



## 4.7 Three Mile Branch

### 4.7.1 Introduction

The information presented in this sub-basin plan for Three Mile Branch is intended to provide the reader with information necessary to understand the physical setting, methodology used, water quantity problems, results, alternatives evaluation, and recommendations. Section 2 of this study describes in greater details the general methodology, including data collection, engineering methods, and regional analysis.

### 4.7.2 Sub-basin Information

This section outlines information on the Three Mile Branch Sub-basin infrastructure, and its ability to meet level of service requirements.

#### 4.7.2.1 Physical Description

The Three Mile Branch sub-basin extends from its confluence with Withlacoochee River in the west to the Five Points Location in the east. The area of the sub-basin is approximately 1 sq mi (598 acres), which was divided into 11 hydrologic units ranging from 15 to 86 acres in size. The hydrologic unit boundaries and the In-stream PSWMS are shown on **Figure 4.7.1**. The HU delineation along with the areas and the loading node for each HU is shown in **Table 4.7.1**.

**Table 4.7.1. Hydrologic Units: Area**

| Hydrologic Unit ID | Area (Acres) | Loading Node |
|--------------------|--------------|--------------|
| HURM19020          | 71.7         | RM90820      |
| HURM19025          | 62.5         | RM90825      |
| HURM19030          | 41.3         | RM90830      |
| HURM19050          | 86.2         | RM90850S     |
| HURM19055          | 61.9         | RM90855      |
| HURM19058          | 69.5         | RM90858      |
| HURM19070          | 69.2         | RM90870APS   |
| HURM19080          | 16.5         | RM90885S     |
| HURM19090          | 50.0         | RM90890S     |
| HURM19100          | 54.6         | RM90900S     |
| HURM19110          | 14.9         | RM90900S     |
| <b>Total</b>       | <b>598.3</b> |              |

The predominant land use in the sub-basin is Medium Density Residential, which accounts for almost 40 percent of the total land use, followed by Light Industrial, Commercial and Institutional. The land use categories along with their respective associated area and percentage for all of Sugar Creek sub-basin are shown in **Table 4.7.2**. The predominant soil within the sub-basin is B, almost 80 percent. **Table 4.7.3** shows the soils breakdown based on HSG. The soil coverage, infiltration and storage



capacity was based on the available data from the NRCS Lowndes County soil survey. Detailed discussion on soils and land use is available in the Methodology Section of the report.

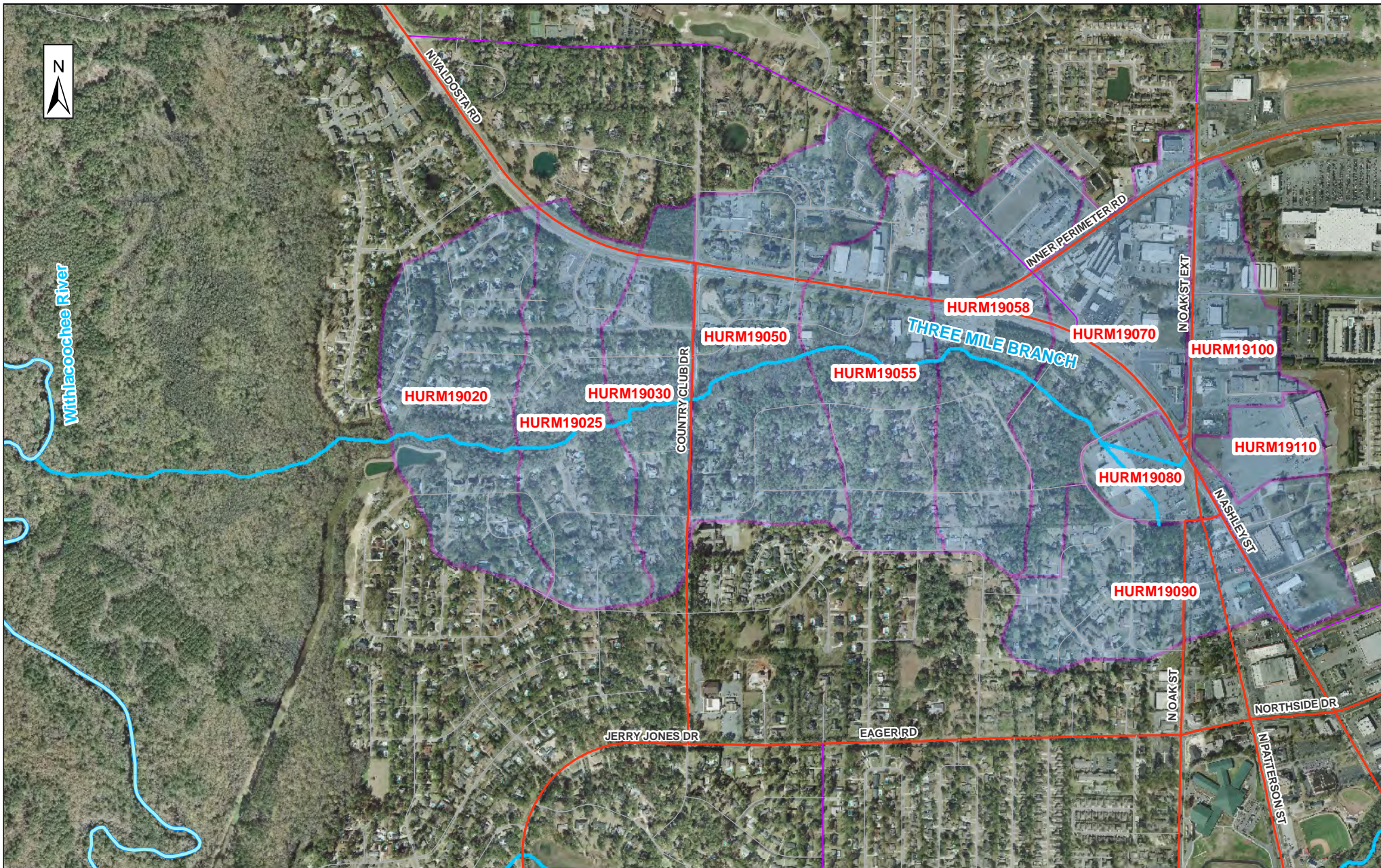
**Table 4.7.2. Land Use**

| Land Use Category                            | Area (Acres) | Area (Percent) |
|----------------------------------------------|--------------|----------------|
| Forest, Open & Park                          | 47.5         | 7.9            |
| Pasture                                      | 0.0          | 0.0            |
| Agricultural                                 | 0.0          | 0.0            |
| Low Density Residential                      | 31.4         | 5.2            |
| Medium Density Residential                   | 236.2        | 39.4           |
| High Density Residential                     | 0.0          | 0.0            |
| Light Industrial, Commercial & Institutional | 180.4        | 30.2           |
| Heavy Industrial & Roadways                  | 98.4         | 16.4           |
| Wetlands                                     | 0.0          | 0.0            |
| Watercourses & Water bodies                  | 4.9          | 0.8            |
| <b>Total</b>                                 | <b>598.3</b> | <b>100.0</b>   |

**Table 4.7.3. Soils**

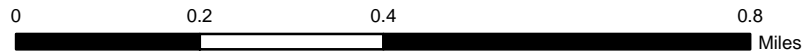
| Hydrologic Soil Group | Area (Acres) | Area (Percent) |
|-----------------------|--------------|----------------|
| A                     | 0.0          | 0.0            |
| B                     | 481.1        | 80.4           |
| C                     | 21.9         | 3.7            |
| D                     | 95.3         | 15.9           |
| <b>Total</b>          | <b>598.3</b> | <b>100.0</b>   |

The In-stream PSWMS consists of a main stem channel flowing east to west and at its most downstream section confluences with the Withlacoochee River. A schematic showing the model representation (hydraulic network along with nodes) of the sub-basin is presented on **Figure 4.7.2.1**.

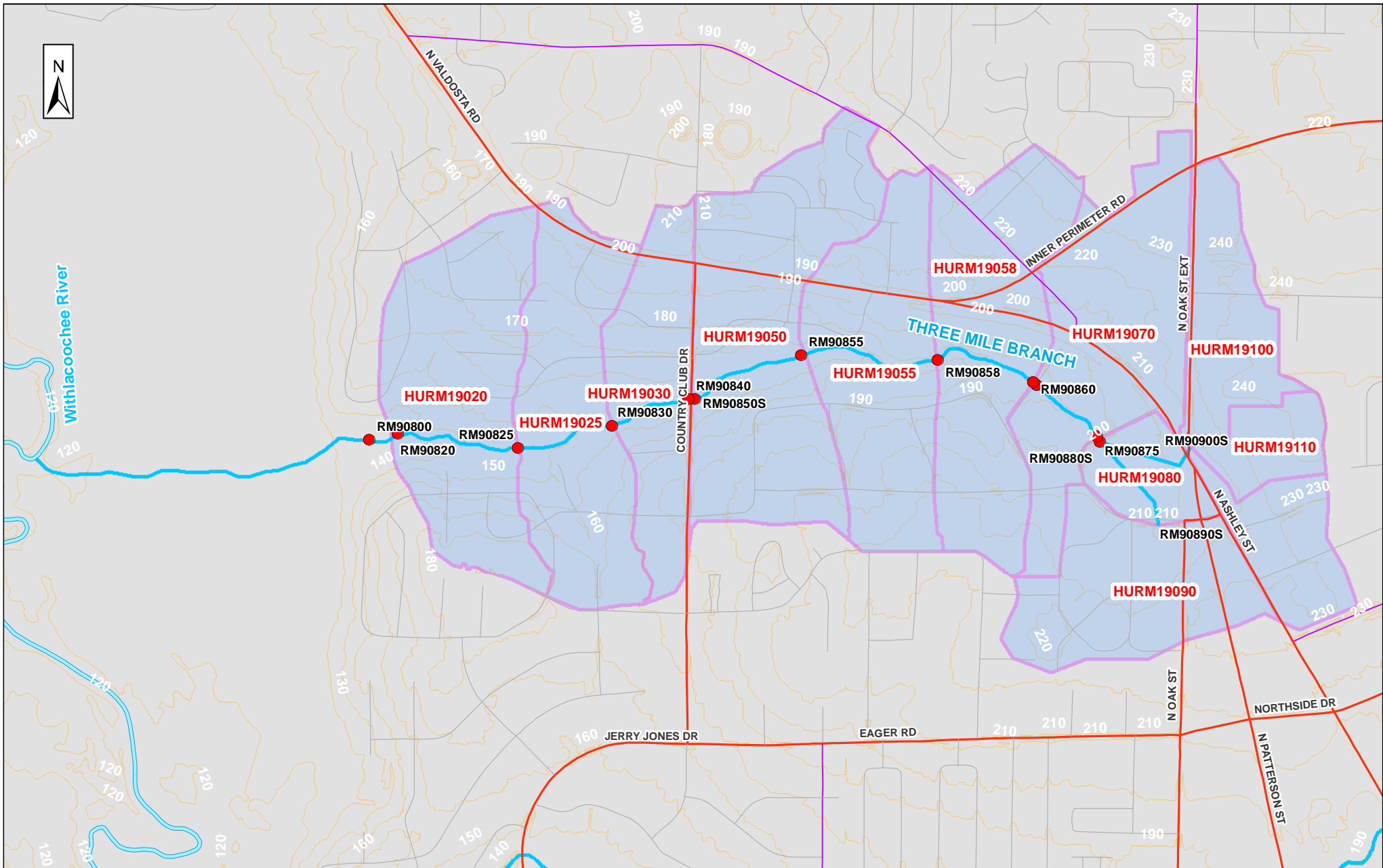


**Legend**

|                  |                   |
|------------------|-------------------|
| Hydrologic Units | — Arterial Roads  |
| HURM190170       | — Collector Roads |
| Streams          | — Local Roads     |



**Figure 4.7.1**  
 City of Valdosta, GA  
 Three Mile Branch Sub-Basin  
 Hydrologic Units Delineation



- Legend**
- Hydrologic Units
    - HURM190170
  - Streams
  - Model Nodes
    - RM90860
  - Arterial Roads
  - Collector Roads
  - Local Roads
  - Topographic Contours (ft)\*

\* Elevations shown are based on NGVD datum. Refer to Section 2.2.1 for conversion to NAVD datum.

**Figure 4.7.2.1**  
 City of Valdosta, GA  
 Three Mile Branch Sub-Basin  
 Hydraulic Network



### 4.7.3 Existing Conditions

Some projects in the Hightower Creek sub-basin were proposed in the 1996 MSMP, but none was implemented. However, some stormwater improvements such as drainage pipe installations as part of other projects in this sub-basin have been undertaken.

- An emergency repair consisting of rebuilding of the Castle Creek Place culvert was undertaken. This road is a dirt road and was washed out after a high flow event. A sinkhole exists about 400 feet downstream of Castle Creek Place in the Three Mile Branch stream just behind some commercial establishments on North Valdosta Road. Channel erosion near this location was observed and the stream banks are almost vertical in this section. Several sewer manholes were observed to be located very close along the Three Mile Branch in this section, which appear to be at risk in the event of big storms.
- Five Points and other commercial properties are located the most upstream on Three Mile Branch. This is completely impervious area of about 80 acres. Untreated runoff from this area flows at high velocities, causing significant erosion in Three Mile Branch in the upstream reaches like just downstream of Briggs Street culvert.

### 4.7.4 Water Quantity Problem Areas

1. Briggs Street: High flows and high velocities have caused significant erosion at this culvert and channel downstream. The stability of the culvert is threatened.
2. Castle Creek Place: This is private road, which, in the past, had washed out during a storm event. The culvert has been rebuilt and upgraded.
3. N. Valdosta Road: Significant stream bank erosion was observed about 400 feet downstream of Castle Creek Place, behind the shops on N. Valdosta Road. This section is near the sinkhole location, where the stream banks are completely vertical. Sewer manholes very close to the stream were also observed. The stream does pose a threat to these sewer manholes.

### 4.7.5 Results

The following paragraphs discuss the water quantity model results, the existing level of service in terms of roads flooding, and sediment loads due to erosion.

#### 4.7.5.1 Water Quantity Results

The stages for the 1.2-in, 5-, 25-, 50-, and 100-year design storms model runs are presented in **Table 4.7.4**. Road crown elevation, road names, and road classification (local, collector, arterial) are also shown in the table. The roads not meeting the City's defined Level of Service are highlighted in the model result tables.



Due to lack of data in terms of finished floor elevations of houses and other structures, available topographic data were utilized to estimate potential flooding of structures for each design storm event and were tabulated. The model results table indicates the nearest node to the structure's flooding location.

#### 4.7.5.2 Total Suspended Solids Evaluation

Significant sediment loads resulting from erosion of stream banks has been observed in the Three Mile Branch. Yearly TSS loads were calculated based on standard EMC of TSS; yearly rainfall; tributary area; and land use characteristics, like percent imperviousness, for Valdosta. Yearly TSS loads from various hydrologic units for each sub-basin were computed in lbs/year. The total TSS loading for Two Mile Branch sub-basin was estimated to be 147,000 lbs/year.

The Georgia Stormwater Manual states the sizing criteria for any stormwater control/mitigation system to treat the runoff from 85 percent of the storms that occur in an average year. For Georgia, this equates to providing water quality treatment for the runoff resulting from a rainfall depth of 1.2 inches. This runoff is also termed as the Water Quality treatment volume ( $WQ_v$ ). Please refer to Georgia Stormwater Manual Volume 2 (technical handbook) Section 1.3 for a detailed discussion on  $WQ_v$  and the unified stormwater sizing criteria. The 1.2-inch storm event was simulated alternative projects evaluation.

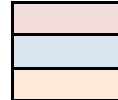
Channel Bank Erosion: About 5,200 linear feet of Three Mile Branch show velocities greater than 3 ft/sec. The threshold velocity for erosive velocity in Three Mile Branch sub-basin is 3 ft/sec. Several locations were verified in the field and showed signs of channel bank erosion.

**Table 4.7.4. Three Mile Branch Existing Condition Model Results**

| Node ID    | Road Name       | Road Class | Road Crown Elevation (ft-NAVD) | Potential Structure Flooding | Design Event                           |        |         |         |          |
|------------|-----------------|------------|--------------------------------|------------------------------|----------------------------------------|--------|---------|---------|----------|
|            |                 |            |                                |                              | Peak Water Surface Elevation (ft-NAVD) |        |         |         |          |
|            |                 |            |                                |                              | 1.2 Inch                               | 5 Year | 25 Year | 50 Year | 100 Year |
| RM90800    |                 |            |                                |                              | 129.0                                  | 131.3  | 136.0   | 140     | 144      |
| RM90820    |                 |            |                                | Y                            | 131.5                                  | 133.8  | 136.0   | 140     | 144      |
| RM90825    |                 |            |                                | Y                            | 141.4                                  | 144.7  | 145.3   | 145.65  | 146.21   |
| RM90830    |                 |            |                                | Y                            | 149.1                                  | 151.5  | 152.2   | 152.8   | 153.17   |
| RM90840    |                 |            |                                |                              | 159.6                                  | 162.5  | 163.1   | 163.42  | 163.9    |
| RM90850S   | Country Club Dr | Arterial   | 168.2                          | Y                            | 159.9                                  | 166.8  | 169.1   | 169.36  | 169.55   |
| RM90855    |                 |            |                                |                              | 166.6                                  | 168.2  | 169.2   | 169.49  | 169.75   |
| RM90858    |                 |            |                                |                              | 175.0                                  | 177.9  | 178.9   | 179.12  | 179.35   |
| RM90860    |                 |            |                                |                              | 184.1                                  | 185.9  | 186.6   | 186.73  | 186.89   |
| RM90870APS | Castle Creek Pl | Local-Pvt  | 187.3                          |                              | 184.2                                  | 188.0  | 188.5   | 188.54  | 188.62   |
| RM90875    |                 |            |                                |                              | 192.3                                  | 193.7  | 194.1   | 194.17  | 194.26   |
| RM90880S   | Briggs St       | Local      | 199.11                         |                              | 193.0                                  | 193.9  | 194.3   | 194.34  | 194.42   |
| RM90885S   |                 |            |                                |                              | 197.8                                  | 200.5  | 200.7   | 200.75  | 200.79   |
| RM90890S   |                 |            |                                |                              | 199.1                                  | 203.6  | 207.0   | 207.19  | 207.37   |
| RM90900S   |                 |            |                                |                              | 201.0                                  | 202.5  | 203.5   | 204.19  | 205.76   |

**Notes:**

1. Roads not meeting the City's defined Level of Service.
2. Roads not meeting the City's define Level of Service due to Withlacoochee flooding.
3. Water surface elevations due to Withlacoochee River Staging.
4. 'Y' depicts potential structure flooding near the corresponding node location.
5. Potential Stucture flooding estimated by comparing model results with the regional 2 foot contours dataset.  
Additional finished floor elevations data shouldbe acquired for further investigation.
6. All design storm events are 24 hour duration.





### 4.7.5.3 Level of Service Summary

Under the present land use conditions, the 1.2-in, 5-, 25-, 50-, and 100-year design storms were simulated to determine the problem areas as defined below:

In the Three Mile Branch sub-basin the following roads do not meet the City's Level of Service as described in Section 2. The Three Mile Branch stage Table 4.7.4 highlights all roads not meeting the level of service in red. For a road to be classified as not meeting the level of service, it has more than 6 inches of flooding for the storm event under consideration for that particular road classification (5-year event for a local road and 50-year event for a collector and arterial road).

- Roads

One arterial road (Country Club Drive) does not meet the defined level of service (more than 6 inches of flooding for a 50-year storm event). Another road (Castle Creek Place) also floods frequently but being a private road is not included in the level of service.

- Structures

Four locations, as represented by model nodes, were identified in the Three Mile Branch sub-basin for potential structural flooding for the 100-year event.

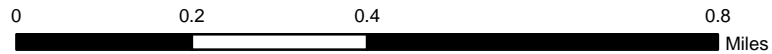
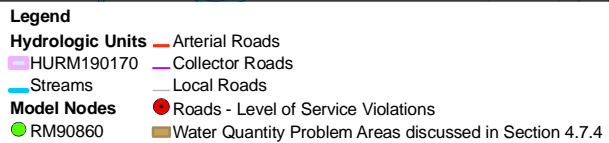
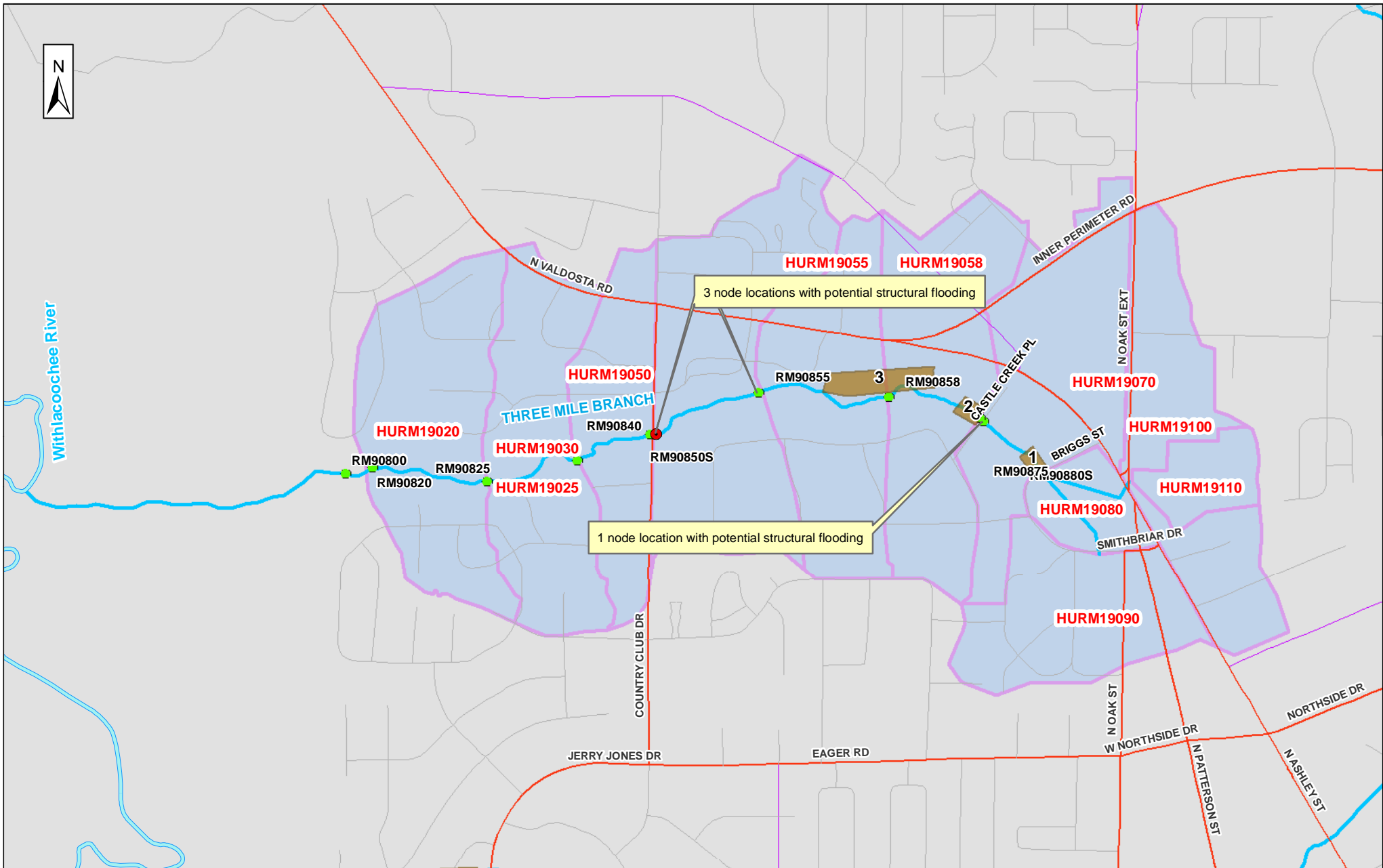
Please refer to **Figure 4.7.2.2** for a map of Level of Service violations in Three Mile Branch Sub-basin. Other water quantity problem areas are also shown on this map.

### 4.7.6 Alternatives Evaluation

This section describes the alternatives evaluated for the Three Mile Branch Sub-basin. Based on the screening process for the alternatives evaluation, the following alternatives representing different levels of service were developed. Detailed public safety options and standards should be considered and used during final design.

- Alternative RM1: Culvert Improvement at Country Club Drive and RSF near Country Club Drive
- Alternative RM2: RSF at Five Points Location
- Alternative RM3: Culvert Rehabilitation at Briggs Street





**Figure 4.7.2.2**  
**City of Valdosta, GA**  
**Three Mile Branch Sub-Basin**  
**Level of Service Violations and**  
**Water Quantity Problem Areas**



### *Alternative RM1 – Culvert Improvement at Country Club Drive and RSF near Country Club Drive*

Alternative RM1 proposes to upgrade the capacity of the Country Club Drive culvert from the existing double 4-ft circular RCPs to double 6-ft circular RCP culverts. This alternative also includes construction of an offline RSF in conjunction with the culvert improvements as shown on **Figure 4.7.3**. This 4.8-acre facility will provide additional storage to attenuate peak flows downstream.

This facility will also provide retrofit treatment to about 464 acres of tributary area, the majority of which is urban and developed. Implementation of this Alternative also brings the arterial road (Country Club Drive) into the level of service compliance. This RSF also provides some reduction in flooding of structures in the vicinity. The land delineated for this project is owned by the City. The proposed RSF occupies 4.8 acres, with a Permanent Pool Volume of 12.1 ac-ft and a Residence Time of 4.1 days. **Table 4.7.5** shows the conceptual cost estimates for this alternative.

### *Alternative RM2 – RSF at Five Points Location*

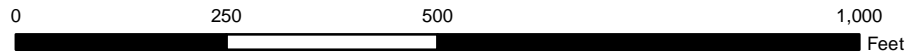
The City has acquired the majority of the Five Points complex. There are redevelopment plans for this location. CDM proposes to include implementation of a RSF as part of the redevelopment plans of this location. A 1.3-acre detention facility has been proposed at the location shown on **Figure 4.7.4**. This facility would provide stormwater runoff treatment for the 15 acres of impervious area of the Five Points complex. The proposed RSF has a Permanent Pool Volume of 3.0 ac-ft and a Residence Time of 16 days. The location and size of this RSF is subject to change as the City moves ahead with the redevelopment plans for this location in the future. **Table 4.7.6** shows the conceptual cost estimates for this alternative.

### *Alternative RM3 – Culvert Rehabilitation at Briggs Street*

The Briggs Street culvert receives high flows coming off the large impervious area just upstream of it, including Five Points. This culvert is in serious condition and the supporting apron to the culvert may fail at any time. This alternative proposes to stabilize this structure by soil grouting and also by providing energy dissipating devices just downstream of the culvert. Some rip rap at the end of the energy dissipater would also help to further protect the channel from the high flow velocities experienced in this section of the stream. **Figure 4.7.5** shows the location of the Briggs Street culvert rehabilitation project. **Table 4.7.7** shows the conceptual cost estimates for this alternative.



- Legend
- Arterial Roads
  - Collector Roads
  - Local Roads
  - Model Nodes
  - Streams



**Figure 4.7.3**  
 City of Valdosta, GA  
 Three Mile Branch Sub-Basin  
 Alternative RM1  
 Country Club Drive Culvert Improvement and  
 Regional Stormwater Facility near Country Club Drive



- Legend
- Arterial Roads
  - Collector Roads
  - Local Roads
  - Model Nodes
  - Streams

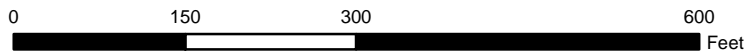
0 150 300 600 Feet

**Figure 4.7.4**  
**City of Valdosta, GA**  
**Three Mile Branch Sub-Basin**  
**Alternative RM2**

**Regional Stormwater Facility at Five Points Location**



- Legend
- Arterial Roads
  - Collector Roads
  - Local Roads
  - Model Nodes
  - Streams



**Figure 4.7.5**  
**City of Valdosta, GA**  
**Three Mile Branch Sub-Basin**  
**Alternative RM3**  
**Briggs Street Culvert Rehabilitation**