

Contents

Section 1 Data Review and Discussion

1.1	Introduction and Background	1-1
1.2	1996 Stormwater Management Plan	1-3
1.3	2004 Two Mile Branch Watershed Management Plan	1-5
1.4	NPDES Mapping Efforts.....	1-5
1.5	2006 Stormwater Utility Implementation.....	1-5
1.6	Flooding Complaints.....	1-6
1.7	Regulatory Coordination.....	1-6
1.8	FEMA Flood Maps	1-7

Section 2 Methodology

2.1	Stormwater Modeling	2-1
2.2	Hydrologic Parameters	2-1
2.2.1	Topographic Data.....	2-1
2.2.2	Hydrologic Units (HUs)	2-3
2.2.3	Rainfall Intensities and Quantities.....	2-3
2.2.4	Hydrologic Parameters.....	2-5
2.2.5	Infiltration Rates and Capacities	2-7
2.2.6	Soils Types and Characteristics	2-9
2.2.7	Impervious Areas	2-12
2.2.8	Land Use.....	2-12
2.2.9	Depression Storage.....	2-16
2.3	Hydraulic Parameters	2-15
2.3.1	Field Investigations, As-Built Data and Additional Survey.....	2-17
2.3.2	Model Schematic.....	2-17
2.3.3	Stage-Area Relationships	2-18
2.3.4	Conduits	2-18
2.3.4.1	Culverts.....	2-18
2.3.4.2	Natural Channels.....	2-18
2.3.4.3	Bridges and Roadway Overflows	2-20
2.3.5	Boundary Conditions.....	2-20
2.3.5.1	Withlacoochee River	2-20
2.3.5.2	Mud Creek Swamp	2-20
2.3.6	Model Calibration/Verification	2-23
2.4	Water Quality Parameters	2-23
2.4.1	Total Suspended Solids (TSS) Reduction Goal and TSS Evaluation.....	2-23
2.4.2	Channel Bank Erosion Evaluation	2-24
2.5	Alternatives Evaluation	2-25
2.5.1	Level of Service.....	2-26
2.5.2	Construction Costs	2-26

2.5.3 Operation and Maintenance Costs..... 2-26
 2.5.4 Project Ranking..... 2-28

Section 3 Sugar Creek Geomorphologic Assessment

3.1 Fundamentals of Fluvial Geomorphology 3-1
 3.1.1 Major Models 3-1
 3.1.2 Lane’s Relationship 3-2
 3.1.3 Channel Evolution – Evaluating Channel Changes in Cross
 Section 3-3
 3.1.4 Meander Formation and Migration – Evaluating Channel
 Change in Plan Form 3-6
 3.1.5 Profile Analysis..... 3-11
 3.1.6 Temporal and Spatial Implications..... 3-12
 3.1.7 Sediment Transport..... 3-13
 3.2 Methods of Geomorphic Investigation..... 3-15
 3.2.1 Geomorphic Background Investigation 3-15
 3.2.2 Geomorphic Field Investigation..... 3-16
 3.3 Sugar Creek Evaluation 3-18
 3.3.1 Geomorphic Field Investigation..... 3-18
 3.3.2 Major Reaches of the Main Stem 3-20
 3.3.3 Channel Geometry 3-38
 3.3.4 Boundary Material 3-41
 3.4 Hydraulics 3-43
 3.4.1 Analysis of Water Surface Profile 3-45
 3.4.2 Tractive Shear 3-47
 3.4.3 Hydraulic Model and Geomorphic Process 3-48
 3.5 Sediment Transport..... 3-48
 3.6 Methods of Management..... 3-48
 3.6.1 Watershed-Scale Stability – Arrest Channel Incision..... 3-48
 3.6.2 Local Stability Prevents Incision and Protects Infrastructure 3-51

Section 4 Withlacoochee Basin

4.1 Browns Canal 4-1
 4.1.1 Introduction..... 4-2
 4.1.2 Sub-basin Information 4-2
 4.1.3 Existing Conditions 4-7
 4.1.4 Water Quantity Problem Areas 4-7
 4.1.4.1 Secondary System (Infrastructure) Problem Areas 4-7
 4.1.5 Results 4-8
 4.1.5.1 Water Quantity Results 4-8
 4.1.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion
 Evaluation..... 4-10
 4.1.5.3 Level of Service Summary 4-10
 4.1.6 Alternatives Evaluation..... 4-12

4.2	Cherry Creek & Stillhouse Branch	4-20
4.2.1	Introduction.....	4-20
4.2.2	Sub-basin Information	4-20
4.2.3	Existing Conditions	4-23
4.2.4	Water Quantity Problem Areas	4-25
4.2.5	Results	4-25
	4.2.5.1 Water Quantity Results	4-25
	4.2.5.2 Total Suspended Solids Evaluation	4-27
	4.2.5.3 Level of Service Summary	4-27
4.2.6	Alternatives Evaluation.....	4-27
4.3	Hightower Creek	4-37
4.3.1	Introduction.....	4-37
4.3.2	Sub-basin Information	4-37
4.3.3	Existing Conditions	4-40
4.3.4	Water Quantity Problem Areas	4-40
4.3.5	Results	4-40
	4.3.5.1 Water Quantity Results	4-40
	4.3.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion Evaluation.....	4-40
	4.3.5.3 Level of Service Summary	4-43
4.3.6	Alternatives Evaluation.....	4-45
4.4	One Mile Branch	4-50
4.4.1	Introduction.....	4-50
4.4.2	Physical Description.....	4-50
4.4.3	Existing Conditions	4-52
4.4.4	Problem Areas.....	4-55
4.4.5	Results	4-55
	4.4.5.1 Water Quantity Results	4-55
	4.4.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion Evaluation.....	4-57
	4.4.5.3 Level of Service Summary	4-57
4.4.6	Alternatives Evaluation.....	4-58
4.5	Sugar Creek	4-76
4.5.1	Introduction.....	4-76
4.5.2	Sub-basin Information	4-76
4.5.3	Existing Conditions	4-80
4.5.4	Water Quantity Problem Areas	4-80
4.5.5	Results	4-81
	4.5.5.1 Water Quantity Results	4-81
	4.5.5.2 Total Suspended Solids (TSS) and Channel Bank Evaluation.....	4-81
	4.5.5.3 Level of Service Summary	4-81
4.5.6	Alternatives Evaluation.....	4-85

4.6	Two Mile Branch.....	4-95
4.6.1	Introduction.....	4-95
4.6.2	Sub-basin Information	4-95
4.6.3	Existing Conditions	4-99
4.6.4	Water Quantity Problem Areas	4-99
4.6.5	Results	4-101
	4.6.5.1 Water Quantity Results	4-101
	4.6.5.2 Total Suspended Solids (TSS) and Channel Bank Erosion Evaluation.....	4-101
	4.6.5.3 Level of Service Summary	4-103
4.6.6	Alternatives Evaluation.....	4-103
4.7	Three Mile Branch	4-126
4.7.1	Introduction.....	4-126
4.7.2	Sub-basin Information	4-126
	4.7.2.1 Physical Description.....	4-126
4.7.3	Existing Conditions	4-130
4.7.4	Water Quantity Problem Areas	4-130
4.7.5	Results	4-130
	4.7.5.1 Water Quantity Results	4-130
	4.7.5.2 Total Suspended Solids Evaluation	4-131
	4.7.5.3 Level of Service Summary	4-133
4.7.6	Alternatives Evaluation.....	4-133

Section 5 Mud Swamp Creek Basin

5.1	Dukes Bay Canal.....	5-1
5.1.1	Introduction.....	5-1
5.1.2	Sub-basin Information	5-1
	5.1.2.1 Physical Description.....	5-1
5.1.3	Existing Conditions	5-4
5.1.4	Water Quantity Problem Areas	5-6
5.1.5	Results	5-9
	5.1.5.1 Water Quantity Results	5-9
	5.1.5.2 Total Suspended Solids Evaluation	5-9
	5.1.5.3 Level of Service Summary	5-9
5.1.6	Alternatives Evaluation.....	5-12

Section 6 Summary and Recommendations

6.1	Stormwater Modeling	6-1
6.2	Infrastructure Flooding.....	6-1

Appendices

- Appendix A* Permitting Coordination Meeting Minutes
- Appendix B* SWMM Model Results
- Appendix C* Stormwater Committee Meeting Minutes
- Appendix D* Park Avenue Culvert Evaluation
- Appendix E* Creekside Assistance
- Appendix F* Browns Canal PDR
- Appendix G* Early Out Projects
- Appendix H* Benchmark Network Documentation
- Appendix I* Baytree Road Culvert Improvements (Trash Collection Device Design)
- Appendix J* Hydrologic Parameters for Hydrologic Units per Sub basin
- Appendix K* Flood Estimates at Withlacoochee WWTP Memorandum