4.1 Browns Canal

4.1.1 Introduction

The information presented in this sub-basin plan for Browns Canal 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.

4.1.2 Sub-basin Information

This section outlines information on the Browns Canal Sub-basin infrastructure, and its ability to meet level of service requirements. The Browns Canal sub-basin extends from Troup Street in the east to its confluence with Sugar Creek in the west. The area of the sub-basin is approximately 1 square mile (676 acres), which was divided into 8 hydrologic units ranging from 20 to 157 acres in size. The hydrologic unit boundaries and the In-stream PSWMS are shown on **Figure 4.1.1**. The HU delineation along with the areas and the loading node for each HU is shown in **Table 4.1.1**.

Table 4.1.1. Hydrologic Units: Area

Hydrologic Unit ID	Area (Acres)	Loading Node
HUBR150190	21.7	BR50190S
HUBR150220	157.6	BR50220S
HUBR150235	20.6	BR50235S
HUBR150260	100.7	BR50260S
HUBR150290	119.3	BR50320S
HUBR150370	98.5	BR50370S
HUBR150460	101.8	BR50460S
HUBR150480	56.0	BR50480APS
Total	**676.3**	

The predominant land use in the sub-basin is Medium Density Residential, which accounts for about 35 percent of the total land use. The land use categories along with their respective associated area and percentage for all of Browns Canal sub-basin are shown in **Table 4.1.2**. The predominant soil within the sub-basin is B. **Table 4.1.3** 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.

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 4.1.2.1**.

Table 4.1.2. Land Use Breakdown

Land Use Category	Area (Acres)	Area (Percent)
Forest, Open & Park	88.8	13.1
Pasture	0.0	0.0
Agricultural	0.0	0.0
Low Density Residential	14.8	2.2
Medium Density Residential	236.3	34.9
High Density Residential	0.0	0.0
Light Industrial, Commercial & Institutional	173.1	25.6
Heavy Industrial & Roadways	160.1	23.7
Wetlands	0.0	0.0
Watercourses & Water bodies	3.1	0.5
Total	**676.3**	**100.0**

Table 4.1.3. Soils Breakdown

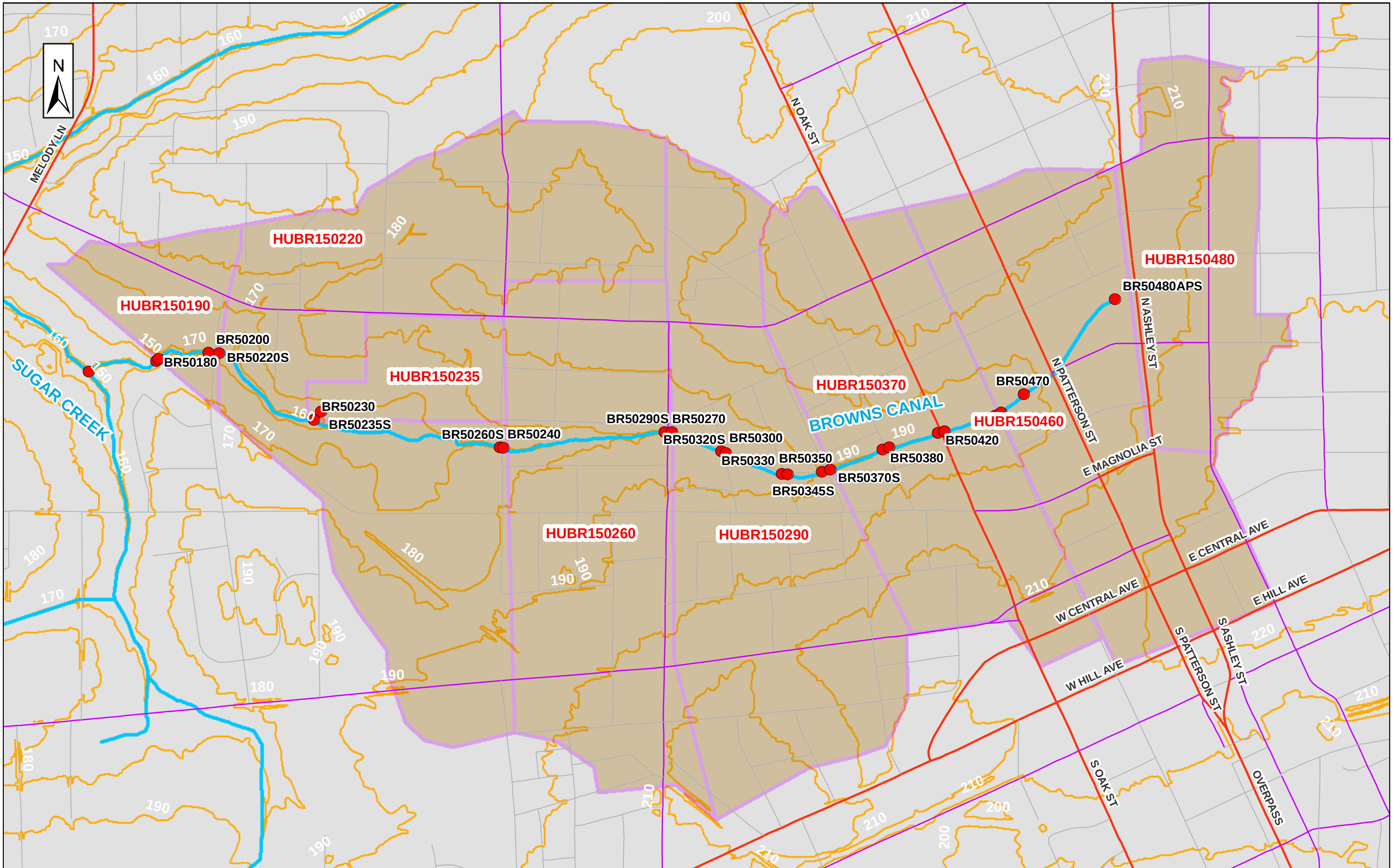
Hydrologic Soil Group (HSG)	Area (Acres)	Area (Percent)
A	0.0	0.0
B	484.1	71.6
C	114.2	16.9
D	78.0	11.5
Total	**676.3**	**100.0**

Legend

Hydrologic Units
HUBR150190
Streams
Arterial Roads
Collector Roads
Local Roads

0 0.25 0.5 1 Miles

Figure 4.1.1
City of Valdosta, GA
Browns Canal Sub-Basin
Hydrologic Units Delineation



Legend

Hydrologic Units
HUBR150190

Streams

Model Nodes
BR50300

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 4.1.2.1
City of Valdosta, GA
Browns Canal Sub-Basin
Hydraulic Network

CDM

4.1.3 Existing Conditions

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

- Ponds at West Street and Canal Street: Two ponds were constructed, one just upstream of West Street and another just upstream of Canal Street. These two ponds are interconnected via the culvert under Canal Street and also via a pipe. These ponds were constructed to provide flow stabilization, lower the velocity, reduce channel erosion and provide some detention in this reach of Browns Canal.

- West Street culvert improvement: Culvert improvement, including a 60-ft concrete channel leading from the pond to the culvert was constructed. This structure has an opening, which regulates the flow from the pond to the culvert. Stabilization with sandbags near the culvert face was also provided.

- Railroad Crossing Improvements

- Hightower Street improvements including culvert replacement: An upgrade to a 7 ft H x 10 ft W triple culvert was completed.

- Browns Canal sub-basin is very much developed and highly impervious, with many residential, industrial and commercial establishments. Much of the area discharges directly to Browns Canal and finally to Sugar Creek without any treatment. The section of Browns Canal between Lamar Street and West Street has experienced significant erosion. A lot of debris and fallen trees were seen in this section as well as along the stream until its outfall to Sugar Creek.

4.1.4 Water Quantity Problem Areas

1. Patterson Street: The section of Browns Canal under Patterson Street is piped from Ashley Street to almost midway between Patterson Street and Toombs Street. There is a recurring flooding problem resulting in traffic being restricted to the middle of the road during storm events. Sandbags have been used in the past to keep water out of the buildings near the intersection of Patterson Street and Webster Street.

2. Lee Street near the intersection with Webster Street has experienced flooding issues in the past. This flooding has been a result of insufficient drainage on the east side from Hamilton Street to Smithland Place.

3. The storm event of April 2009 caused significant stream erosion in Browns Canal. The stream section just upstream of Lamar Street experienced significant bank erosion. The ponds upstream of West Street and Canal Street also experienced erosion losses. Sandbags were also displaced.

4. **Secondary System (Infrastructure) Problem Areas:** The City identified flooding on W. Gordon Street and an apparent failure of the elliptical Corrugated Metal Pipe (CMP) under the Gordon Street intersection with Greenwood Drive in Browns Canal sub-basin. There is a 42-inch CMP directing flow from the tributary area to this culvert. Repeated flooding of Gordon Street has been observed. CDM identified the insufficient drainage capacity of these pipes. W. Gordon Street is a collector road, and to meet the Level of Service, should not flood for a 50-year event. CDM proposes to replace the 42-inch CMP with two 48-inch Reinforced Concrete Pipes (RCP). The elliptical CMP under Gordon Street is proposed to be replaced by two 48-inch RCPs. During the site visit, a depression in the road asphalt over the pipe was observed and shows signs of pipe failure. However, detailed survey would be required to do a complete analysis and design for this upgrade.

4.1.5 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.

4.1.5.1 Water Quantity Results

The stages for the 1.2-in, 5-, 25-, 50-, and 100–year design storms model runs are presented in **Table 4.1.4**. 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 the lack of data in terms of finished floor elevations of houses and other structures, available topographic data were utilized to estimate flooding of structures. All structures that were flooding due to the 100-year flood were recorded. The model results table indicates the nearest node to the structure's flooding location.

Table 4.1.4. Browns Canal 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
BR50180					153.5	156.3	157.2	158.0	158.9
BR50190S	Railroad	R/R	165.7		154.2	158.1	159.5	160.0	160.6
BR50200					157.4	159.9	160.6	160.9	161.2
BR50220S	Hightower Street	Local	164.7		157.4	160.0	160.8	161.1	161.5
BR50230					164.1	167.3	168.2	168.5	168.9
BR50235S					162.7	166.6	168.9	169.4	169.5
BR50240					168.0	170.7	171.5	171.8	172.0
BR50260S	Lamar Street	Local	177.1		168.3	171.7	172.7	173.1	173.5
BR50270					176.3	178.4	179.1	179.4	179.7
BR50290S	West Street	Collector	184.5		176.8	179.9	180.4	180.6	180.8
BR50290W					178.1	182.7	183.2	183.4	183.5
BR50292					178.2	182.8	183.3	183.4	183.6
BR50295W					181.3	184.5	185.4	185.6	185.8
BR50300					181.3	184.5	185.5	185.6	185.8
BR50320S					184.0	186.7	187.0	187.1	187.2
BR50330				Y	185.3	187.5	188.1	188.3	188.4
BR50345S	3rd Avenue	Local	188.7	Y	185.4	187.9	188.6	188.8	189.0
BR50350				Y	186.8	189.7	190.3	190.5	190.6
BR50370S	York Street	Local	191.1	Y	187.2	191.6	192.0	192.1	192.1
BR50380					189.3	191.2	192.0	192.1	192.2
BR50400S	Johnson Street	Collector	194.8	Y	189.8	193.9	194.7	195.0	195.1
BR50420				Y	190.9	194.0	194.8	195.1	195.2
BR50440S	Oak Street	Arterial	197.0	Y	191.2	195.1	196.3	196.7	197.0
BR50450					193.1	195.6	196.5	196.8	197.2
BR50460S	Toombs Street	Local	197.3	Y	193.2	196.7	197.8	197.9	198.1
BR50470					193.3	196.6	197.8	197.9	198.1
BR50475APS					193.7	197.1	200.6	201.2	202.1
BR50480APS	Patterson Street	Arterial	199.9		194.7	200.1	200.5	200.6	200.7

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.

4.1.5.2 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 Browns Canal. 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 Browns Canal was estimated to be 177,000 lbs/year.

Channel Bank Erosion: Almost 5,000 linear feet of Browns Canal show velocities greater than 3 ft/sec. The threshold velocity for erosive velocity in Browns Canal sub-basin is 3 ft/sec. Several locations were verified in field and showed signs of channel bank erosion.

4.1.5.3 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 Browns Canal sub-basin, the following roads do not meet the City's Level of Service as described in Section 2. The Browns Canal stage Table 4.1.4 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).

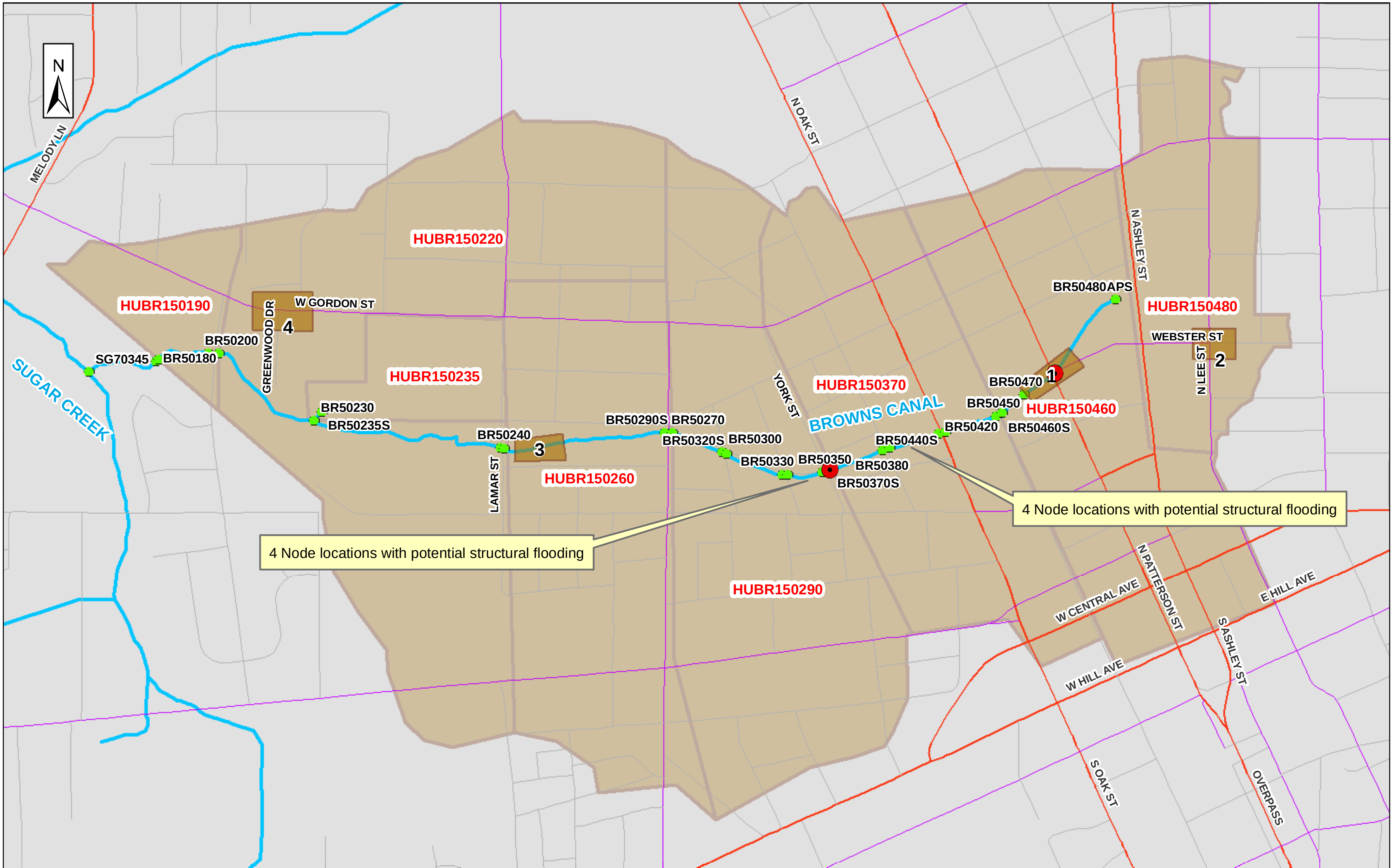
- Roads Flooding

One local road (York Street) does not meet the defined level of service (more than 6 inches of flooding for a 5-year storm event). One arterial road (Patterson Street) also does not meet the defined level of service (more than 6 inches of flooding for a 50-year storm event).

- Structures

Eight locations, as represented by model nodes, were identified in the Browns Canal sub-basin for probable structural flooding for the 100-year event.

Please refer to **Figure 4.1.2.2** for a map of Level of Service violations for the Browns Canal sub-basin. Other water quantity problem areas are also shown on this figure.



Legend

Hydrologic Units
HUBR150190
Streams
Model Nodes
BR50300
Arterial Roads
Collector Roads
Local Roads
Roads - Level of Service Violations
Water Quantity Problem Areas discussed in Section 4.1.4

0 0.25 0.5 1 Miles

Figure 4.1.2.2
City of Valdosta, GA
Browns Canal Sub-Basin
Level of Service violations and
Water Quantity Problem areas

CDM

4.1.6 Alternatives Evaluation

This section describes the alternatives evaluated for the Browns Canal 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 BR1: Upgrade of Browns Canal Ponds between West Street and 3rd Avenue
- Alternative BR2: Grade Control between Railroad and confluence with Sugar Creek
- Alternative BR3: Stream Restoration between Lamar Street and West Street

Alternative BR1 – Upgrade of Browns Canal Ponds between West Street and 3rd Avenue

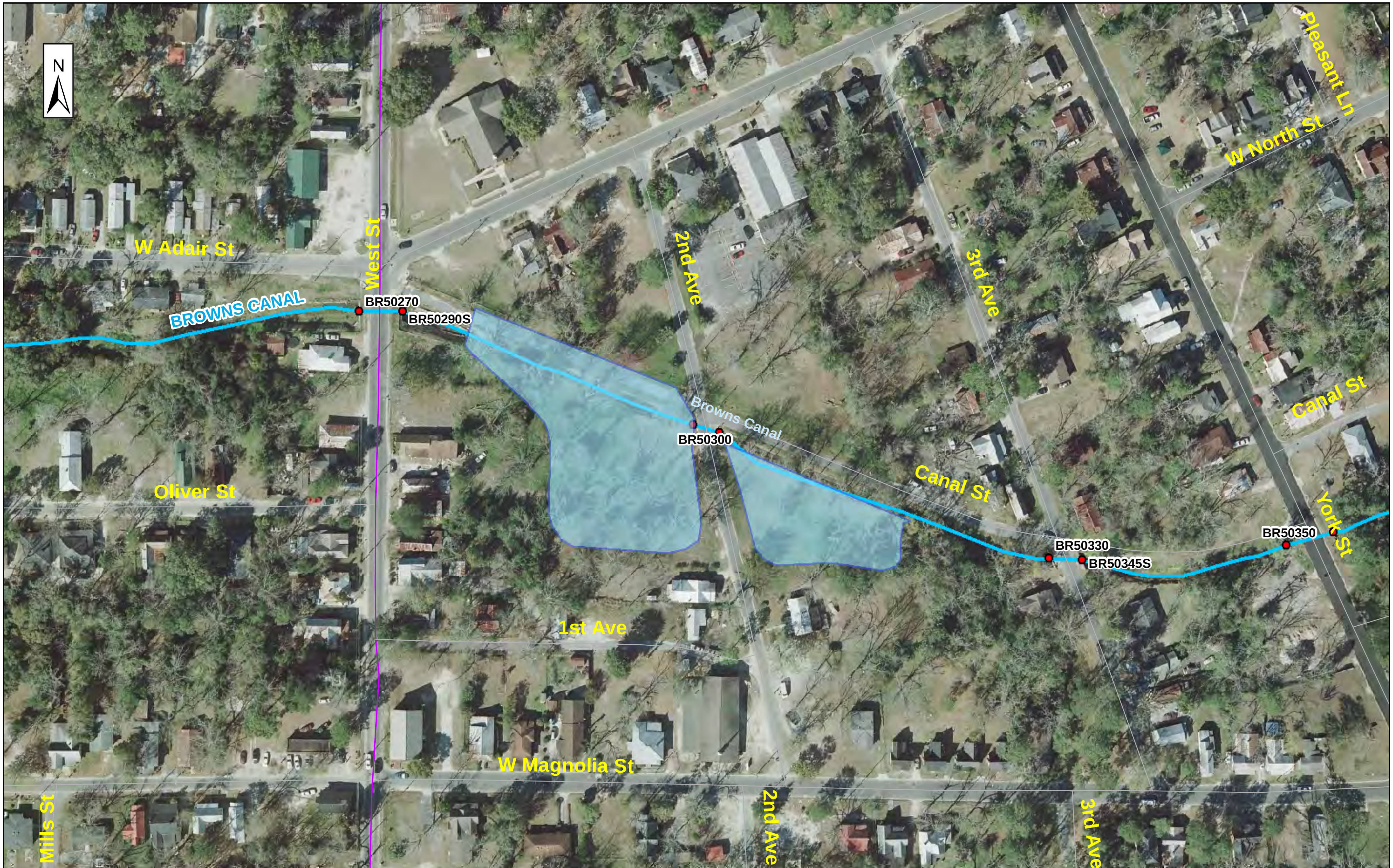
A brief description and advantages summary for each alternative project is listed below. Two detention ponds on Browns Canal between West Street and 3rd Avenue were constructed as per the recommendations of the 1996 SWMP. CDM identified this update as an opportunity to improve on these ponds and therefore provide more benefit in this sub-basin. The Browns Canal ponds inlet control structures can be modified to increase the efficiency of these ponds to hold more sediment, flows and reduce velocities. **Figure 4.1.3** shows the location of the ponds in Browns Canal.

There is a possibility to even increase the capacity of these ponds, including a proposition to merge and expand these ponds into one big pond. This has not investigated at this point.

There is an existing FEMA grant availability for rehabilitation of a portion of these ponds. This grant provides partial funding for replacement of the sand bags in these ponds that had failed in an earlier flood event. **Table 4.1.5** shows the conceptual cost estimates for this alternative.

Alternative BR2 – Grade Control Structure between Railroad and Confluence with Sugar Creek

Alternative BR2 includes construction of a grade control structure at this location on Browns Canal as shown in **Figure 4.1.4**, downstream of the railroad and upstream of its confluence with Sugar Creek. One grade control structure will be constructed 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 design of the drop structure is beyond the scope of this planning level analysis. An access easement as shown on Figure 4.1.4 would need to be provided along the railroad for access during construction and maintenance afterward. **Table 4.1.6** 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.



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

0 150 300 600 Feet

Figure 4.1.3
City of Valdosta, GA
Browns Canal Sub-basin
Alternative BR1
Upgrade of the Ponds between West St and 3rd Ave

CDM

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

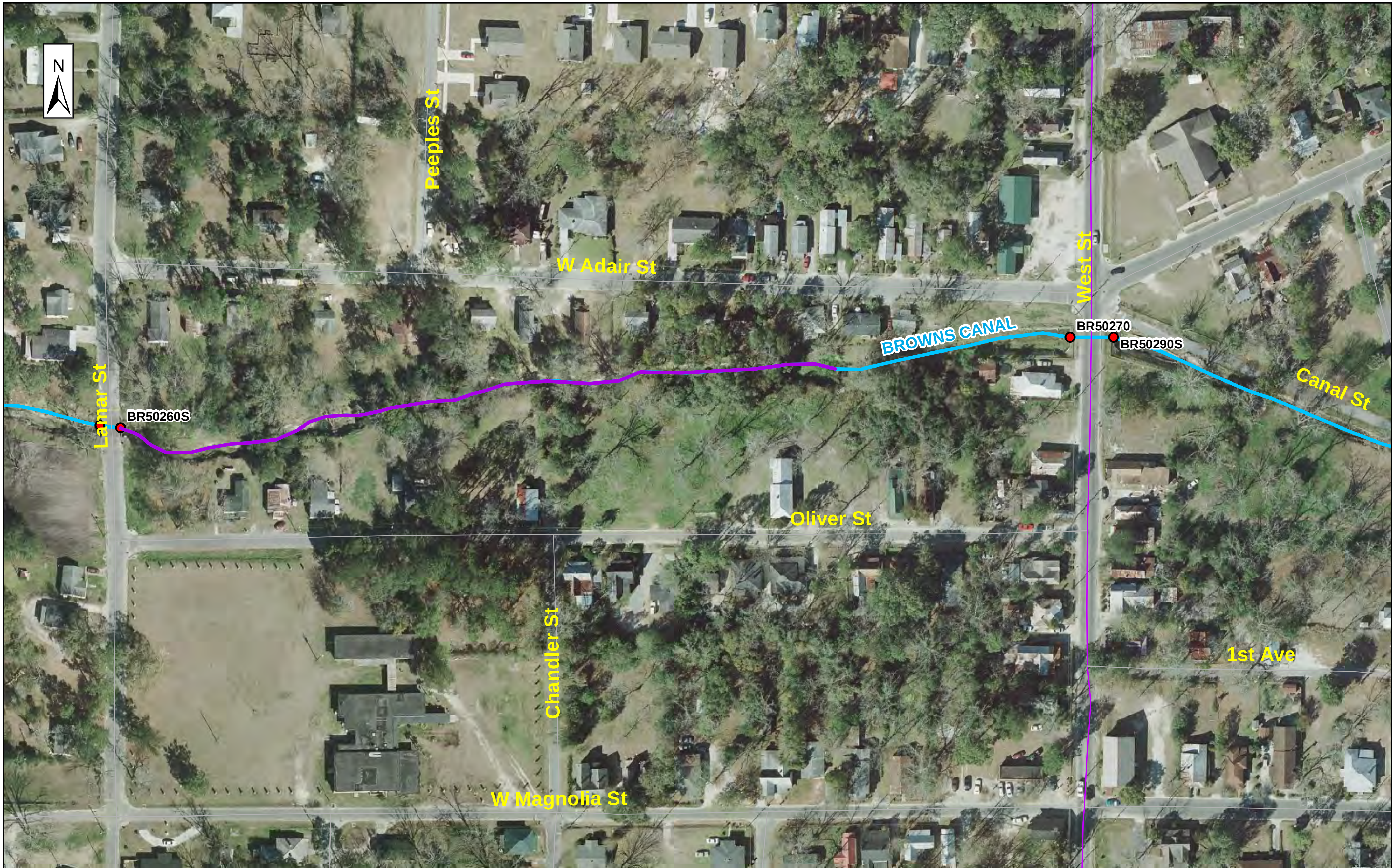
0 200 400 800 Feet

Figure 4.1.4
City of Valdosta, GA
Browns Canal Sub-basin
Alternative BR2
Grade Control structure downstream of Railroad crossing

CDM

Alternative BR3 – Stream Restoration and Grade Control between Lamar Street and West Street

Appendix F contains detailed discussion of this alternative. **Figure 4.1.5** shows the location of this project. **Table 4.1.7** shows the conceptual cost estimates for this alternative. CDM recommends that detailed geomorphologic assessment is carried out before commencing any design or construction for a grade control project.



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

0 150 300 600 Feet

Figure 4.1.5
City of Valdosta, GA
Browns Canal Sub-basin
Alternative BR3
Browns Canal Stream Restoration (NRCS)

CDM