# 4.3 Hightower Creek

## 4.3.1 Introduction

The information presented in this sub-basin plan for Hightower Creek 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.

## 4.3.2 Sub-basin Information

This section outlines information on the Hightower Creek Sub-basin infrastructure, and its ability to meet level of service requirements. The Hightower Creek sub-basin extends from its confluence with Sugar Creek in the north to James Road and Westside Road in the south. The area of the sub-basin is approximately 1.6 sq mi (1,019 acres), which was divided into 14 hydrologic units ranging from 18 to 203 acres in size. The hydrologic unit boundaries and the In-stream PSWMS are shown on **Figure 4.3.1**. The HU delineation along with the areas and the loading node for each HU is shown in **Table 4.3.1**. A considerable portion of the tributary area to Hightower Creek, about 500 acres, is outside the City limits.

The predominant land use in the sub-basin is Medium Density Residential, which accounts for a little over 50 percent of the total land use. The land use categories along with their respective associated area and percentage for all of One Mile Branch sub-basin are shown in **Table 4.3.2**. The predominant soil within the sub-basin is B. **Table 4.3.3** 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 the Soils and Land Use is available in the Methodology Section of the report.


**Figure 4.3.1**
**City of Valdosta, GA**
**Hightower Creek Sub-Basin**
**Hydrologic Units Delineation**

**Table 4.3.1. Hydrologic Unit Areas**

| Hydrologic Unit ID | Area (Acres) | Loading Node |
|---|---|---|
| HUHT26100 | 73.0 | HT32110W |
| HUHT26140 | 63.8 | HT32145W |
| HUHT26170 | 100.3 | HT32170S |
| HUHT26200 | 17.7 | HT32200S |
| HUHT27150 | 81.5 | HT30150 |
| HUHT27200 | 52.0 | HT30200S |
| HUHT27210 | 26.6 | HT30210 |
| HUHT27250 | 38.4 | HT30250S |
| HUHT27300 | 203.0 | HT30350AP |
| HUHT28080 | 18.6 | HT31100APS |
| HUHT28150 | 46.7 | HT31150APS |
| HUHT29100 | 63.2 | HT33100S |
| HUHT29200 | 77.1 | HT33200S |
| HUHT29300 | 156.7 | HT33300S |
| **Total** | **1,018.7** | |

**Table 4.3.2. Land Use**

| Land Use Category | Area (Acres) | Area (Percent) |
|---|---|---|
| Forest, Open & Park | 474.4 | 46.6 |
| Pasture | 0.0 | 0.0 |
| Agricultural | 23.6 | 2.3 |
| Low Density Residential | 0.0 | 0.0 |
| Medium Density Residential | 112.3 | 11.0 |
| High Density Residential | 0.0 | 0.0 |
| Light Industrial, Commercial & Institutional | 277.9 | 27.2 |
| Heavy Industrial & Roadways | 124.3 | 12.2 |
| Wetlands | 0.0 | 0.0 |
| Watercourses & Water bodies | 6.3 | 0.6 |
| **Total** | **1,018.7** | **100.0** |

**Table 4.3.3. Soils**

| Hydrologic Soil Group | Area (Acres) | Area (Percent) |
|---|---|---|
| A | 27.4 | 2.7 |
| B | 713.3 | 70.0 |
| C | 132.8 | 13.0 |
| D | 145.2 | 14.3 |
| **Total** | **1,018.7** | **100.0** |

The In-stream PSWMS consists of a main stem channel that at its most downstream section confluences with the Sugar Creek. A schematic showing the model representation (hydraulic network along with nodes) of the sub-basin is presented on **Figure 4.3.2**.1.

## 4.3.3 Existing Conditions

Some projects in the Hightower Creek sub-basin were proposed in the 1996 MSMP, but none was implemented. However, some culvert upgrades have been implemented and some stormwater pipes have been installed to improve the drainage conditions in the sub-basin.

The Norman Spells Pond just upstream of the Norman Drive has been filled in. A temporary detention area to provide treatment of stormwater runoff coming off the Wal-Mart and neighboring commercial establishments was constructed just upstream of River Street on Hightower Creek.

## 4.3.4 Water Quantity Problem Areas

1. St. Augustine Road: During field investigation, severe channel undercutting and loss of sand bags downstream of the St. Augustine Road culvert was observed.

## 4.3.5 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.

### 4.3.5.1 Water Quantity Results

The stages for the 1.2-in, 5-, 25-, 50-, and 100–year 24-hour design storms model runs are presented in **Table 4.3.4**. 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 and tabulated. The model results table indicates the nearest node to the structures flooding location.

### 4.3.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion Evaluation

Significant sediment loads resulting from erosion of stream banks has been observed in the whole Sugar Creek basin and in One Mile Branch. As per the findings of the Geomorphologic assessment report (Section 3 of this report) of the Sugar Creek, this increase in sediment loads is generated by down cutting of the channel bed (incision), scour of the stream banks or both.

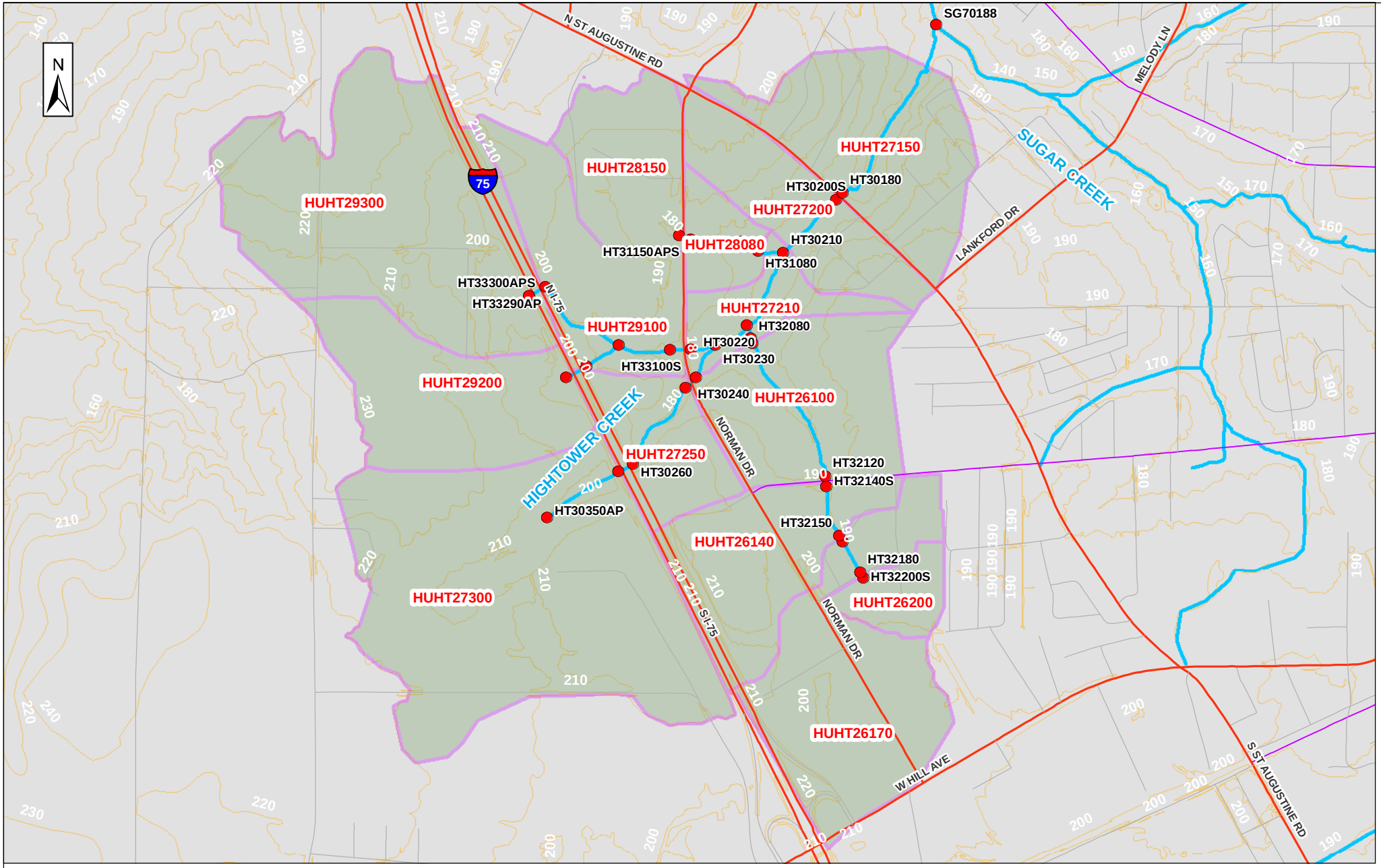


**Figure 4.3.2.1**
**City of Valdosta, GA**
**Hightower Creek Sub-Basin**
**Hydraulic Network**

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**Table 4.3.4. Hightower Creek Existing Condition Model Results**

| | | | | | Design Event | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Peak Water Surface Elevation (ft-NAVD) | | | | |
| Node ID | Road Name | Road Class | Road Crown Elevation (ft-NAVD) | Potential Structure Flooding | 1.2 Inch | 5 Year | 25 Year | 50 Year | 100 Year |
| HT30160 | | | | | 147.7 | 149.5 | 150.1 | 150.3 | 150.7 |
| HT30170 | | | | | 152.3 | 153.4 | 153.8 | 153.9 | 154.1 |
| HT30180 | | | | | 156.7 | 157.7 | 158.0 | 158.1 | 158.3 |
| HT30200S | St. Augustine Road | Arterial | 165.6 | | 157.7 | 162.3 | 165.3 | 166.2 | 166.6 |
| HT30210 | | | | | 160.2 | 163.1 | 165.5 | 166.3 | 166.8 |
| HT30220 | | | | | 164.3 | 167.6 | 168.7 | 169.0 | 169.2 |
| HT30230 | | | | | 168.3 | 170.8 | 171.1 | 171.2 | 171.3 |
| HT30240 | | | | | 170.6 | 171.5 | 171.6 | 171.7 | 171.7 |
| HT30250S | Norman Drive | Arterial | 181.8 | | 172.0 | 175.5 | 177.4 | 178.0 | 178.5 |
| HT30260 | | | | | 191.5 | 192.5 | 192.8 | 192.9 | 192.9 |
| HT30300S | I-75 | Arterial | 204.7 | | 192.4 | 194.4 | 195.3 | 195.7 | 196.0 |
| HT30350AP | | | | | 197.5 | 197.8 | 198.1 | 198.2 | 198.3 |
| HT31080 | | | | | 165.9 | 166.7 | 167.0 | 167.1 | 167.2 |
| HT31100APS | | | | | 166.4 | 168.4 | 169.5 | 169.9 | 170.3 |
| HT31140AP | | | | | 178.2 | 178.9 | 179.1 | 179.2 | 179.2 |
| HT31150APS | | | | | 178.7 | 180.4 | 181.3 | 181.6 | 182.0 |
| HT32080 | | | | | 167.7 | 169.5 | 170.2 | 170.5 | 170.7 |
| HT32100S | | | | | 167.7 | 170.5 | 171.6 | 171.9 | 172.2 |
| HT32110W | | | | | 169.0 | 174.1 | 175.0 | 175.2 | 175.5 |
| HT32120 | | | | | 188.1 | 190.5 | 191.7 | 192.0 | 192.2 |
| HT32140S | River Street | Collector | 193.6 | Y | 188.2 | 192.2 | 193.1 | 193.2 | 193.4 |
| HT32145W | | | | | 189.5 | 194.0 | 194.6 | 194.7 | 194.8 |
| HT32150 | | | | Y | 189.7 | 193.9 | 194.8 | 194.9 | 194.9 |
| HT32170S | Dow Street | Local | 194.2 | Y | 189.8 | 194.7 | 195.0 | 195.1 | 195.2 |
| HT32180 | | | | Y | 189.9 | 194.7 | 195.1 | 195.1 | 195.2 |
| HT32200S | Business Parkway | Local | 193.8 | Y | 189.9 | 194.7 | 195.1 | 195.1 | 195.2 |
| HT33080 | | | | | 170.0 | 172.0 | 172.1 | 172.2 | 172.2 |
| HT33100S | Norman Drive | Arterial | 181.3 | | 172.2 | 174.8 | 176.8 | 177.6 | 178.3 |
| HT33100S2 | Norman Drive | Arterial | | | 170.3 | 178.0 | 177.7 | 177.7 | 182.5 |
| HT33150AP | | | | | 184.9 | 186.2 | 186.8 | 187.0 | 187.1 |
| HT33190AP | | | | | 191.5 | 192.0 | 192.2 | 192.2 | 192.3 |
| HT33200APS | | | | | 192.6 | 193.5 | 194.6 | 195.7 | 197.0 |
| HT33290AP | | | | | 192.3 | 193.0 | 193.3 | 193.4 | 193.5 |
| HT33300APS | | | | | 193.4 | 200.8 | 202.3 | 202.6 | 202.8 |

**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 Staging.
3. 'Y' depicts potential structure flooding near the corresponding node location.
4. Potential Stucture flooding estimated by comparing model results with the regional 2 foot contours dataset. Additional finished floor elevations data shall be acquired for further investigation.
5. Potential Stucture flooding estimated by comparing model results with the regional 2 foot contours dataset. Additional finished floor elevations data should be acquired for further investigation.
6. All design storm events are 24 hour duration.

Yearly TSS loads were calculated based on standard EMC of TSS, yearly rainfall, tributary area; land use characteristics like percent imperviousness for Valdosta. Yearly TSS loads from various hydrologic units for each sub-basin were computed in lbs/year units. The total TSS loading of Hightower Creek was estimated to be 170,000 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: Almost 7,000 linear feet of Hightower Creek show velocities greater than 3 ft/sec. The threshold velocity for erosive velocity in Hightower Creek sub-basin is 3 ft/sec. Several locations were verified in field and showed signs of channel bank erosion.

### 4.3.5.3 Level of Service Summary

Under the present land use conditions, the 1.2-in, 5-, 25-, 50-, and 100–year 24-hour design storms were simulated to determine the problem areas as defined below.

In the Hightower Creek sub-basin the following roads do not meet the City's Level of Service as described in Section 2. The Hightower Creek stage Table 4.3.4 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

Two local roads (Dow Street and Business Parkway) do not meet the defined level of service (more than 6 inches of flooding for a 5-year storm event). One arterial road (St. Augustine Road) also does not meet the defined level of service (more than 6 inches of flooding for a 50-year storm event).

- Structures

Five locations, as represented by model nodes, were identified in the Hightower Creek sub-basin for potential structural flooding for the 100-year event.

Please refer to **Figure 4.3.2.2** for a map of Level of Service violations for Hightower Creek sub-basin. Other water quantity problem areas are also shown on this figure.

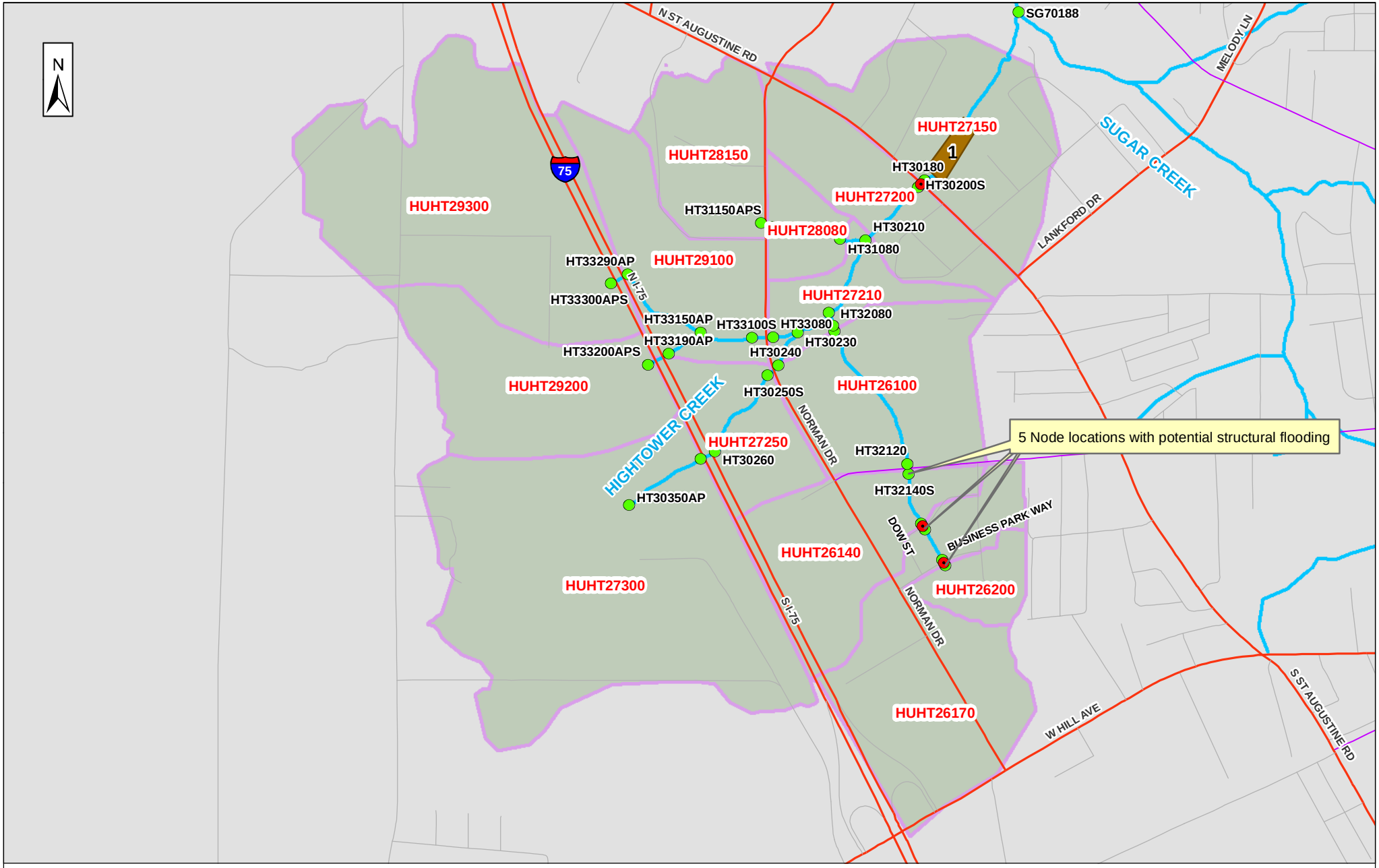


**Figure 4.3.2.2**
**City of Valdosta, GA**
**Hightower Creek Sub-Basin**
**Level of Service Violations and Water Quantity Problem Areas**

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## 4.3.6 Alternatives Evaluation

This section describes the alternatives evaluated for the Hightower Creek 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 HT1: RSF near Hightower Circle
- Alternative HT2: Grade Control structure downstream of St. Augustine Road

### *Alternative HT1 – RSF near Hightower Circle*

This Alternative consists of constructing a 3.5-acre Regional Stormwater Facility (RSF) near Hightower Circle. The proposed RSF has a Permanent Pool Volume (Water Quality Volume) of 9.0 ac-ft and a Residence Time of 4.8 days. The tributary area to the facility is 793 acres. The implementation of this alternative brings arterial road (St. Augustine Road) into Level of Service compliance along with reducing sediment loads in Sugar Creek.

The proposed RSF will treat 793 acres of untreated tributary area, and therefore will reduce sediment load. Land acquisition would be required. The location of the proposed RSF is shown on **Figure 4.3.3**. **Table 4.3.5** shows the conceptual cost estimates for this alternative.

### *Alternative HT2– Grade Control Structure Downstream of St. Augustine Road*

Alternative BR2 includes construction of a grade control structure just downstream of the N. St. Augustine Road. During field investigation erosion was observed in this section, hence a designed series of engineered drop structures is proposed at this location on Browns Canal as shown on **Figure 4.3.4**. In addition to providing reduction in channel erosion and reduction in high velocities in the stream, this project is part of a basin-wide effort to stabilize and restore the stream. **Table 4.3.6** shows the conceptual cost estimates for this alternative. CDM recommends detailed geomorphologic assessment is carried out before commencing any design or construction for a grade control project.


**Figure 4.3.3**
**City of Valdosta, GA**
**Hightower Creek Sub-basin**
**Alternative HT1**
**Regional Stormwater Facility near Hightower Circle**

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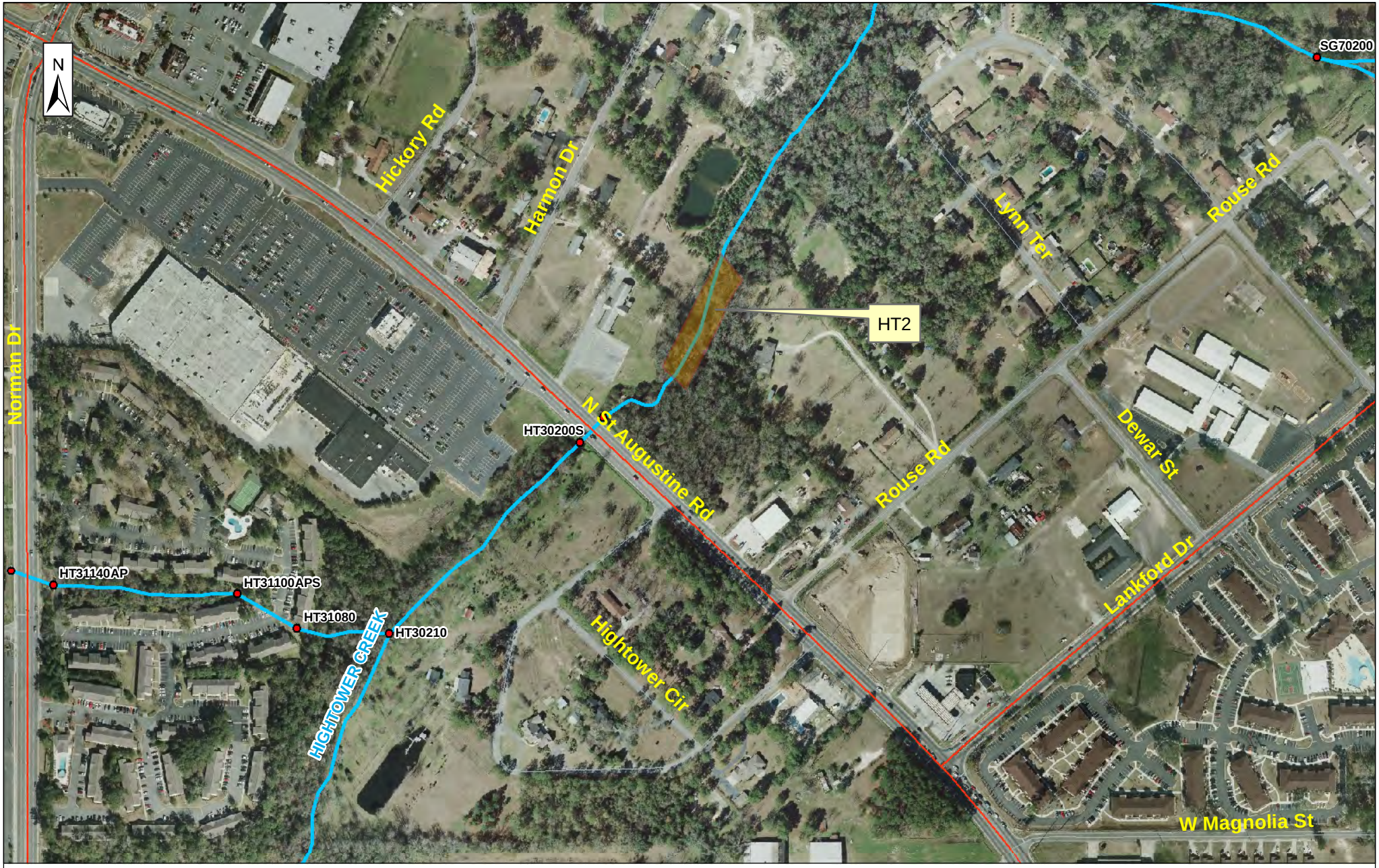


Legend
- Arterial Roads
- Collector Roads
- Local Roads
- Model Nodes
- Streams

0 250 500 1,000 Feet

**Figure 4.3.4**
**City of Valdosta, GA**
**Hightower Creek Sub-basin**
**Alternative HT2**
**Grade Control Structure Downstream of St. Augustine Rd**

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