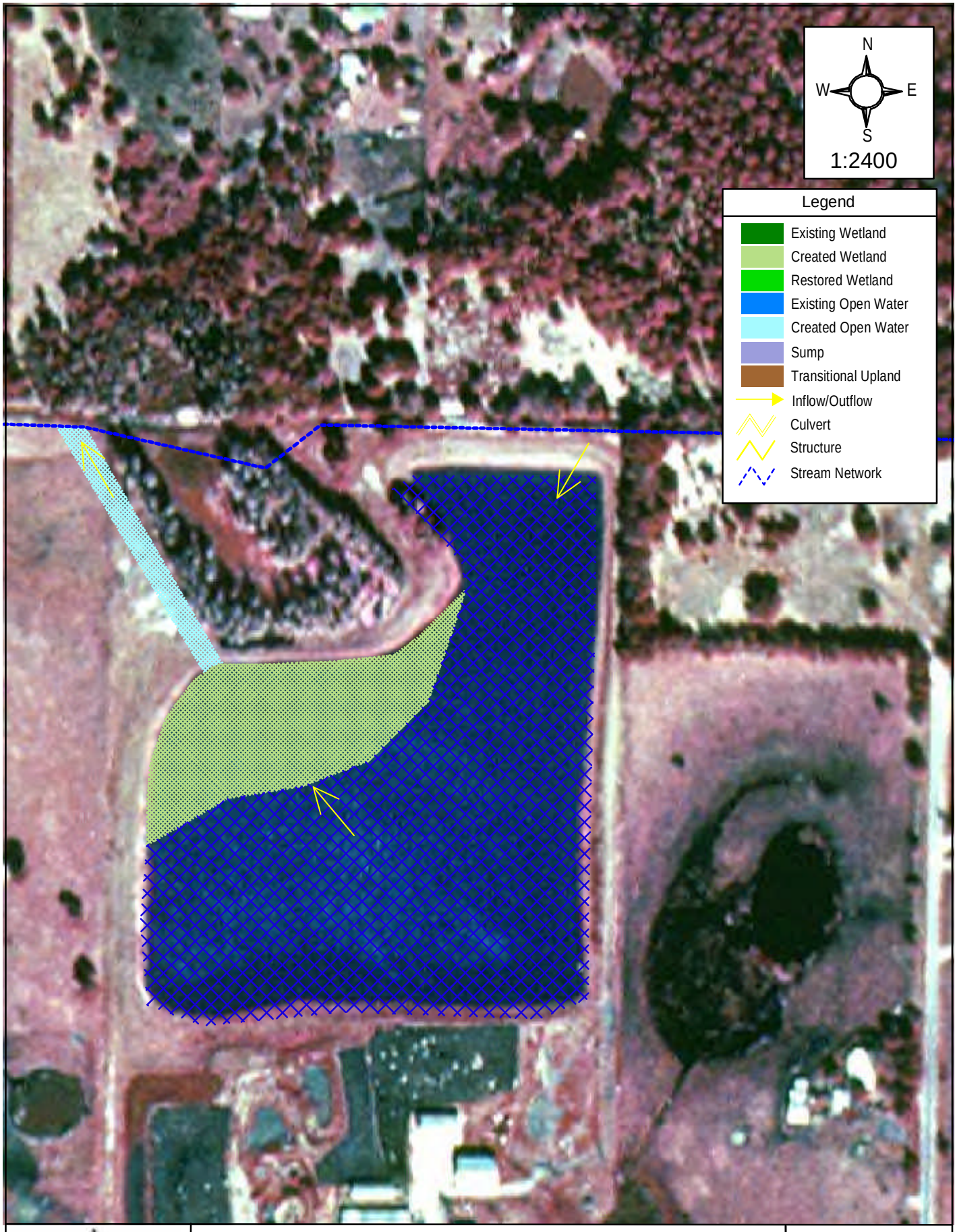
This system would be designed to divert stormwater runoff from the main channel systems through created sump/wetland systems and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The diversion of flow through the existing pond and the created littoral shelf will provide some degree of treatment for the low flows within the creek.

**Natural Systems Issues**

The impacts associated with the diversion and discharge of water through the existing pond will be a minor permitting matter. The creation of a littoral marsh across the outfall will offset these impacts. The connection of the existing pit to the stream channel will improve the aquatic aspects of the habitat and the planted littoral area will provide additional marsh habitat.




# Natural Systems and Water Quality Conceptual Alternatives

**Figure 13.3.3.3.4 Hollomans Branch Subwatershed, HBA C**

AYRES ASSOCIATES

| Alternative: HBA C | |
|---|---|
| Construction | $36,300.00 |
| Land Acquisition | $63,101.17 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$134,401.17** |

**Alternative HBA D**

At the southeast corner of the intersection of Dormany and Varn Roads, there is an approximately 40-acre (16.19-hectare) wetland that has been subject to long-term dehydration. Evidence of this condition includes the invasion of blackberry (*Rubus* sp.) in the deepest part of the system, noticeable soil subsidence, rusty-colored, loose, powdery soils and the invasion of fossorial animals such as the gopher tortoise (*Gopherus polyphemus*) into the wetland area. The only living wetland vegetation at the time of the field visit consisted of willows (*Salix* sp.) and primrose willows (*Ludwigia* sp.) in the deepest area of the system on the southern end. The project involves the hydrologic restoration of this area by constructing berms adjacent to Varn and Dormany Roads and a control structure at the discharge from the wetland on Dormany Road. Some portion of the wetland area may be planted to promote the development of a viable wetland community. To the east of the wetland there is approximately 15 acres (6.07 hectares) of high quality flatwoods habitat that could be preserved as an amenity to the restored wetland.

**Water Quantity Issues**

The expected changes in water quantity for this alternative may result in minor changes in downstream flooding, however, during extreme flood events (i.e. El Nino) the amount of storage available in these shallow wetland systems may not be significant. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. After construction, the extended hydroperiod and growth or planting of wetland vegetation will provide water quality treatment for the discharge from the site.

**Natural Systems Issues**

In its current condition, this area provides minimal wetland functions at best. The restoration of hydrology and the wetland plantings represent a major increase in the habitat values of the site. The overall site values will be further increased if the adjacent flatwoods uplands can be preserved and protected with the restored wetland.

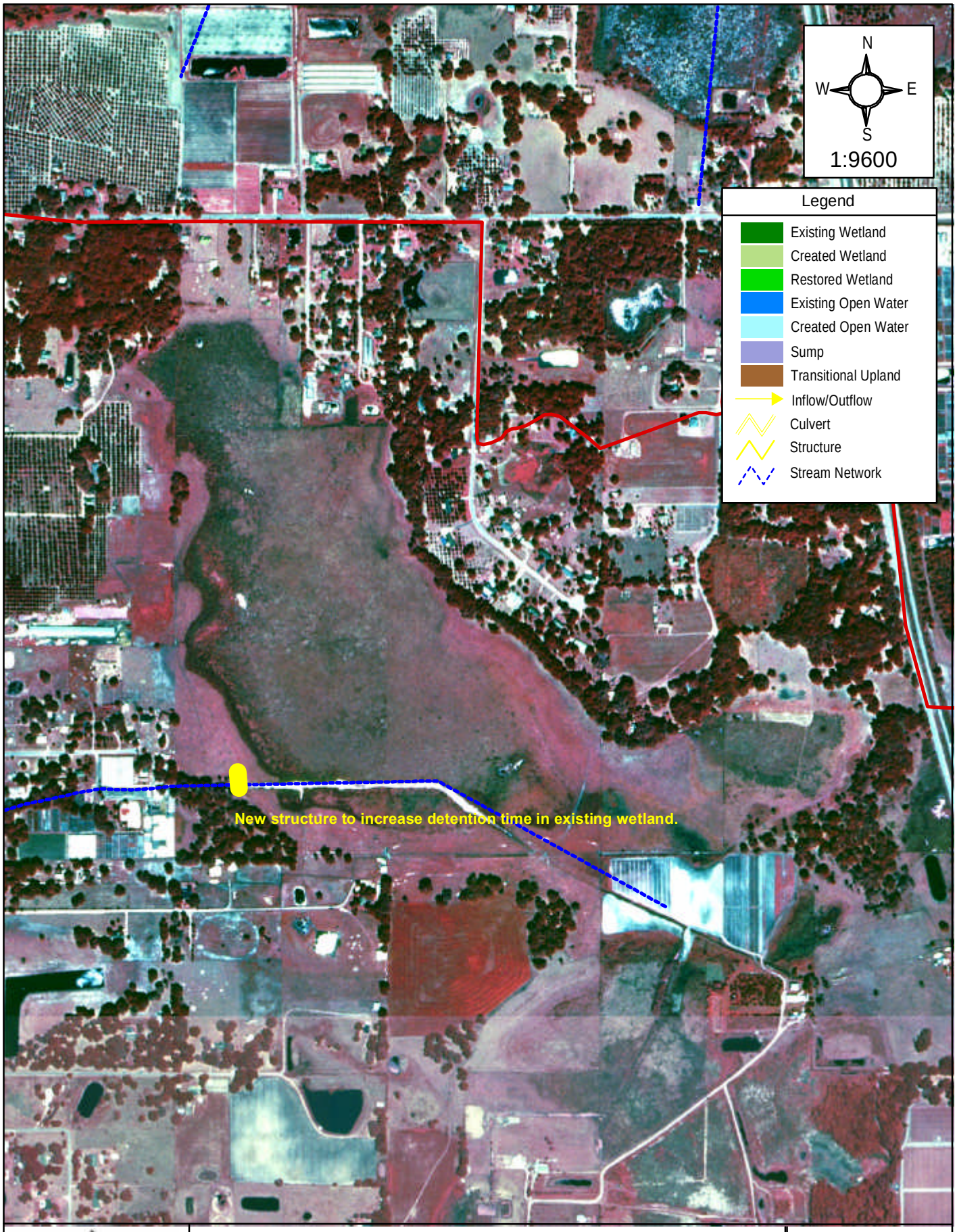
| **Alternative: HBA D** | |
|---|---|
| Construction | $365,750.00 |
| Land Acquisition | $310,795.31 |
| Design/Permitting | $124,725.00 |
| **Total:** | **$801,270.31** |

### Alternative HBA E

This alternative involves the creation of a system of ditch blocks/control structures to increase the hydroperiod of the large wetland complex located south of Knights Griffin Road near SR 39 (Figure 13.3.3.3.5). This approximately 90-acre (36.42-hectare) wetland is currently severely dehydrated and supports primarily a growth of dog fennel (*Eupatorium* sp.). The minimal amounts of desirable wetland species imply that the soils have not been greatly disturbed. As a result, it may be possible to rehydrate the system with minimal planting required. Hillsborough County and the SWIM program have taken a similar approach with the Lake Thonotosassa shoreline marsh project. The increased detention time and growth or planting of wetland vegetation will increase the pollutant removal capacity of the discharge from the area. The removal of row crops from part of the area will further improve water quality.

### Water Quantity Issues

The expected changes in water quantity for this alternative may result in minor changes in downstream flooding, however, during extreme flood events (i.e. El Nino) the amount of storage available in these shallow wetland systems may not be significant. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.




# Natural Systems and Water Quality Conceptual Alternatives

**Figure 13.3.3.3.5 Hollomans Branch Subwatershed, HBA E**

AYRES ASSOCIATES

**Water Quality Issues**

This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The increased detention time in the rehydrated wetland and the growth or planting of wetland vegetation will result in improvements to the water quality of the discharge from this area.

**Natural Systems Issues**

The construction of the ditch blocks or control structures will result in very minor wetland impacts. The restoration of the hydrology to the large wetland will provide adequate mitigation for these impacts. Any restored acreage not required to offset the impacts of this project should be examined for their applicability as mitigation for other projects in the vicinity.

| **Alternative: HBA E** | |
|---|---|
| Construction | $1,986.38 |
| Land Acquisition | $1,907,405.00 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$1,944,391.38** |

## 13.3.4 Tampa Bypass Canal and Tributaries Region

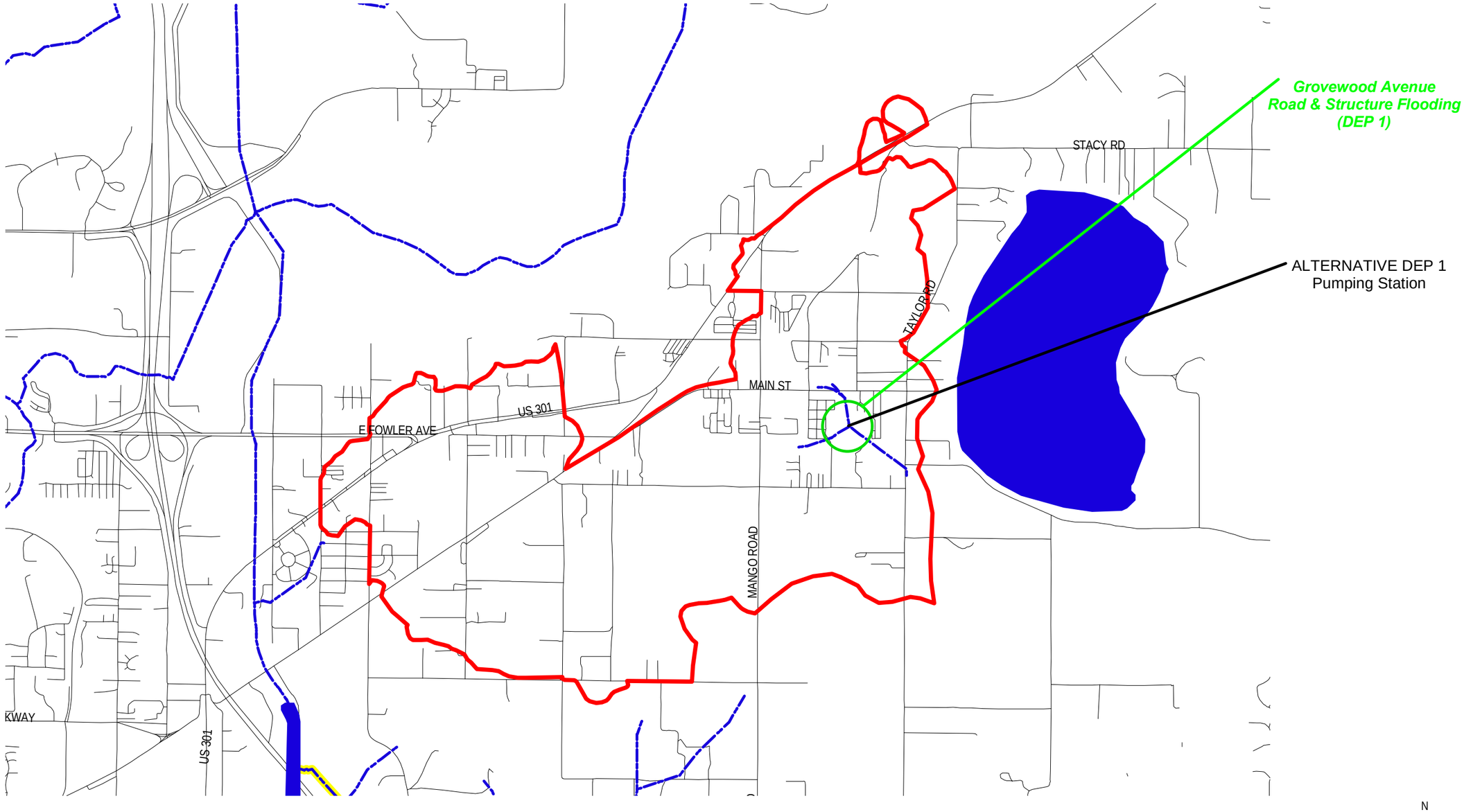
### 13.3.4.1 Depressions Subwatershed

Water Quantity LOS Deficiency

The flooding LOS is D for the 25-year storm event within the Depressions subwatershed. This area is an internally drained subwatershed where all runoff ultimately collects in a sinkhole near Grovewood Avenue (Figure 13.3.4.1.1). County Maintenance personnel indicated several complaints of road and site flooding during the 1997/1998 El Nino event near this sinkhole. The area surrounding this sinkhole is densely populated with elevated single family manufactured, and on grade block construction residences. High groundwater levels combined with decreased infiltration/percolation capacities appear to be the cause of flooding during prolonged wet periods or seasons.

Water Quality Treatment Overall LOS Deficiency

Based on pollutant loading modeling, these rural residential basins have little to no existing stormwater treatment, a high potential as a source of pollutants, and are designated as LOS F.




Hillsborough River Watershed Management Plan

**Figure 13.3.4.1.1**
**Depressions Subwatershed Alternatives Location Map**

Natural Systems Deficiency

The Depressions subwatershed received a natural systems evaluation score of F. This subwatershed has little remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas.

### *Flooding Alternatives*

*Grovewood Avenue Sinkhole*

EXTRAN modeling, assuming sinkhole percolation is ineffective during periods of high groundwater, indicates that several roadways in the area will be inundated to depths over 2 feet (0.6 m) and some homesites to depths of over 3.5 feet (1.06 m). Flood volumes above the lowest homesite are estimated to be in excess of 200 acre-feet (246,696 cu. meters). Since the area is internally drained with no positive outfall, any solution to the flooding problems will require construction of a pumping station for emergency relief.

Resolution of this problem to a 25-year level of service will not be cost effective, however, the County may wish to consider providing an emergency pumping station similar to the current project being designed for the Lake Mead area to provide relief for the duration of flooding.

**Alternative DEP 1**

An alternative for this site is to construct a 2-3 cfs pumping station to provide emergency flood relief to the area.

**Water Quantity Issues**

Several concerns exist with this alternative. The nearest location to accept the excess flood waters that has a positive outfall is Lake Thonotosassa, which is approximately 1.5 miles away and would require a significant length of forcemain. Secondary locations are the Hillsborough River or Cow House Creek, both over 2 miles away. An ERP will be required for the alternative to ensure there are no adverse impacts to the existing hydroperiods of the sinkhole and the receiving water body. Modifications to the size of the pump stations and the control elevations may be necessary to accommodate these concerns.

**Water Quality Issues**

The water quality of the water to be pumped during flood events should be evaluated and compared to that of the receiving water body. If the discharge has the potential to degrade the receiving water, some form of treatment may be required at the discharge end of the forcemain system. Also, the intake and outfall structures for this and other pump stations identified in this plan should be located in such a manner as to avoid disturbing bottom sediments at the withdrawal point. Nutrients, metals, and other pollutants (including pathogens) are often bound to sediments and could easily be transferred between waterbodies or transported downstream to the Hillsborough River if sediments are resuspended as a result of pumping activities. Nutrients may also be released into the water column if sediments are resuspended, which could result in algal blooms in receiving waters. This

alternative also has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural Systems Issues**

No significant natural systems improvements or impacts are anticipated with this alternative. However, the ERP will address this issue to ensure that no adverse impacts are associated with the implementation of this alternative.

| **Alternative: DEP 1** | |
|---|---|
| Construction | $96,000.00 |
| Land Acquisition | $0 |
| Design/Permitting | $53,400.00 |
| **Total:** | **$149,400.00** |

### 13.3.4.2 Vandenburg Subwatershed

Water Quantity LOS Deficiency

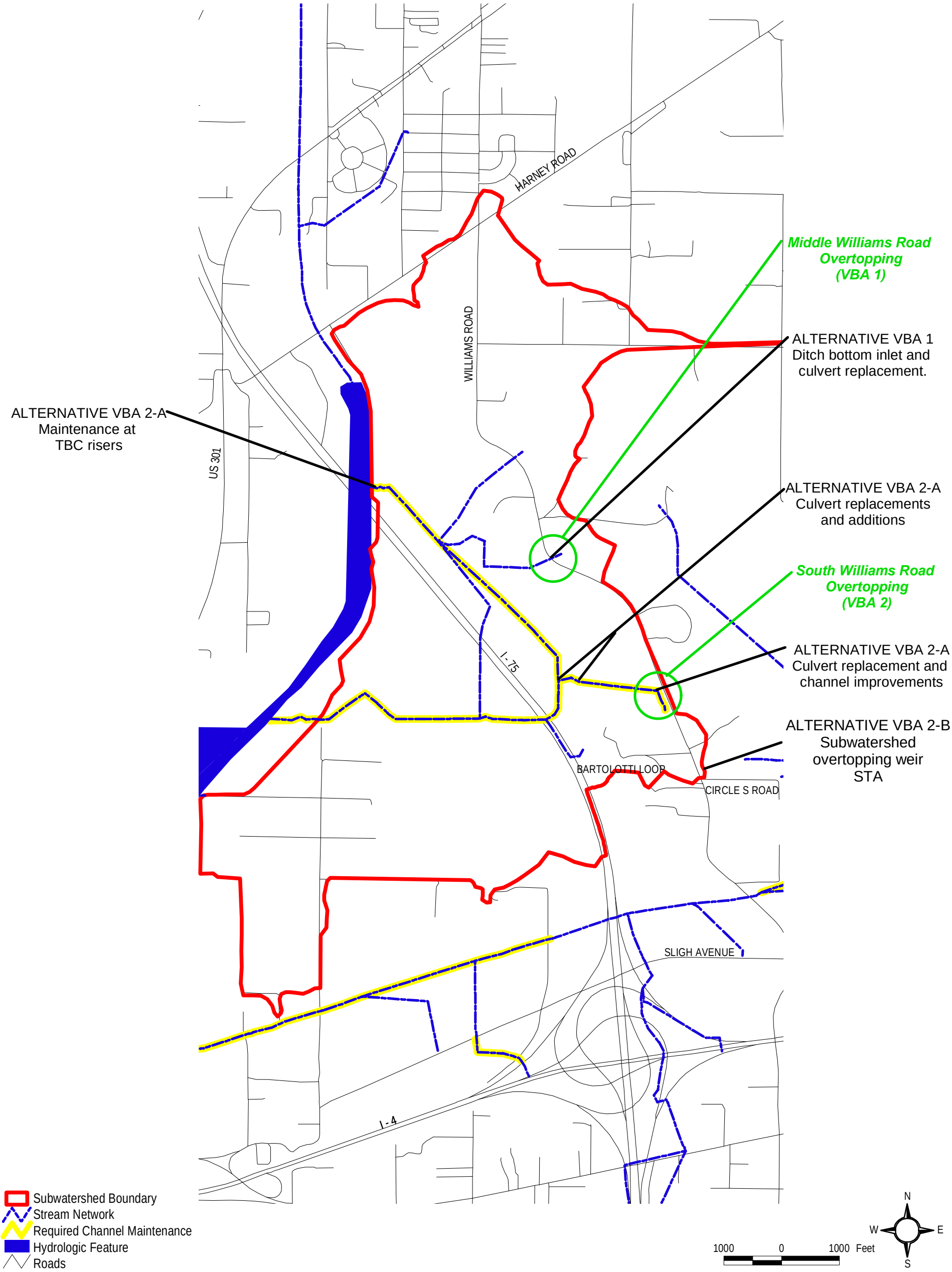
The water quantity LOS is C for the 25-year storm event within the Vandenburg subwatershed. The deficiency consists of road flooding that occurs at two locations on Williams Road, referred to here as the Middle and South Road overtopping. These locations are illustrated in Figure 13.3.4.2.1. There is also structure flooding at the Middle Williams Road location, although it is likely a consequence of sheet flow across the front yard and into the house, both of which are down gradient of the road.

Water Quality Treatment Overall LOS Deficiency

Based on pollutant loading modeling, these mostly urbanized basins are designated as LOS F and have a high potential as a source of pollutants. There are numerous industrial facilities in the subwatershed, most of which receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

The natural systems evaluation score is F for the Vandenburg subwatershed. This area has minimal remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas.




Hillsborough River Watershed Management Plan

**Figure 13.3.4.2.1**
**Vandenburg Subwatershed Alternatives Location Map**

### *Flooding Alternatives*

*Middle Williams Road*

The EXTRAN model predicts road overtopping to a depth of 0.67 feet (0.20 m) over Williams Road at the Middle Williams Road location. A longtime resident confirmed repeated flooding at this site, including incidences of house flooding. The flooding results from an undersized cross drain and ditch bottom inlet located east of the road, which are the key components of the existing conveyance system for the surrounding drainage area. Runoff collects at the ditch bottom inlet, runs through the culvert west under the road into a swale, and continues west through a pasture to the Tampa Bypass Canal. Because the road is super-elevated at this location, water will be deeper over one lane than the depth predicted by the model. The house flooding does not result directly from the road flooding. Instead it likely occurs when water that is overtopping the road sheet flows across the front lawn, gaining velocity due to the down gradient direction of flow, and then flows directly into the house.

**Alternative VBA 1**

The alternative for this site is to replace the existing ditch bottom inlet and the 18" diameter CMP with a type E ditch bottom inlet and a 36" diameter RCP. The invert of the replacement RCP should be set to approximately the same height as the existing CMP after compensating for the additional 12" culvert diameter.

This alternative consists of simple upgrades to the existing system. Upgrades of the existing ditch bottom inlet may not be necessary and the final design should be based on further data collection and discussions between the County and design engineer.

**Water Quantity Issues**

The EXTRAN model predicts no adverse off site impacts from this alternative and there should not be any significant obstacles in obtaining an ERP. Although the effective conveyance of the system is increased by increasing the culvert diameter, the peak discharge occurs at hour 12.8. The peak discharge of the ditch that the culvert flows into occurs at approximately hour 15, which is well behind the replacement culvert peak. The differences in peak times offset any potential impacts from higher flood levels and this alternative has negligible or no impact.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural Systems Issues**

This alternative will have no significant natural systems involvement.

| **Alternative VBA 1** | |
|---|---|
| Construction | $21,296.63 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$56,296.83** |

*South Williams Road*

The EXTRAN model predicts that there will be overtopping to a depth of 1.0 foot (0.30 m) over Williams Road at the South Williams Road location. Local residents verified the occurrence of flooding. The primary cause of the flooding is an undersized cross drain in the roadside drainage system, undersized downstream culverts and sedimentation and overgrowth of vegetation in the outlet conveyance system that flows east through a pasture to the Tampa Bypass Canal.

**Alternative VBA 2-A**

The solution to road overtopping at South Williams Road is to maintain open ditches and increase the size of culvert crossings from the beginning of the conveyance system west of Williams Road to the outlet at the Tampa Bypass Canal. The alternative includes replacing the existing 18" CMP with one 29" x 45" oval RCP, regrading and maintaining the existing channel, replacing the existing 12" CMP with two 30" RCPs and the existing 30" CMPs with 30" RCP at the next two road crossings respectively, replacing the 18" diameter RCP with a 36" RCP, and clearing the debris from the front of the system outlet flap gates at the Tampa Bypass Canal.

The locations of culvert replacements, culvert additions and channel regrading and maintenance for the outlet conveyance system are illustrated on Figure 13.3.4.2.1. The alternative is designed to improve conveyance in each reach of the system and, except minor regrading of 1000 feet (304 m) of channel, will not require changes to the channel cross sections. Maintenance of the channel is defined here as minor sediment removal and mowing or cutting back vegetation and overgrowth.

**Water Quantity Issues**

A number of private property issues will affect this alternative. Other than the Tampa Bypass Canal, the conveyance system is in single ownership, and easements may have to be obtained if they do not already exist. The property owners may be willing to grant easements if they recognize that they will have a drier pasture for more frequent and longer periods of time resulting from the maintenance and culvert installations. The alternative creates no adverse offsite impacts, principally because the culvert additions are made throughout the system and no head losses will occur behind road crossings. However, an ERP including modeling results will be required to demonstrate no impact and it will have to address the outlet of the system at the Tampa Bypass Canal. The EXTRAN model showed 0.3 feet (0.09 m) increase in water surface elevation just upstream of the flap gates on the Bypass Canal, but this area is assumed to be in the Bypass right-of-way and not in the canal itself.

Also, the peak discharge of the conveyance system is at approximately hour 15, well ahead the Tampa Bypass Canal time to peak of 72 hours. The impacts in the canal right-of-way, though negligible, will require permission from SWFWMD. Maintenance of the flap gates is included in the SWFWMD annual budget for canal maintenance, but may require a request from the County to initiate the maintenance action.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural Systems Issues**

The majority of the soils that the drainage channels pass through are hydric. Field review shows that the surrounding area has been severely dewatered by the channels, although most of the area will be characterized as jurisdictional wetland. As a result, construction access for the maintenance of the channels may result in wetland impacts. This issue is further complicated by the fact that the structure of the soils has been affected by the lowered water table and the dominant vegetation has shifted from herbaceous to forested, primarily red maple. Many of the trees are leaning or have fallen due to the soil subsidence resulting from oxidation. Excavation may cause some of the adjacent trees to fall due to the instability of the soils, causing additional wetland impacts.

| **Alternative VBA 2-A** | |
|---|---|
| Construction | $55,996.93 |
| Land Acquisition | $0 |
| Design/Permitting | $37,398.77 |
| **Total:** | **$93,395.70** |

**Alternative VBA 2-B**

A second solution to the South Williams road overtopping is to construct a weir east of Williams Road, across the Vandenberg-Williams subwatersheds at an elevation of 24.5 feet (7.46 m) NGVD and redirect the water into Williams ditch. Attenuation will be required to offset adverse offsite impacts

This alternative consists of grading the existing ridge that comprises the watershed divide from approximately 27.1 feet (8.26 m) NGVD, to 24.5 feet (7.46 m) NGVD, and attenuating the additional volume in a 3-acre (1.21-hectare), 4-foot (1.22–m) deep STA. Flow velocities calculated during final design will determine if any erosion control is required. The owner of an existing STA, north of the flooding location and east of Williams Road, expressed an interest in adding to his system during field visits to the area.

**Water Quantity Issues**
The location of the proposed grading is on private property and an ERP will be required to address adverse offsite impacts. Redirection of the flow into another subwatershed should not be an issue since the Tampa Bypass Canal is the outfall for both subwatersheds. Discussions with property owners during field visits revealed some willingness to grant easements to the County in order to reduce the flooding on and around Williams Road. The property owners were confident that the County holds an easement over Williams Ditch, but stated that they were willing to grant an easement if the County does not currently have one.

**Water Quality Issues**
This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. Because the Vandenberg and Williams subwatersheds both have LOS F for water quality, the transfer of water across the subwatershed boundary should not be an issue.

**Natural Systems Issues**
There are no natural systems issues associated with this alternative.

| **Alternative VBA 2-B** | |
|---|---|
| Construction | $65,102.50 |
| Land Acquisition | $0 |
| Design/Permitting | $41,041.00 |
| **Total:** | **$106,143.50** |

***Water Quality/Natural Systems Alternatives***

**Alternative VBA A**
A water quality treatment system consisting of an off-line detention pond could be constructed for this subwatershed located at the southern outfall of the existing conveyance system to the Tampa Bypass Canal.

**Water Quantity Issues**
This system would be designed to divert stormwater runoff from the main channel system through a created sump/wetland system and then discharged back into the main channel. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

This alternative would be a wet detention system incorporating a sediment sump and biological treatment. Several parcels of open land currently exist adjacent to the Tampa Bypass Canal near the southern outfall that could be reconfigured to store and treat flows discharging from this area of the subwatershed. This site would help reduce pollutant loads to the Tampa Bypass Canal and, ultimately, the Hillsborough River Reservoir and Tampa Bay. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2).

**Natural Systems Issues**

The water quality alternative developed above would be designed to incorporate freshwater wetland habitat similar to that found in existing nearby wetland systems (forested and herbaceous). This alternative could be used to offset potential wetland impacts resulting from the future construction of the County's Sligh Avenue Extension project, currently in the PD&E phase.

| **Alternative: VBA A** | |
|---|---|
| Construction | $422,930.00 |
| Land Acquisition | $50,000.00 |
| Design/Permitting | $141,879.00 |
| **Total:** | **$614,809.00** |

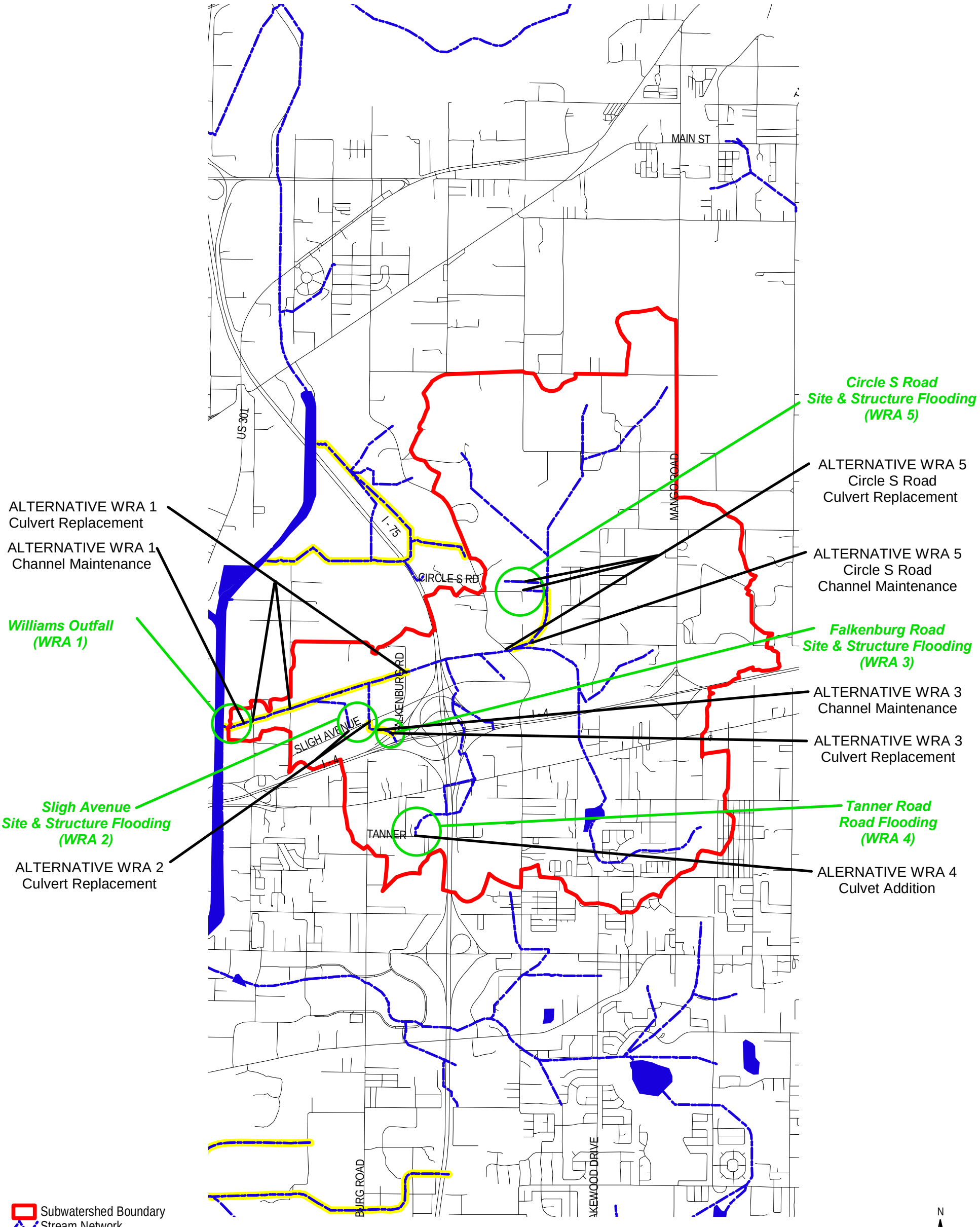
### 13.3.4.3 Williams Subwatershed

Water Quantity LOS Deficiency

The flooding LOS is D for the 25-year storm event within the Williams subwatershed. The deficiency consists of road and site flooding along Sligh Avenue, Falkenburg Road, Tanner Road and Circle S Road. These locations are illustrated in Figure 13.3.4.3.1.

Water Quality Treatment Overall LOS Deficiency

Based on pollutant loading modeling, these mostly rural/residential basins are designated as LOS F and have a high potential as a source of pollutants. Much of the area receives little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.




Hillsborough River Watershed Management Plan

**Figure 13.3.4.3.1**
**Williams Subwatershed Alternatives Location Map**

Natural Systems Deficiency

The Williams subwatershed received a natural systems evaluation score of F. This subwatershed has little remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas.

### *Flooding Alternatives*

*Williams Area Outfall*

Review of the model results for the Williams subwatershed indicate that the stretch of the Williams ditch from Falkenburg Road to the Tampa Bypass Canal consists of undersized culverts and adversely sloped ditches. This condition causes excess water to back up behind Eureka Springs Road and remain for extended periods. Considering the intensity of development in the southern portion of the subwatershed and the limited available storage capacities in the northern portion of the watershed, there are insufficient open spaces to provide the necessary storage treatment areas near the flooding problem areas.

#### Alternative WRA 1

An alternative for this area is to regrade the ditch from Falkenburg Road to the Tampa Bypass Canal to provide a positive slope on the channel, replacing each roadway crossing along the way with much larger structures. The Falkenburg Road crossing currently consists of two 48" RCPs that should be replaced with two 6' x 10' concrete box culverts. The Eureka Springs crossing currently consists of a single 6' x 10.5' concrete box culvert and should be replaced with three 6' x 12' concrete box culverts. The Wilkins Road crossing currently consists of three 48" RCPs and should be replaced with three 6' x 12' concrete box culverts. This alternative is recommended for all remaining alternatives within this subwatershed.

#### Water Quantity Issues

An ERP will be required for this alternative and must demonstrate that attenuation of excess floodwaters is not necessary due to the controlled nature of the Tampa Bypass Canal.

#### Water Quality Issues

This alternative will have no direct water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts. Regrading activities should result in a positive water quality effect through the removal of accumulated sediments that may have had the potential to contribute nutrients, pesticides, and heavy metals to the Tampa Bypass Canal.

**Natural Systems Issues**

Although this alternative involves maintenance of a ditch that passes through hydric soils, wetland impacts are expected to be minimal due to the extensive dewatering that has resulted from the construction of the Tampa Bypass Canal and its associated drainage ditches. Some of the hydric soil areas may be claimed as jurisdictional wetlands, however, these areas are limited in extent and generally located only on one side of the existing channel. This will allow construction access from the upland areas adjacent to the channel, minimizing or eliminating wetland impacts.

| **Alternative: WRA 1** | |
|---|---|
| Construction | $321,796.29 |
| Land Acquisition | $0 |
| Design/Permitting | $111,538.89 |
| **Total:** | **$433,335.17** |

*Sligh Avenue*

The EXTRAN model predicts site and structure flooding at two locations on Sligh Avenue west of Falkenburg Road. A longtime resident confirmed site flooding but was unable to confirm structure flooding. Ayres Associates staff observed other adjacent low yards and structures indicating that three to four properties are impacted in this area. The flooding is caused by the constrictions in the Williams outfall ditch and the undersized cross drains under Sligh Avenue.

**Alternative WRA 2**

The alternative described for this area is to replace the existing double 30" CMPs under the western crossing of Sligh Avenue with two 3' x 5' concrete box culverts. Additionally the existing 36" CMP under the eastern crossing of Sligh Avenue should be replaced with a 36" RCP to reduce friction losses.

**Water Quantity Issues**

An ERP will be required for the western crossing and to obtain the permit it must be demonstrated that attenuation of excess floodwaters is not necessary due to the controlled nature of the Tampa Bypass Canal. Replacement of the eastern crossing can be accomplished through the County's maintenance program. The culvert replacement is "in like kind" and should qualify for a permit exemption.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural Systems Issues**

This alternative will have no significant natural systems involvement.

| **Alternative: WRA 2** | |
|---|---|
| Construction | $59,723.45 |
| Land Acquisition | $0 |
| Design/Permitting | $38,889.38 |
| **Total:** | **$98,612.83** |

*Falkenburg Road*

The EXTRAN model predicts site, structure and roadway flooding in this area. A resident confirmed frequent roadway flooding during storm events causing 8 to 10 inch (20.32 to 25.54 cm) deep site flooding, but indicated no structure flooding since the home has been elevated. The flooding is caused by undersized cross drains under Falkenburg Road and the overgrown conditions in the ditch between Falkenburg Road and Sligh Avenue.

**Alternative WRA 3**

The alternative described for this area is to replace the existing 29" x 45" elliptical CMP and 24" RCP under Falkenburg Road with 2' x 3.5' and 2' x 3' concrete box culverts, respectively. Additionally, the channel between Falkenburg Road and Sligh Avenue should be maintained to improve the conveyance in the reach.

**Water Quantity Issues**

Most of the conveyance system is on private property and easements may have to be obtained if they do not already exist. Property owners may be willing to grant easements if they recognize that they will have drier yards for more frequent and longer periods of time resulting from the County maintenance and culvert installation. An ERP will be required for this alternative which must demonstrate that attenuation of excess floodwaters is not necessary due to the controlled nature of the Tampa Bypass Canal.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural Systems Issues**

This alternative will have no significant natural systems involvement.

*Tanner Road*

The EXTRAN model predicts roadway flooding in this area. Hillsborough County has documented this problem, which is caused by the lack of a cross drain at the low point in Tanner Road.

| **Alternative: WRA 3** | |
|---|---|
| Construction | $50,989.46 |
| Land Acquisition | $0 |
| Design/Permitting | $35,395.79 |
| **Total:** | **$86,385.25** |

**Alternative WRA 4**

The alternative described for this area is to provide positive drainage from south of Tanner Road by installing a 2' x 3' concrete box culvert under Tanner Road at the low point and connecting the runoff from the south to the existing conveyance system to the north.

**Water Quantity Issues**

An ERP will be required for this alternative and the design engineer will need to demonstrate to the SWFWMD that the attenuation of excess floodwaters is not necessary due to the controlled nature of the Tampa Bypass Canal.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural Systems Issues**

This alternative will have no significant natural systems involvement.

| **Alternative: WRA 4** | |
|---|---|
| Construction | $38,117.51 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$73,117.51** |

*Circle S Road*

The EXTRAN model predicts site and street flooding in this area. A longtime resident confirmed frequent flooding of all surrounding properties. The resident claims that the ditch is owned by the County but is infrequently maintained. The flooding is caused by undersized cross drains under Virginia Lane and Williams Road, combined with the siltation of the existing canal (Black Dairy Canal) in the same area.

**Alternative WRA 5**

The alternative described for this area is to provide for desiltation of Black Dairy Canal from Williams Road to Virginia Lane. Additionally, the existing 18" CMP under Virginia Lane should be replaced with a 24" RCP and the existing 24" x 38" elliptical CMP should be replaced with a 2' x 4' concrete box culvert. The dual 60" CMPs currently existing under Williams Road, downstream of this area, also should be replaced with two 5' x 10' concrete box culverts.

**Water Quantity Issues**

Most of the conveyance system is on private property and easements may have to be obtained if they do not already exist. Property owners may be willing to grant easements if they recognize that they will have drier yards and pastures for more frequent and longer periods of time resulting from the County maintenance and culvert installation. An ERP will be required for this alternative which must demonstrate that the attenuation of excess floodwaters is not necessary due to the controlled nature of the Tampa Bypass Canal.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts. Desiltation activities should result in a positive water quality effect through the removal of accumulated sediments that may have had the potential to contribute nutrients, pesticides, and heavy metals to the Tampa Bypass Canal.

**Natural Systems Issues**

This alternative will have no significant natural systems involvement.

| **Alternative: WRA 5** | |
|---|---|
| Construction | $141,153.04 |
| Land Acquisition | $0 |
| Design/Permitting | $71,461.22 |
| **Total:** | **$212,614.25** |

***Water Quality/Natural Systems Alternatives***

**Alternative WRA A**

This alternative would utilize and restore an existing fish farm adjacent to the north bank of Kennedy Canal. Most of this parcel has been excavated as ponds for rearing tropical fish. The existing condition of the site will minimize the volume of excavation needed to create an off-line treatment area. A structure in the canal could divert some part of the flow into the area. This flow would pass through a sump, an open water area and finally through a planted littoral shelf prior to its discharge back into the canal (Figure 13.3.4.3.2).

**Water Quantity Issues**

This alternative will potentially reduce flood levels downstream of its location through increased storage capacity and detention time.

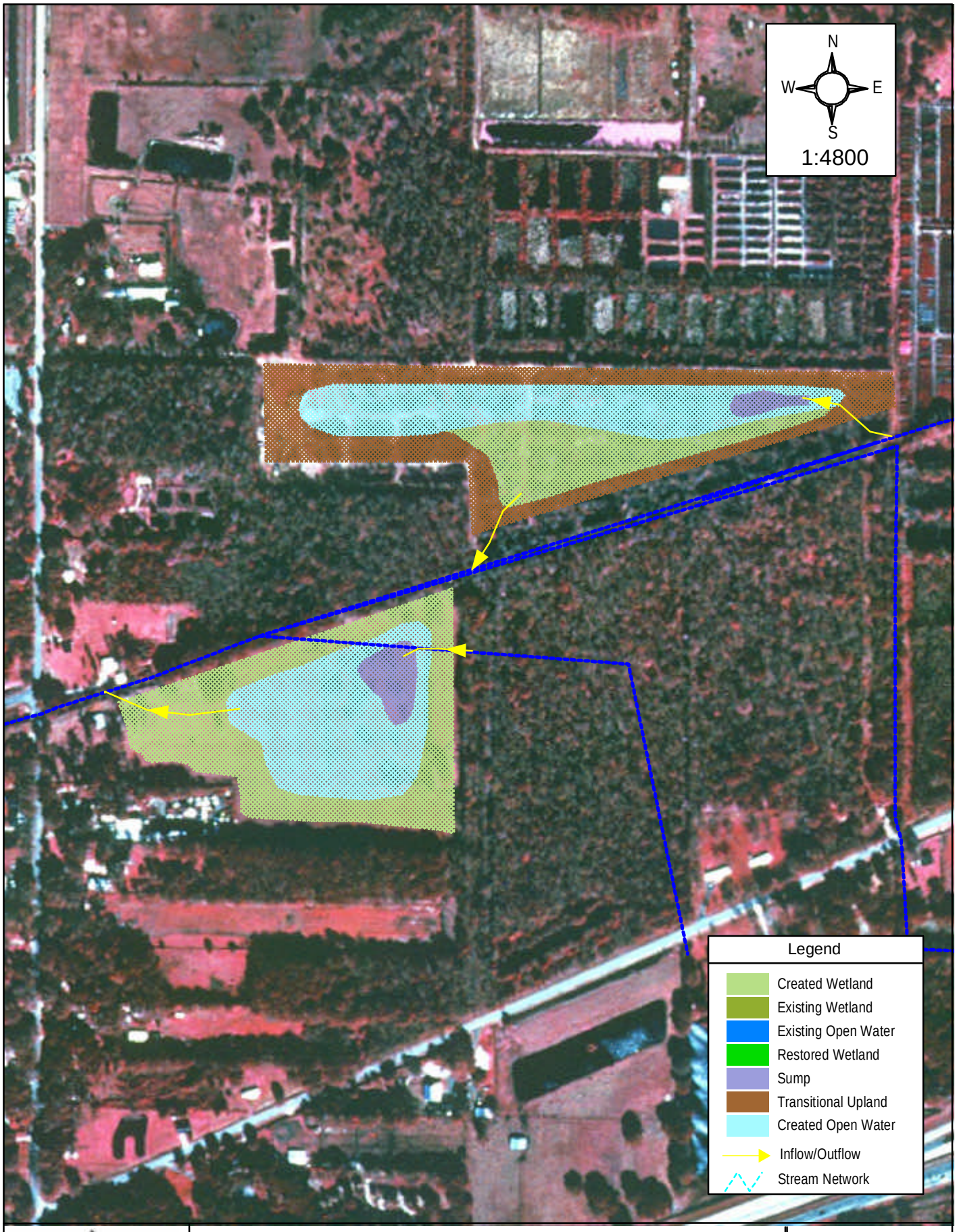
**Water Quality Issues**

The increased detention time and the planting of wetland vegetation in the littoral shelf will provide water quality treatment. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2). This alternative also has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural System Issues**

The planting of additional wetland vegetation in the littoral shelf of the pond will provide an improvement to the existing wetland and riparian habitat.

| **Alternative: WRA A** | |
|---|---|
| Construction | $213,892.05 |
| Land Acquisition | $90,938.28 |
| Design/Permitting | $100,566.82 |
| **Total:** | **$405,387.15** |




# Natural Systems and Water Quality Conceptual Alternatives

**Figure 13.3.4.3.2. Williams Subwatershed, WRA A**

AYRES ASSOCIATES

**Alternative WRA B**

This alternative involves an approximately 25-acre (8.09 hectare) borrow pit in the northeast quadrant of I-4/I-75 interchange that was excavated to provide fill for the construction of I-75 (Figure 13.3.4.3.3). The depth of the excavation is not known. Prior to the recent reconstruction of I-4, some of the runoff from the adjacent roadways was discharged to the pit. With the reconstruction, all of the stormwater runoff is now directed to treatment facilities, with no discharge to the pit. This represents an excellent opportunity to use the area for water quality enhancement and habitat creation.

Most of the runoff from the area of the subwatershed south of the I-4/I-75 interchange flows through a ditch that passes just to the west of the pit. A structure could be constructed in this ditch to divert part of the flow into the pit. There is a pipe near the northeast corner of the pit and under Sligh Avenue that allows water to flow north to the main channel of Kennedy Canal. An additional control structure may be needed on this outfall to further increase detention time.

**Water Quantity Issues**

This alternative will potentially reduce flood levels downstream of its location through increased storage capacity and detention time.

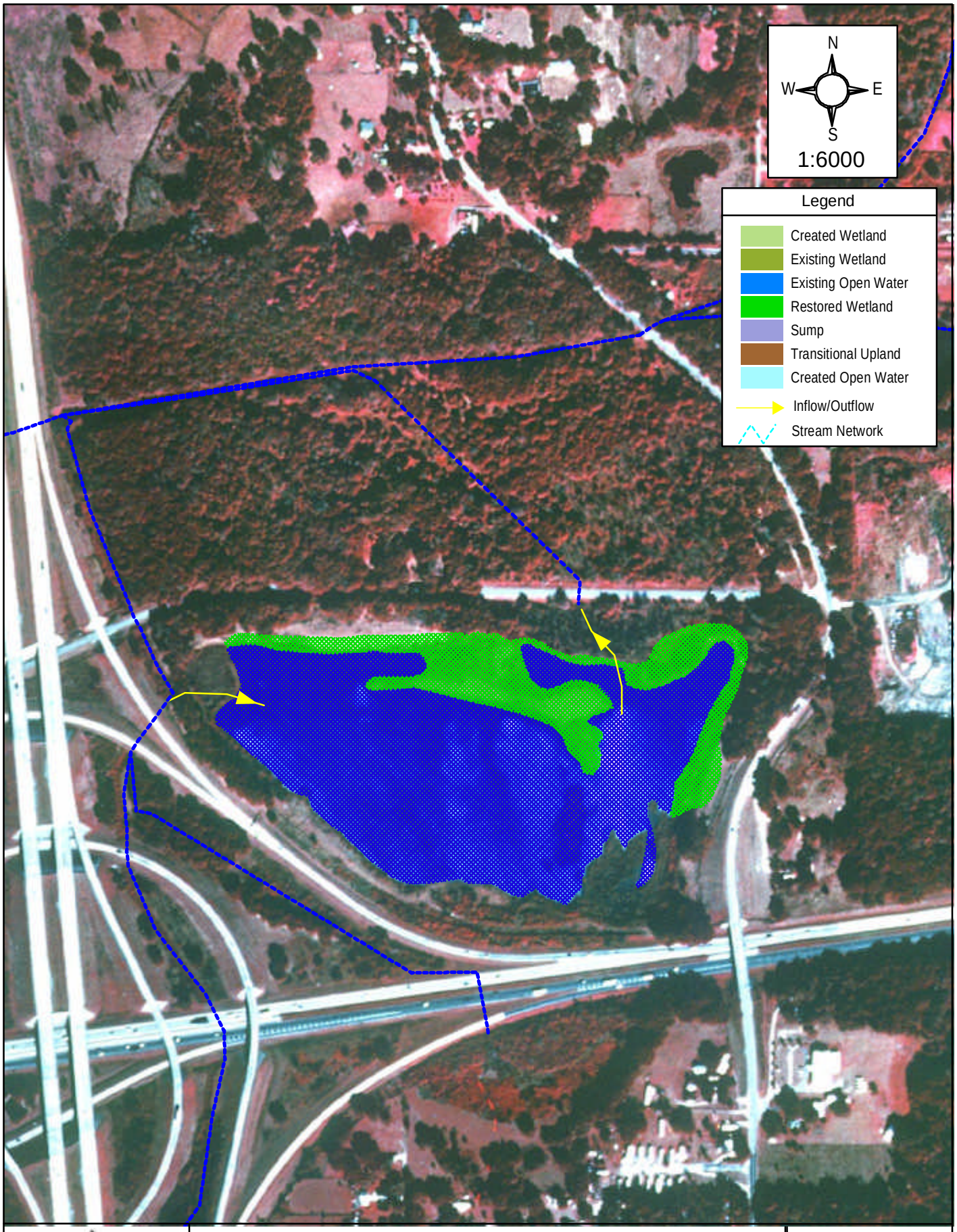
**Water Quality Issues**

While the increased detention time alone will provide some water quality treatment, the planting of additional wetland vegetation in the shallower parts of the pit will further increase pollutant uptake. If designed to meet a 14-day detention period, this alternative should result in significant reductions in TSS, TN, and TP (Table 13.2.2). This alternative has the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce potential impacts.

**Natural System Issues**

The removal of exotic/nuisance vegetation and the planting of additional wetland vegetation in the shallower areas of the pit will provide an improvement to the existing wetland habitat.

| **Alternative: WRA B** | |
|---|---|
| Construction | $147,700.00 |
| Land Acquisition | $258,940.11 |
| Design/Permitting | $74,080.00 |
| **Total:** | **$480,720.11** |




Natural Systems and Water Quality
Conceptual Alternatives

**Figure 13.3.4.3.3. Williams Subwatershed, WRA B**

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### 13.3.4.4 Mango Subwatershed

Water Quantity LOS Deficiency

The water quantity LOS is C for the 25-year storm event within the Mango subwatershed. The deficiency consists of road and site flooding from the Forest Hills subdivision east of Kingsway Road in Brandon through the Brenda Drive area to the Larson Avenue sinkhole. These locations are illustrated in Figure 13.3.4.4.1. Structure flooding may occur during periods of heavy rainfall events combined with high groundwater levels (as seen during El Nino).

Water Quality Treatment Overall LOS Deficiency

Based on pollutant loading modeling, these suburban basins are designated as LOS F and have a high potential as a source of pollutants and increased runoff. These basins receive little to no stormwater treatment and the channelization of the conveyance system throughout most of the area results in the rapid transport of pollutants downstream.

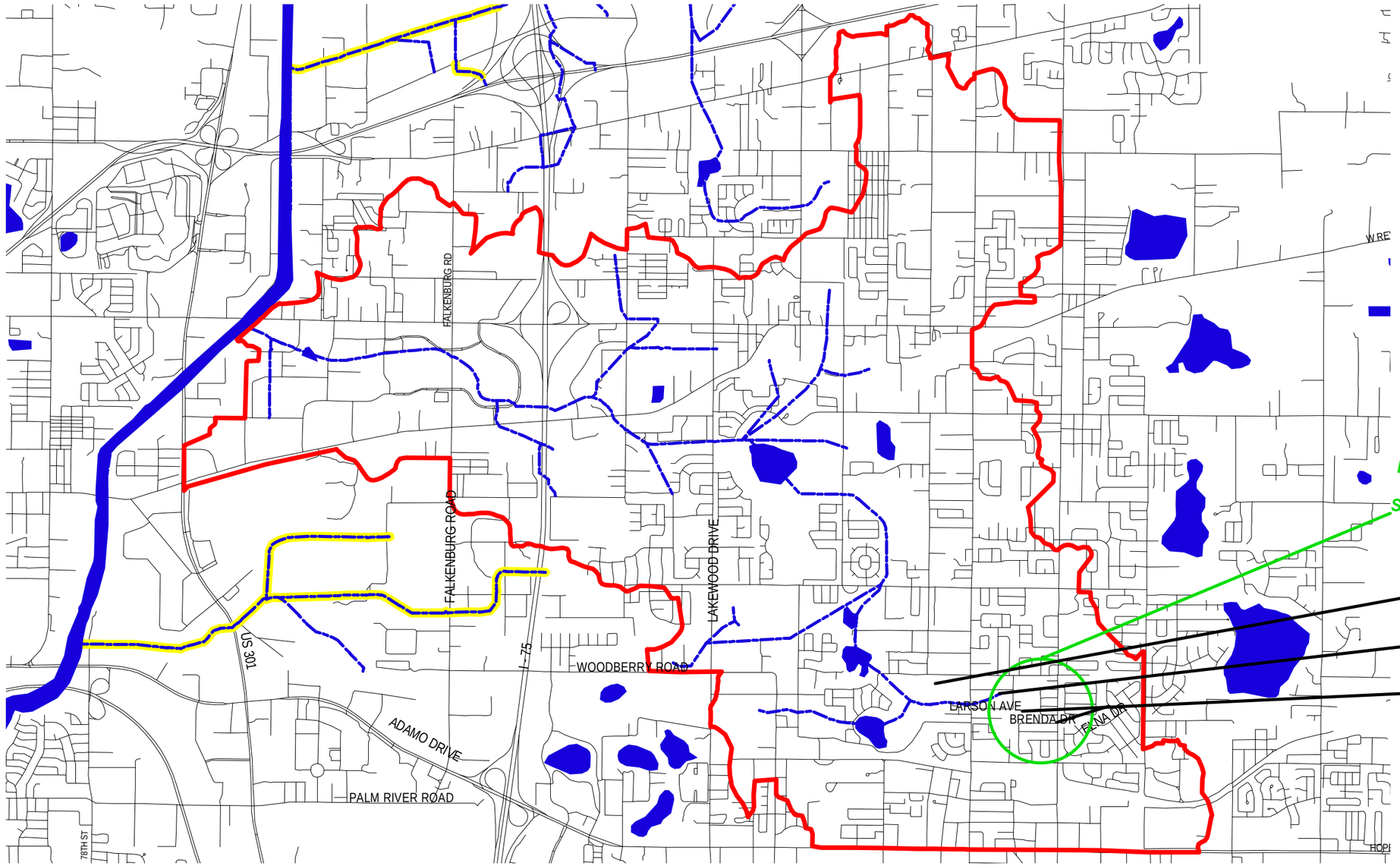
Natural Systems Deficiency

The natural systems evaluation score is F for the Mango subwatershed. This area has minimal remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas. Exotic vegetation (Brazilian pepper, cattails) frequently occurs in disturbed upland areas and along the waterways such as Lake Mango.

#### *Flooding Alternatives*

*Elna Drive, Brenda Drive, Larson Avenue*

Discussions with County personnel indicated numerous complaints of site and street flooding in the aforementioned areas during the 1997/1998 El Nino event. The EXTRAN model predicts road overtopping to a depth of 0.43 feet (0.13 m) over Kingsway Road near the Forest Hills Subdivision, a depth of 0.85 feet (0.25 m) in the Brenda Drive area and a depth of 0.52 feet (0.15 m) over Parsons Avenue near the Larson Avenue sinkhole. The flooding is caused by a combination of factors. First, the drainage systems in the areas have no positive outfalls. The systems rely on infiltration/percolation to recover storage volumes, and hence experience decreased efficiency during high groundwater periods. Secondly, the storage facilities are undersized for the drainage areas they serve. Stormwater runoff exceeds the capacity of the storage facility in the Forest Hills subdivision and spill over Kingsway Road to join with the runoff from the Brenda Drive area to the already overloaded storage facility there. That facility is connected to the Larson Avenue sinkhole by an undersized culvert and ultimately overtops Parsons Avenue and enters Lake Mead.




# Hillsborough River Watershed Management Plan

**Figure 13.3.4.4.1**
**Mango Subwatershed Alternatives Location Map**

**Alternative MGA 1-A**

The alternative for this site is to construct a gravity storm sewer of 30" RCPs from the Forest Hills subdivision storage treatment facility to the Brenda Drive pond. Upgrading of the existing pipe from the Brenda Drive facility to the Larson Avenue sinkhole to a 36" RCP is also required. A 10 cfs pump station is required to convey the excess flood waters from the Larson Avenue sinkhole to the depressional area that exists northeast of Lake Mead and south of Jersey Avenue. The depressional area and the land surrounding it will need to be acquired and enlarged to provide 15.8 acre-feet (19,489 cubic meters) of additional storage to accommodate the excess floodwaters without adverse impacts to Lake Mead.

| **Alternative: MGA 1-A** | |
|---|---|
| Construction | $386,028.60 |
| Land Acquisition | $38,984.00 |
| Design/Permitting | $130,808.58 |
| **Total:** | **$555,821.18** |

**Alternative MGA 1-B**

A second alternative for this site is to replace the proposed gravity storm sewer from the Forest Hills subdivision storage treatment facility to the Brenda Drive pond with a 15 cfs pump station. The remaining proposed improvements would be the same as in the above Alternative MGA 1-A.

**Water Quantity Issues**

An ERP will be required for either alternative. Obtaining the permit should be routine, however, care should be taken during the design of the pump station to ensure no adverse impacts to the existing water quality or hydroperiod of the Larson Avenue sinkhole or the Forest Hills Subdivision pond. Modifications to the size of the pump stations and the control elevations may be necessary to accommodate these concerns.

**Water Quality Issues**

No significant water quality improvements are anticipated with this alternative. However, the intake and outfall structures for this pump station should be located in such a manner as to avoid disturbing bottom sediments at the withdrawal point. Nutrients, metals, and other pollutants (including pathogens) are often bound to sediments and could easily be transferred between waterbodies or transported downstream if sediments are resuspended as a result of pumping activities. Nutrients may also be released into the water column if sediments are resuspended which could result in algal blooms.

**Natural Systems Issues**

The depression to the northeast of Lake Mead is part of a large wetland complex that has been affected by the surrounding development. Most of the area is jurisdictional wetland and any impacts to it will require mitigation. One potential source of mitigation for this project could be the wetland enhancements proposed in Alternative MGA A.

| **Alternative: MGA 1-B** | |
|---|---|
| Construction | $374,116.10 |
| Land Acquisition | $38,984.00 |
| Design/Permitting | $127,234.83 |
| **Total:** | **$540,334.93** |

*Woodbury Road and Oak Hollow Place*

Discussions with County staff and review of maintenance records indicate frequent flooding of this area. Hillsborough County is currently designing a cross drain and storage area to resolve this problem. The ultimate drainage of runoff excess from this area will be directed to the Delaney Creek Watershed. No alternative has been developed for this area.

*Lakewood Drive and Woodbury Road*

During the 1997/1998 El Nino event, numerous problems occurred in the area surrounding Cottageside Court, Cottage Oaks Court, Marianne Lane and Cottagewood Drive. Discussions with County staff revealed that this area was reviewed substantially at that time. Confirmation has been obtained for structure flooding within the area, however the homesites are considerably below the roadway grade. No roadway flooding can be confirmed. This location has not been evaluated for an alternative.

*Highview Road*

Structure flooding has historically been reported and confirmed by residents in this area. Residents indicate, however, that recent improvements to the drainage system have solved their drainage concerns. This location has not been evaluated for an alternative.

*Clay Pit Road and N. Pine Road*

Street and structure flooding was reported for this area during the 1997/1998 El Nino event. This site is adjacent to a stormwater pumping station maintained by Hillsborough County that failed during that time period. This location has not been evaluated for an alternative.

*Lake Mead Area*

Numerous complaints were received concerning flooding around Lake Mead and several homesites were threatened during the 1997/1998 El Nino event. Design storm simulation does not indicate the flooding of structures. Hillsborough County is currently designing a recovery pumping station to provide emergency relief for this area. This location has not been evaluated for an alternative.

***Water Quality/Natural Systems Alternatives***

**Alternative MGA A**

Mud Lake is the result of peat excavation and lacks significant littoral area or aquatic vegetation. The alternative solution is to regrade and plant the shoreline to create marsh wetland.

**Water Quantity Issues**

This project could potentially lower peak flood levels. If there is regrading and removal of material that is below the SHWT then the effect on the flood levels will be minimal. If the regrading extends to the area above the SHWT, then there could be some lowering of the flood levels, although a considerable volume of material would have to be removed to produce a significant effect.

**Water Quality Issues**

The proposed marsh should be designed to provide the maximum water quality benefit to the low and average flows discharged from Mud Lake. This will involve regrading some of the area on the west shore of the lake, planting it with native wetland vegetation and maximizing the residence time of the discharge in the marsh. This should result in a net improvement in water quality discharged from the lake.

**Natural System Issues**

The regrading and planting of the outfall area will provide a significant increase in the available shoreline habitat for wildlife.

| **Alternative: MGA A** | |
|---|---|
| Construction | $163,500.00 |
| Land Acquisition | $25,000.00 |
| Design/Permitting | $80,400.00 |
| **Total:** | **$268,900.00** |

**Alternative MGA B**

The islands and peninsulas in Lake Mango are infested with exotic and nuisance vegetation. The alternative solution is to remove undesirable species and replant with native species including arrowhead (*Sagittaria* sp.), pickerelweed (*Pontedaria cordata*), and bulrush (*Scirpus* sp.). A large portion of the southwest region of the lake was converted to citrus crop and is relatively undeveloped except for a single home. If the current property owner is willing, portions of this property could be acquired for preservation and wetland creation/restoration to provide additional shoreline habitat for the lake. A cooperative project coordinated by the County's Lakewatch program could also be promoted with lakefront homeowners to install and maintain native wetland vegetation along their shoreline properties.

**Water Quantity Issues**

There are no significant water quantity issues anticipated for this alternative.

**Water Quality Issues**

Acquisition/preservation of parcel(s) along the southwest region of the lake would restrict further development of this large tract into multi-family home sites and, therefore, result in a reduced pollutant loading potential for the lake. This would prevent any additional water quality degradation of the lake beyond its current state (borderline fair/poor water quality index rating).

The majority of the remaining lake shoreline is devoid of vegetation. Much of the existing vegetation on the shoreline and islands consists of primrose willow, an exotic nuisance species that generally becomes dormant during the winter months. Plantings along the shoreline and elsewhere in the lake, coupled with the removal of undesirable species and their replacement with native plants that can remain active throughout the year, should improve the water quality of the lake. Some water quality improvements may be gained by the replacement of certain nuisance exotic vegetation, such as Brazilian pepper (*Schinus terebinthifolius*) which have lower pollutant uptake capabilities than native aquatic species (i.e. *Sagittaria* sp.).

**Natural Systems Issues**

The elimination of undesirable species and the planting of native vegetation will greatly enhance the wetland habitat of the lake. Acquisition and restoration of the southwestern parcels along the lake would preserve the remaining habitat for wildlife utilization.

| **Alternative: MGA B** | |
|---|---|
| Construction | $20,625.00 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$55,625.00** |

**Alternative MGA C**

The wetlands in Williams Park are infested with exotic and nuisance vegetation. The alternative solution is to remove undesirable wetland species from these areas and replant with native species such as arrowhead, pickerelweed, and bulrush.

**Water Quantity Issues**
There are no significant water quantity issues anticipated for this alternative.

**Water Quality Issues**
Much of the existing vegetation consists of primrose willow, an exotic nuisance species that generally becomes dormant during the winter months. The removal of this and other undesirable species and their replacement with native plants that can remain active throughout the year should improve the water quality of the wetlands.

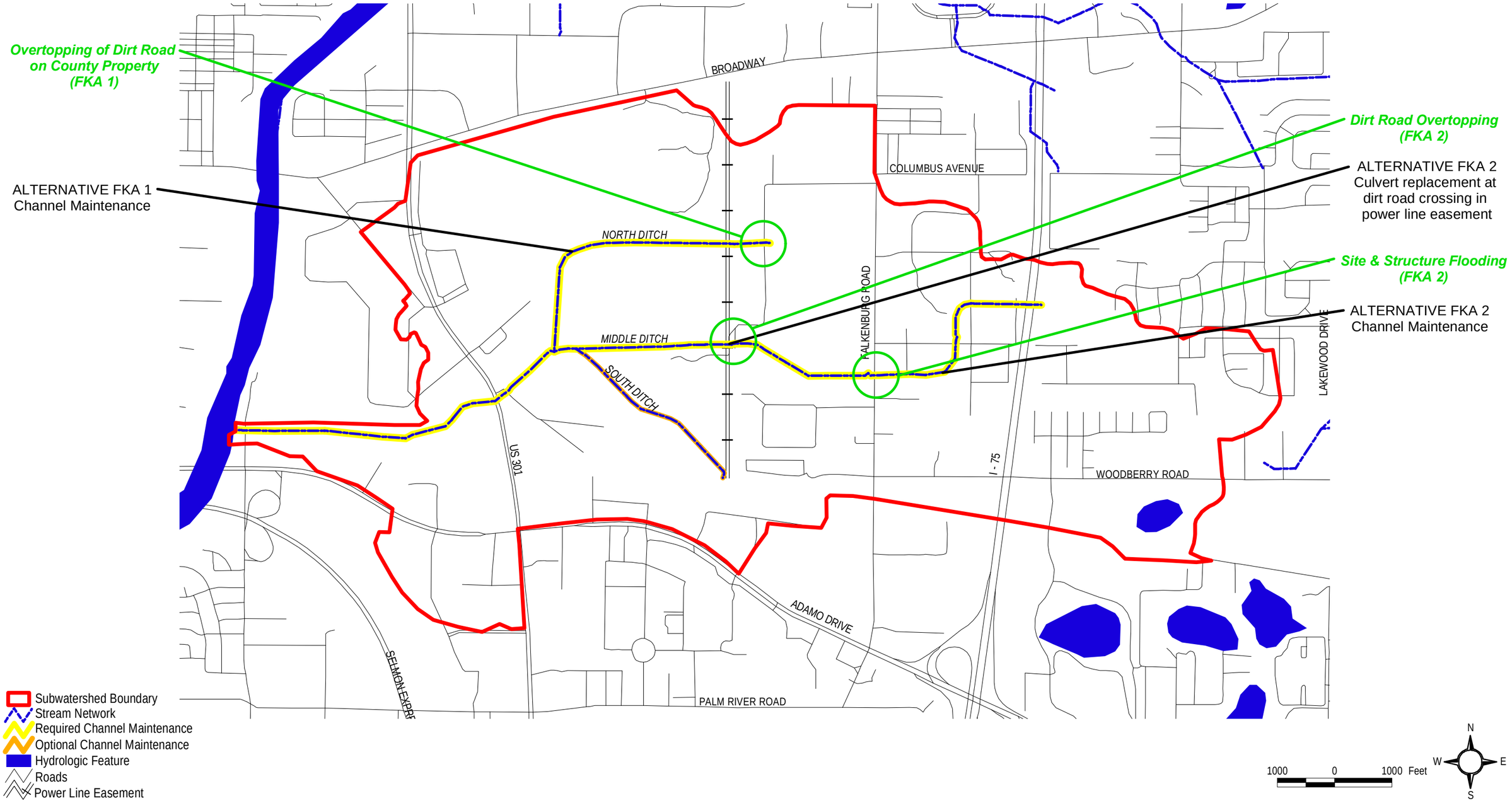
**Natural Systems Issues**
The elimination of undesirable species and the planting of native vegetation will greatly enhance the wetland habitat of the park. The improvement of wetland habitat at this site could be used to offset impacts resulting from other alternatives identified within the watershed.

| **Alternative: MGA C** | |
|---|---|
| Construction | $364,875.00 |
| Land Acquisition | $0 |
| Design/Permitting | $124,462.5 |
| **Total:** | **$489,337.50** |

### 13.3.4.5 Falkenburg Subwatershed

Water Quantity LOS Deficiency
The water quantity LOS is D for the 25-year storm event in the Falkenburg subwatershed. The deficiency occurs within the two major conveyance systems (North Ditch and Middle Ditch) in the subwatershed (Figure 13.3.4.5.1). The third ditch system (South Ditch) does not have any associated flooding deficiency.

Water Quality Treatment Overall LOS Deficiency
Based on pollutant loading modeling, these basins are designated as LOS F and have a high potential as a source of pollutants and increased runoff. Much of the watershed lies in Polk County, extending into the heart of Lakeland and includes older developments that do not have stormwater treatment facilities.




Hillsborough River Watershed Management Plan

**Figure 13.3.4.5.1**

**Falkenburg Subwatershed Alternatives Location Map**

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Natural Systems Deficiency

The natural systems evaluation score for the Falkenburg subwatershed is F. This subwatershed has little remaining natural habitat or riparian buffer and no publicly owned lands. Any remaining habitats are highly fragmented and are not strategic habitat conservation areas.

### *Flooding Alternatives*

*North Ditch*

The North Ditch begins within the Hillsborough County complex, flows east under two dirt roads located on County property and a power line easement, bends south, and then discharges into Middle Ditch. The EXTRAN model predicts overtopping of the dirt road on County property of 0.85 feet (0.25 m). Flooding has not been confirmed and there were no high water marks to indicate road overtopping. Any actual flooding or high water problems in this case would be a result of dense vegetation within the ditch.

#### Alternative FKA 1

Alternative FKA 1 consists of approximately 2230 feet (679 m) of channel maintenance along North Ditch from the downstream end of the dirt road crossing to the confluence with South Ditch.

#### Water Quantity Issues

The dirt road overtopping at the crossing of North Ditch is on undeveloped County-owned property. Increased peak water levels downstream at the Highway 301 crossing are expected as a consequence of the enhanced conveyance. However, due to this alternative's non-structural nature and emphasis on maintenance, it should be exempt from permitting requirements.

#### Water Quality Issues

This alternative may result in a negative impact on water quality since the current conditions result in slow stormwater conveyance and a greater opportunity for existing channelside vegetation to uptake nutrients and other pollutants. The improved conveyance will result in greater flow rates (more rapid transport of pollutants downstream) during storm events and the removal of channel vegetation. However, a water quality improvement project has been proposed downstream of these channel improvements at the Tampa Bay Water treatment plant site that is anticipated to result in highly efficient removal of nutrients and suspended solids (see below) and which may offset the negative water quality effects resulting from improved conveyance. There is also the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls should reduce the possibility of these effects.

#### Natural Systems Issues

The majority of the soils that these ditches pass through are hydric. Field review shows that the area has been severely dewatered by the ditches, although much of the area will be characterized as jurisdictional wetland. As a result, construction access for the maintenance of the ditches will result in wetland impacts. A Hillsborough County EPC wetlands permit may be difficult to obtain if vegetation within the channel section is considered to be wetland plant species, reducing the

feasibility of permitting the alternatives identified for this conveyance system. Alternative FKA A may serve as potential mitigation for these impacts.

| **Alternative FKA 1** | |
|---|---|
| Construction | $4,439.50 |
| Land Acquisition | $0 |
| Design/Permitting | $0* |
| **Total:** | **$4,439.50** |

*Project is maintenance only. Assumed County will handle internally.

*Middle Ditch*

The Middle Ditch system begins at I-75, passes under Falkenburg Road through two culverts, runs east through the County complex and under two dirt roads located on County property and a power line easement, and ultimately discharges into the Tampa Bypass Canal. The EXTRAN model predicts site and structure flooding both upstream and downstream of Falkenburg Road. However, dense vegetation growth was observed in the upstream and downstream channel during the site visit. A business proprietor confirmed the occurrence of site and structure flooding at this location during the early 1990's, but also stated that flooding has not occurred since Falkenburg Road was improved and the channel was cleaned. In addition, the downstream end of a 48" CMP at the power line crossing is crushed and the effective diameter of the pipe is significantly reduced.

*South Ditch*

Maintenance is also recommended for the South Ditch even though there are no flooding problems associated with it. The ditch measures 2930 feet (893 m) long from the railroad embankment west of Falkenburg Road to the confluence with Middle Ditch. Maintaining this conveyance system in conjunction with the required maintenance on the North and Middle Ditch would be a proactive approach and would avoid the cost of additional mobilization if it were to be maintained at a later date.

**Alternative FKA 2**

Alternative FKA 2 consists of 7000 feet (2133 m) of channel maintenance along Middle Ditch from the Tampa Bypass Canal to the dirt road crossing, 2090 feet (637 m) of maintenance from Falkenberg Road crossing east to the dirt road crossing, and 2650 feet (807 m) of maintenance from I-75 to Falkenberg Road. This alternative also includes replacement of the 48" CMP with an equal size RCP.

**Water Quantity Issues**
Culvert and ditch cleaning are routine maintenance activities and are typically exempt from permitting. Increased peak water levels downstream at the Highway 301 crossing are expected as a consequence of the enhanced conveyance. However, due to this alternative's non-structural nature and emphasis on maintenance, it should be exempt from permitting requirements.

**Water Quality Issues**
There is the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls should reduce potential impacts.

**Natural Systems Issues**
The majority of the soils that these ditches pass through are hydric. Field review shows that the area has been severely dewatered by the ditches, although much of the area will be characterized as jurisdictional wetland. As a result, construction access for the maintenance of the ditches will result in wetland impacts. Potential mitigation for these impacts could be compensated in Alternative FKA A.

| **Alternative FKA 2** | |
|---|---|
| Construction | $25,417.93 |
| Land Acquisition | $0 |
| Design/Permitting | $0* |
| **Total:** | **$25,417.93** |

*Project is maintenance only. Assumed County will handle internally.

***Water Quality/Natural Systems Alternatives***

A significant water quality improvement initiative is currently being cooperatively developed for this subwatershed by Tampa Bay Water, the SWFWMD-Surface Water Improvement and Management (SWIM) Program, and Hillsborough County. This stormwater treatment project involves the design and construction of an alum treatment/wetland creation system located at the future Tampa Bay Water Regional Water Treatment Plant north of Adamo Drive. The use of alum treatment is anticipated to result in high removal rates of TP, TN, and TSS loads generated in this heavily urbanized basin. Several acres of created wetland habitat are also proposed. Hillsborough County has agreed to assume the responsibility of continued maintenance once the project is completed.

**Alternative FKA A**
This alternative for the Falkenburg subwatershed provides for additional water quality and natural systems improvements in addition to the project described above in FKA 2. The goal of this alternative is to restore an area of marsh in the large wetland complex located east of US 301 and south of C.R. 574 and the CSX rail line through the use of a ditch block to route water into the

existing wetland. Excavation around the adjacent wetland would compensate for the additional backwater effects created by the ditch block.

**Water Quantity Issues**
The expected changes in water quantity for this alternative will result in changes in downstream flooding, however, the full benefit of the additional storage will only be obtained if the upstream conveyance system is maintained and kept relatively unobstructed. The ditch blocks should be appropriately designed to meet permit requirements of no adverse impacts during the 100-year event either upstream or downstream impacts of the site.

**Water Quality Issues**
The proposed marsh restoration will provide increased detention time and an increase in the removal of nutrients and other pollutants flowing through this area.

**Natural System Issues**
The regrading and planting of an area will provide a significant increase in the available wetland habitat compared to the existing ditch. The jurisdictional status of the site is expected to be a permitting issue but the significant improvement in wetland functions should mitigate for any wetland impacts.

| **Alternative: FKA A** | |
|---|---|
| Construction | $546,486.38 |
| Land Acquisition | $0 |
| Design/Permitting | $151,621.59 |
| **Total:** | **$698,107.97** |

### 13.3.4.6 Tampa Bypass Canal / Harney Subwatershed

Water Quantity LOS Deficiency
The Tampa Bypass and Harney Canal subwatershed is the portion of the Tampa Bypass Canal and Tributaries Region which includes the canals themselves and the contributing watershed that lies within incorporated portions of the County that are beyond the scope of this study. No water quantity LOS determinations were made for this area.

Water Quality Treatment Overall LOS Deficiency
Based on pollutant loading modeling, these mostly commercial/residential basins are designated as LOS-F and have a high potential as a source of pollutants. These basins receive little to no stormwater treatment. In addition, the channelization of the conveyance system throughout the area results in the rapid transport of these pollutants downstream.

Natural Systems Deficiency

The natural systems evaluation score is D for the Tampa Bypass Canal/Harney subwatershed. This subwatershed is the only one within the Tampa Bypass Canal and Tributaries Region to receive a score greater than F. This is primarily due to the riparian buffer areas along the Tampa Bypass Canal. There is minimal and highly fragmented natural habitat in this subwatershed.

***Water Quality/Natural Systems Alternatives***

A large portion of this subwatershed lies within the purview of the East Lake Watershed area for which a separate plan and alternatives have been developed by Hillsborough County staff. In addition, a cooperative project between the SWFWMD-SWIM Program and Hillsborough County (East Lake Stormwater Retrofit Project) has recently been implemented. The project involved a detailed nutrient and hydrologic evaluation of East Lake, which drains to the Tampa Bypass Canal. An alum treatment system was constructed at the downstream end of the outfall of the lake to treat nutrient-rich discharges prior to entering the canal. As a result of this project and other ongoing planning activities, no water quality or natural systems alternatives were developed in this plan for this subwatershed.

## 13.3.5 Northwest Tributaries Region

### 13.3.5.1 New River Subwatershed

Water Quantity LOS Deficiency

This subwatershed's headwaters are located in a series of interconnected wetlands and unnamed swamps located north of S.R. 54 and east of C.R. 577 in Pasco County. The river crosses S.R. 54, Chancey Road, and Creek Road before entering Hillsborough County. New River continues to flow southward through rural areas and crosses Morris Bridge Road prior to discharge into the Hillsborough River within the Hillsborough River State Park boundary. No LOS deficiencies exist within the Hillsborough County boundary and no alternatives were evaluated.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these rural residential basins are designated as LOS F and have a high potential as a source of pollutants. Much of the subwatershed lies outside of Hillsborough County, including portions of the City of Zephyrhills. Much of this area also receives little to no water quality treatment and only a small area exists in Hillsborough County to provide significant treatment of the upstream area.

Natural Systems Deficiency
This subwatershed received a natural systems evaluation score of D. There are minimal unfragmented natural habitats, and no public lands or strategic habitat conservation areas.

### 13.3.5.2 Basset Branch Subwatershed

Water Quantity LOS Deficiency
This subwatershed is located to the west of New River. Its headwaters are a series of wetlands located to the south of S.R. 54 in Pasco County. The stream meanders southward from these wetlands for approximately 3.9 miles before entering Hillsborough County and crosses Morris Bridge Rd downstream of the county line before discharging to the Hillsborough River. No LOS deficiencies exist within the Hillsborough County boundary and no alternatives were evaluated.

Water Quality LOS Deficiency
Based on pollutant loading modeling, these rural residential basins are designated as LOS F and have a high potential as a source of pollutants. Much of the subwatershed lies outside of Hillsborough County, including portions of the city of Zephyrhills. Much of this area receives little to no water quality treatment and limited area exists in Hillsborough County to provide significant treatment of the upstream area.

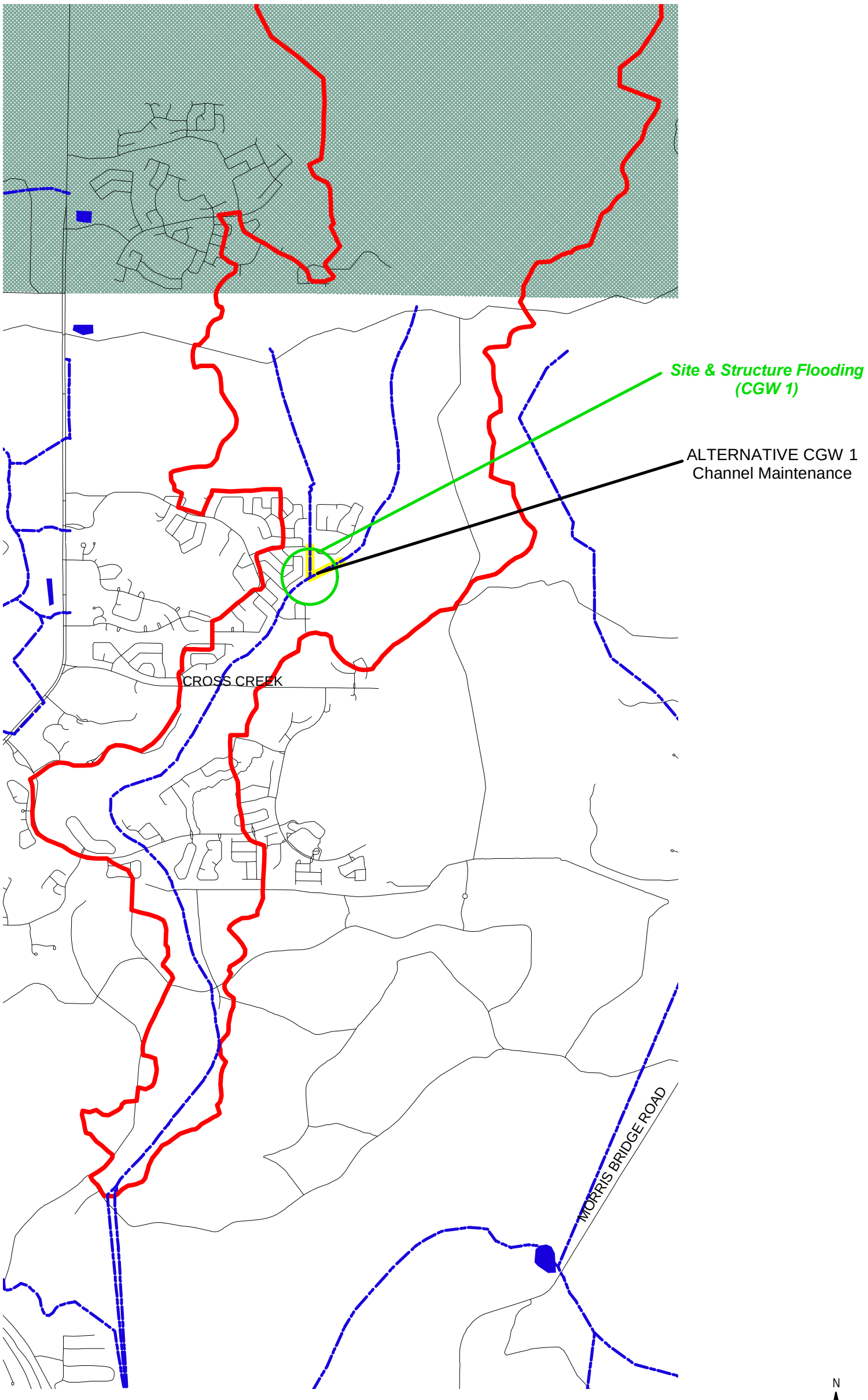
Natural Systems Deficiency
The natural systems evaluation score was D for this subwatershed. There are minimal unfragmented natural habitats, and no public lands or strategic habitat conservation areas.

### 13.3.5.3 Clay Gully West Subwatershed

Water Quantity LOS Deficiency
Structure flooding on Fox Chapel Way in the Pebble Creek Subdivision results in a LOS of D for the 25-year storm event in the subwatershed (Figure 13.3.5.3.1).

Water Quality LOS Deficiency
Based on pollutant loading modeling, these primarily residential basins are designated as LOS D and have a moderate potential as a source of pollutants. Much of the area has been developed with the last 15 years and includes stormwater treatment facilities.

Natural Systems Deficiency
This subwatershed received a natural systems evaluation score of C. Although there are no public lands, there are some remaining unfragmented natural habitats, riparian buffers, and strategic habitat conservation areas.




Hillsborough River Watershed Management Plan

**Figure 13.3.5.3.1**
**Clay Gully West Subwatershed Alternatives Location Map**

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### *Flooding Alternatives*

Structure flooding on Fox Chapel Way in the Pebble Creek Subdivision was predicted. Several attempts at confirmation of the flooding were unsuccessful. The EXTRAN predicted flooding from a natural channel cross section with a high roughness value. The upstream end of the cross section is a weir and trapezoidal channel, both of which are part of the subdivision stormwater management system.

**Alternative CGW 1** (635700)
The alternative solution to flooding in this area is to maintain (clear and snag) 1150 feet (350 m) of channel from the weir structure to the channel confluence with Clay Gully West.

**Water Quantity Issues**
The channel reach consists of cypress trees and dense understory, particularly on the channel banks. The maintenance should include clearing the underbrush from the channel bottom. Increased peak water levels downstream at the channel confluence with Clay Gully West are expected as a consequence of the enhanced conveyance. However, due to this alternative's non-structural nature and emphasis on maintenance, it should be exempt from permitting requirements.

**Water Quality Issues**
This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects.

**Natural System Issues**
Approximately the northern 150 feet (45.7 m) of the subject channel is vegetated with willow, slash pine (*Pinus elliottii*) and red maple up to approximately 8 inches in diameter. The southern 100 feet (30 m) is vegetated with a mixture of grasses and herbaceous species up the edge of the Clay Gully West floodplain. If construction as-built drawings can confirm the original dimensions of this ditch, maintenance should be an exempt activity. A Hillsborough County EPC wetlands permit may be somewhat more difficult to obtain if EPC considers any vegetation within the channel section to be a wetland plant species, reducing the feasibility of alternatives for this conveyance system.

| **Alternative: CGW 1** | |
|---|---|
| Construction | $3,197.50 |
| Land Acquisition | $0 |
| Design/Permitting | $0* |
| **Total:** | **$3,197.50** |

*Project is maintenance only. Assumed County will handle internally.

### 13.3.5.4 Trout Creek Subwatershed

Water Quantity LOS Deficiency

Trout Creek's headwaters are located in Pasco County to the east of S.R. 54. This area is known as Cabbage Swamp, which is also at the headwaters of Cypress Creek. Approximately 1.1 miles downstream of the county boundary, the creek enters the City of Tampa limits and flows southward through Bruce B. Downs Boulevard before re-entering unincorporated Hillsborough County in the Flatwoods Park recreational area prior to discharge into the LHFDA just upstream of control structure S-155. No LOS deficiencies exist within the Hillsborough County boundary and no alternatives were evaluated.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these rural residential basins are designated as LOS-F and have a high potential as a source of pollutants. Some of the subwatershed lies outside of Hillsborough County, including portions of the Wesley Chapel area. Much of the development of the subwatershed in Hillsborough County has occurred within the last 15 years and includes stormwater treatment facilities. The older, untreated developments and agricultural lands outside of the County are primarily responsible of the low LOS rating.

Natural Systems Deficiency

The natural systems evaluation score was C for this subwatershed. Although there are no public lands, there are some remaining riparian buffers and unfragmented natural habitat that are classified as strategic habitat conservation areas.

### 13.3.6 Hillsborough River Region

#### 13.3.6.1 Hillsborough River Below S-155 Subwatershed

Water Quantity LOS Deficiency

This watershed encompasses the main stem of the Hillsborough River between S-155 and the Tampa Dam. This portion of the river flows through Lettuce Lake Park and the University of South Florida's Riverside Park before passing through the City of Temple Terrace and the City of Tampa prior to reaching the Tampa Dam. This portion of the river is also controlled by the operations of S-155 and the Harney Canal. These control structures manage the elevations within the river to levels satisfying the County's LOS criteria to the extent possible. Therefore, a LOS determination has not been established for this subwatershed.

Water Quality LOS Deficiency

Based on pollutant loading modeling, the main channel of the Hillsborough River is designated as LOS D and has a high potential as a source of pollutants. These basins generally receive little to no stormwater treatment and the channelization of the conveyance system throughout much of the area results in the rapid transport of pollutants downstream.

Natural Systems Deficiency

Although this subwatershed has areas adjacent to the stream network that serve as riparian buffers, there is minimal remaining natural unfragmented habitat throughout the area, and few properties in public ownership. Therefore, the natural systems evaluation score for this subwatershed was D.

***Water Quality/Natural Systems Alternatives***

**Alternative HRB A-1**

This alternative consists of enhancing the shoreline of Rogers Park by removing undesirable vegetation, regrading some areas to improve circulation and replanting with desirable wetland species.

**Water Quantity Issues**

Because this alternative will not alter the flows or stages of the river or any tributary, there are no water quantity issues associated with it.

**Water Quality Issues**

In addition, portions of the area could be reconfigured to provide limited detention of stormwater runoff from the adjacent golf course to further improve pollutant uptake. Although this area is located within the City of Tampa's political boundaries, the ability to provide additional riparian habitat in this reach of the Hillsborough River is limited. This area is also adjacent to the Hillsborough River Reservoir, a significant water supply source for the Tampa Bay region. A created wetland treatment system (comprised of macrophytes) could help assimilate nutrients that have been causing periodic algae blooms in the reservoir for the past several years.

**Natural Systems Issues**

The elimination of undesirable species and the planting of native vegetation will greatly enhance the wetland habitat of the area. Given the current disturbed nature of this area, permitting is not expected to be a major issue.

| **Alternative: HRB A-1** | |
|---|---|
| Construction | $142,575.00 |
| Land Acquisition | $0 |
| Design/Permitting | $72,030.00 |
| **Total:** | **$214,605.00** |

**Alternative HRB A-2**

Improve the water quality of the discharge from the Rogers Park Golf Course through some combination of increased detention, wetland plantings and/or physio-chemical treatment in the existing wetland areas on the course.

**Water Quantity Issues**

This system would be designed to divert stormwater runoff from the golf course through created sump/wetland systems and then discharged into the Hillsborough River Reservoir. This alternative is anticipated to provide additional storage for the subwatershed and may result in the reduction of downstream flooding. Permit requirements for this alternative will require that no adverse impacts occur during the 100-year event either upstream or downstream of the site.

**Water Quality Issues**

The runoff from the golf course is currently discharged directly to the river with minimal treatment due to the lack of aquatic vegetation and the unrestricted connections to the river. Planting desirable wetland vegetation will increase pollutant uptake. These plantings may be most efficient and least restrictive to the current uses if they are concentrated near the outfalls where they would provide a final polishing of the discharge. Some degree of increased detention may be possible by placing control structures at the connections to the river or possibly at other locations in the drainage system. Another option, if nutrient loads were found to be particularly heavy from the golf course, would be alum or other chemical treatment.

**Natural Systems Issues**

The existing shorelines of the drainage features in Rogers Park are mowed to the water's edge and no littoral vegetation is allowed to grow. The planting of native vegetation will greatly improve the habitat values of the system. The use of alum treatment may not be permittable by the FDEP due to the close proximity to the dam and saline reaches of the lower Hillsborough River (and Tampa Bay).

| **Alternative: HRB A-2** | |
|---|---|
| Construction | $137,500.00 |
| Land Acquisition | $0 |
| Design/Permitting | $70,000.00 |
| **Total:** | **$207,500.00** |

### 13.3.6.2 Hillsborough River Above S-155 Subwatershed

Water Quantity LOS Deficiency

This watershed encompasses the main stem of the Hillsborough River between S-155 and Crystal Springs and the Corey Lake Isles subdivision (Figure 13.3.6.2.1). A large portion of the river is contained within the Lower Hillsborough Flood Detention Area (LHFDA) and Hillsborough River State Park. Upstream of the Hillsborough River State Park is approximately 3.0 miles of rural river system that receives inflows from Crystal Springs, the City of Zephyrhills, Big Ditch and Blackwater Creek. The only portion of this area for which the County's flood LOS can be applied realistically is the Cory Lake Isles area.

Water Quality LOS Deficiency

Based on pollutant loading modeling, these rural residential basins are designated as LOS D and have a moderate potential as a source of pollutants. Portions of the subwatershed lie outside of Hillsborough County, including parts of the city of Zephyrhills, much of which receives little to no water quality treatment. Limited area exists in Hillsborough County to provide significant treatment of the upstream area.

Natural Systems Deficiency

The natural systems evaluation score was A for this subwatershed due to a high percentage of existing non-fragmented natural habitat that also serves as a riparian buffer to the Hillsborough River. Much of the natural area is also under public ownership.

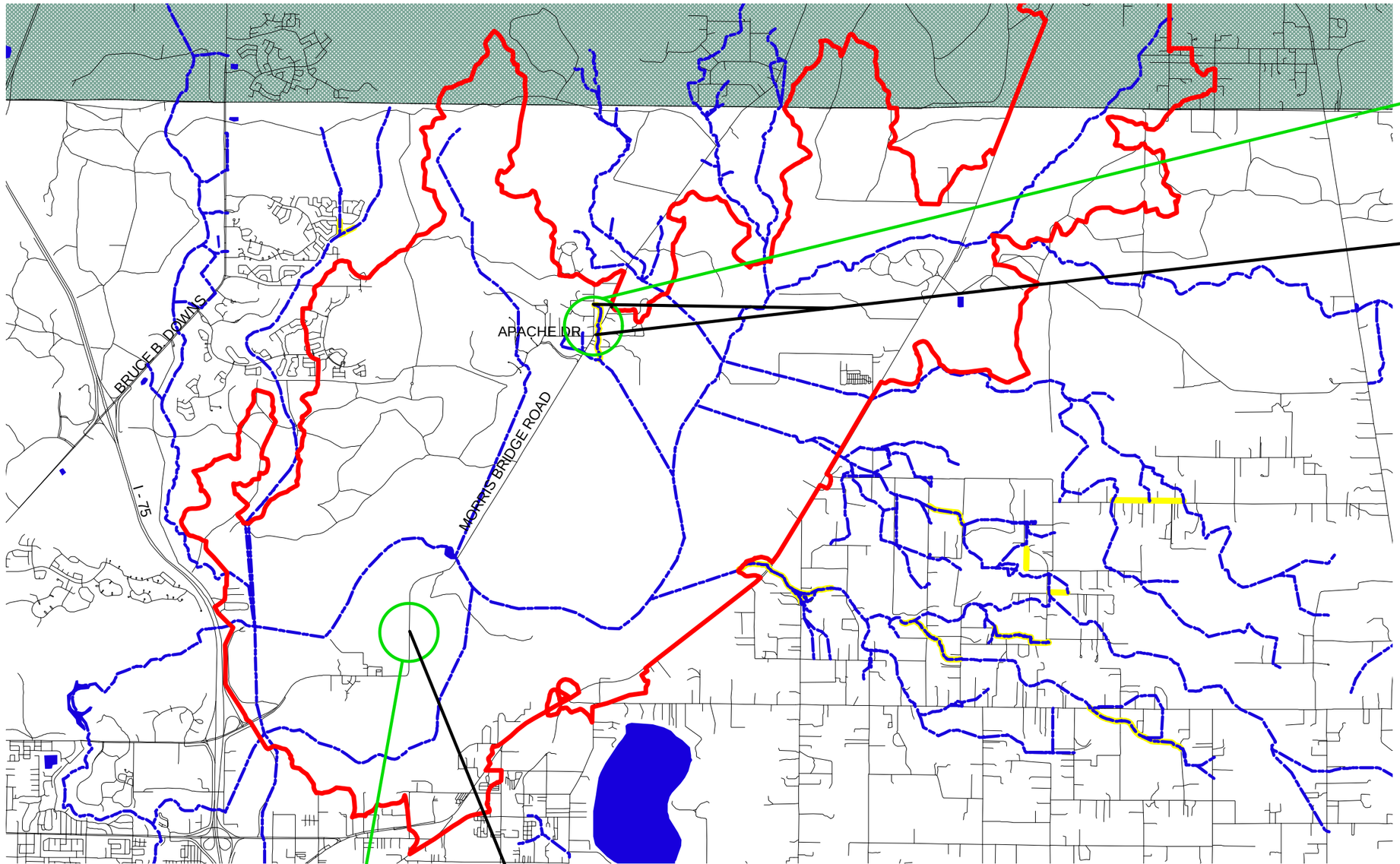
#### *Flooding Alternatives*

*Apache Road*

This area of the Hillsborough River subwatershed has a LOS of B resulting from the 25-year storm event in which there is flooding to a depth of 0.45 feet (0.13 m) over Apache Road. A long time Apache Road resident stated that the road floods once about every 10 years. The County accepts a minimal flooding depth of 0.45 feet (0.13 m) above the road crown before requiring any abatement or flood protection. However, the frequency of flooding reported by the resident was sufficient to develop an alternative should the County choose to correct the problem.

**Alternative HRA 1**

The alternative solution to flooding in this area is to maintain approximately 3000 feet (914 m) of channel from Apache Road to Branchton Church Road upstream of the Hillsborough River, add a 14” x 23” (like kind and size) culvert under Apache Road, and add a 34” x 53” (like kind and size) culvert under Morris Bridge Road.




# Hillsborough River Watershed Management Plan

**Figure 13.3.6.2.1**

**Hillsborough Above S-155 Subwatershed Alternatives Location Map**

**Water Quantity Issues**

Maintenance is necessary to reduce the severe friction factor in the channel caused by vegetation growth. Flooding is behind or upstream of the road, thus the culvert addition will increase conveyance at Apache Road and reduce the flood level. The culvert addition downstream at Morris Bridge Road is necessary to avoid any increase in downstream impacts resulting from the culvert addition at Apache Road. The system has its confluence with the Hillsborough River just downstream of Morris Bridge Road on public lands. The additional culverts will cause impacts (slightly higher peak water surface elevations) at the confluence, which would typically require attenuation. However, this alternative is predicated on the SWFWMD (the land owners) accepting the impacts as a cooperating agency whose interest is for the greater public benefit. In addition, the impacts are in a floodplain, no structures are threatened, and the degree of impact is minor and transient.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The removal of the existing vegetation may reduce nutrient uptake temporarily.

**Natural Systems Issues**

Portions of the existing channel has become overgrown with mature cypress, red maples and willows. Other portions support a mixture of desirable and undesirable herbaceous wetland species. The maintenance of this channel may be a permitting issue due to the maturity of the forested portions.

| **Alternative: HRA 1** | |
|---|---|
| Construction | $40,541.40 |
| Land Acquisition | $0 |
| Design/Permitting | $35,000.00 |
| **Total:** | **$75,541.40** |

*Morris Bridge Road*

The location in Figure 13.3.6.2.1 was identified by Hillsborough County Maintenance staff as severely overtopping during the El Nino event in 1998. It is characterized as a low “stretch” in the road of about 2000 feet (609 m). The overtopping was confirmed by a local resident who stated that the flooding was from the east from the Hillsborough River. Due to the roads close proximity to I-75 and its use by local residents as the only practical route out of the area, it was investigated for alternative development.

**Alternative HRA 2**

The alternative for flooding on the road is to raise it 2.5 feet (0.76 m) so that it is above the 100-year flood elevation of the Hillsborough River.

To account for the additional shoulder to meet County/DOT requirements, additional right-of-way will be required. No additional cross drains are proposed at this time however, a local runoff model developed for final design may reveal the need for some additional cross drain capacity.

**Water Quantity Issues**

Filling the 100-year floodplain could theoretically be identified as an issue in an ERP review process. Any requirement for 100-year floodplain compensation should be met by roadside excavation.

**Water Quality Issues**

This alternative will have no water quality impacts other than the potential for transient events involving elevated turbidity during construction. The proper use of erosion, sedimentation and turbidity controls will reduce the possibility of these effects. The removal of the existing vegetation may reduce nutrient uptake temporarily.

**Natural Systems Issues**

There are no anticipated natural systems impacts related to this project.

| **Alternative: HRA 2** | |
|---|---|
| Construction | $323,627.43 |
| Land Acquisition | $4,207.00 |
| Design/Permitting | $112,088.23 |
| **Total:** | **$435,715.65** |

## 13.4 Non-Structural Alternatives

In addition to the alternatives described above, several watershed planning activities are recommended to improve and/or protect the resources of the Hillsborough River.

- Implement low impact development standards for future developments. A model for low impact development has been developed for Prince George's County (Coffman et al., 1998) which integrates urban development with water quality, habitat, and flood protection. Low impact development (LID) improves stormwater management by changing conventional site designs to create environmentally functional landscapes that mimic natural watershed hydrologic functions (discharge, frequency, recharge and volume). The approach to accomplishing this includes minimizing impacts to the extent practicable by reducing imperviousness, conserving natural resources /ecosystems, maintaining natural drainage courses, reducing the use of pipes and minimizing clearing and grading. Also, detention and retention storage areas are dispersed throughout a site with the use of open swales, flatter slopes, rain gardens (bioretention) and rain barrels. Attempts to maintain predevelopment time of concentration values are accomplished by strategically routing flows to maintain travel time. Finally, property owners are encouraged to use effective pollution prevention measures and to maintain management measures.

- Review zoning plans and determine whether future land uses are compatible with the existing environment. Since the riparian zone has been shown to play an important role in protecting water quality, providing wildlife corridors, and providing flood attenuation, the density of development should be decreased with decreasing distance to riparian habitat. For example, future land uses could be restricted to low density residential adjacent to riparian corridors, increase to medium/high density outside of a 1000 ft. buffer along the corridor, followed by commercial/industrial outside a 2000 ft. buffer.

In conjunction with potential changes in zoning, the preservation of riparian habitats will also be critical to maintaining flood protection, water quality and natural systems within the Hillsborough River watershed. The water quality and natural systems alternatives map presented earlier in this chapter identifies potential riparian habitat preservation and restoration areas along the entire stream network of the Hillsborough River (shown in Figure 13.2.2). This map can be used as a tool to assess future projects that affect the riparian zone within a given tributary, as well as a goal for future protection of this important habitat.

Table 13.4.1 shows the rough estimated cost of land parcels within the 731.66-foot (223-meter) riparian buffer of the Hillsborough River and its major tributaries. The calculations were based on a 731.66-foot (223-meter) buffer of Hillsborough River Stream Network, 1995 Landuse (SWFWMD) and Hillsborough County Property data (2000 Hillsborough County Property Appraiser and Real Estate Departments). All conservation lands, residential/commercial (FLUCCS 1), transportation (FLUCCS 8), and streams and waterways (FLUCCS 5100) were excluded from the buffer. Parcels

whose average cost/acre was greater than $1,000,000 were also excluded to account for anomalous slivers in the GIS data, as well as compensation for the use of 1995 land use data and 2000 property values that may have resulted in inflated land values. The average just market value cost/acre is based on the value of all building and land of the parcels in the buffer. The total just market cost is the sum of the just market values for each parcel in the buffer. The average land cost/acre is based only on the land values of parcels in the buffer, and the total land cost is the sum of the land values for each parcel of land in the buffer. This analysis does not account for land acquisition based on not for fee or conservation easements.

**Table 13.4.1 Estimated cost for land within the 223-meter riparian buffer.**

| Subwatershed | Acres in 223 m Buffer | Average Just Market Value Cost/Acre | Total Just Market Cost | Average Land Cost/Acre | Total Land Cost |
|---|---|---|---|---|---|
| Basset Branch | 835.85 | 36,483.88 | 5,053,374.91 | 35,260.54 | 4,894,797.16 |
| Big Ditch | 188.95 | 1,005.57 | 189,997.42 | 1,005.57 | 189,997.42 |
| Blackwater Creek | 2,790.72 | 6,535.18 | 4,745,733.63 | 3,955.78 | 3,880,524.51 |
| Clay Gully East | 2,272.61 | 15,857.14 | 12,442,767.54 | 7,531.04 | 8,945,016.25 |
| Clay Gully West | 981.82 | 234,267.22 | 17,406,471.31 | 82,427.77 | 8,450,059.31 |
| Depressions | 52.61 | 53,249.80 | 1,079,893.83 | 33,259.01 | 555,703.56 |
| East Canal | 1,123.89 | 23,130.87 | 9,347,386.17 | 10,452.89 | 6,329,859.01 |
| Falkenburg | 298.97 | 65,831.17 | 20,230,201.70 | 32,626.00 | 9,029,722.88 |
| Hillsborough River above S-155 | 2,041.01 | 161,801.87 | 18,702,246.44 | 102,845.91 | 16,482,452.06 |
| Hillsborough River below S-155 | 760.91 | 75,273.41 | 48,594,576.32 | 34,081.64 | 23,225,688.78 |
| Hollomans Branch | 3,770.42 | 18,850.07 | 26,912,298.78 | 7,975.77 | 17,502,502.48 |
| Itchepackesassa | 920.95 | 36,642.56 | 8,153,063.85 | 28,909.78 | 6,627,446.51 |
| Mango | 1,133.92 | 171,305.01 | 48,217,891.49 | 66,997.07 | 24,159,065.35 |
| New River | 1,098.01 | 4,108.86 | 4,179,348.88 | 3,572.33 | 3,857,557.78 |
| Tampa Bypass Canal | 225.96 | 94,049.08 | 7,479,792.31 | 27,685.45 | 3,841,822.58 |
| Tiger Creek | 473.81 | 14,251.30 | 3,551,172.57 | 7,072.76 | 2,345,105.31 |
| Trout Creek | 1,054.41 | 236,695.35 | 100,805,980.12 | 93,863.15 | 40,787,481.27 |
| Two Hole Branch | 3,380.79 | 8,069.78 | 8,224,235.92 | 4,027.43 | 6,406,621.49 |
| Vandenburg | 472.21 | 18,464.87 | 10,391,484.96 | 13,231.06 | 9,120,048.85 |
| Williams | 1,426.76 | 43,666.01 | 18,016,351.06 | 18,390.85 | 12,505,711.04 |
| **TOTAL** | **25,304.56** | | **$373,724,269.21** | | **$209,137,183.60** |

A more concerted effort to acquire riparian and floodplain habitats should be implemented either through outright acquisition or less than fee acquisition. Less-than-fee involves the acquisition of limited interests in property, as opposed to outright, or fee simple, purchase. Conservation easements are probably the best known example of this type of protection. By purchasing such an easement, the County would obtain and retire certain rights from the landowner, such as the right to erect structures, clear native vegetation, dredge/fill, or conduct other activities inconsistent with the conservation and protection of natural resources on the property.

Less-than-fee methods may provide several benefits since only certain rights associated with a property are acquired, resource protection is less costly, and the protection of more land can be accomplished with limited funds. Since less-than-fee lands continue in private ownership, they remain on the local property tax rolls. Also, the County would not incur the costs of land management, since management would remain the responsibility of the landowner. Potential disadvantages of less-than-fee methods include less control over the use and management of acquired properties, the necessity to monitor and enforce less-than-fee agreements, the possibility of divergent goals when properties are sold, fewer opportunities for long-term restoration, and reduced or prohibited public access for recreation.

Less-than-fee techniques can be used to supplement fee simple land acquisition; however, pristine lands with the most sensitive natural habitat or complex management requirements should be acquired using fee simple purchase. Given the numerous landowners within each of the various subwatersheds, less-than-fee acquisition may be a viable alternative to preserve the remaining natural riparian habitat in the watershed and may also provide opportunities for additional restoration (e.g., native vegetation plantings, hydrologic restoration/maintenance).

## 13.5 Conclusions

Many alternatives have been developed in the previous sections based on extensive data collection and analyses summarized in Chapters 1-12. The following chapters of the plan will discuss the following:

- a summary of the format, items discussed, and feedback received from the second public meeting,
- a list of preferred alternatives developed from an evaluation matrix based on anticipated flood protection, water quality, and natural systems benefits, costs, feedback from the second public meeting, and other agency reviews and comments,
- recommended actions, and
- monitoring and maintenance plans for the watershed.

# Appendix H-1

Cost estimates for flooding alternatives

**Hillsborough River Watershed Management Plan**
**Blackwater Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: BLK 1** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $20,000.00 |
| 120-1 | Excavation Regular | CY | 193600 | 3.50 | $677,600.00 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 200 | 493.40 | $98,680.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 43560 | 3.00 | $130,680.00 |
| **Total (Construction)** | | | | | $926,960.00 |
| **25% construction contingencies** | | | | | $231,740.00 |
| | | | | | **$1,158,700.00** |
| **Engineering/design services** | | | | | $173,805.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 30 | 4709.53 | $141,285.90 |
| **Overall Total** | | | | | **$1,488,790.90** |

**Hillsborough River Watershed Management Plan**
**Blackwater Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: BLK 1 (With Polk Co. Project)** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $15,000.00 |
| 120-1 | Excavation Regular | CY | 322667 | 3.50 | $1,129,334.50 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 200 | 493.40 | $98,680.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 72600 | 3.00 | $217,800.00 |
| **Total (Construction)** | | | | | $1,460,814.50 |
| **25% construction contingencies** | | | | | $365,203.63 |
| | | | | | **$1,826,018.13** |
| **Engineering/design services** | | | | | $273,902.72 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 50 | 4709.53 | $235,476.50 |
| **Overall Total** | | | | | **$2,350,397.34** |

**Hillsborough River Watershed Management Plan**
**East Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: ECN 1A** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $2,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 160 | 9.15 | $1,464.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 2771 | 17.82 | $49,379.22 |
| 430-142-105 | Pipe Ellip Conc Culv (Class HE III) (29"X45" CD) | LF | 320 | 65.50 | $20,960.00 |
| 430-982-405 | Mitered End Section (ELLIP PIPE) (29" X 45" CD) | EA | 8 | 1,059.00 | $8,472.00 |
| **Total (Construction)** | | | | | $82,275.22 |
| **25% construction contingencies** | | | | | $20,568.81 |
| | | | | | **$102,844.03** |
| **Engineering/design services** | | | | | $41,137.61 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$158,981.64** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**East Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: ECN 1B** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $2,000.00 |
| 430-142-105 | Pipe Ellip Conc Culv (Class III) (36" CD) | LF | 2325 | 40.00 | $93,000.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 6 | 990.37 | $5,942.22 |
| **Total (Construction)** | | | | | $100,942.22 |
| **25% construction contingencies** | | | | | $25,235.56 |
| | | | | | **$126,177.78** |
| **Engineering/design services** | | | | | $50,471.11 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$191,648.89** |

**Hillsborough River Watershed Management Plan**
**East Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: ECN 2** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 40 | 9.15 | $366.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 1467 | 17.82 | $26,141.94 |
| 430-128-208 | Alum Type 2 Steel SRP Culv Arch (GAUGE 12) (68"X43") | LF | 40 | 122.57 | $4,902.80 |
| 430-984-509 | Mit End Sec (Alum Steel SRP Arch) (Gauge 12) (68"X43") | EA | 2 | 2,275.00 | $4,550.00 |
| **Total (Construction)** | | | | | $37,560.74 |
| **25% construction contingencies** | | | | | $9,390.19 |
| | | | | | **$46,950.93** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$81,950.93** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Two Hole Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: TWH 1** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $10,000.00 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation Regular | CY | 36322 | 3.50 | $127,127.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 920 | 17.82 | $16,394.40 |
| 160-4 | Type B Stabilization | SY | 328 | 1.36 | $446.08 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 430-142-329 | Concrete Pipe | LF | 141 | 51.01 | $7,192.41 |
| 570-2 | Seed and Mulch | SY | 223 | 0.10 | $22.30 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 15 | 1.36 | $20.40 |
| Ayres Estimate | Ditch Maintenance | LF | 4140 | 0.92 | $3,808.80 |
| Ayres Estimate | Littoral Shelf Plants | EA | 10666 | 3.00 | $31,998.00 |
| **Total (Construction)** | | | | | $205,088.93 |
| **25% construction contingencies** | | | | | $51,272.23 |
| | | | | | **$256,361.16** |
| **Engineering/design services** | | | | | $76,908.35 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 7.5 | 5499.21 | $41,244.08 |
| **Overall Total** | | | | | **$389,504.06** |

**Hillsborough River Watershed Management Plan**
**Two Hole Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: TWH 2** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $15,000.00 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation Regular | CY | 59855 | 3.50 | $209,492.50 |
| 160-4 | Type B Stabilization | SY | 660 | 1.36 | $897.60 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 20 | 501.34 | $10,026.80 |
| 430-142-329 | Concrete Pipe (Class III) | LF | 80 | 40.00 | $3,200.00 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Littoral Shelf Plants | EA | 23000 | 3.00 | $69,000.00 |
| **Total (Construction)** | | | | | $318,861.38 |
| **25% construction contingencies** | | | | | $79,715.35 |
| | | | | | **$398,576.73** |
| **Engineering/design services** | | | | | $119,573.02 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 10 | 5499.21 | $54,992.10 |
| **Overall Total** | | | | 5499.21 | **$588,141.84** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 2** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 20 | 9.15 | $183.00 |
| 120-1 | Excavation Regular | CY | 75827 | 3.50 | $265,394.50 |
| 430-142-105 | Pipe Ellip Conc Culv (Class HE III) (29"X45" CD) | LF | 40 | 65.50 | $2,620.00 |
| 430-982-405 | Mitered End Section (ELLIP PIPE) (29" X 45" CD) | EA | 2 | 1,059.00 | $2,118.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 43560 | 3.00 | $130,680.00 |
| **Total (Construction)** | | | | | $415,995.50 |
| **25% construction contingencies** | | | | | $103,998.88 |
| | | | | | **$519,994.38** |
| **Engineering/design services** | | | | | $129,998.59 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 30 | 4709.53 | $141,285.90 |
| **Overall Total** | | | | | **$806,278.87** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 3A** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation Regular | CY | 48400 | 3.50 | $169,400.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 14520 | 3.00 | $43,560.00 |
| **Total (Construction)** | | | | | $217,960.00 |
| **25% construction contingencies** | | | | | $54,490.00 |
| | | | | | **$272,450.00** |
| **Engineering/design services** | | | | | $81,735.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 10 | 4709.53 | $47,095.30 |
| **Overall Total** | | | | | **$416,280.30** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 3B** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 100 | 9.15 | $915.00 |
| 120-1 | Excavation Regular | CY | 129067 | 3.50 | $451,734.50 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 20 | 501.34 | $10,026.80 |
| 410-70-084 | Precast Concrete Box Culvert (Various Sizes) | LF | 100 | 500.00 | $50,000.00 |
| Ayres Estimate | Ditch Maintenance | LF | 3512 | 0.92 | $3,231.04 |
| Ayres Estimate | Littoral Shelf Plants | EA | 29040 | 3.00 | $87,120.00 |
| **Total (Construction)** | | | | | $618,027.34 |
| **25% construction contingencies** | | | | | $154,506.84 |
| | | | | | **$772,534.18** |
| **Engineering/design services** | | | | | $193,133.54 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 20 | 4709.53 | $94,190.60 |
| **Overall Total** | | | | | **$1,074,858.32** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 3C** | | | | | |
| 101-1 | Mobilization $150,000 - $199,999 | LS | 1 | 2,200.00 | $2,200.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 100 | 9.15 | $915.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 4750 | 17.82 | $84,645.00 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 20 | 501.34 | $10,026.80 |
| 410-70-084 | Precast Concrete Box Culvert (Various Sizes) | LF | 100 | 500.00 | $50,000.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $147,786.80 |
| **25% construction contingencies** | | | | | $36,946.70 |
| | | | | | **$184,733.50** |
| **Engineering/design services** | | | | | $73,893.40 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$273,626.90** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 6A** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation Regular | CY | 96800 | 3.50 | $338,800.00 |
| Ayres Estimate | Ditch Maintenance | LF | 3512 | 0.92 | $3,231.04 |
| Ayres Estimate | Littoral Shelf Plants | EA | 21780 | 3.00 | $65,340.00 |
| **Total (Construction)** | | | | | $422,371.04 |
| **25% construction contingencies** | | | | | $105,592.76 |
| | | | | | **$527,963.80** |
| **Engineering/design services** | | | | | $131,990.95 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 15 | 4709.53 | $70,642.95 |
| **Overall Total** | | | | | **$745,597.70** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 6B** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation Regular | CY | 145200 | 3.50 | $508,200.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 43560 | 3.00 | $130,680.00 |
| **Total (Construction)** | | | | | $653,880.00 |
| **25% construction contingencies** | | | | | $163,470.00 |
| | | | | | **$817,350.00** |
| **Engineering/design services** | | | | | $204,337.50 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 30 | 4709.53 | $141,285.90 |
| **Overall Total** | | | | | **$1,177,973.40** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 6C** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation Regular | CY | 80667 | 3.50 | $282,334.50 |
| Ayres Estimate | Littoral Shelf Plants | EA | 72600 | 3.00 | $217,800.00 |
| **Total (Construction)** | | | | | $515,134.50 |
| **25% construction contingencies** | | | | | $128,783.63 |
| | | | | | **$643,918.13** |
| **Engineering/design services** | | | | | $160,979.53 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 50 | 9207.42 | $460,371.00 |
| **Overall Total** | | | | | **$1,280,268.66** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 7A** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation, Regular | CY | 82 | 9.42 | $772.44 |
| 160-4 | Type B Stabilization | SY | 328 | 1.36 | $446.08 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 425-1-553 | Inlet (DT BOT)(TYPE E)(J BOT, <10') | EA | 1 | 2,802.22 | $2,802.22 |
| 430-12-329 | Pipe Conc Culv (CLASS III) (24"CD) | LF | 25 | 51.01 | $1,275.25 |
| 430-982-229 | Mitered End Section (CONC. PIPE ROUND) (24" CD) | EA | 2 | 750.00 | $1,500.00 |
| 570-2 | Seed and Mulch | SY | 223 | 0.10 | $22.30 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 15 | 1.36 | $20.40 |
| **Total (Construction)** | | | | | $16,418.23 |
| **25% construction contingencies** | | | | | $4,104.56 |
| | | | | | **$20,522.79** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$55,522.79** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 5A** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 74 | 9.15 | $677.10 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation Regular | CY | 246 | 9.42 | $2,317.32 |
| 160-4 | Type B Stabilization | SY | 984 | 1.36 | $1,338.24 |
| 285-701-001 | Base optional (Base Group 01) | SY | 180 | 7.43 | $1,337.40 |
| 285-709-990 | Base optional (Base Group 09) | SY | 411 | 5.96 | $2,449.56 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 24 | 1.03 | $24.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 570 | 6.67 | $3,801.90 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 24 | 55.21 | $1,325.04 |
| 430-12-341 | Pipe Conc Culv (CLASS III) (48" CD) | LF | 111 | 94.67 | $10,508.37 |
| 430-982-241 | Mitered End Section (CONC. PIPE ROUND) (48" CD) | EA | 6 | 1,371.22 | $8,227.32 |
| 570-2 | Seed and Mulch | SY | 669 | 0.10 | $66.90 |
| 570-9 | Water for grass | MG | 6 | 50.00 | $300.00 |
| 575-5 | Sodding | SY | 45 | 1.36 | $61.20 |
| **Total (Construction)** | | | | | $39,035.07 |
| **25% construction contingencies** | | | | | $9,758.77 |
| | | | | | **$48,793.84** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$83,793.84** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 5B** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 74 | 9.15 | $677.10 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation Regular | CY | 14766 | 9.42 | $139,095.72 |
| 160-4 | Type B Stabilization | SY | 984 | 1.36 | $1,338.24 |
| 285-701-001 | Base optional (Base Group 01) | SY | 180 | 7.43 | $1,337.40 |
| 285-709-990 | Base optional (Base Group 09) | SY | 411 | 5.96 | $2,449.56 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 24 | 1.03 | $24.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 570 | 6.67 | $3,801.90 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 24 | 55.21 | $1,325.04 |
| 430-12-341 | Pipe Conc Culv (CLASS III) (48" CD) | LF | 111 | 94.67 | $10,508.37 |
| 430-982-241 | Mitered End Section (CONC. PIPE ROUND) (48" CD) | EA | 6 | 1,371.22 | $8,227.32 |
| 570-2 | Seed and Mulch | SY | 669 | 0.10 | $66.90 |
| 570-9 | Water for grass | MG | 6 | 50.00 | $300.00 |
| 575-5 | Sodding | SY | 45 | 1.36 | $61.20 |
| **Total (Construction)** | | | | | $179,213.47 |
| **25% construction contingencies** | | | | | $44,803.37 |
| | | | | | **$224,016.84** |
| **Engineering/design services** | | | | | $89,606.74 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 1 | 6979.67 | $6,979.67 |
| **Overall Total** | | | | | **$335,603.24** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 1A** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $10,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 74 | 9.15 | $677.10 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 110-1-1 | Clearing & Grubbing | AC | 6 | 14,962.12 | $89,772.72 |
| 120-1 | Excavation Regular | CY | 16046 | 3.50 | $56,161.00 |
| 160-4 | Type B Stabilization | SY | 3936 | 1.36 | $5,352.96 |
| 285-701-001 | Base optional (Base Group 01) | SY | 720 | 7.43 | $5,349.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 1644 | 5.96 | $9,798.24 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 96 | 1.03 | $98.88 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 2280 | 6.67 | $15,207.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 96 | 55.21 | $5,300.16 |
| 430-12-338 | Pipe Conc. Culv (CLASS III) (36" CD) | LF | 48 | 40.00 | $1,920.00 |
| 430-12-341 | Pipe Conc Culv (CLASS III) (48" CD) | LF | 410 | 94.67 | $38,814.70 |
| 430-12-342 | Pipe Conc. Culv (CLASS III) (54" CD) | LF | 40 | 91.00 | $3,640.00 |
| 430-128-244 | Aluminum Type II Steel SRP Culvert (GAUGE 12) (66") | LF | 96 | 137.30 | $13,180.80 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 4 | 990.37 | $3,961.48 |
| 430-982-241 | Mitered End Section (CONC. PIPE ROUND) (48" CD) | EA | 20 | 1,371.22 | $27,424.40 |
| 430-982-242 | Mitered End Section (CONC. PIPE ROUND) (54" CD) | EA | 4 | 2,740.00 | $10,960.00 |
| 430-984-344 | Mit End Sec (Alum TYPE 2 STEEL SRP) (GAUGE 12) (66") | EA | 8 | 3,150.00 | $25,200.00 |
| 570-2 | Seed and Mulch | SY | 2676 | 0.10 | $267.60 |
| 570-9 | Water for grass | MG | 24 | 50.00 | $1,200.00 |
| 575-5 | Sodding | SY | 180 | 1.36 | $244.80 |
| Ayres Estimate | Ditch Maintenance | LF | 3472.8 | 0.92 | $3,194.98 |
| **Total (Construction)** | | | | | $332,727.02 |
| **25% construction contingencies** | | | | | $83,181.75 |
| | | | | | **$415,908.77** |
| **Engineering/design services** | | | | | $124,772.63 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$555,681.40** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 4A** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation, Regular | CY | 82 | 9.42 | $772.44 |
| 120-3 | Excavation - Lateral Ditch | CY | 1134 | 17.82 | $20,207.88 |
| 160-4 | Type B Stabilization | SY | 328 | 1.36 | $446.08 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 425-1-553 | Inlet (DT BOT)(TYPE E)(J BOT, <10') | EA | 1 | 2,802.22 | $2,802.22 |
| 430-12-329 | Pipe Conc Culv (CLASS III) (24"CD) | LF | 50 | 51.01 | $2,550.50 |
| 430-982-229 | Mitered End Section (CONC. PIPE ROUND) (24" CD) | EA | 2 | 750.00 | $1,500.00 |
| 570-2 | Seed and Mulch | SY | 223 | 0.10 | $22.30 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 15 | 1.36 | $20.40 |
| **Total (Construction)** | | | | | $38,001.36 |
| **25% construction contingencies** | | | | | $9,500.34 |
| | | | | | **$47,501.70** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$82,501.70** |

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA 1B** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| Ayres Estimate | Ditch Maintenance | LF | 5495.3 | 0.92 | $5,055.68 |
| **Total (Construction)** | | | | | $6,555.68 |
| **25% construction contingencies** | | | | | $1,638.92 |
| | | | | | **$8,194.60** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$43,194.60** |

**Hillsborough River Watershed Management Plan**
**Vandenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative VBA 1** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 1020-1~ | Pipe Removal (18" or less) | LF | 40 | 9.15 | $365.96 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation, Regular | CY | 82 | 9.42 | $772.44 |
| 160-4 | Type B Stabilization | SY | 328 | 1.36 | $446.08 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 425-1551 | Inlets (Ditch Bottom, Type E, <10') | EA | 1 | 2,250.00 | $2,250.00 |
| 430-12-338 | Pipe Conc Culv (Class III) (36" CD) | LF | 40 | 40.00 | $1,600.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 2 | 990.37 | $1,980.74 |
| 570-2 | Seed and Mulch | SY | 223 | 0.10 | $22.30 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 15 | 1.36 | $20.40 |
| **Total (Construction)** | | | | | $17,037.46 |
| **25% construction contingencies** | | | | | $4,259.37 |
| | | | | | **$21,296.83** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$56,296.83** |

~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Vandenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative VBA 2A** | | | | | |
| 101-1 | Mobilization $50,000 - $99,999 | LS | 1 | 1,800.00 | $1,600.00 |
| 1020-1~ | Pipe Removal (18" or less) | LF | 64 | 9.15 | $585.60 |
| 1020-1**~ | Pipe Removal (>18") | LF | 60.7 | 9.15 | $555.41 |
| 102-1 | Maintenance of Traffic | LS | 1 | 10,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 164 | 9.42 | $1,544.88 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 430-12-333 | Pipe Conc Culv (CLASS III) (30" CD) | LF | 121.4 | 40.00 | $4,856.00 |
| 430-12-338 | Pipe Conc Culv (Class III) (36" CD) | LF | 40 | 40.00 | $1,600.00 |
| 430-142-105 | Pipe Ellip Conc Culv (Class HE III) (29"X45" CD) | LF | 24 | 65.50 | $1,572.00 |
| 430-982-233 | Mitered End Section (CONC. PIPE ROUND) (30" CD) | EA | 8 | 776.41 | $6,211.28 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 2 | 990.37 | $1,980.74 |
| 430-982-405 | Mitered End Section (ELLIP PIPE) (29" X 45" CD) | EA | 2 | 1,059.00 | $2,118.00 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Ditch Maintenance | LF | 5475 | 0.92 | $5,037.00 |
| **Total (Construction)** | | | | | $44,797.55 |
| **25% construction contingencies** | | | | | $11,199.39 |
| | | | | | **$55,996.93** |
| **Engineering/design services** | | | | | $22,398.77 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$93,395.70** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Vandenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative VBA 2B** | | | | | |
| | Weir Construction | | | | |
| 101-1 | Mobilization $50,000 - $99,999 | LS | 1 | 1,800.00 | $1,800.00 |
| 120-1 | Excavation, Regular | CY | 100 | 9.42 | $942.00 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| **Total (Construction)** | | | | | $52,082.00 |
| **25% construction contingencies** | | | | | $13,020.50 |
| | | | | | **$65,102.50** |
| **Engineering/design services** | | | | | $26,041.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$106,143.50** |

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: WRA 1** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 269 | 9.15 | $2,461.35 |
| 102-1 | Maintenance of Traffic | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation, Regular | CY | 246 | 9.42 | $2,317.32 |
| 160-4 | Type B Stabilization | SY | 984 | 1.36 | $1,338.24 |
| 285-701-001 | Base optional (Base Group 01) | SY | 180 | 7.43 | $1,337.40 |
| 285-709-990 | Base optional (Base Group 09) | SY | 411 | 5.96 | $2,449.56 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 24 | 1.03 | $24.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 570 | 6.67 | $3,801.90 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 24 | 55.21 | $1,325.04 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 40 | 501.34 | $20,053.60 |
| 410-70-066 | Precast Concrete Box Culvert (Various Sizes) | LF | 400 | 500.00 | $200,000.00 |
| 570-2 | Seed and Mulch | SY | 669 | 0.10 | $66.90 |
| 570-9 | Water for grass | MG | 6 | 50.00 | $300.00 |
| 575-5 | Sodding | SY | 45 | 1.36 | $61.20 |
| Ayres Estimate | Ditch Maintenance | LF | 2065 | 0.92 | $1,899.80 |
| **Total (Construction)** | | | | | $257,437.03 |
| **25% construction contingencies** | | | | | $64,359.26 |
| | | | | | **$321,796.29** |
| **Engineering/design services** | | | | | $96,538.89 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$433,335.17** |

~ FDOT Item

**Same Item for <18" Pipe

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: WRA 2** | | | | | |
| 101-1 | Mobilization $50,000 - $99,999 | LS | 1 | 1,800.00 | $1,800.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 114 | 9.15 | $1,043.10 |
| 102-1 | Maintenance of Traffic | LS | 2 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 164 | 9.42 | $1,544.88 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 10 | 501.34 | $5,013.40 |
| 410-70-065 | Precast Concrete Box Culvert (Various Sizes) | LF | 35 | 500.00 | $17,500.00 |
| 430-12-338 | Pipe Conc Culv (Class III) (36" CD) | LF | 44 | 40.00 | $1,760.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 2 | 990.37 | $1,980.74 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| **Total (Construction)** | | | | | $47,778.76 |
| **25% construction contingencies** | | | | | $11,944.69 |
| | | | | | **$59,723.45** |
| **Engineering/design services** | | | | | $23,889.38 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$98,612.83** |

~ FDOT Item

**Same Item for <18" Pipe

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: WRA 3** | | | | | |
| 101-1 | Mobilization $50,000 - $99,999 | LS | 1 | 1,800.00 | $1,600.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 59 | 9.15 | $539.85 |
| 102-1 | Maintenance of Traffic | LS | 2 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 164 | 9.42 | $1,544.88 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 10 | 501.34 | $5,013.40 |
| 410-70-64 | Precast Conc Box Culvert (Various Sizes) | LF | 28 | 500.00 | $14,000.00 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Ditch Maintenance | LF | 1040 | 0.92 | $956.80 |
| **Total (Construction)** | | | | | $40,791.57 |
| **25% construction contingencies** | | | | | $10,197.89 |
| | | | | | **$50,989.46** |
| **Engineering/design services** | | | | | $20,395.79 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$86,385.25** |

~ FDOT Item

**Same Item for <18" Pipe

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: WRA 4** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 59 | 9.15 | $539.85 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation, Regular | CY | 82 | 9.42 | $772.44 |
| 160-4 | Type B Stabilization | SY | 328 | 1.36 | $446.08 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 10 | 501.34 | $5,013.40 |
| 410-70-64 | Precast Conc Box Culvert (Various Sizes) | LF | 28 | 500.00 | $14,000.00 |
| 570-2 | Seed and Mulch | SY | 223 | 0.10 | $22.30 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 15 | 1.36 | $20.40 |
| **Total (Construction)** | | | | | $30,494.01 |
| **25% construction contingencies** | | | | | $7,623.50 |
| | | | | | **$38,117.51** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$73,117.51** |

~ FDOT Item

**Same Item for <18" Pipe

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: WRA 5** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $2,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 59 | 9.15 | $539.85 |
| 102-1 | Maintenance of Traffic | LS | 3 | 5,000.00 | $15,000.00 |
| 120-1 | Excavation, Regular | CY | 246 | 9.42 | $2,317.32 |
| 160-4 | Type B Stabilization | SY | 984 | 1.36 | $1,338.24 |
| 285-701-001 | Base optional (Base Group 01) | SY | 180 | 7.43 | $1,337.40 |
| 285-709-990 | Base optional (Base Group 09) | SY | 411 | 5.96 | $2,449.56 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 24 | 1.03 | $24.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 570 | 6.67 | $3,801.90 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 24 | 55.21 | $1,325.04 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 20 | 501.34 | $10,026.80 |
| 410-70-64 | Precast Conc Box Culvert (Various Sizes) | LF | 135 | 500.00 | $67,500.00 |
| 430-14-329 | Pipe Conc. Culv (CLASS III) (24" CD) | LF | 30 | 51.01 | $1,530.30 |
| 430-982-229 | Mitered End Section (CONC. PIPE ROUND) (24" CD) | EA | 2 | 750.00 | $1,500.00 |
| 570-2 | Seed and Mulch | SY | 669 | 0.10 | $66.90 |
| 570-9 | Water for grass | MG | 6 | 50.00 | $300.00 |
| 575-5 | Sodding | SY | 45 | 1.36 | $61.20 |
| Ayres Estimate | Ditch Maintenance | LF | 1960 | 0.92 | $1,803.20 |
| **Total (Construction)** | | | | | $112,922.43 |
| **25% construction contingencies** | | | | | $28,230.61 |
| | | | | | **$141,153.04** |
| **Engineering/design services** | | | | | $56,461.22 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$212,614.25** |

~ FDOT Item

**Same Item for <18" Pipe

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 1** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $20,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 100 | 9.15 | $915.00 |
| 160-4 | Type B Stabilization | SY | 327 | 1.36 | $444.72 |
| 285-701-001 | Base optional (Base Group 01) | SY | 60 | 7.43 | $445.80 |
| 285-709-990 | Base optional (Base Group 09) | SY | 137 | 5.96 | $816.52 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 8 | 1.03 | $8.24 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 190 | 6.67 | $1,267.30 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 8 | 55.21 | $441.68 |
| 570-2 | Seed and Mulch | SY | 275 | 0.10 | $27.50 |
| 570-9 | Water for grass | MG | 2 | 50.00 | $100.00 |
| 575-5 | Sodding | SY | 35 | 1.36 | $47.60 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 4 | 501.34 | $2,005.36 |
| 410-70-054 | Precast Concrete Box Culvert (Various Sizes) | LF | 365 | $500.00 | $182,500.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 36340 | 3.00 | $109,020.00 |
| **Total (Construction)** | | | | | $372,379.72 |
| **25% construction contingencies** | | | | | $93,094.93 |
| | | | | | **$465,474.65** |
| **Engineering/design services** | | | | | $139,642.40 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 0 | 6129.86 | $0.00 |
| **Overall Total** | | | | | **$605,117.05** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 4** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation, Regular | CY | 129067 | 3.50 | $451,734.50 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 29040 | 3.00 | $87,120.00 |
| **Total (Construction)** | | | | | $603,194.50 |
| **25% construction contingencies** | | | | | $150,798.63 |
| | | | | | **$753,993.13** |
| **Engineering/design services** | | | | | $165,958.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 20 | 4155.5 | $83,110.00 |
| **Overall Total** | | | | | **$1,018,061.13** |

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 2** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $15,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 200 | 9.15 | $1,830.00 |
| 120-1 | Excavation, Regular | CY | 48342 | 3.50 | $169,197.00 |
| 160-4 | Type B Stabilization | SY | 984 | 1.36 | $1,338.24 |
| 285-701-001 | Base optional (Base Group 01) | SY | 180 | 7.43 | $1,337.40 |
| 285-709-990 | Base optional (Base Group 09) | SY | 421 | 5.96 | $2,509.16 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 24 | 1.03 | $24.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 576 | 6.67 | $3,841.92 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 24 | 55.21 | $1,325.04 |
| 570-2 | Seed and Mulch | SY | 669 | 0.10 | $66.90 |
| 570-9 | Water for grass | MG | 6 | 50.00 | $300.00 |
| 575-5 | Sodding | SY | 44 | 1.36 | $59.84 |
| 102-1 | Maintenance of Traffic | LS | 3 | 5,000.00 | $15,000.00 |
| 400-1-2 | Concrete Class I ( ENDWALLS) | CY | 40 | 501.34 | $20,053.60 |
| 410-70-054 | Precast Concrete Box Culvert (Various Sizes) | LF | 82 | $500.00 | $41,000.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 15079 | 3.00 | $45,237.00 |
| **Total (Construction)** | | | | | $318,120.82 |
| **25% construction contingencies** | | | | | $79,530.21 |
| | | | | | **$397,651.03** |
| **Engineering/design services** | | | | | $119,226.45 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 7.5 | 6129.86 | $45,973.95 |
| **Overall Total** | | | | | **$577,851.43** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 3** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $2,000.00 |
| 430-142-105 | Pipe Ellip Conc Culv (Class III) (24" CD) | LF | 80 | 40.00 | $3,200.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (24" CD) | EA | 4 | 990.37 | $3,961.48 |
| 570-2 | Seed and Mulch | SY | 120 | 0.10 | $12.00 |
| 570-9 | Water for grass | MG | 14 | 50.00 | $700.00 |
| 575-5 | Sodding | SY | 45 | 1.36 | $61.20 |
| **Total (Construction)** | | | | | $9,934.68 |
| **25% construction contingencies** | | | | | $2,781.71 |
| | | | | | **$12,716.39** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$47,716.39** |

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 5** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $15,000.00 |
| 120-1 | Excavation, Regular | CY | 129067 | 3.50 | $451,734.50 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 29040 | 3.00 | $87,120.00 |
| **Total (Construction)** | | | | | $603,194.50 |
| **25% construction contingencies** | | | | | $150,798.63 |
| | | | | | **$753,993.13** |
| **Engineering/design services** | | | | | $165,958.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 20 | 6129 | $122,580.00 |
| **Overall Total** | | | | | **$1,057,531.13** |

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGE 6A** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $20,000.00 |
| 120-1 | Excavation, Regular | CY | 193600 | 3.50 | $677,600.00 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 43560 | 3.00 | $130,680.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 3556 | 17.82 | $63,367.92 |
| **Total (Construction)** | | | | | $940,987.92 |
| **25% construction contingencies** | | | | | $235,246.98 |
| | | | | | **$1,176,234.90** |
| **Engineering/design services** | | | | | $176,435.24 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 30 | 4155.5 | $124,665.00 |
| **Overall Total** | | | | | **$1,492,335.14** |
| | | | | | |
| | | | | | |
| **Alternative: CGE 6B** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $20,000.00 |
| 120-1 | Excavation, Regular | CY | 193600 | 3.50 | $677,600.00 |
| 400-1-15 | Concrete Class I (Miscellaneous) | CY | 100 | 493.40 | $49,340.00 |
| Ayres Estimate | Littoral Shelf Plants | EA | 43560 | 3.00 | $130,680.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 3556 | 17.82 | $63,367.92 |
| **Total (Construction)** | | | | | $940,987.92 |
| **25% construction contingencies** | | | | | $235,246.98 |
| | | | | | **$1,176,234.90** |
| **Engineering/design services** | | | | | $190,133.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 30 | 6129 | $183,863.70 |
| **Overall Total** | | | | | **$1,565,231.60** |

**Hillsborough River Watershed Management Plan**
**Mango Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: MGA 1A** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $10,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 500 | 9.15 | $4,575.00 |
| 102-1 | Maintenance of Traffic | LS | 2 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 25655 | 3.50 | $89,792.50 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 430-12-329 | Pipe Conc Culv (CLASS III) (24" CD) | LF | 1400 | 51.01 | $71,414.00 |
| 430-12-338 | Pipe Conc Culv (Class III) (36" CD) | LF | 500 | 40.00 | $20,000.00 |
| 430-982-229 | Mitered End Section (CONC. PIPE ROUND) (24" CD) | EA | 2 | 750.00 | $1,500.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 2 | 990.37 | $1,980.74 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Littoral Shelf Plants | EA | 5808 | 3.00 | $17,424.00 |
| Ayres Estimate | 10 cfs pump station | LS | 1 | 75,000.00 | $75,000.00 |
| **Total (Construction)** | | | | | $308,822.88 |
| **25% construction contingencies** | | | | | $77,205.72 |
| | | | | | **$386,028.60** |
| **Engineering/design services** | | | | | $115,808.58 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 8 | 4873 | $38,984.00 |
| **Overall Total** | | | | | **$555,821.18** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Mango Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: MGA 1B** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $10,000.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 500 | 9.15 | $4,575.00 |
| 102-1 | Maintenance of Traffic | LS | 2 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 25655 | 3.50 | $89,792.50 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 430-12-338 | Pipe Conc Culv (Class III) (36" CD) | LF | 500 | 40.00 | $20,000.00 |
| 430-982-238 | Mitered End Section (CONC. PIPE ROUND) (36" CD) | EA | 2 | 990.37 | $1,980.74 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Littoral Shelf Plants | EA | 5808 | 1.00 | $5,808.00 |
| Ayres Estimate | 10 cfs pump station | LS | 2 | 75,000.00 | $150,000.00 |
| **Total (Construction)** | | | | | $299,292.88 |
| **25% construction contingencies** | | | | | $74,823.22 |
| | | | | | **$374,116.10** |
| **Engineering/design services** | | | | | $112,234.83 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 8 | 4873 | $38,984.00 |
| **Overall Total** | | | | | **$540,334.93** |

**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Falkenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative FKA 1** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | | $1,500.00 |
| Ayres Estimate | Ditch Maintenance | LF | 2230 | 0.92 | $2,051.60 |
| **Total (Construction)** | | | | | $3,551.60 |
| **25% construction contingencies** | | | | | $887.90 |
| | | | | | **$4,439.50** |
| **Engineering/design services*** | | | | | $0.00 |
| **Survey Cost*** | | | | | $0.00 |
| **Overall Total** | | | | | **$4,439.50** |

*Project is maintenance only. Assumed County will handle internally.

**Hillsborough River Watershed Management Plan**
**Falkenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative FKA 2** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | | $1,500.00 |
| 1020-1**~ | Pipe Removal (>18") | LF | 25 | 9.15 | $228.75 |
| 430-12341 | Pipe Conc Culv (Class III, 48" CD) | LF | 25 | 94.67 | $2,366.75 |
| 430-982-241 | Mitered End Section (CONC. PIPE ROUND) (48" CD) | EA | 2 | 1,371.22 | $2,742.44 |
| Ayres Estimate | Ditch Maintenance | LF | 11740 | 0.92 | $10,800.80 |
| Ayres Estimate | South Ditch Recommended Maintenance | LF | 2930 | 0.92 | $2,695.60 |
| **Total (Construction)** | | | | | $20,334.34 |
| **25% construction contingencies** | | | | | $5,083.59 |
| | | | | | **$25,417.93** |
| **Engineering/design services*** | | | | | $0.00 |
| **Survey Cost*** | | | | | $0.00 |
| **Overall Total** | | | | | **$25,417.93** |

*Project is maintenance only. Assumed County will handle internally.
**Same Item for <18" Pipe
~ FDOT Item

**Hillsborough River Watershed Management Plan**
**Depressions Area Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: DEP 1** | | | | | |
| 101-1 | Mobilization $50,000-$99,999 | LS | 1 | | $1,800.00 |
| Ayres Estimate | 2 - 3 cfs pump station | LS | 1 | 75,000.00 | $75,000.00 |
| **Total (Construction)** | | | | | $76,800.00 |
| **25% construction contingencies** | | | | | $19,200.00 |
| | | | | | **$96,000.00** |
| **Engineering/design services** | | | | | $38,400.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$149,400.00** |

**Hillsborough River Watershed Management Plan**
**Clay Gully West Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: CGW 1** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | | $1,500.00 |
| Ayres Estimate | Ditch Maintenance | LF | 1150 | 0.92 | $1,058.00 |
| **Total (Construction)** | | | | | $2,558.00 |
| **25% construction contingencies** | | | | | $639.50 |
| | | | | | **$3,197.50** |
| **Engineering/design services*** | | | | | $0.00 |
| **Survey Cost*** | | | | | $0.00 |
| **Overall Total** | | | | | **$3,197.50** |

*Project is maintenance only. Assumed County will handle internally.

**Hillsborough River Watershed Management Plan**
**Hillsborough River Above Structure 155 Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HRA 1** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 102-1 | Maintenance of Traffic | LS | 2 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation, Regular | CY | 164 | 9.42 | $1,544.88 |
| 160-4 | Type B Stabilization | SY | 656 | 1.36 | $892.16 |
| 285-701-001 | Base optional (Base Group 01) | SY | 120 | 7.43 | $891.60 |
| 285-709-990 | Base optional (Base Group 09) | SY | 274 | 5.96 | $1,633.04 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 16 | 1.03 | $16.48 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 380 | 6.67 | $2,534.60 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 16 | 55.21 | $883.36 |
| 430-142-102 | Pipe Ellip Conc Culv (CLASS HE III) (14"X23" CD) | LF | 40 | 80.28 | $3,211.20 |
| 430-142-108 | Pipe Ellip Conc Culv (CLASS HE III) (34"X53" CD) | LF | 40 | 63.32 | $2,532.80 |
| 430-982-402 | Mitered End Section (ELLIP PIPE) (14" X 23" CD) | EA | 2 | 750.00 | $1,500.00 |
| 430-982-408 | Mitered End Section (ELLIP PIPE) (34" X 53" CD) | EA | 2 | 1,428.00 | $2,856.00 |
| 570-2 | Seed and Mulch | SY | 446 | 0.10 | $44.60 |
| 570-9 | Water for grass | MG | 4 | 50.00 | $200.00 |
| 575-5 | Sodding | SY | 30 | 1.36 | $40.80 |
| Ayres Estimate | Ditch Maintenance | LF | 2230 | 0.92 | $2,051.60 |
| **Total (Construction)** | | | | | $32,433.12 |
| **25% construction contingencies** | | | | | $8,108.28 |
| | | | | | **$40,541.40** |
| **Engineering/design services** | | | | | $20,000.00 |
| **Survey Cost** | | | | | $15,000.00 |
| **Overall Total** | | | | | **$75,541.40** |

**Hillsborough River Watershed Management Plan**
**Hillsborough River Above Structure 155 Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HRA 2** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 102-1 | Maintenance of Traffic | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation, Regular | CY | 11113 | 9.42 | $104,684.46 |
| 160-4 | Type B Stabilization | SY | 13252 | 1.36 | $18,022.72 |
| 285-701-001 | Base optional (Base Group 01) | SY | 2424 | 7.43 | $18,010.32 |
| 285-709-990 | Base optional (Base Group 09) | SY | 5535 | 5.96 | $32,988.60 |
| 300-1-3 | Bituminous Material (Tack Coat) | GA | 324 | 1.03 | $333.72 |
| 334-1-14 | Superpave Asphaltic Conc. | SY | 7676 | 6.67 | $51,198.92 |
| 337-7-5 | Asph. Conc. Friction Course (FC-5) | TN | 324 | 55.21 | $17,888.04 |
| 570-2 | Seed and Mulch | SY | 9010 | 0.10 | $901.00 |
| 570-9 | Water for grass | MG | 81 | 50.00 | $4,050.00 |
| 575-5 | Sodding | SY | 606 | 1.36 | $824.16 |
| **Total (Construction)** | | | | | $258,901.94 |
| **25% construction contingencies** | | | | | $64,725.49 |
| | | | | | **$323,627.43** |
| **Engineering/design services** | | | | | $97,088.23 |
| **Survey Cost** | | | | | $15,000.00 |
| **Land Acquisition** | | AC | 1.4 | 3005 | $4,207.00 |
| **Overall Total** | | | | | **$435,715.65** |

# Appendix H-2

Cost estimates for select water quality/natural systems alternatives

**Hillsborough River Watershed Management Plan**
**Falkenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: FKA A** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 5 | 17.82 | $89.10 |
| Ayres Estimate | Wetland Plants | EA | 145,200 | 3.00 | $435,600.00 |
| **Total (Construction)** | | | | | $ 437,189.10 |
| **25% construction contingencies** | | | | | $ 109,297.28 |
| | | | | | **$ 546,486.38** |
| **Engineering/design services** | | | | | $ 136,621.59 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 698,107.97** |

Assumptions: Area is owned by SWFWMD
30 acres planted with wetland vegetation

**Hillsborough River Watershed Management Plan**
**Blackwater Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: BLK A** | | | | | |
| 101-1 | Mobilization $500,000 - $999,999 | LS | 1 | 15,000.00 | $10,000.00 |
| 120-1 | Excavation - Regular | CY | 130,000 | 3.50 | $455,000.00 |
| 570-2 | Seed and Mulch | SY | 9,680 | 0.10 | $968.00 |
| 570-9 | Water | MG | 96 | 50.00 | $4,800.00 |
| Ayres Estimate | Wetland Plants | EA | 96,800 | 3.00 | $290,400.00 |
| **Total (Construction)** | | | | | 761,168.00 |
| **25% construction contingencies** | | | | | 190,292.00 |
| | | | | | **951,460.00** |
| **Engineering/design services** | | | | | 237,865.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **1,204,325.00** |

Land Acquisition based on average cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

Assumptions: 20 acres excavated 4 feet
20 acres planted with wetland vegetation
2 acres seed and mulch
Property owned by SWFWMD

**Hillsborough River Watershed Management Plan**
**Eastside Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: ECA A** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation - Regular | CY | 45,173 | 3.50 | $158,105.50 |
| 570-2 | Seed and Mulch | SY | 14,500 | 0.10 | $1,450.00 |
| 570-9 | Water | MG | 145 | 50.00 | $7,250.00 |
| Ayres Estimate | Wetland Plants | EA | 33,880 | 3.00 | $101,640.00 |
| **Total (Construction)** | | | | | $ 278,445.50 |
| **25% construction contingencies** | | | | | $ 69,611.38 |
| | | | | | **$ 348,056.88** |
| **Engineering/design services** | | | | | $ 104,417.06 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 15 | 4709.53 | $ 70,642.95 |
| **Overall Total** | | | | | **$ 538,116.89** |

Land Acquisition based on average cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

Assumptions: 7 acres excavated 4 feet
7 acres planted with wetland vegetation
3 acres seeded and mulched

**Hillsborough River Watershed Management Plan**
**Eastside Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: ECA B** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $10,000.00 |
| 120-1 | Excavation - Regular | CY | 24,200 | 3.50 | $84,700.00 |
| 570-2 | Seed and Mulch | SY | 9,680 | 0.10 | $968.00 |
| 570-9 | Water | MG | 96 | 50.00 | $4,800.00 |
| Ayres Estimate | Wetland Plants | EA | 24,200 | 3.00 | $72,600.00 |
| **Total (Construction)** | | | | | $ 173,068.00 |
| **25% construction contingencies** | | | | | $ 43,267.00 |
| | | | | | **$ 216,335.00** |
| **Engineering/design services** | | | | | $ 86,534.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 15 | 4709 | $ 70,635.00 |
| **Overall Total** | | | | | **$ 388,504.00** |

Land Acquisition based on average cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

Assumptions: 5 acres excavated 3 feet
5 acres planted with wetland vegetation
2 acres seeded and mulched

**Hillsborough River Watershed Management Plan**
**Two Hole Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: TWH A** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 20 | 17.82 | $356.40 |
| **Total (Construction)** | | | | | $ 1,856.40 |
| **25% construction contingencies** | | | | | $ 464.10 |
| | | | | | **$ 2,320.50** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 140 | | $ 225,672.00 |
| **Overall Total** | | | | | **$ 262,992.50** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: HBA A** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $1,800.00 |
| 120-1 | Excavation - Regular | CY | 363,000 | 3.50 | $1,270,500.00 |
| 570-2 | Seed and Mulch | SY | 24,200 | 0.10 | $2,420.00 |
| 570-9 | Water | MG | 242 | 50.00 | $12,100.00 |
| Ayres Estimate | Wetland Plants | EA | 145,200 | 3.00 | $435,600.00 |
| **Total (Construction)** | | | | | $ 1,722,420.00 |
| **25% construction contingencies** | | | | | $ 430,605.00 |
| | | | | | **$ 2,153,025.00** |
| **Engineering/design services** | | | | | $ 322,953.75 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 50 | 6979 | $ 348,950.00 |
| **Overall Total** | | | | | **$ 2,839,928.75** |

Land Acquisition based on average of HBA C, HBA D, and IPC C cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs or other land use types (commercial, industrial, agricultural, residential)
Excavation is a GIS calculation of the area and depth to seasonal low water level (Soil Survey of Hillsborough County).

Assumptions: 45 acres excavated 5 feet
30 acres planted with wetland vegetation
5 acres seed and mulch

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: HBA B** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch Block | CY | 15 | 17.82 | $267.30 |
| **Total (Construction)** | | | | | $ 1,767.30 |
| **25% construction contingencies** | | | | | $ 441.83 |
| | | | | | **$ 2,209.13** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 118 | | $ 772,181.00 |
| **Overall Total** | | | | | **$ 809,390.13** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA C** | | | | | |
| 101-1 | Mobilization $25,000 - $49,999 | LS | 1 | 1,600.00 | $1,600.00 |
| 120-1 | Excavation - Regular | CY | 750 | 3.50 | $2,625.00 |
| Ayres Estimate | Wetland Plants | EA | 9,680 | 3.00 | $29,040.00 |
| **Total (Construction)** | | | | | $ 29,040.00 |
| **25% construction contingencies** | | | | | $ 7,260.00 |
| | | | | | **$ 36,300.00** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 10 | | $ 63,101.17 |
| **Overall Total** | | | | | **$ 134,401.17** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

Assumptions: 250' x 20' x 4' channel escavated
2 acres planted with wetland vegetation
8 acres are existing open water

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA D** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $2,200.00 |
| Ayres Estimate | Wetland Plants | EA | 96,800 | 3.00 | $290,400.00 |
| Ayres Estimate | Selective Clearing | LS | 1 | 10,000.00 | |
| **Total (Construction)** | | | | | $ 292,600.00 |
| **25% construction contingencies** | | | | | $ 73,150.00 |
| | | | | | **$ 365,750.00** |
| **Engineering/design services** | | | | | $ 109,725.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 49 | | $ 310,795.31 |
| **Overall Total** | | | | | **$ 801,270.31** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

Assumptions: 20 acres planted with wetland vegetation

**Hillsborough River Watershed Management Plan**
**Hollomans Branch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: HBA E** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch | CY | 5 | 17.82 | $89.10 |
| **Total (Construction)** | | | | | $ 1,589.10 |
| **25% construction contingencies** | | | | | $ 397.28 |
| | | | | | **$ 1,986.38** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 247 | | $ 1,907,405.00 |
| **Overall Total** | | | | | **$ 1,944,391.38** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

**Hillsborough River Watershed Management Plan**
**Vandenburg Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative VBA A-1** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $1,500.00 |
| 120-1 | Excavation - Regular | CY | 58,080 | 3.50 | $203,280.00 |
| 570-2 | Seed and Mulch | SY | 4,840 | 0.10 | $484.00 |
| 570-9 | Water | MG | 48 | 50.00 | $2,400.00 |
| Ayres Estimate | Wetland Plants | EA | 43,560 | 3.00 | $130,680.00 |
| **Total (Construction)** | | | | | $ 338,344.00 |
| **25% construction contingencies** | | | | | $ 84,586.00 |
| | | | | | **$ 422,930.00** |
| **Engineering/design services** | | | | | $ 126,879.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 10 | 5000 | $ 50,000.00 |
| **Overall Total** | | | | | **$ 614,809.00** |

Assumptions: 9 acres excavated to 4 feet
9 acres planted with wetland vegetation
1 acre seed and mulch

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: WRA A** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation - Regular | CY | 18,421 | 3.50 | $64,473.64 |
| Ayres Estimate | Wetland Plants | EA | 29,040 | 3.00 | $87,120.00 |
| Ayres Estimate | Transitional Upland Plants | EA | 4,840 | 3.00 | $14,520.00 |
| **Total (Construction)** | | | | | $ 171,113.64 |
| **25% construction contingencies** | | | | | $ 42,778.41 |
| | | | | | **$ 213,892.05** |
| **Engineering/design services** | | | | | $ 85,556.82 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 12 | | $ 90,938.28 |
| **Overall Total** | | | | | **$ 405,387.15** |

Land Acquisition is based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, but does not account for variations in wetland and upland costs.

Excavation is a GIS calculation of the area and depth to seasonal low water level (Soil Survey of Hillsborough County).

Assumptions: 6 acres planted with wetland vegetation
1 acre planted with transitional vegetation

**Hillsborough River Watershed Management Plan**
**Williams Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: WRA B** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $2,000.00 |
| Ayres Estimate | Wetland Plants | EA | 38,720 | 3.00 | $116,160.00 |
| **Total (Construction)** | | | | | $ 118,160.00 |
| **25% construction contingencies** | | | | | $ 29,540.00 |
| | | | | | **$ 147,700.00** |
| **Engineering/design services** | | | | | $ 59,080.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 35 | | $ 258,940.11 |
| **Overall Total** | | | | | **$ 480,720.11** |

Land Acquisition is based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, but does not account for variations in wetland and upland costs.

Assumptions: 8 acres restored and planted with wetland vegetation
27 acres are existing open water

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: CGE A** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch Block | CY | 10 | 17.82 | $178.20 |
| **Total (Construction)** | | | | | $ 1,678.20 |
| **25% construction contingencies** | | | | | $ 419.55 |
| | | | | | **$ 2,097.75** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 282 | | $ 1,429,317.00 |
| **Overall Total** | | | | | **$ 1,466,414.75** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

**Hillsborough River Watershed Management Plan**
**Clay Gully East Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: CGE B** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| 120-3 | Excavation - Lateral Ditch Block | CY | 15 | 17.82 | $267.30 |
| **Total (Construction)** | | | | | $ 1,767.30 |
| **25% construction contingencies** | | | | | $ 441.83 |
| | | | | | **$ 2,209.13** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 120 | | $ 480,864.00 |
| **Overall Total** | | | | | **$ 518,073.13** |

Land Acquisition based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, does not account for variations in wetland and upland costs.

**Hillsborough River Watershed Management Plan**
**Mango Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: MGA A** | | | | | |
| 101-1 | Mobilization $150,000 - $199,999 | LS | 1 | 2,200.00 | $1,500.00 |
| 120-1 | Excavation - Regular | CY | 16,200 | 3.50 | $56,700.00 |
| Ayres Estimate | Wetland Plants | EA | 24,200 | 3.00 | $72,600.00 |
| **Total (Construction)** | | | | | $ 130,800.00 |
| **25% construction contingencies** | | | | | $ 32,700.00 |
| | | | | | **$ 163,500.00** |
| **Engineering/design services** | | | | | $ 65,400.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 5 | 5000 | $ 25,000.00 |
| **Overall Total** | | | | | **$ 268,900.00** |

Assumptions: 5 acres excavated 2 feet
5 acres planted with wetland vegetation

**Hillsborough River Watershed Management Plan**
**Mango Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: MGA B** | | | | | |
| 101-1 | Mobilization $0 - $24,999 | LS | 1 | 1,500.00 | $1,500.00 |
| Ayres Estimate | Wetland Plants | EA | 5,000 | 3.00 | $15,000.00 |
| **Total (Construction)** | | | | | $ 16,500.00 |
| **25% construction contingencies** | | | | | $ 4,125.00 |
| | | | | | **$ 20,625.00** |
| **Engineering/design services** | | | | | $ 20,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 55,625.00** |

**Hillsborough River Watershed Management Plan**
**Mango Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: MGA C** | | | | | |
| 101-1 | Mobilization $350,000 - $499,999 | LS | 1 | 10,000.00 | $1,500.00 |
| Ayres Estimate | Wetland Plants | EA | 96,800 | 3.00 | $290,400.00 |
| Ayres Estimate | Selective Clearing | LS | 1 | 10,000.00 | |
| **Total (Construction)** | | | | | $ 291,900.00 |
| **25% construction contingencies** | | | | | $ 72,975.00 |
| | | | | | **$ 364,875.00** |
| **Engineering/design services** | | | | | $ 109,462.50 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 489,337.50** |

Assumptions: 20 acres planted with wetland vegetation

**Hillsborough River Watershed Management Plan**
**Hillsborough River Below Structure 155 Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: HRB A1** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $20,000.00 |
| Ayres Estimate | Wetland Plants | EA | 14,520 | 3.00 | $43,560.00 |
| Ayres Estimate | Wetland Plants (Trees) | EA | 6,500 | 7.00 | $45,500.00 |
| Ayres Estimate | Selective Clearing | LS | 1 | 5,000.00 | $5,000.00 |
| **Total (Construction)** | | | | | $ 114,060.00 |
| **25% construction contingencies** | | | | | $ 28,515.00 |
| | | | | | **$ 142,575.00** |
| **Engineering/design services** | | | | | $ 57,030.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 214,605.00** |

Assumptions: 3 acres planted

**Hillsborough River Watershed Management Plan**
**Hillsborough River Below Structure 155 Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: HRB A2** | | | | | |
| 101-1 | Mobilization $100,000 - $149,999 | LS | 1 | 2,000.00 | $20,000.00 |
| Ayres Estimate | Wetland Plants | EA | 30,000 | 3.00 | $90,000.00 |
| **Total (Construction)** | | | | | $ 110,000.00 |
| **25% construction contingencies** | | | | | $ 27,500.00 |
| | | | | | **$ 137,500.00** |
| **Engineering/design services** | | | | | $ 55,000.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 207,500.00** |

**Hillsborough River Watershed Management Plan**
**Itchepackasassa Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: IPC A** | | | | | |
| Ayres Estimate | Upland Plants | EA | 131,000 | 20.00 | $2,620,000.00 |
| **Total (Construction)** | | | | | $ 2,620,000.00 |
| **25% construction contingencies** | | | | | NA |
| | | | | | **$ 2,620,000.00** |
| **Engineering/design services** | | | | | $ 5,000.00 |
| **Survey Cost** | | | | | $ 5,000.00 |
| **Land Acquisition** | | AC | 0 | | $ - |
| **Overall Total** | | | | | **$ 2,630,000.00** |

Land is under public ownership.

Assumptions: 300 acres planted with upland trees

**Hillsborough River Watershed Management Plan**
**Itchepackasassa Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: IPC B** | | | | | |
| 101-1 | Mobilization $200,000 - $349,999 | LS | 1 | 5,000.00 | $5,000.00 |
| 120-1 | Excavation - Regular | CY | 11,152 | 3.50 | $39,032.00 |
| 570-2 | Seed and Mulch | SY | 48,400 | 0.10 | $4,840.00 |
| 570-9 | Water | MG | 48 | 50.00 | $2,400.00 |
| Ayres Estimate | Wetland Plants | EA | 53,240 | 3.00 | $159,720.00 |
| **Total (Construction)** | | | | | $ 210,992.00 |
| **25% construction contingencies** | | | | | $ 52,748.00 |
| | | | | | **$ 263,740.00** |
| **Engineering/design services** | | | | | $ 79,122.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | 50 | 10600 | $ 530,000.00 |
| **Overall Total** | | | | | **$ 887,862.00** |

Land Acquisition is based on cost per acre land values calculated from Hillsborough County Property Real Estate Data, but does not account for variations in wetland and upland costs.

Excavation is a GIS calculation of the area and depth to seasonal low water level (Soil Survey of Hillsborough County)

Assumptions: 11 acres planted with wetland vegetation
17 acres are existing open water
10 acres seed and mulch

**Hillsborough River Watershed Management Plan**
**Itchepackasassa Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| | | | | | |
| **Alternative: IPC C** | | | | | |
| 101-1 | Mobilization > $1,000,000 | LS | 1 | 20,000.00 | $20,000.00 |
| 120-1 | Excavation - Regular | CY | 242,000 | 3.50 | $847,000.00 |
| 570-2 | Seed and Mulch | SY | 48,400 | 0.10 | $4,840.00 |
| 570-9 | Water | MG | 48 | 50.00 | $2,400.00 |
| Ayres Estimate | Wetland Plants | EA | 194,000 | 3.00 | $582,000.00 |
| **Total (Construction)** | | | | | $ 1,456,240.00 |
| **25% construction contingencies** | | | | | $ 364,060.00 |
| | | | | | **$ 1,820,300.00** |
| **Engineering/design services** | | | | | $ 273,045.00 |
| **Survey Cost** | | | | | $ 15,000.00 |
| **Land Acquisition** | | AC | | | $ - |
| **Overall Total** | | | | | **$ 2,108,345.00** |

Assumptions: 50 acres excavated 3 feet
40 acres planted with wetland vegetation
10 acres seeded and mulched

**Hillsborough River Watershed Management Plan**
**Trout Creek Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition<br>Restoration Land Acquisition | AC<br>AC | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**Tiger Creek Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**Tampa Bypass Canal Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**New River Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**Hillsborough River Above Structure 155 Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**Depressions Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

**Hillsborough River Watershed Management Plan**
**Big Ditch Subwatershed**
**Recommended Capital Improvement Projects Construction Cost Estimates**

| FDOT Item No. | Cost Item | Unit | Amount | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| **Alternative: Acquisition of Preservation and Agricultural Lands within 223 M Buffer of Stream Network** | | | | | |
| | Preservation Land Acquisition | AC | | | $0.00 |
| | Restoration Land Acquisition | AC | | | $0.00 |
| | | | | | $0.00 |
| **Total (Construction)** | | | | | $0.00 |
| **Survey Cost** | | | | | 15,000.00 |
| **Overall Total** | | | | | **15,000.00** |

# Appendix H-3

Load reductions for TSS, TN, TP

***Appendix H-3. Load Reductions for Water Quality Alternatives in the Hillsborough River Watershed.***

| | Existing Loads Entering Alternative (lb/ac/yr) | | | Proposed Loads After Alternative (lb/ac/yr) | | | Difference (lb/ac/yr) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Alternative Name** | **TSS** | **TN** | **TP** | **TSS** | **TN** | **TP** | **TSS** | **TN** | **TP** |
| MGA C | 213.19 | 15.98 | 8.90 | 31.98 | 9.59 | 4.45 | 181.21 | 6.39 | 4.45 |
| BLK 1 | 157.47 | 21.53 | 13.24 | 23.62 | 12.92 | 6.62 | 133.85 | 8.61 | 6.62 |
| ECN B | 314.01 | 22.95 | 10.38 | 47.10 | 13.77 | 5.19 | 266.91 | 9.18 | 5.19 |
| CGE 1 | 565.93 | 98.82 | 68.96 | 84.89 | 59.29 | 34.48 | 481.04 | 39.53 | 34.48 |
| HBA A | 1411.33 | 184.15 | 109.35 | 211.70 | 110.49 | 54.68 | 1199.63 | 73.66 | 54.68 |
| WRA A | 2989.42 | 144.77 | 50.51 | 448.41 | 86.86 | 25.25 | 2541.01 | 57.91 | 25.25 |
| WRA B | 2063.45 | 57.04 | 7.14 | 309.52 | 34.23 | 3.57 | 1753.93 | 22.82 | 3.57 |
| MGA A | 2182.80 | 197.95 | 90.77 | 327.42 | 118.77 | 45.38 | 1855.38 | 79.18 | 45.38 |
| VBA A-2 | 165.93 | 18.98 | 11.86 | 24.89 | 11.39 | 5.93 | 141.04 | 7.59 | 5.93 |
| VBA A-1 | 308.87 | 24.10 | 9.99 | 46.33 | 14.46 | 5.00 | 262.54 | 9.64 | 5.00 |
| IPC C | 863.31 | 97.38 | 56.68 | 137.68 | 60.18 | 28.88 | 725.63 | 37.20 | 27.80 |
| BLK A | 109.52 | 13.76 | 7.53 | 16.43 | 8.26 | 3.77 | 93.09 | 5.51 | 3.77 |
| IPC B | 343.55 | 73.93 | 56.79 | 51.54 | 44.36 | 28.40 | 292.01 | 29.57 | 28.39 |
| ECN A | 183.26 | 29.96 | 20.01 | 27.49 | 17.98 | 10.00 | 155.77 | 11.98 | 10.00 |
| HBA E | 78.62 | 9.50 | 5.77 | 11.79 | 5.70 | 2.89 | 66.83 | 3.80 | 2.89 |
| TWH 1 | 76.48 | 11.31 | 7.19 | 11.47 | 6.79 | 3.60 | 65.01 | 4.52 | 3.60 |
| HBA 6 | 223.15 | 39.62 | 28.07 | 33.47 | 23.77 | 14.04 | 189.67 | 15.85 | 14.04 |
| HBA 5 | 136.49 | 22.48 | 14.62 | 20.47 | 13.49 | 7.31 | 116.02 | 8.99 | 7.31 |
| HBA 3-B | 344.65 | 49.60 | 26.48 | 51.70 | 29.76 | 13.24 | 292.96 | 19.84 | 13.24 |
| HBA C | 33.62 | 4.06 | 1.94 | 5.04 | 2.43 | 0.97 | 28.58 | 1.62 | 0.97 |
| CGE B | 74.45 | 9.28 | 4.95 | 11.17 | 5.57 | 2.48 | 63.28 | 3.71 | 2.48 |
| HBA 2-A | 101.99 | 16.04 | 9.18 | 15.30 | 9.62 | 4.59 | 86.69 | 6.42 | 4.59 |
| HBA D | 33.59 | 6.57 | 4.80 | 5.04 | 3.94 | 2.40 | 28.55 | 2.63 | 2.40 |

CHAPTER 14

# Second Public Meeting

The second public meeting was held on June 21, 2001 at the Brandon High School auditorium (Hillsborough County, Florida). The meeting began at approximately 6:30 p.m. and ended at approximately 8:30 p.m. EDT.

The format of the public meeting was more formal than the first public meeting and was conducted to provide the public with the results of the existing conditions analysis and alternatives developed by Ayres Associates to address significant flooding, water quality, and natural systems issues. The meeting agenda included the following topics:

- Introduction
- Description of project purpose
- Description of existing flooding, water quality, and natural systems conditions in the Hillsborough River Watershed
- General description of proposed alternatives developed to address flooding, water quality, habitat, and water supply
- Request for feedback regarding proposed alternatives
- Scheduling of final meeting to discuss recommended alternatives

The first portion of the meeting was in the form of a video presentation, which was produced to help reacquaint local residents with the watershed and the objectives of the management plan. At the end of the video presentation, attendees were invited to view and discuss flooding, water quality, and natural systems problems and alternatives with Ayres Associates and County staff at a series of poster-sized boards in the front of the auditorium. Staff were available to answer specific questions about proposed alternatives for flooding, water quality, and natural systems problems. During the remainder of the meeting the attendees were invited to provide oral and written comments to Ayres Associates and Hillsborough County staff. Public comments were recorded by project staff and comment forms were also provided to attendees for submittal in person at the meeting or via mail.

After eliminating persons affiliated with the project (Ayres Associates, Hillsborough County), only one attendee was identified as a watershed resident. This person was concerned about low water levels in Lake Mango with respect to access to the lake from his dock. He inquired as to whether it would be feasible to retain water in the lake to maintain a higher normal pool than what currently exists. Staff discussed this issue with the resident and requested he fill out a comment form detailing this issue. He was also referred to the SWFWMD Structures Operations Department to discuss this further. Two other residents were present who live outside the watershed near Lake Valrico. Concerns from these individuals were related to El Nino flooding in the lake, which drains north to Lake Thonotosassa. Other issues identified from these two residents were related to possible

dredging of the lake to remove muck/vegetation (tussocks) and potential opportunities to replant the shoreline of the lake with native vegetation. No comment forms were left during the public meeting and none were received after the meeting.

At the end of the video presentation, attendees were informed that the next public meeting would occur in August 2001. The purpose of this third meeting will be to present the recommended alternatives based on a detailed evaluation and comparison of each alternative for overall project benefit, permittability, and public feedback.

# Sign In Sheet

Hillsborough River Watershed Management Plan

**Charette No. 2 – June 21, 2001**
Brandon High School

**PLEASE PRINT**

| NAME | ADDRESS | REPRESENTING |
|---|---|---|
| 1 | | |
| 2 | | |
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| 15 | | |

# COMMENT FORM

***Charette No. 2 – June 21, 2001***
***For your comments regarding the Hillsborough River Watershed Management Plan***

Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

*Please deposit in Comment Box tonight or mail to the address on the back of this form by* ***July 12, 2001.***

**Comments**
We encourage you to write down your opinions and comments in reference to the project in the space below.

_____

_____

_____

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_____

***Visit the project website at www.hillsboroughriver.org***

**THANK YOU - YOUR COMMENTS ARE APPRECIATED!**