4.4 One Mile Branch

4.4.1 Introduction

The information presented in this sub-basin plan for One 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.

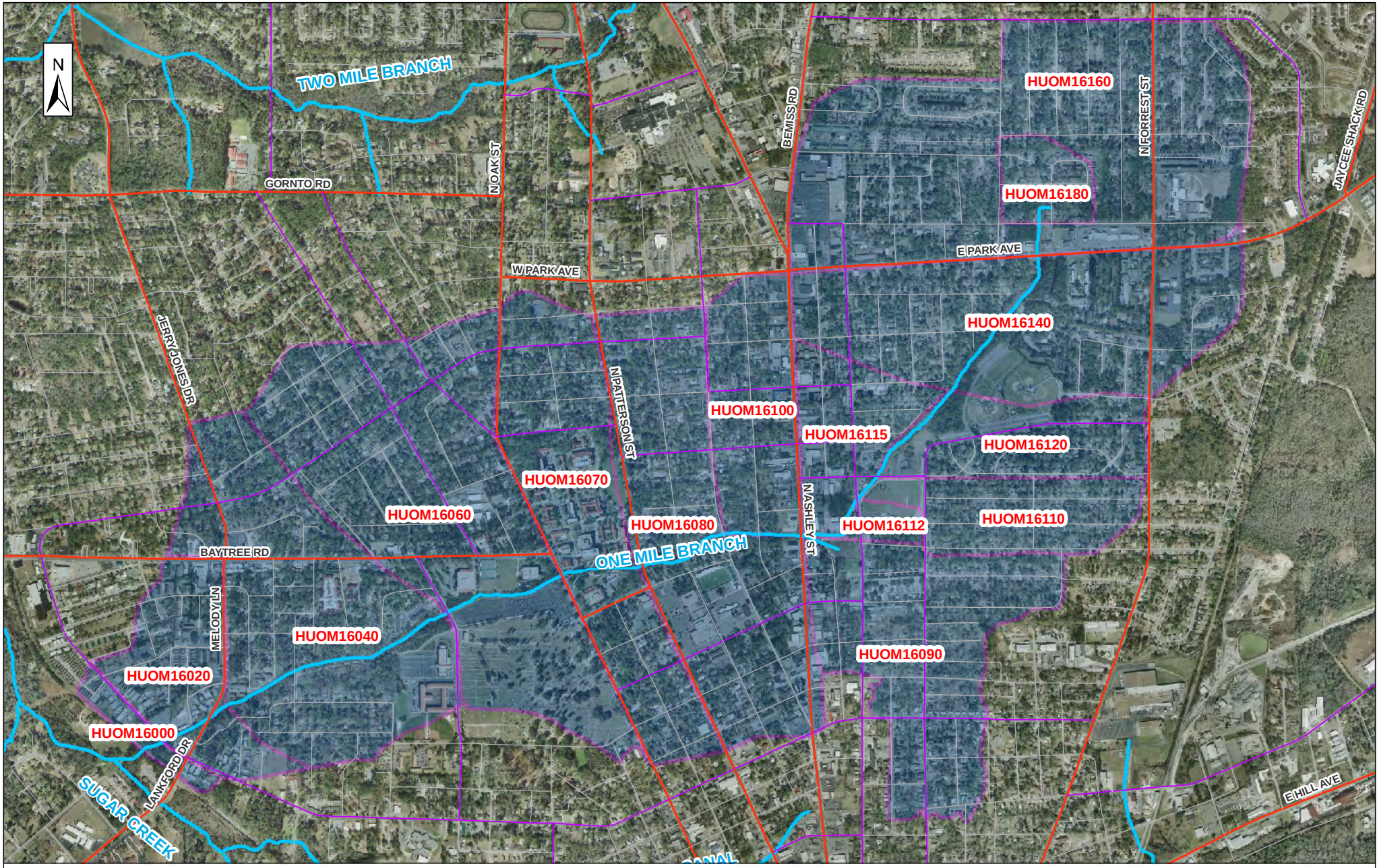
4.4.2 Physical Description

The One Mile Branch sub-basin extends from Pineview Drive in the north to its confluence with Sugar Creek. The area of the sub-basin is approximately 3 sq mi (1,944 acres), which was divided into 15 hydrologic units ranging from 11 to 320 acres in size. The hydrologic unit boundaries and the In-stream PSWMS are shown on **Figure 4.4.1**. The HU delineation along with the areas and the loading node for each HU is shown in **Table 4.4.1**.

Table 4.4.1. Hydrologic Units: Area

Hydrologic Unit ID	Area (Acres)	Loading Node
HUOM16000	15.1	OM60020S
HUOM16020	78.3	OM60040S
HUOM16040	215.6	OM60080S
HUOM16060	281.0	OM60140S
HUOM16070	156.7	OM60170S
HUOM16080	196.8	OM60190S
HUOM16090	155.0	OM60265S
HUOM16100	82.5	OM60220S
HUOM16110	64.9	OM60290
HUOM16112	10.7	OM60270
HUOM16115	59.7	OM60270
HUOM16120	73.0	OM60300S
HUOM16140	206.9	OM60320
HUOM16160	319.5	OM60360
HUOM16180	28.0	OM60380
Total	**1,943.8**	

The predominant land use in the sub-basin is Medium Density Residential, which accounts for 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 4.4.2**. The predominant soil within the sub-basin is B. **Table 4.4.3** 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.



Legend

Hydrologic Units
HUOM16160
Streams

Arterial Roads
Collector Roads
Local Roads

0 0.25 0.5 1 Miles

Figure 4.4.1
City of Valdosta, GA
One Mile Branch Sub-Basin
Hydrologic Units Delineation

CDM

Table 4.4.2. Land Use

Land Use Category	Area (Acres)	Area (Percent)
Forest, Open & Park	162.6	8.4
Pasture	0.0	0.0
Agricultural	0.0	0.0
Low Density Residential	1.6	0.1
Medium Density Residential	990.7	50.9
High Density Residential	14.4	0.7
Light Industrial, Commercial & Institutional	424.4	21.8
Heavy Industrial & Roadways	343.9	17.7
Wetlands	1.1	0.1
Watercourses & Water bodies	5.1	0.3
Total	**1,943.8**	**100.0**

Table 4.4.3. Soils

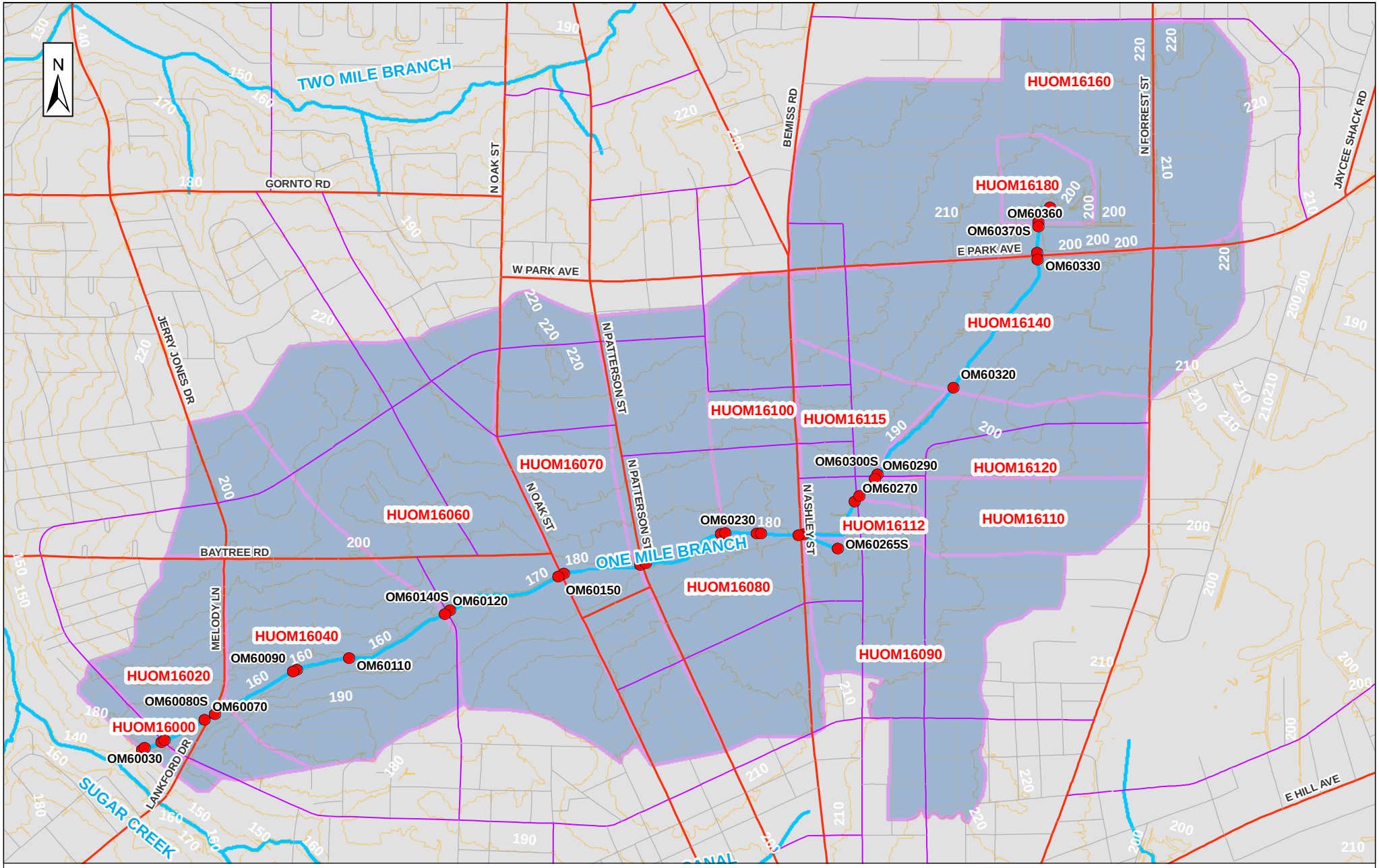
Hydrologic Soil Group	Area (Acres)	Area (Percent)
A	0.0	0.0
B	1,495.6	77.0
C	248.2	12.9
D	200.0	10.2
Total	**1,943.8**	**100.0**

The In-stream PSWMS consists of a main stem channel, which 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 4.4.2.1.**

4.4.3 Existing Conditions

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

- Lee Street detention facility: This 2-acre detention facility just upstream of Ashley Street (between Ashley Street and Lee Street) was constructed to provide storage and treatment to about 150 acres of tributary area upstream of Ashley Street and south of E. Brookwood Drive. This detention facility provides peak flow attenuation for low flow events and mean annual flows from this tributary area.



Legend

Hydrologic Units
- HUOM16160

Streams

Model Nodes
- OM60290

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 0.25 0.5 1 Miles

Figure 4.4.2.1
City of Valdosta, GA
One Mile Branch Sub-Basin
Hydraulic Network

CDM

For greater flow events it also acts as an offline detention facility and receives flows from One Mile Branch as the stage level rises upstream of Ashley Street and flows back into the facility, thus providing additional storage in this part of the sub-basin, which is prone to flooding especially at the nearby Coca Cola bottling facility just north of the facility. However, this detention facility is small for the drainage area it receives flows from.

- Lakeland Avenue culvert replacement: An upgrade to a 4 ft H x 6 ft W double culvert as per the 1996 MSMP recommendation was completed.
- Lee Street culvert replacement: An upgrade to a 5 ft H x 8 ft W double culvert as per the 1996 MSMP recommendation was completed.
- Williams Street culvert replacement: An upgrade to a 6 ft H x 10 ft W double culvert as per the 1996 MSMP recommendation was completed.
- Iola Drive culvert replacement: An upgrade to a 6 ft H x 10 ft W double culvert as per the 1996 MSMP recommendation for culvert upgrade was completed.
- Edgewood Drive improvements: The existing bridge at Edgewood Drive was prone to blockage due to debris and this had caused flooding in some homes in the vicinity. The bridge was demolished and it is an open channel now.
- Lakeland Avenue drainage improvements: To alleviate street and localized flooding in the areas in vicinity of Wilson Avenue and Caswell Street, flows were routed using pipes to a ditch running parallel to Lakeland Avenue. This ditch was paved with concrete and a series of energy dissipating structures were constructed on it. The flows run in this ditch and finally discharge into One Mile Branch just downstream of the Lakeland Avenue culvert crossing.
- Another significant feature in One Mile Branch sub-basin that affects hydrology and hydraulics of the system is Valdosta State University (VSU). VSU has its campus and several other buildings in the vicinity of the One Mile Branch. VSU occupies about 130 acres in the tributary area of One Mile Branch. This area stretches from Patterson Street in the north to Wainwright Drive to the south and directly effects about 5000 feet of the stream. Most of the VSU area is developed and highly impervious, which discharges into the stream with limited treatment.
- Another location that has experienced significant erosion is the section of One Mile Branch downstream of the railroad before it confluences with Sugar Creek. A lot of debris and fallen trees were seen in this section. Debris deposits, fallen drainage pipes and damage to the upstream face of the Patterson Street culvert were observed. Significant erosion of the stream banks was seen downstream of the Park Avenue culvert crossing. Foamy and odorous discharge was observed just

downstream of the Lakeland Avenue culvert, indicating the possibility of sewer leakage.

4.4.4 Problem Areas

1. Ashley Street - Coca Cola bottling plant flooding: The Coca Cola bottling plant located just upstream of the Ashley Street crossing has experienced flooding in the past from big storm events. Several drainage improvements upstream of this location such as culvert upgrades have lead to increased flows at this location. The Ashley Street culvert is acting as a bottleneck to the flow. Another establishment (a deli) just upstream of Ashley Street has experienced flooding of its parking lot during big storm events.

2. Pine Oak Circle area, north of the Lakeland Avenue has experienced repeated flooding of several low lying homes. Drainage improvements in this area along with Lakeland Avenue culvert upgrade have been completed. However, Park Avenue culvert south of Lakeland Avenue has been noted as a bottleneck at this location.

3. Gordon Street flooded during a January 2009 event due to debris clogging storm drains east of Hightower Street.

The storm event of April 2009 caused widespread flooding at several locations within the City, including most of the above locations in One Mile Branch.

4.4.5 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.

4.4.5.1 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 4.4.4**. 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 storm event and tabulated. The model results table indicates the nearest node to the structure's flooding location.

Table 4.4.4. One 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 Inch	5 Year	25 Year	50 Year	100 Year
OM60010					142.7	148.0	149.8	150.2	150.8
OM60020S	Railroad	R/R	162.4		142.9	148.1	149.8	150.3	150.9
OM60030					148.4	152.1	153.5	154.6	155.0
OM60040S	Gordon Street	Local	154.5	Y	148.4	153.1	154.9	155.5	155.8
OM60050					148.9	154.3	156.0	156.5	156.8
OM60070					149.0	154.1	155.8	156.2	156.4
OM60080S	Melody Lane	Arterial	158.4		149.1	154.9	157.1	157.8	158.3
OM60090				Y	152.2	156.2	157.9	158.5	159.0
OM60100S	Wainwright Drive	Local	158.4	Y	152.6	158.9	160.1	160.4	160.6
OM60110					153.5	159.4	160.8	161.1	161.4
OM60120					158.1	163.0	164.7	165.1	165.4
OM60140S	Sustella Avenue	Collector	170.2		159.6	165.6	167.0	167.4	167.7
OM60150				Y	169.4	172.7	173.7	173.9	174.1
OM60170S	Oak Street	Arterial	178.4	Y	169.7	174.3	175.5	176.0	176.5
OM60180				Y	176.7	180.4	181.2	181.4	181.6
OM60190S	Patterson Street	Arterial	183.7	Y	176.9	181.3	182.6	183.0	183.4
OM60200					179.5	181.9	183.1	183.5	184.0
OM60220S	Williams Street	Collector	185.3	Y	179.6	182.5	183.9	184.4	185.6
OM60230				Y	181.6	184.1	184.7	185.0	186.0
OM60240S	Iola Drive	Local	186.1		181.8	184.6	185.4	185.8	186.7
OM60250					184.2	187.3	188.1	188.4	188.6
OM60260S	Ashley Street	Arterial	192.7	Y	186.1	191.2	192.6	193.1	193.4
OM60265S					185.6	191.2	192.6	193.1	193.4
OM60270				Y	188.3	192.0	192.9	193.3	193.6
OM60280S	Lee Street	Collector	193.3	Y	188.4	193.2	194.1	194.3	194.5
OM60290					188.9	193.6	194.4	194.6	194.8
OM60300S	Vallotton Drive	Collector	193.3		188.9	193.8	194.8	195.1	195.4
OM60320				Y	191.0	195.1	196.1	196.5	196.8
OM60330				Y	196.1	199.2	200.1	200.5	200.9
OM60350S	Park Avenue	Arterial	200.2	Y	196.3	201.0	201.2	201.4	201.4
OM60360				Y	196.3	200.3	201.0	201.2	201.3
OM60370S	Lakeland Avenue	Local	199.6	Y	196.3	200.4	201.0	201.2	201.3
OM60380				Y	196.3	200.4	201.1	201.2	201.3

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.
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.

4.4.5.2 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. 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 for One Mile Branch was estimated to be 472,000 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.

Channel Bank Erosion: Almost 9,000 linear feet of One Mile Branch show velocities greater than 3 ft/sec. The threshold velocity for erosive velocity in One Mile Branch is 3 ft/sec. Several locations were verified in field and showed signs of channel bank erosion.

4.4.5.3 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:

- Roads

In the One Mile Branch sub-basin the following roads do not meet the City's Level of Service as described in Section 2. The One Mile Branch stage Table 4.4.4 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).

One local road (Lakeland Avenue) does not meet the defined level of service (more than 6 inches of flooding for a 5-year storm event). Two collector roads (Lee Street and Vallotton Drive) do not meet the defined level of service (more than 6 inches of flooding for a 50-year storm event). One arterial road (Park Avenue) also does not meet the defined level of service (> 6 inches of flooding for a 50-year storm event).

- Structures

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

Please refer to Figure **4.4.2.2** for a map of Level of Service violations for One Mile Branch sub-basin. Other water quantity problem areas are also shown on this figure.

4.4.6 Alternatives Evaluation

This section describes the alternatives evaluated for the One 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 OM1: Patterson Street Culvert Upgrade and RSF near Patterson Street.
- Alternative OM2: Park Avenue Culvert Improvement and RSF near Lakeland Avenue.
- Alternative OM3: Ashley Street Culvert Improvement and RSF near Vallotton Drive.
- Alternative OM4: End of Pipe Treatment @ Vallotton Drive
- Alternative OM 5: End of Pipe Treatment @ Lee Street
- Alternative OM 6: End of Pipe Treatment @ VSU Parking Lot
- Alternative OM 7: Grade Control structures (South of Gordon Street to confluence with Sugar Creek).

Alternative OM1 – Patterson Street Culvert Upgrade and RSF near Patterson Street

Alternative OM1 proposes to upgrade the capacity of the Patterson Street Culvert from the existing 7 ft H x 7 ft W double box culvert to a 7 ft H x 10 ft W double box culvert. Williams Street and Iola Drive culverts were upgraded as per the recommendation of the 1996 MSMP, which led to a considerable increase in the flow capacity of these culverts. Patterson Street culvert upgrade was also suggested in 1996 but was not implemented. The recent culvert improvement projects upstream of Patterson Street have led to increased flows at the Patterson Street culvert.

This alternative also includes construction of an offline RSF in conjunction with the culvert improvements as shown on **Figure 4.4.3**.

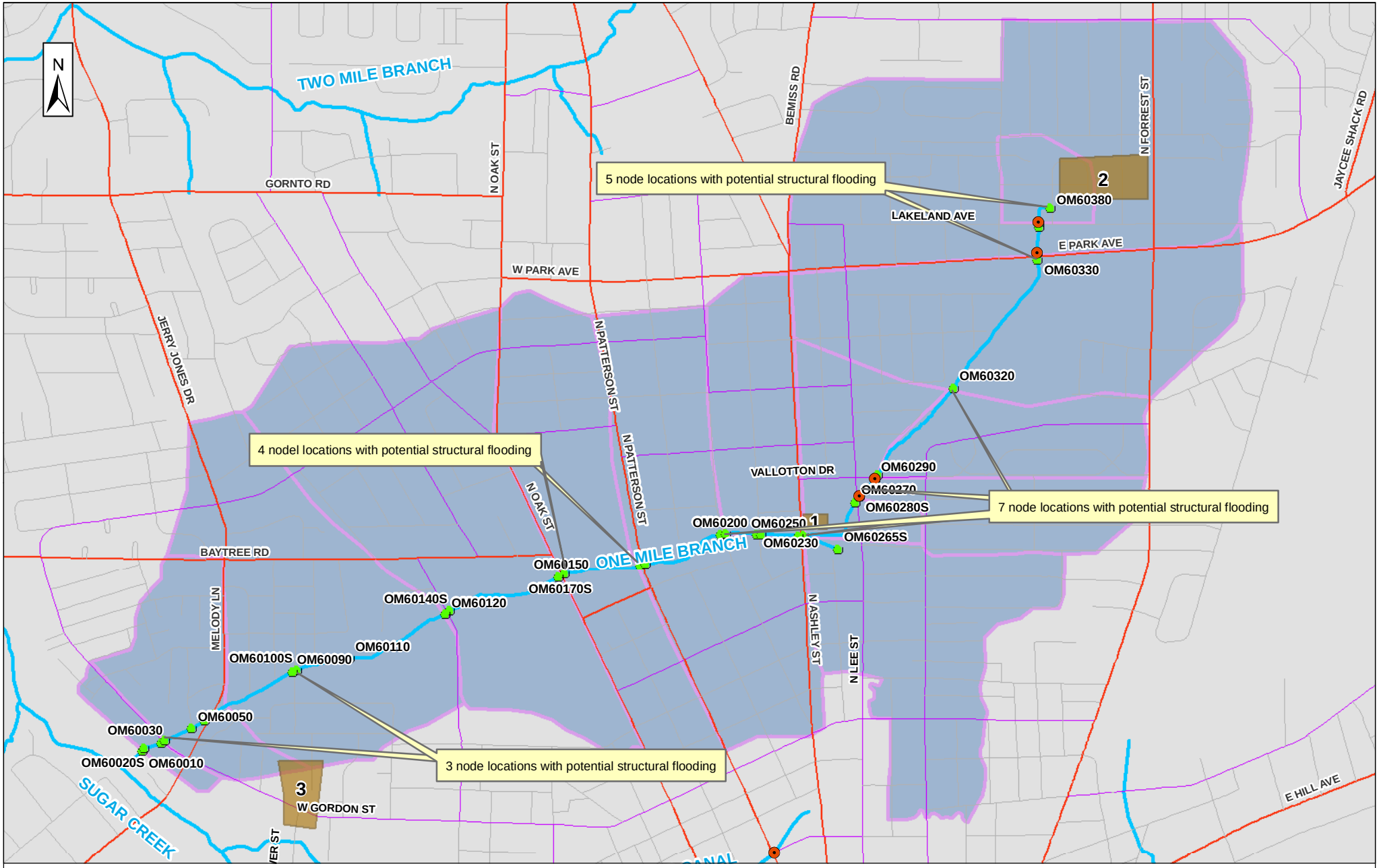


Figure 4.4.2.2
City of Valdosta, GA
One Mile Branch Sub-Basin
Level of Service Violations and
Water Quantity Problem Areas

CDM

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

0 200 400 800 Feet

Figure 4.4.3
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM1
Patterson Street Culvert Improvement and Regional Stormwater Facility near Patterson Street

CDM

This 3.3-acre facility will provide additional storage to attenuate peak flows downstream. This facility will also provide partial retrofit treatment to about 1,000 acres of tributary area, the majority of which is urban and developed. 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 3.3 acres, with a Permanent Pool Volume of 6.2 ac-ft and a Residence Time of 1.7 days. **Table 4.4.5** shows the conceptual cost estimates for this alternative.

Alternative OM2 – Park Avenue Culvert Improvement and RSF near Lakeland Avenue

The City identified an opportunity to receive construction funds from the Georgia Department of Transportation (GDOT) to improve the Park Avenue culvert at One Mile Branch. CDM performed a separate evaluation for this alternative that is described in detail in Appendix D.

This alternate included the upgrade of the existing culvert to a 7 ft H x 4 ft W double box culvert in conjunction with a RSF. The design drawings for this culvert upgrade at Park Avenue are available to the City. The stormwater facility consists of an offline detention basin located between Lakeland Avenue and Park Avenue as shown on **Figure 4.4.4**. The maximum size for the RSF that the open space available downstream of Lakeland Avenue allows is 1.2 acres. This alternative achieves a significant stage reduction both upstream and downstream of the facility. The stormwater drainage off the Lakeland Avenue on the west of One Mile Branch can be routed to the RSF and then discharged to the stream.

The proposed RSF occupies 1.2 acres, with a Permanent Pool Volume of 1.9 ac-ft and a Residence Time of 2 days. The tributary area to the facility is 107 acres. The implementation of this alternative will bring Lakeland Avenue in compliance with the level of service and also reduce some flooding in the neighboring structures.

The proposed RSF will treat 107 acres of untreated tributary area, and therefore will reduce sediment load to One Mile Branch. Based on field observations, and the regional data included in the National Wetland Inventory (NWI), it is anticipated that this facility will require wetland mitigation. The land on which this facility is proposed is also not owned by the City. **Table 4.4.6** shows the conceptual cost estimates for this alternative.

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

0 150 300 600 Feet

Figure 4.4.4
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM2
Park Avenue Culvert Improvement and
Regional Stormwater Facility near Lakeland Avenue

CDM

A 5.1-acre RSF is also proposed to be constructed. This facility consists of an offline detention basin and is proposed to be located upstream of Vallotton Drive, and will provide additional storage and peak flow attenuation downstream. The secondary benefit of this facility is retrofitting existing urban development. The proposed RSF will treat and attenuate 627 acres of untreated tributary area, the majority of which is urban and developed.

The proposed RSF would be 5.1 acres in size with a Permanent Pool Volume of 9 ac-ft and a Residence Time of 2.3 days. The tributary area to the facility is 627 acres. The land on which this facility is proposed is owned by the City. The location of the RSF is shown on **Figure 4.4.5**. Also shown on this figure is an alternate location for a RSF. This location at the site of an existing playground can be used to construct a 6-acre RSF.

Table 4.4.7 shows the conceptual cost estimate for this alternative.

Alternative OM4 – Installation of Baffle Box to provide End of Pipe Treatment @ Vallotton Drive

Alternative OM4 provides sediment control and other water quality benefits in the One Mile Branch sub-basin. This alternative involves installation of offline baffle boxes for retrofit treatment of nutrient and sediment loads.

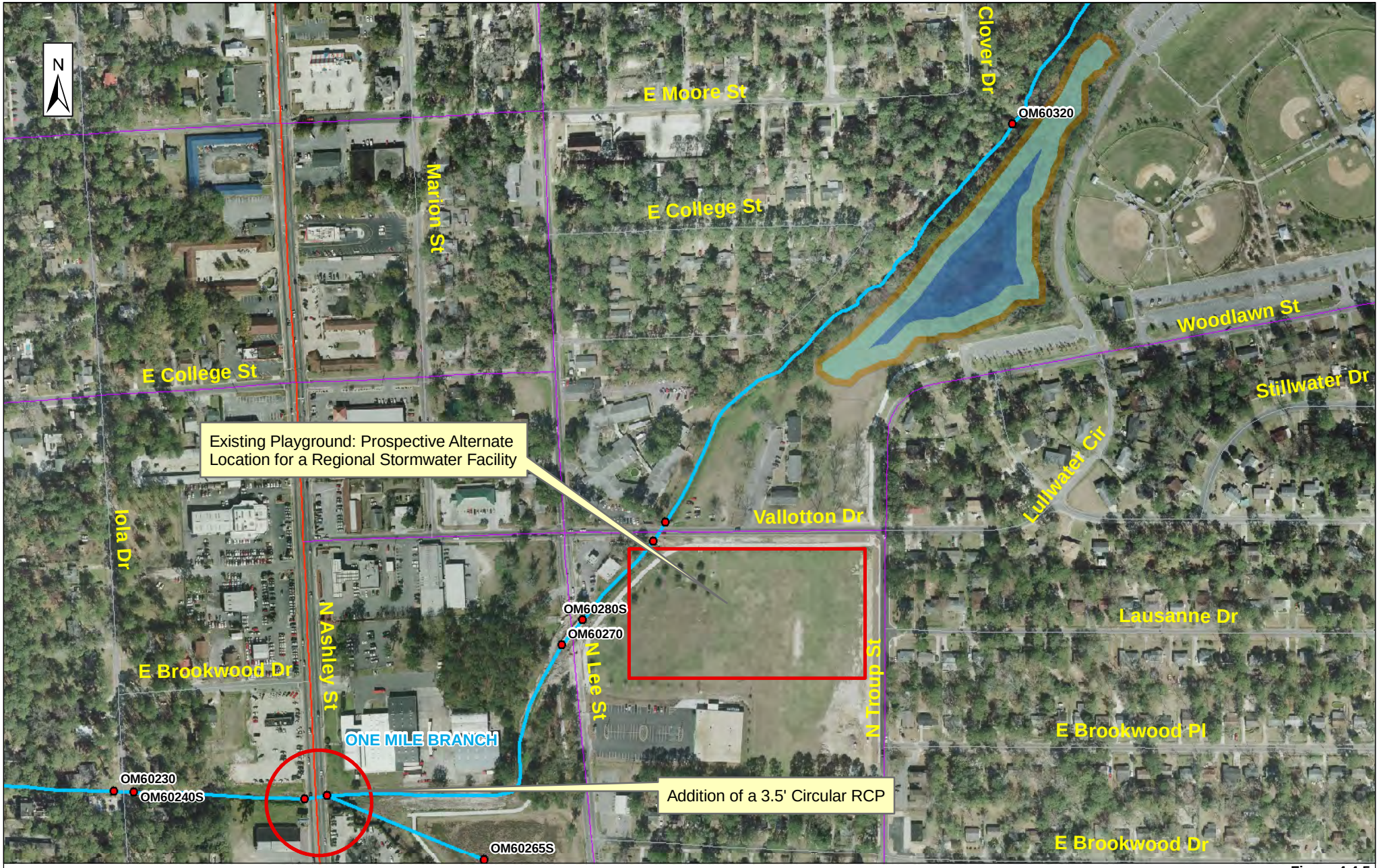
One baffle box is considered just near Vallotton Drive crossing at the end of a 42-inch drainage pipe. This baffle box will provide retrofit treatment to about 65 acres with a considerable impervious area. **Figure 4.4.6** shows the tributary area to the Baffle Box and its approximate location. **Table 4.4.8** shows the conceptual cost estimate for this alternative.

Alternative OM5 – Installation of Baffle Box to provide End of Pipe Treatment @ Lee Street

Similar to Alternative OM4, another offline baffle box is proposed at the end of a 30-inch drainage pipe near the Lee Street crossing on One Mile Branch. This baffle box will provide retrofit treatment to about 45 acres with a considerable impervious area. Figure 4.4.6 also shows the tributary area to this Baffle Box and its approximate location. **Table 4.4.9** shows the conceptual cost estimate for this alternative.

Alternative OM6 –– Installation of Baffle Boxes to provide End of Pipe Treatment @ VSU Parking Lot

Similar to Alternative OM4 and OM5, two offline baffle boxes are proposed, one each at the end of the 30-inch drainage pipes off the VSU parking lot. These baffle boxes will provide retrofit treatment to about 10 acres of completely impervious area. **Figure 4.4.7** shows the tributary area to this Baffle Box and its approximate location.

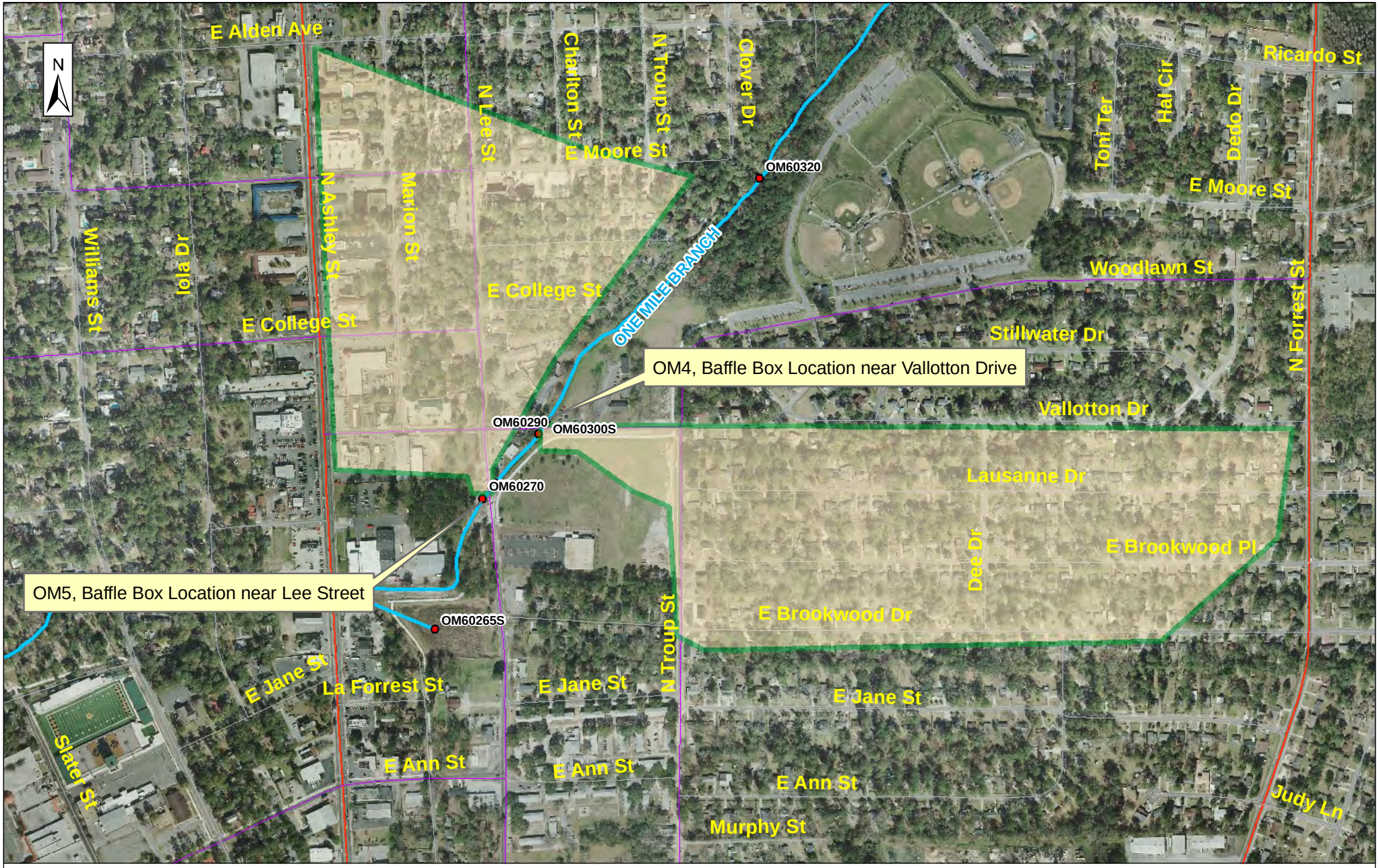


Legend
- Arterial Roads
- Collector Roads
- Local Roads
- Model Nodes
- Streams

0 345 690 1,380 Feet

Figure 4.4.5
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM3
Ashley Street Culvert Improvement and Regional Stormwater Facility near Vallotton Drive

CDM



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

0 600 1,200 2,400 Feet

Figure 4.4.6
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM4, OM5
Tributary Area to the Baffle Boxes

CDM

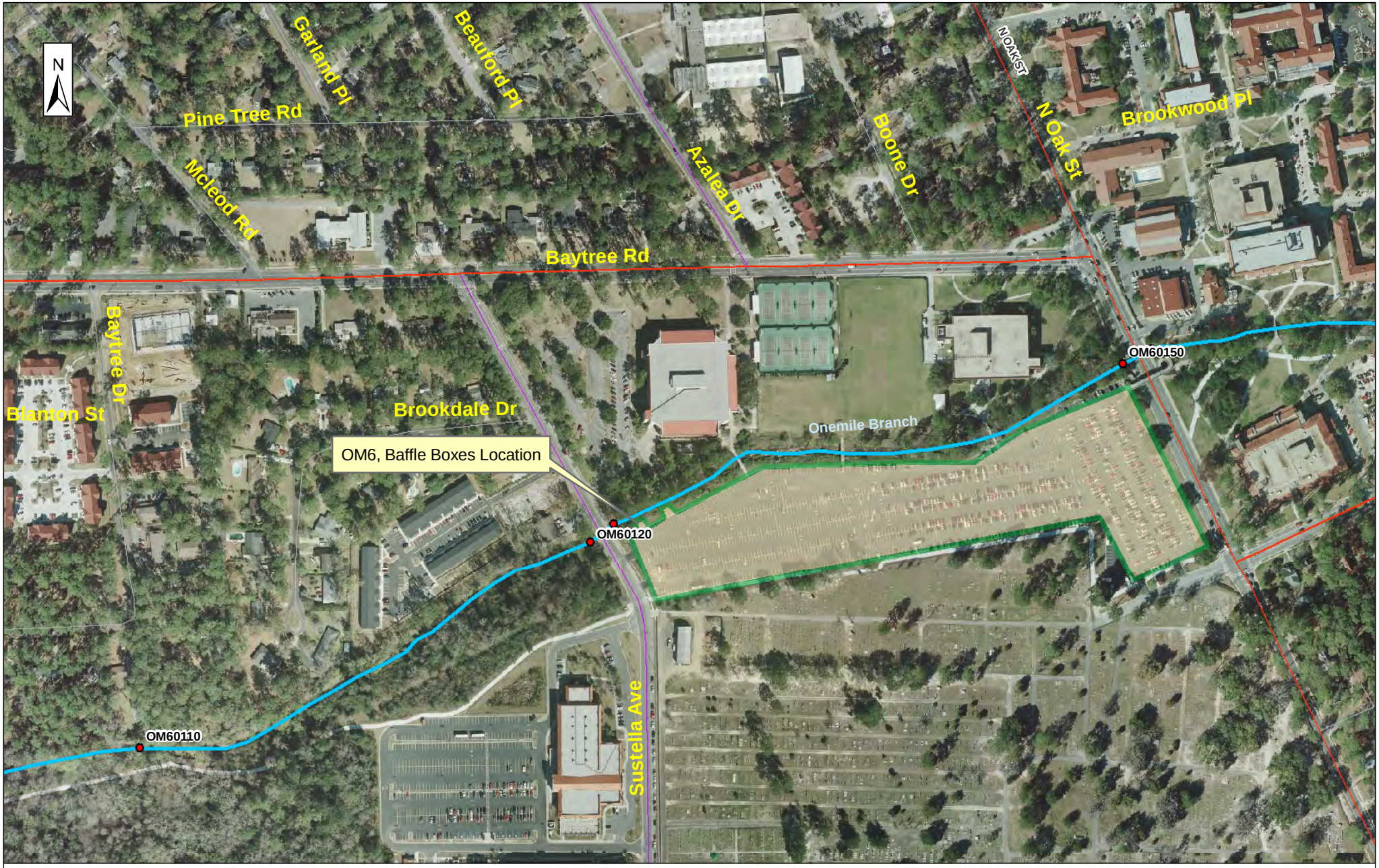


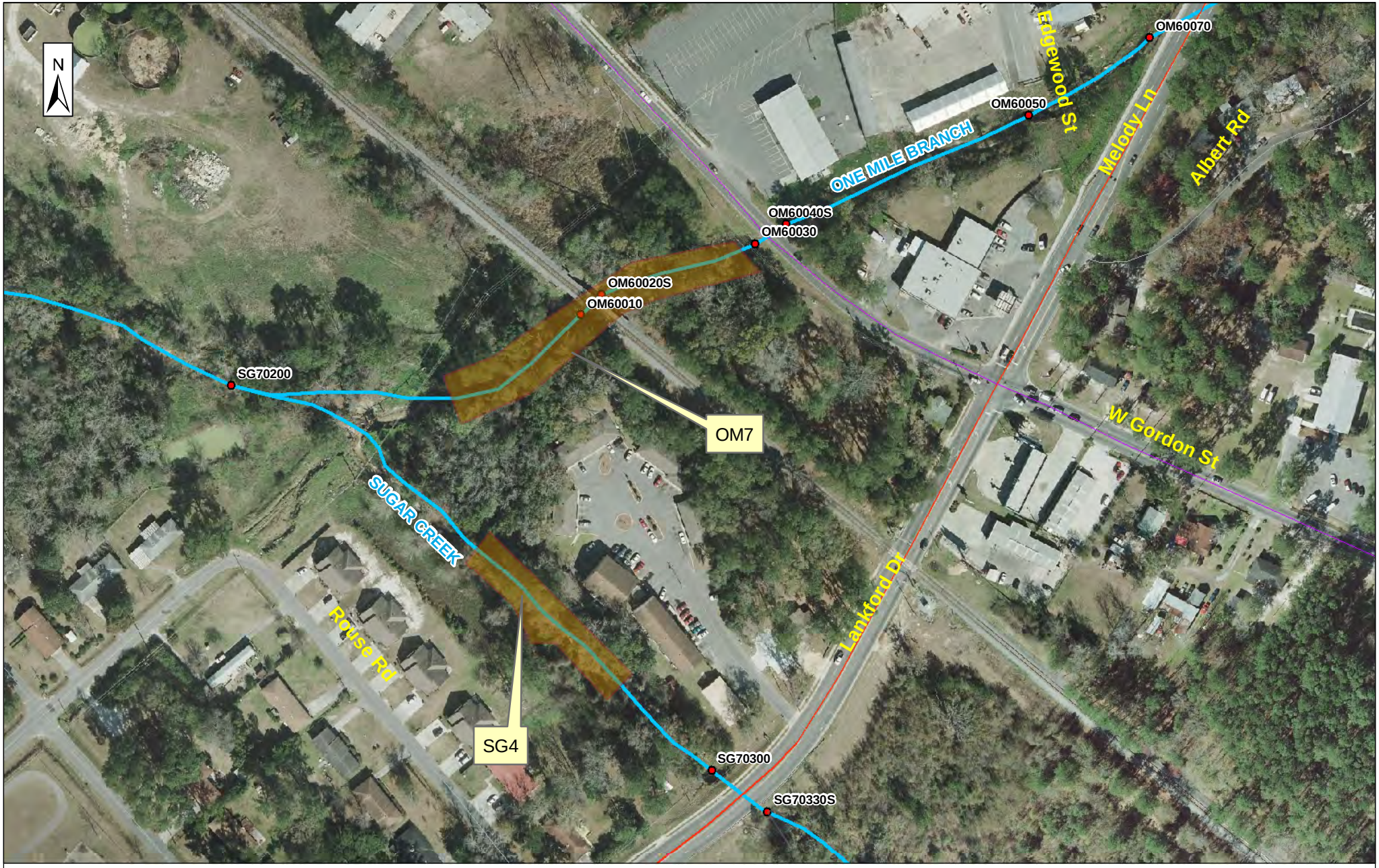
Figure 4.4.7
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM6
Tributary Area to the Baffle Boxes near VSU Parking Lot

CDM

Baffle boxes can be designed to capture 85 percent of the average annual flow and a 70 percent TSS removal efficiency. Sizing and other design considerations for baffle boxes is beyond the scope of this planning level analysis. Flows, topography, slopes, soils, land use and existing local drainage infrastructure should be considered in detail before implementation of this alternative. An average sized baffle box has been considered for the cost estimation. **Table 4.4.10** shows the conceptual cost estimate for this alternative.

Alternative OM7 – Grade Control (South of Gordon St to confluence with Sugar Creek)

Alternative OM7 includes construction of grade control structures (drop structures) at the location of a naturally occurring knick point on One Mile Branch, just upstream of its confluence with Sugar Creek. A total of two grade control structures will be constructed in series at this location. 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. The locations for these grade control structures were identified during the geomorphologic assessment of the Sugar Creek basin. Section 3 of this report gives in detail the geomorphologic assessment of the Sugar Creek basin. The approximate location of the grade control structures is shown on **Figure 4.4.8**. **Table 4.4.11** shows the conceptual costs 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

0 150 300 600 Feet

Figure 4.4.8
City of Valdosta, GA
One Mile Branch Sub-basin
Alternative OM7
2 Grade Control Structures Downstream of Gordon Street

CDM