4.6 Two Mile Branch

4.6.1 Introduction

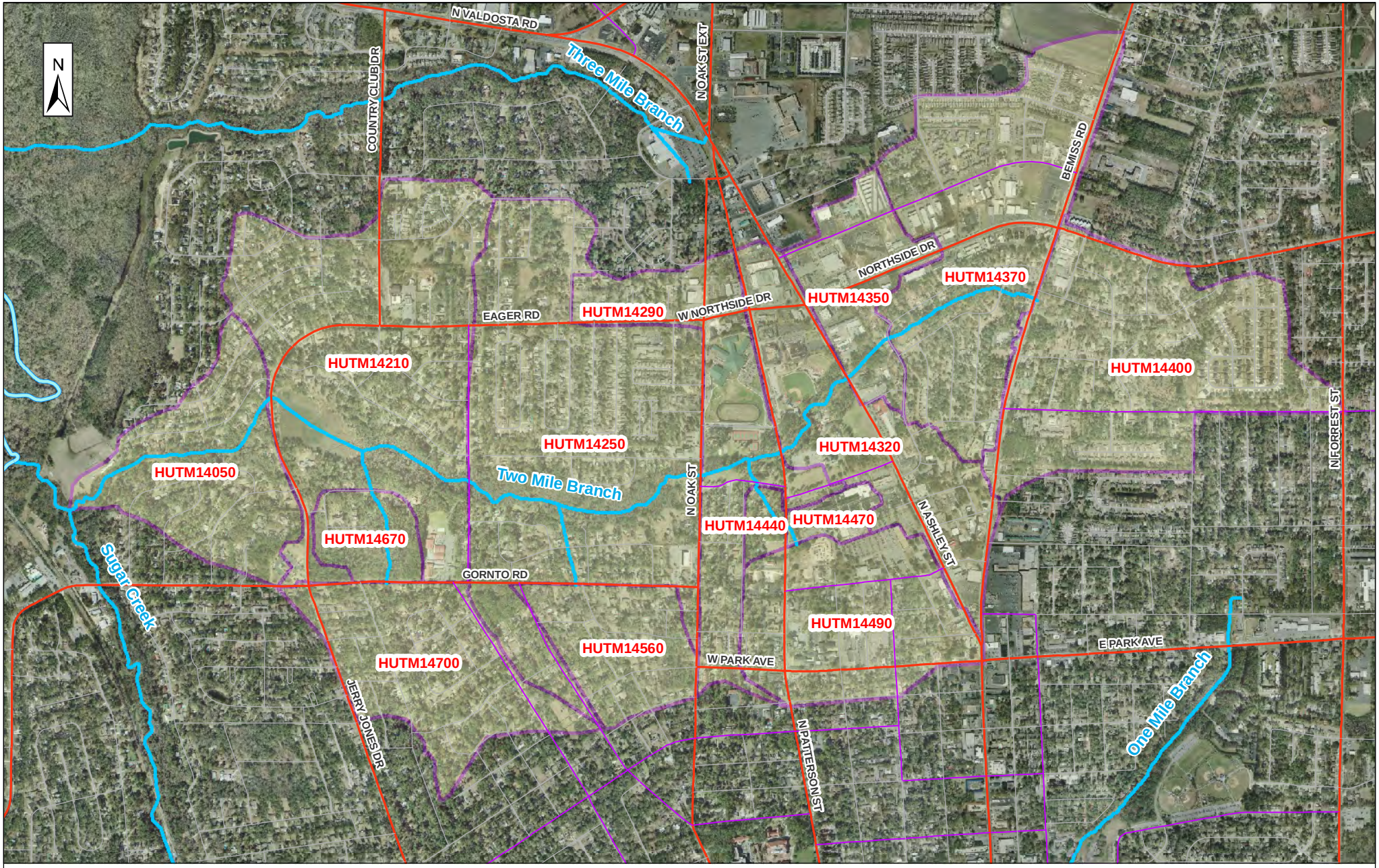
The information presented in this sub-basin plan for Two Mile Branch is intended to provide the reader with information necessary to understand the physical setting, methodology used, water quantity problems, results, alternatives evaluation, and recommendations. Section 2 of this study describes in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

4.6.2 Sub-basin Information

This section outlines information on the Two Mile Branch Sub-basin infrastructure and its ability to meet level of service requirements. The Two Mile Branch sub-basin extends from the intersection of Pineview Drive and North Forrest Street in the east to its confluence with Sugar Creek. The area of the sub-basin is approximately 2.8 sq mi (1,799 acres), which was divided into 14 hydrologic units ranging from 11 to 308 acres in size. The hydrologic unit boundaries and In-stream PSWMS are shown on **Figure 4.6.1**. The HU delineation along with the areas and the loading node for each HU is shown in **Table 4.6.1**.

Table 4.6.1. Hydrologic Units: Area

Hydrologic Unit ID	Area (Acres)	Loading Node
HUTM14320	128.2	TM40320S
HUTM14350	67.7	TM40350S
HUTM14370	212.9	TM40375
HUTM14050	116.4	TM40170
HUTM14290	119.8	TM40295
HUTM14700	115.5	TM41700S
HUTM14210	266.9	TM40220
HUTM14560	66.1	TM42560S
HUTM14250	308	TM40250S
HUTM14400	213.1	TM40400S
HUTM14490	125.8	TM43490APS
HUTM14440	10.6	TM43440S
HUTM14470	14.3	TM43470S
HUTM14670	33.2	TM41670S
Total	**1,798.5**	



Legend

Hydrologic Units
HUTM14050
Streams

Arterial Roads
Collector Roads
Local Roads

0 0.375 0.75 1.5 Miles

Figure 4.6.1
City of Valdosta, GA
Two Mile Branch Sub-Basin
Hydrologic Unit Boundaries

CDM

The predominant land uses in the sub-basin are Medium Density Residential and Light Industrial, Commercial, and Industrial, which account for a little over 50 percent and 20 percent of the total land use, respectively. The land use categories along with their respective associated area and percentage for all of Two Mile Branch sub-basin are shown in **Table 4.6.2**. The predominant soil within the sub-basin is HSG B. **Table 4.6.3** shows the soils breakdown based on HSG. The soil coverage, infiltration and storage capacity were 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.

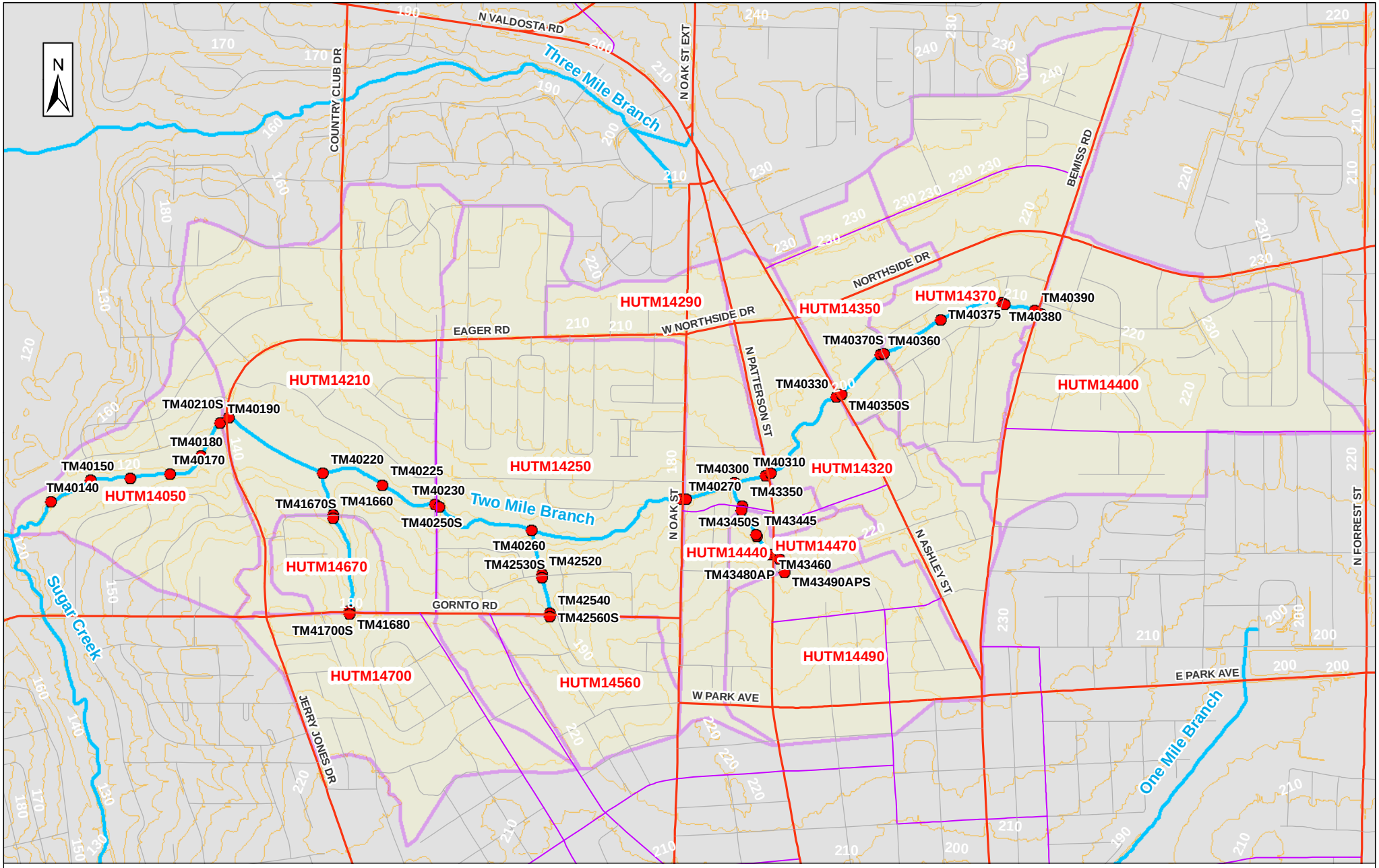
Table 4.6.2. Land Use

Land Use Category	Area (Acres)	Area (Percent)
Forest, Open & Park	127.3	7.1
Pasture	0.0	0.0
Agricultural	8.5	0.5
Low Density Residential	0.0	0.0
Medium Density Residential	962.5	53.5
High Density Residential	0.0	0.0
Light Industrial, Commercial & Institutional	396.8	22.1
Heavy Industrial & Roadways	275.3	15.3
Wetlands	4.3	0.2
Watercourses & Water bodies	23.8	1.3
Total	**1798.5**	**100.0%**

Table 4.6.3. Soils Breakdown

Hydrologic Soil Group	Area (Acres)	Area (Percent)
A	5.7	0.3
B	1523.7	84.7
C	93.1	5.2
D	176.0	9.8
Total	**1798.5**	**100.0**

The In-stream PSWMS consists of a main stem channel, which at its most downstream section confluences with the Sugar Creek, and two tributary channels that collect stormwater from south of the main stem channel. A schematic showing the model representation (hydraulic network along with nodes) of the sub-basin is presented on **Figure 4.6.2.1.**



Legend

Hydrologic Units
HUTM14050

Streams

Model Nodes
TM40140

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.*

0 0.35 0.7 1.4 Miles

Figure 4.6.2.1
City of Valdosta, GA
Two Mile Branch Sub-Basin
Hydraulic Network

CDM

4.6.3 Existing Conditions

Two Mile Branch has experienced several developments and improvements since the 1996 MSMP. Several projects in the Two Mile Branch sub-basin have been implemented as per the recommendations of the previous master plan, such as:

- Erosion Control Downstream of Jerry Jones Road: Significant erosion was noted along the channel downstream of Jerry Jones Road in the 1996 MSMP. To reduce in-channel velocities downstream of Jerry Jones Road, the City has installed 13 large concrete baffles on the downstream side of the Jerry Jones Two Mile crossing.

- Mill Pond Excavation: High sediment loads in the Two Mile Branch sub-basin lead to sediment accumulation and loss of storage in Mill Pond. In 2007, Mill Pond was excavated and the sediment was removed. However, the City has noted that large amounts of sediment are accumulating in the pond again.

- Berkley Drive culvert replacement: An upgrade to a 5 ft H x 9 ft W triple box culvert. The 1996 SWMP had recommended upgrading to only a 4 ft H x 6 ft W triple box culvert.

- N Oak Street culvert replacement: An upgrade to a 5 ft H x 8 ft W triple box culvert. The 1996 SWMP had recommended upgrading to only a 4 ft H x 8 ft W triple box culvert.

- Approximately 1,400 feet of Two Mile Branch passes through a portion of the VSU campus. Severe erosion has occurred in this stretch of the Branch, between N. Ashley and N. Patterson Streets. This erosion is primarily due to the highly impervious areas along the N. Ashley Street and Northside Drive corridors. This area is developed and highly impervious and discharges into the stream with little attenuation or treatment.

- Another location that has experienced significant erosion is the section of Two Mile Branch between Seymour Street and University Drive. The highly impervious commercial area along Northside Drive discharges directly, via open channel, into this stretch of the stream, resulting in high flows and velocities. Debris and fallen trees were seen in this section.

4.6.4 Water Quantity Problem Areas

1. Mill Pond: The City routinely draws down the water level in Mill Pond in advance of large storm events to create additional storage volume and prevent flooding of upstream roads and property.

2. Berkley Drive: The Two Mile Branch crossing at Berkley Drive experiences repeated flooding, even during small storm events. A culvert upgrade was recommended in

the 1996 SWMP and the City completed this improvement. However, during dry periods there are several feet of standing water in the Berkley Drive culvert. This standing water is a result of blockages in the stream section between Berkley Drive and Mill Pond.

3. University Drive: City staff indicated that University Drive and adjacent residential properties experience frequent nuisance flooding, even during small rainfall events.

4. Randolph Street: Flooding of residential properties near the Two Mile headwater swamp has been frequently reported to the City. This flooding is located along the channel, which accepts overflow from the swamp. This channel flows under the driveway for 900 Randolph Street before crossing under Orlando Drive and discharging into Taylor-Cowart Park. In recent years, a new subdivision has been constructed on the east side of the Two Mile headwater swamp with a stormwater pond that discharges directly into the swamp. Residents report that no flooding occurred until after the construction of the subdivision and its stormwater pond.

5. Patterson/Cowart Streets: These roadways near the South Georgia Medical Center flood frequently. The South Georgia Medical Center is nearly 100 percent impervious. Additionally, a recent expansion of the Medical Center in the southeast corner of Patterson/Cowart has added to the impervious area. Stormwater facilities serving the Medical Center appear to be undersized and result in surcharging of the stormwater collection pipes during storm events.

6. The storm event of April 2009 caused widespread flooding at several locations within the city. Significant flooding along Two Mile Branch was encountered downstream of Jerry Jones Road.

7. **Secondary System (Stormwater Infrastructure) Problem Areas:** The City identified the Two Mile Branch headwater swamp as an area of concern. Homes located adjacent to this headwater swamp have reported repeated flooding, specifically at 800 Randolph Street and 803 Randolph Street. These homes are adjacent to the stream that serves as the outfall for the headwater swamp. Because this area was upstream of the topographic survey performed on Two Mile Branch, a detailed recommendation could not be presented. However, a preliminary analysis was performed to determine if the existing culverts under Randolph Street and Orlando Drive, a crossing located downstream of Randolph Drive and upstream of Taylor-Cowart Park, were sized properly. Currently a 30-inch RCP serves Randolph Street, while two 24-inch RCPs cross under Orlando Drive.

   Based on the preliminary hydrologic evaluation of the tributary area to the crossings, the culvert under Randolph Street would need to provide conveyance for the 5-year peak flow of 198 cfs, and the culvert under Orlando Drive would need to provide conveyance for the 5-year peak flow of 233 cfs. The evaluation was performed with the 5-year storm because both of the roads under question are local roads. To convey the peak flow under Randolph Street, approximately three

additional 30-inch pipes would need to be installed. For Orlando Drive, approximately 3 additional 36-inch pipes would need to be installed to convey the 5-year peak flow.

During the site visit to this area, the stream was observed to be full of vegetation. Standing water was also noted throughout the stream and was partially filling the culvert under Randolph Drive. Removal of the in-channel vegetation and any blockages downstream may help to reduce flooding, as this will allow the channel to convey its maximum capacity. This headwater swamp has also been identified as a natural spring-fed headwater wetland, and therefore, will perennially have standing water. This means that little volume is available in the wetland for flood storage.

4.6.5 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.

4.6.5.1 Water Quantity Results

The stages for the 1.2-in, 5-, 25-, 50-, and 100–year design storms model runs are presented in **Table 4.6.4**. 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 finished floor elevation data of houses and other structures, available topographic data were utilized to estimate potential flooding for each design storm event and were tabulated. The model results table indicates the nearest node to the location of potential flooding structures.

4.6.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion Evaluation

Significant sediment loads resulting from erosion of stream banks has been observed in Two 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 403,000 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.

Table 4.6.4 Two Mile Branch 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 in	5 Year	25 Year	50 Year	100 Year
SG70000					112.0	128.0	133.0	137.0	140.0
SG70050					116.9	128.0	133.0	137.0	140.0
TM40140					118.7	128.0	133.0	137.0	140.0
TM40150					120.2	128.0	133.0	137.0	140.0
TM40160					121.7	128.0	133.0	137.0	140.0
TM40170				Y	123.1	128.0	133.0	137.0	140.0
TM40180					126.3	129.3	133.0	137.0	140.0
TM40190					132.0	134.7	135.7	137.0	140.0
TM40210S	JERRY JONES DRIVE	ARTERIAL	143.90		132.4	137.5	140.5	142.1	143.9
TM40220					145.6	147.9	148.8	149.2	149.5
TM40225				Y	150.9	152.5	153.1	153.3	153.6
TM40230				Y	151.2	153.2	153.9	154.3	154.6
TM40250S	BERKLEY ROAD	COLLECTOR	154.19		151.2	154.2	155.3	155.6	155.8
TM40260				Y	157.2	160.0	160.8	161.1	161.4
TM40270					172.4	173.6	173.9	174.0	174.2
TM40290S					173.2	177.9	178.3	178.4	178.4
TM40295	N OAK STREET	ARTERIAL	178.85		174.4	179.2	179.7	179.8	179.9
TM40300					176.1	180.1	180.8	181.1	181.4
TM40310					177.0	180.6	181.4	181.7	182.1
TM40320S	N PATTERSON STREET	ARTERIAL	185.78		177.9	183.7	186.1	186.7	187.0
TM40330					192.4	195.6	197.0	197.4	197.8
TM40350S	N ASHLEY STREET	ARTERIAL	198.92	Y	193.3	198.8	199.7	199.9	200.0
TM40360				Y	194.5	199.1	200.2	200.5	200.7
TM40370S	UNIVERSITY DRIVE	LOCAL	196.86	Y	194.7	199.2	200.2	200.5	200.8
TM40375				Y	203.9	206.4	207.1	207.3	207.5
TM40380				Y	209.1	211.0	211.7	212.0	212.2
TM40385S	SEYMOUR STREET	LOCAL	211.00	Y	209.1	211.5	211.9	212.1	212.3
TM40388				Y	210.7	213.9	214.9	215.2	215.6
TM40390				Y	212.9	217.1	217.5	217.7	217.9
TM40400S	BEMISS ROAD	ARTERIAL	218.88	Y	213.1	217.8	219.1	219.4	219.6
TM41660				Y	149.7	151.4	152.0	152.3	152.6
TM41670S	S FORTY ROAD	LOCAL	156.43		150.1	152.5	154.0	155.1	156.0
TM41680					173.5	174.6	175.3	175.8	176.2
TM41700S	GORNTO ROAD	ARTERIAL	182.27		175.1	181.4	183.0	183.2	183.3
TM42520				Y	167.9	169.4	169.9	170.2	170.4
TM42530S	MACK DRIVE	LOCAL	173.19	Y	168.8	171.6	173.2	173.6	173.8
TM42540					178.5	180.3	181.1	181.2	181.4
TM42560S	GORNTO ROAD	ARTERIAL	183.99		180.1	184.2	184.7	184.8	184.9
TM43350					179.8	181.1	181.7	181.9	182.0
TM43440S	ROOSEVELT DRIVE	COLLECTOR	184.39		180.1	184.4	185.2	185.3	185.4
TM43445					184.9	187.1	187.9	188.0	188.2

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 should be acquired for further investigation.
6. All design storm events are 24 hour duration.

Channel Bank Erosion: About 6,200 linear feet of Two Mile Branch show velocities greater than 5 ft/sec. The threshold velocity for erosive velocity in the Two Mile Branch sub-basin is 5 ft/sec. Several locations were verified in the field and showed signs of channel bank erosion.

4.6.5.3 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 Two Mile Branch sub-basin, the following roads do not meet the City's Level of Service as described in Section 2. The Two Mile Branch stage Table 4.6.4 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 greater 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 (University Drive and Cowart Avenue) do not meet the defined level of service, (more than 6 inches of flooding for a 5-year storm event). Two collector roads (Berkley Drive and Roosevelt Drive) do not meet the defined level of service (more than 6 inches of flooding for a 50-year storm event). Five arterial roads (N. Oak Street, N. Patterson Street, N. Ashley Street, Bemiss Road, and N. Patterson Street at the South Georgia Medical Center) also do not meet the defined level of service, (more than 6 inches of flooding for a 50-year storm event).

- Structures

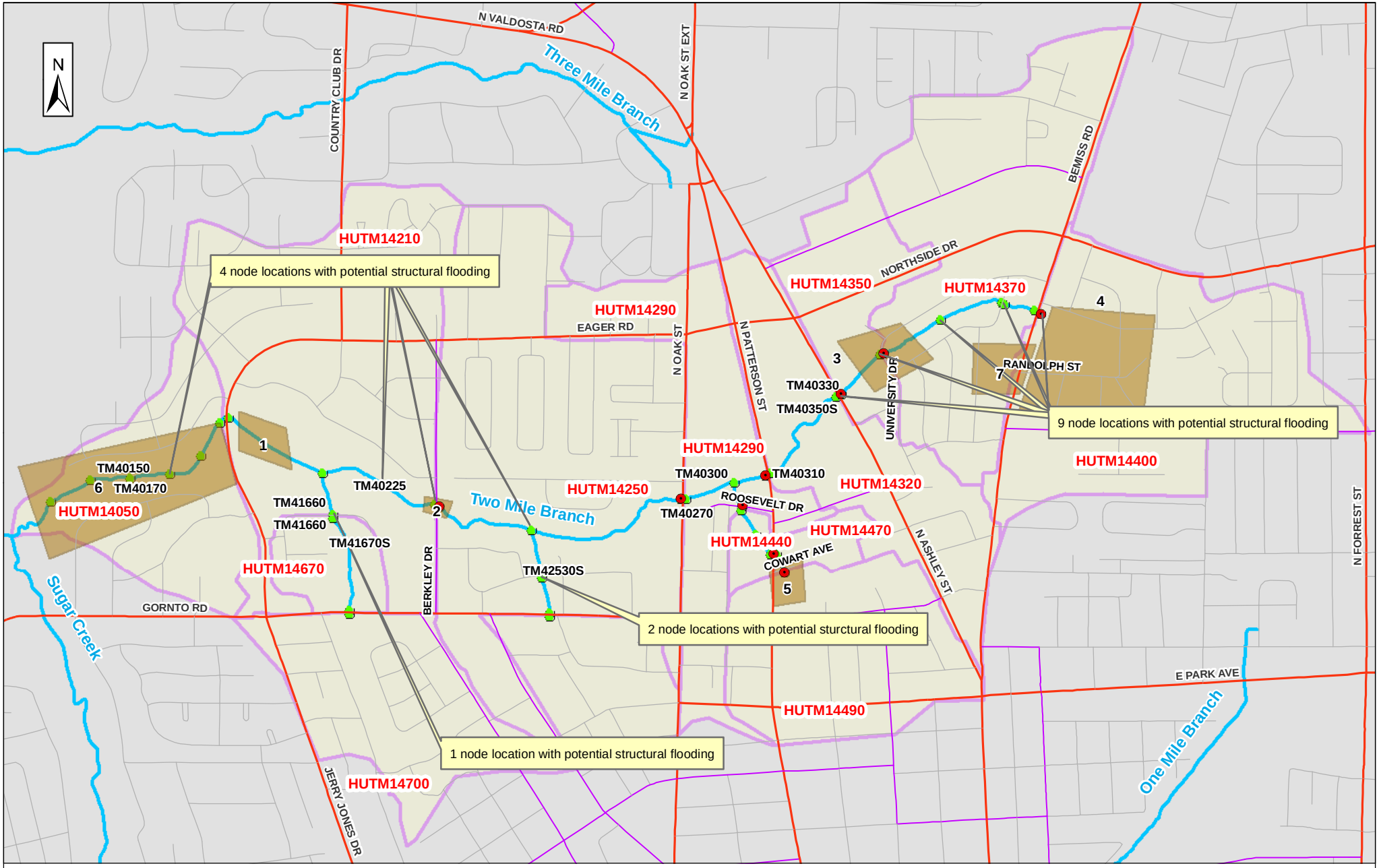
Sixteen locations, as represented by model nodes, were identified in the Two Mile Branch sub-basin for potential structural flooding for the 100-year event.

Refer to **Figure 4.6.2.2** for a map of Level of Service violations in Two Mile Branch Sub-basin. Other water quantity problems areas are also shown on this map.

4.6.6 Alternatives Evaluation

This section describes the alternatives evaluated for the Two 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 TM1: Mill Pond Dam Rehabilitation
- Alternative TM2: Berkley Drive/Mill Pond Stream Restoration
- Alternative TM3: Berkley Drive RSF



Legend

Model Nodes
- TM40140
- Streams

Hydrologic Units
- HUTM14050

- Arterial Roads
- Collector Roads
- Local Roads
- Roads - Level of Service Violations
- Water Quantity Problem Areas discussed in Section 4.6.4

0 0.25 0.5 1 Mile

Figure 4.6.2.2
City of Valdosta, GA
Two Mile Branch Sub-Basin
Level of Service Violations and Water Quantity Problem Areas

CDM

- Alternative TM4: Patterson Street Culvert Improvement (two 5 ft H x 8 ft W) + McKey Park RSF
- Alternative TM5: Grade Control – Ashley Street to Patterson Street.
- Alternative TM6: Ashley Street Culvert Improvement (two 5 ft H x 8 ft W) + Ashley Street -VSU RSF
- Alternative TM7: University Drive Culvert Replacement
- Alternative TM8: Grade Control structures between Seymour Street and University Drive.
- Alternative TM9: Two Mile Branch Headwater Swamp Improvements.

Alternative TM1 – Mill Pond Dam Rehabilitation

The City of Valdosta identified the existing Mill Pond Dam as a public safety hazard due to its age and current structural condition. The City also routinely lowers the water level in Mill Pond in advance of large storm events. In addition to an existing 12-inch outlet pipe, the City also transports pumps to Mill Pond to assist with lowering the water level. This process can take 2-3 days to significantly lower the water level in Mill Pond.

This alternative proposes to demolish the existing dam structure and reconstruct a new in-kind dam structure. The location of the dam is shown on **Figure 4.6.3**. The City has recently improved the Jerry Jones Drive crossing, and no flooding was noted in the current design of the dam and culvert.

Because increases in conveyance or decreases in storage are not proposed in this alternative, the proposed changes were not evaluated in the stormwater model. However, to assist with Mill Pond drawdown efforts, the new structure should incorporate a gate, weir, or other device for water level control. **Table 4.6.5** shows the conceptual cost estimates for this alternative.

Alternative TM2 – Stream Restoration from Berkley Drive to Mill Pond

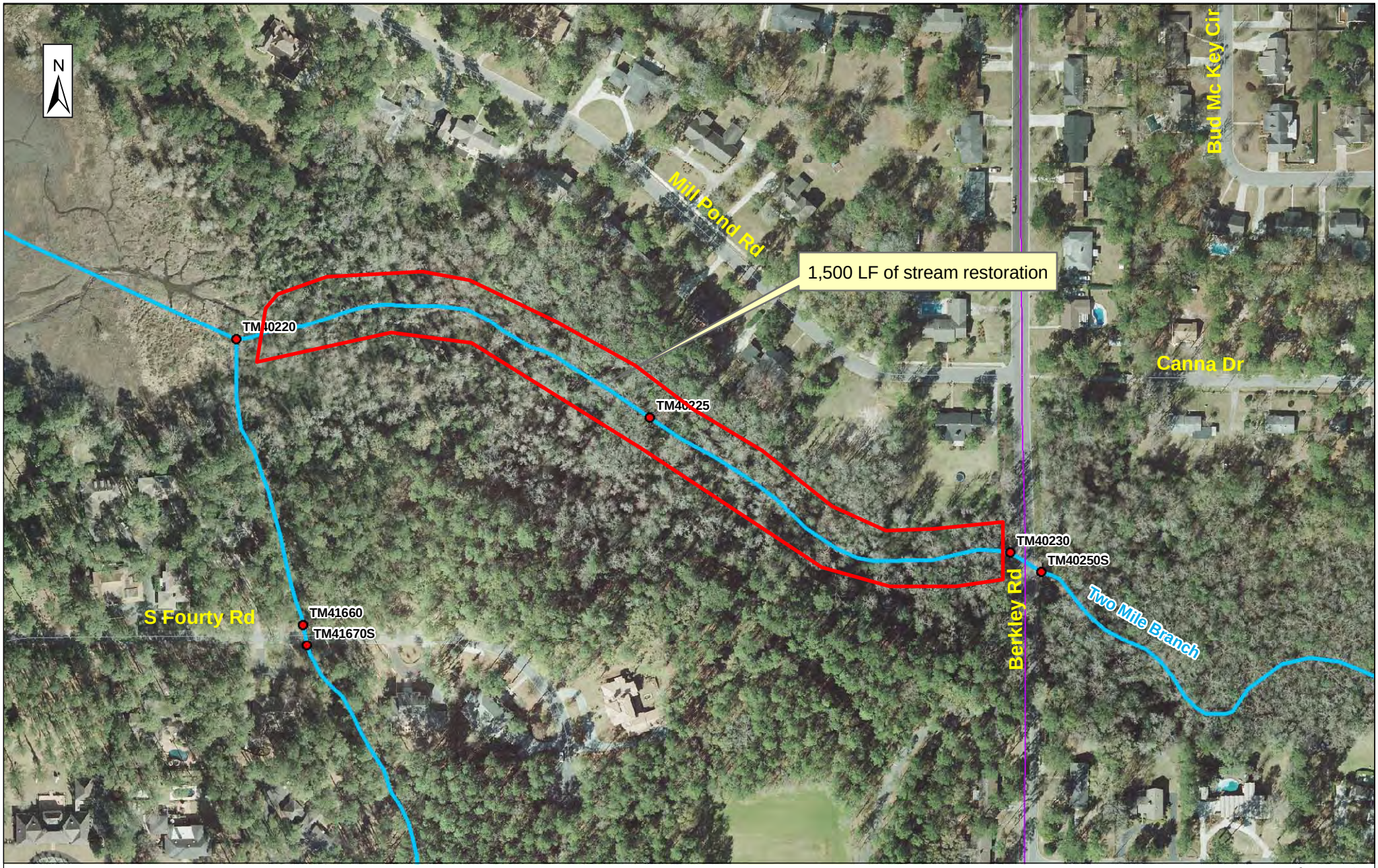
In order to lower the standing water at Berkley Drive, stream restoration of Two Mile Branch below Berkley Drive to the stream's confluence with Mill Pond is recommended. Specifically, implementation of this alternative will include removal of existing in-stream blockages; regrading of bed slope and side slope; and armoring walls to prevent erosion and decrease the sediment load to Mill Pond. This stream restoration will also serve as a natural deterrent to beavers currently colonizing this section of the stream. The location of the stream restoration is shown on **Figure 4.6.4**.

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

0 125 250 500 Feet

Figure 4.6.3
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM1
Mill Pond Dam Replacement

CDM



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

0 250 500 1,000 Feet

Figure 4.6.4
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM2
Stream Restoration - Berkley Road to Mill Pond

CDM

Implementation of this alternative will allow Berkley Drive, classified as a collector road, to meet the 50-year level of service. Currently, Berkley Drive does not meet the 50-year level of service. Nine parcels along Mill Pond Road will also be protected from the 100-year flood. **Table 4.6.6** shows the conceptual cost estimates for this alternative.

In its existing state, this section of Two Mile Branch also experiences high stream velocities, in excess of 5 ft/sec during the 1.2-inch storm, resulting in erosion and additional sediment load to Mill Pond. Implementation of alternative TM2 reduced the in-channel velocities to approximately 2 ft/sec during the 1.2-inch storm, resulting in less erosion and decreased sediment generation.

An additional analysis was performed to determine if raising the roadway elevation of Berkeley Road at Two Mile Branch would be sufficient to allow Berkeley Drive to meet its defined level of service (more than 6 inches of flooding for a 50-year storm event). This analysis was performed due to the expected cost of implementing alternative TM2, and the possibility of beaver recolonization in the stream. If raised by approximately 2.5 feet near the crossing of Two Mile Branch, it is feasible for Berkeley Drive to meet its level of service. Cost analysis and a feasibility study should be performed before recommending this option for design.

Alternative TM3 – Berkley Drive RSF

The City requested evaluation of the possibility of a RSF located upstream of Mill Pond to capture sediment and litter that would otherwise be deposited in Mill Pond. While an in-line facility would be the best option to serve this purpose, difficulty in permitting an in-line facility makes implementation unlikely. Therefore, an off-line RSF is proposed. Based on an evaluation of adjacent properties, topography, and stormwater conveyance systems, the proposed location of the facility is immediately upstream of Berkley Drive and north of the Two Mile Branch main channel, as shown on **Figure 4.6.5**.

The proposed RSF occupies approximately 3 acres of land currently owned by the City. The facility will intercept an existing stormwater ditch draining 41 acres of residential land between Berkley Drive and Willow Wood Circle. The RSF provides a Permanent Pool Volume of 6.1 ac-ft and a residence time of almost 7 days, resulting in an annual reduction of approximately 4,800 pounds of sediment.

Some wetland mitigation should be anticipated with implementation of this alternative; however, the stream buffer is wide in this section of Two Mile Branch and mitigation would likely be required with an alternative adjacent to the stream. **Table 4.6.7** shows the conceptual cost estimates for this alternative.

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

0 250 500 1,000 Feet

Figure 4.6.5
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM3
Regional Stormwater Facility
near Berkley Road

CDM

Alternative TM4 – Patterson Street Culvert Improvement (two 5 ft H x 8 ft W) + McKey Park RSF

The existing culvert at Patterson Street was found to be undersized and is causing Patterson Street (arterial road) to not meet the 50-year level of service. Additionally, the culvert should be replaced based on its current condition and age. The improvement includes replacing the existing 6 ft H x 11 ft W box culvert with a 5 ft H x 8 ft W double box culvert. The 1996 SWMP also recommended replacing this culvert with a 6 ft H x 8 ft W double box culvert.

A 1.6-acre RSF is also proposed to be constructed. This facility consists of an offline retention basin and is proposed to be located upstream of N. Oak Street in the City-owned McKey Park. Primarily, the RSF needs to be constructed to provide additional storage and peak flow attenuation in order to prevent increased water levels downstream of Patterson Street, as a result of the increased conveyance at the Patterson Street crossing. A secondary benefit of this facility is that it will treat and attenuate 173 acres of previously untreated tributary area, which is fully developed residential and commercial property.

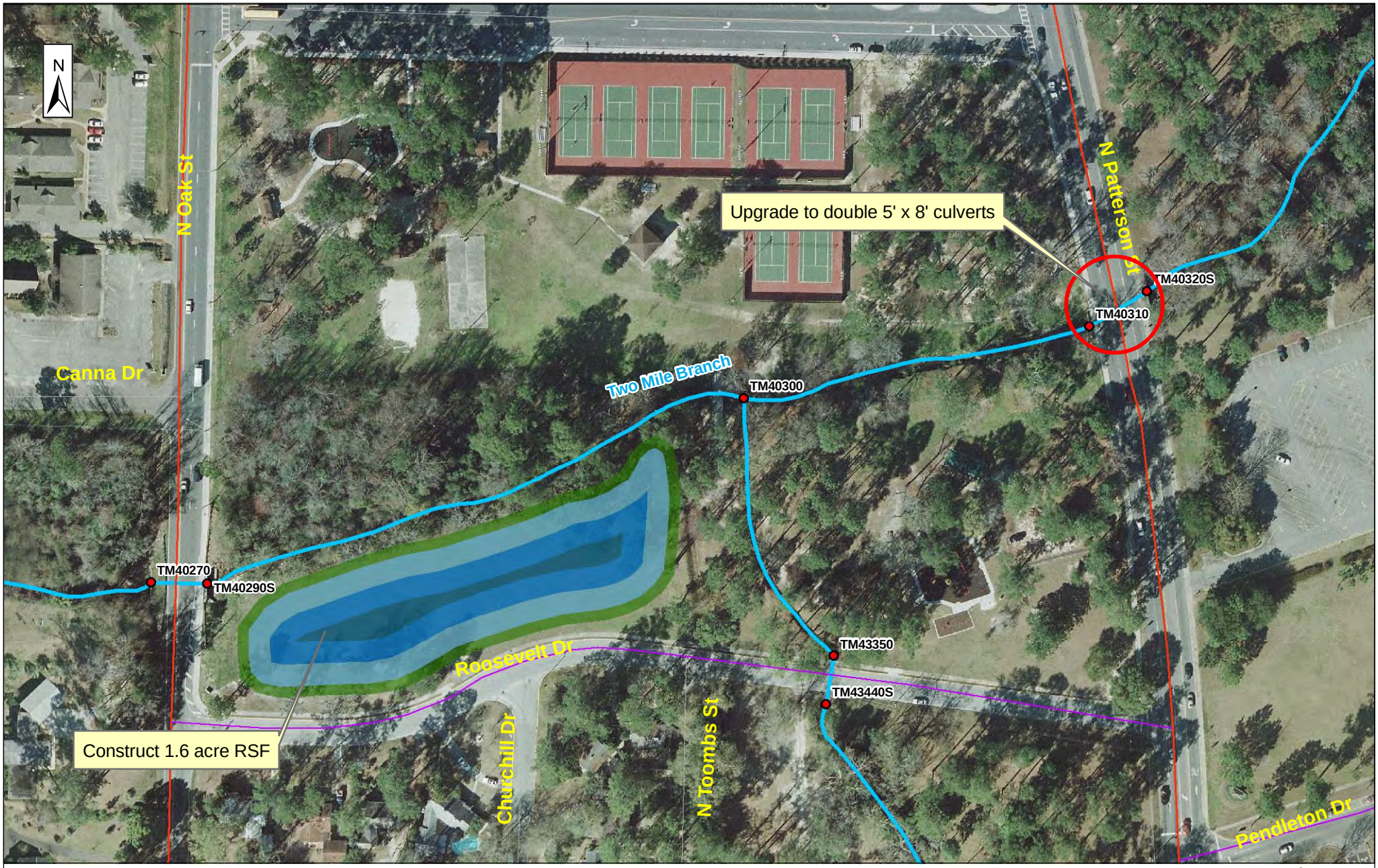
This tributary area is located between N. Oak Street and N. Toombs Street, south of McKey Park. The proposed RSF occupies approximately 2 acres and provides a permanent pool volume of 4.4 ac-ft and a residence time of 2.8 days. The location of the RSF is shown on **Figure 4.6.6**.

Implementation of this alternative will allow N. Patterson Street, classified as an arterial road, to meet the 50-year level of service. Additionally, the RSF has the ability to capture more than 20,000 pounds of sediment annually. Because the RSF is proposed to be located in McKey Park, which is owned by the City, no land will need to be acquired for this alternative. However, it should be noted that the City agreed, upon purchasing the McKey Park property, to not develop the land. This could be an obstacle to implementation of this alternative, but incorporation of park features and amenities with the RSF could assist with completion of this project. Additionally, maintenance of traffic along N. Patterson Street will need to be addressed, as replacing the culvert under N. Patterson Street will result in significant traffic disruption. **Table 4.6.8** shows the conceptual cost estimates for this alternative.

Alternative TM5 – Grade Control – Ashley Street to Patterson Street

In order to reduce the high velocities and channel erosion observed along the 1,400-foot section of Two Mile Branch between N. Ashley and N. Patterson Streets, grade control structures are recommended to be installed. Implementation of Alternative TM5 includes the installation of three 3-foot high grade control structures spaced approximately 450 feet apart.

In its existing condition, velocities reaching almost 7 ft/sec during the 1.2-inch storm are observed in the stormwater model. After completion of Alternative TM5, no stream velocities are observed above the erosive threshold, which for the soils predominant in Two Mile Branch, is 5 ft/sec.



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

0 125 250 500 Feet

Figure 4.6.6
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM4
N Patterson Street Culvert Improvement &
Regional Stormwater Facility at McKey Park

CDM

The approximate location of the grade control structures is shown on **Figure 4.6.7**. The design of the drop structure is beyond the scope of this planning level analysis. **Table 4.6.9** 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.

Alternative TM6 – Ashley Street Culvert Improvement (two 5 ft H x 8 ft W) + Ashley-VSU RSF

The existing culvert at Ashley Street was found to be undersized and is causing Ashley Street (arterial road) to not meet the 50-year level of service. Additionally, the culvert needs to be replaced based on its current condition and age. The improvement includes replacing the existing 5 ft H x 5 ft W box culvert (including the 1.5 ft H x 3 ft W low flow channel) with a 5 ft H x 8 ft W double box culvert. The 1996 SWMP also recommended replacing this culvert with a 6 ft H x 10 ft W box culvert.

A 2.0-acre RSF is also proposed to be constructed. This facility consists of an offline retention basin and is proposed to be located directly downstream of N. Ashley Street on property currently owned by VSU. Primarily, the RSF needs to be constructed to provide additional storage and peak flow attenuation in order to prevent increased water levels downstream of Ashley Street, as a result of the increased conveyance at the Ashley Street crossing. A secondary benefit of this facility is that it will treat and attenuate 64 acres of previously untreated tributary area, which is fully developed commercial property along Ashley Street south of the Two Mile Branch main stem.

The proposed RSF occupies approximately 3 acres and provides a permanent pool volume of 4.1 ac-ft and a residence time of 9.3 days. The location of the RSF is shown on **Figure 4.6.8**.

Implementation of this alternative will allow N. Ashley Street, classified as an arterial road, to meet the 50-year level of service. Additionally, the RSF has the ability to capture more than 11,000 pounds of sediment annually. Because the RSF is proposed to be located on VSU property, approximately 3 acres of land will need to be acquired for this alternative. However, it should be noted that any development by VSU in the currently open parcel along N. Ashley Street will require construction of a stormwater treatment facility. Coordination with VSU to ensure that any additional impervious area constructed nearby could be treated with this RSF, may assist with implementation of this alternative. Additionally, maintenance of traffic along N. Ashley Street will need to be addressed, as replacing the culvert under N. Ashley Street will result in significant traffic disruption. **Table 4.6.10** shows the conceptual cost estimates for this alternative.

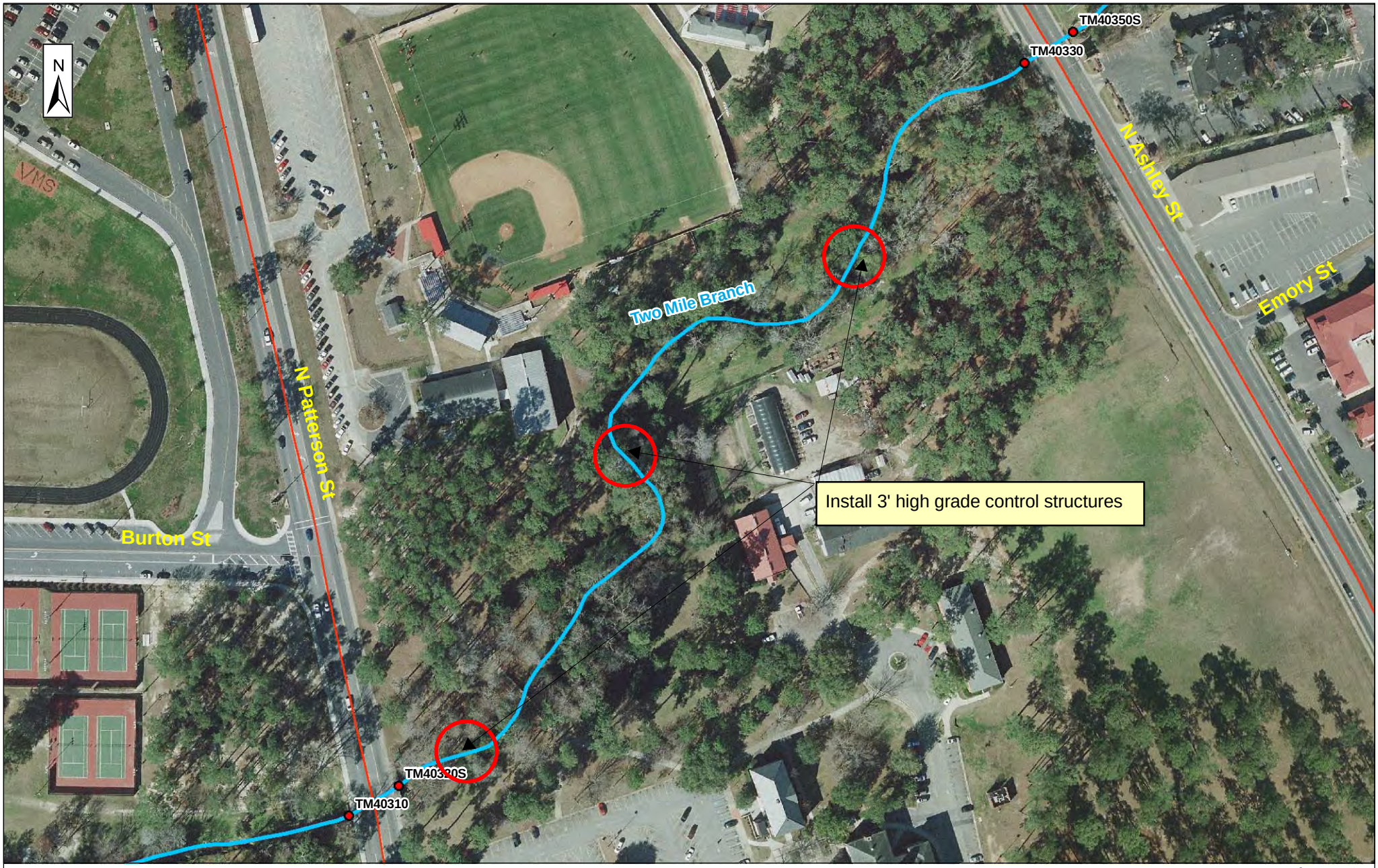


Figure 4.6.7
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM5
Grade Control Structures Between N Ashley Street and N Patterson St

CDM

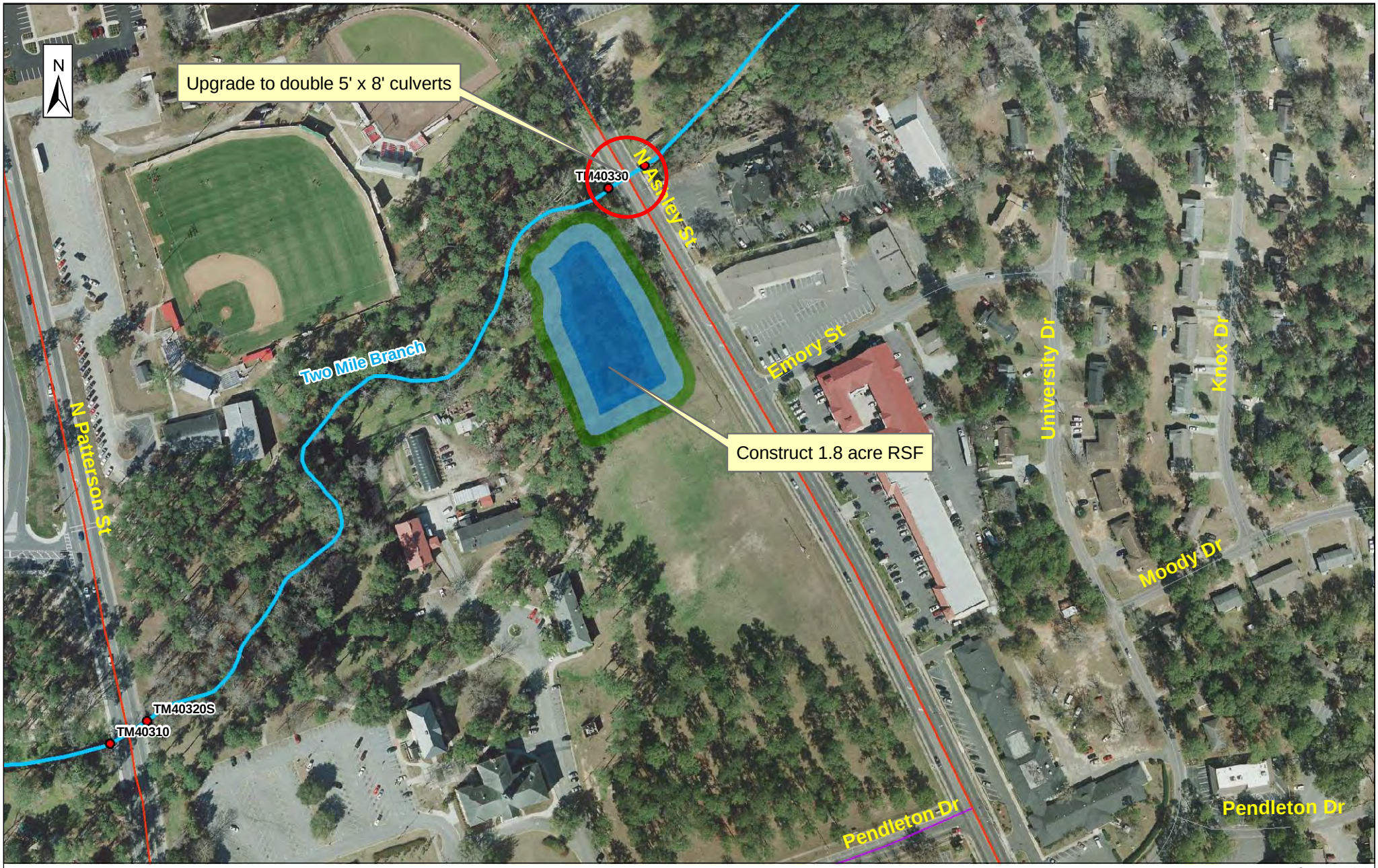


Figure 4.6.8
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM6
N Ashley Street Culvert Improvement &
Regional Stormwater Facility at Ashley St/VSU

CDM

Alternative TM7 – University Drive Culvert Replacement

The existing culvert at University Drive was found to be undersized and is causing University Drive (local road) to not meet the 5-year level of service. Additionally, the City recommended this culvert to be replaced based on its age. During the evaluation of upsizing this culvert, it was found that replacing the existing culvert with a reasonably sized larger culvert would not allow University Drive to meet the 5-year level of service. The water level at University Drive during storm events is controlled by tail-water conditions rather than by the size of the University Drive culvert. Therefore, this alternative recommends an in-kind replacement of the existing 4ft H x 5 ft W triple box culvert, based on the recommendation by the City.

No benefits to flood reduction or improvement in water quality occur as part of Alternative TM7. The location of the culvert replacement is shown on **Figure 4.6.9**. **Table 4.6.11** shows the conceptual cost estimates for this alternative.

Alternative TM8 – Grade Control – Seymour Street to University Drive

In order to reduce the high velocities and channel erosion observed along the 1,600-foot section of Two Mile Branch between Seymour Street and University Drive, grade control structures are recommended to be installed. Implementation of Alternative TM8 includes the installation of three 3-foot high grade control structures spaced about 510 feet apart.

In its existing condition, velocities reaching almost 7 ft/sec during the 1.2-inch storm are observed in the stormwater model. After completion of Alternative TM5, peak stream velocities are reduced to less than 4 ft/sec. No stream velocities are observed above the erosive threshold, which for the soils predominant in Two Mile Branch is 5 ft/sec.

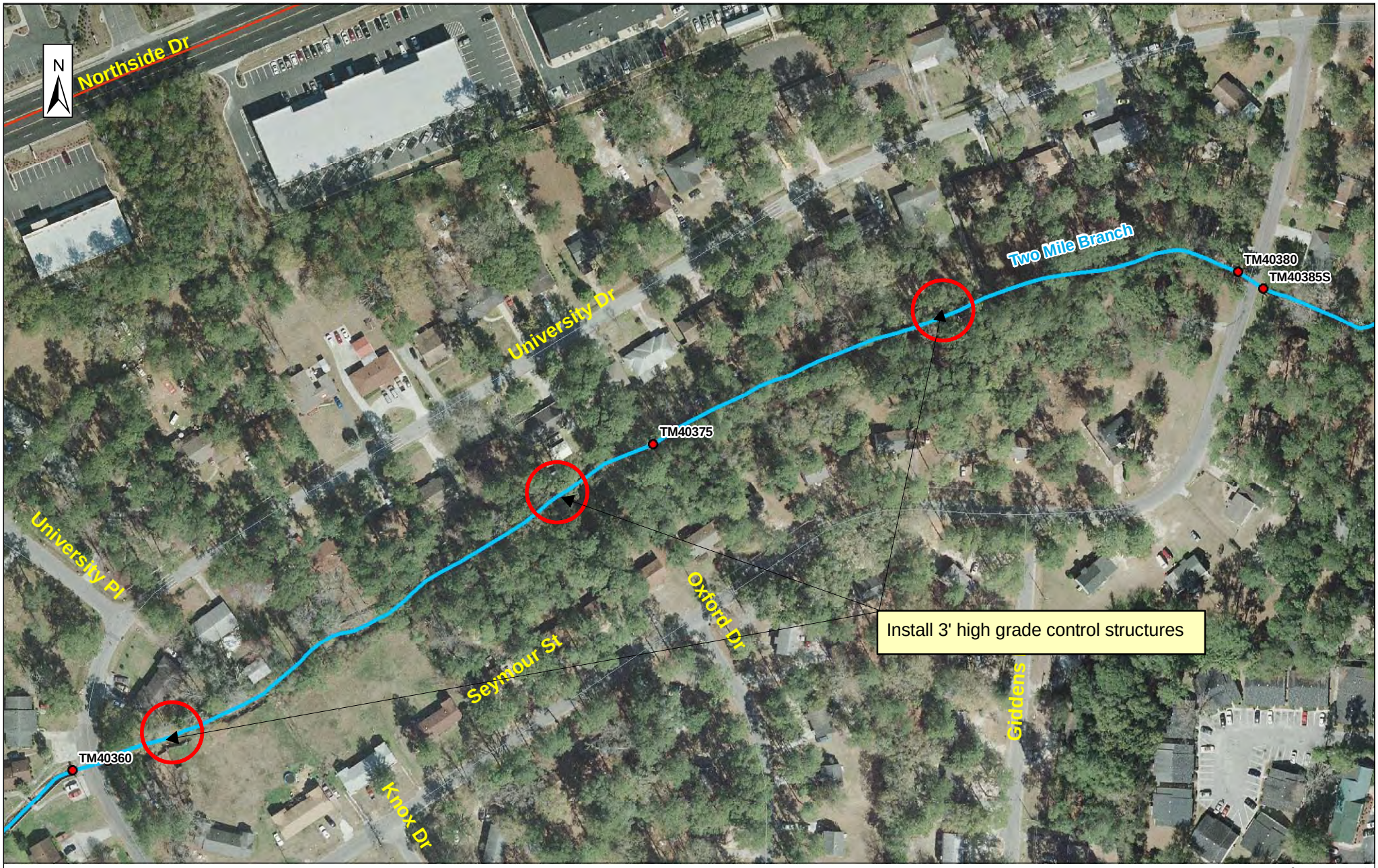
The approximate location of the grade control structures is shown on **Figure 4.6.10**. **Table 4.6.12** shows the conceptual cost estimates for this alternative. CDM recommends detailed geomorphologic assessment is carried out before commencing any design or construction for a grade control project.

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

0 125 250 500 Feet

Figure 4.6.9
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM7
University Drive Culvert Replacement

CDM



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

0 125 250 500 Feet

Figure 4.6.10
City of Valdosta, GA
Two Mile Branch Sub-basin
Alternative TM8
Grade Control Structures Between Seymour Street and University Drive

CDM