
Tyrrell County

Water Management Study

May 19, 2014

Albemarle Resource Conservation & Development Council, Inc



TABLE OF CONTENTS

Study Background 3

Scope of Work 4

Study Process..... 3

Proposed Special Use Water Management Districts..... 4

County-Wide Issues and Concerns..... 6

Recommendations for Future Water Management..... 6

Descriptions of Special Use Water Management Districts..... 6

Scuppernong SUWMD..... 7

Soundside SUWMD..... 9

Columbia SUWMD..... 11

Riders Creek/Travis SUWMD..... 13

Alligator/Goat Neck SUWMD..... 15

South Fork SUWMD..... 17

Kilkenny SUWMD..... 19

Second Creek SUWMD..... 21

Frying Pan SUWMD..... 23

Table 1. Scuppernong SUWMD..... 7

Table 2. Soundside SUWMD..... 9

Table 3. Columbia SUWMD..... 11

Table 4. Riders Creek/Travis SUWMD..... 13

Table 5. Alligator/Goat Neck SUWMD..... 15

Table 6. South Fork SUWMD..... 17

Table 7. Kilkenny SUWMD..... 19

Table 8. Second Creek SUWMD..... 21

Table 9. Frying Pan SUWMD..... 23

Table 10. Total lengths of channels and clearing and snagging..... 25

Table 11. County-Wide SUWMD..... 25

Table 12. Clearing and Snagging Post Hurricane Isabel by SUWMD..... 26

Figure 1. Proposed Special Use Water Management Districts..... 5

Figure 2. Scuppernong SUWMD..... 8

Figure 3. Soundside SUWMD..... 10

Figure 4. Columbia SUWMD..... 12

Figure 5. Riders Creek/Travis SUWMD..... 14

Figure 6. Alligator/Goat Neck SUWMD..... 16

Figure 7. South Fork SUWMD..... 18

Figure 8. Kilkenny SUWMD..... 20

Figure 9. Second Creek SUWMD..... 22

Figure 10. Frying Pan SUWMD..... 24

Appendix A. Agricultural Drainage Report, 1978..... 27

Appendix B. Photos of Typical A, B, C, D, E, and F Channels..... 31

Appendix C. Photos of Water Management Problems..... 32

Appendix D. Creating a SUWMD..... 34

Appendix D. Example of Public Notice for SUWMD..... 35

Appendix E. Example Ordinance for Establishing a SUWMD..... 37

Appendix F. 1994 Pocosin Lakes NWR Study..... 39

Appendix G. Photos of Tide Gates in Alligator and Goat Neck..... 45

Appendix H. Guinea Mill, Newland & Camden County Examples..... 48

Study Background

With elevations at or just above sea level across much of Tyrrell County, water management is a critical activity for preventing flooding of agricultural lands, towns and communities. Streams, canals and water management structures are easily damaged or impaired by storm events ranging from strong thunderstorms, to tropical storms and hurricanes. The inventorying and mapping of water management and drainage features in a Geographic Information System (GIS) will help the county develop long-range plans for water management, including a coordinated response to natural disasters.

Mapping streams, canals and water management systems at the watershed level will also provide the county with the information it needs consider establishing Special Use Water Management Districts (SUWMD). Each SUWMD would have a three to four person advisory board of local residents. The advisory board would help identify and prioritize water management projects within the SUWMD, and help secure funding for priority projects.

Tyrrell County implemented the water management study with technical assistance from the Albemarle Resource Conservation and Development Council (RC&D). The Albemarle RC&D Council's consultant Mark Powell, worked with a county water management committee and Tyrrell Soil and Water Conservation District staff and supervisors. The Albemarle RC&D Council is a regional non-profit group that works in 10 counties around the Albemarle and Pamlico Sounds, including Tyrrell County. It has assisted Tyrrell, Perquimans, Pasquotank, Camden and Currituck Counties with similar water management studies.

Scope of Work

Tyrrell County contracted the Albemarle RC&D Council to perform the following tasks:

- Coordinate the study with the county's Water Management Committee and Tyrrell Soil and Water Conservation District staff and supervisors.
- Identify and obtain maps and GIS data that will directly contribute to the implementation of the study.
- Develop an inventory of drainage sub-basins and surface drainage features using ArcMap GIS.
- Identify key water management systems and structures, system components needing maintenance, and other factors that would contribute adversely to water quality.
- Provide draft language for establishing Special Use Water Management Districts.
- Develop a prioritized list for clearing and snagging major streams and canals on a 5-year recurrence interval.
- Develop a list of areas to be analyzed in the future for possible use of Best Management Practices (BMPs) to protect water quality.
- Develop a report documenting data-collection methods and areas to be analyzed for BMPs.

Study Process

The first step of the study was to collect information from local residents through the water management committee, and group and individual meetings. The initial water management committee consisted of Nathan "Tommy" Everett (County Commissioner), Trey Liverman (Tyrrell Soil and Water Conservation District Supervisor), Rhett White (Manager, Town of

Columbia), Ty Fleming (Tyrell Soil and Water Technician), Kirby Balance (former Tyrrell Soil and Water Technician and NRCS Soil Conservationist), and Ken Windley (Interim County Manager).

A follow up meeting was held with farmers and residents from across the county. In attendance were Chris Hopkins, Ronnie Helms, Leroy Spivey (County Commissioner), Durwood Cooper, Archie Spear, Buddy Cahoon, Danny Davis, Eric Brown, Greg Comstock, Ken Cherry, Hal Bateman, Thomas Spruill (County Commissioner), David Clegg (County Manager), Kirby Balance, Trey Liverman, Tommy Everett, and Ty Fleming.

Follow up meetings were held with Ty Fleming and Kirby Balance to review historical maps and records of water management in the county. The information listed below was collected and used in this study.

- NRCS and Soil and Water sub-watershed maps to define and digitize the proposed SUWMD.
- Forest Service and DOT maps to digitize secondary roads and drainage features.
- NRCS and Soil and Water maps to digitize clearing and snagging of streams, canals and ditches post Hurricane Isabel.
- Maps from a 1978 drainage study to digitize Class A , B, C, D, E and F drainage features in the county.
- Current aerial imagery and local knowledge to map dikes and locations of pumps.
- The county's parcels database to calculate different costs of maintaining mapped drainage features on a five-year interval in each SUWMD.

The information presented in this study and digitized in GIS is a baseline for the county to move forward with water management planning. The information and data should be continually updated as the county considers forming SUWMD, and/or develops plans and projects for specific areas.

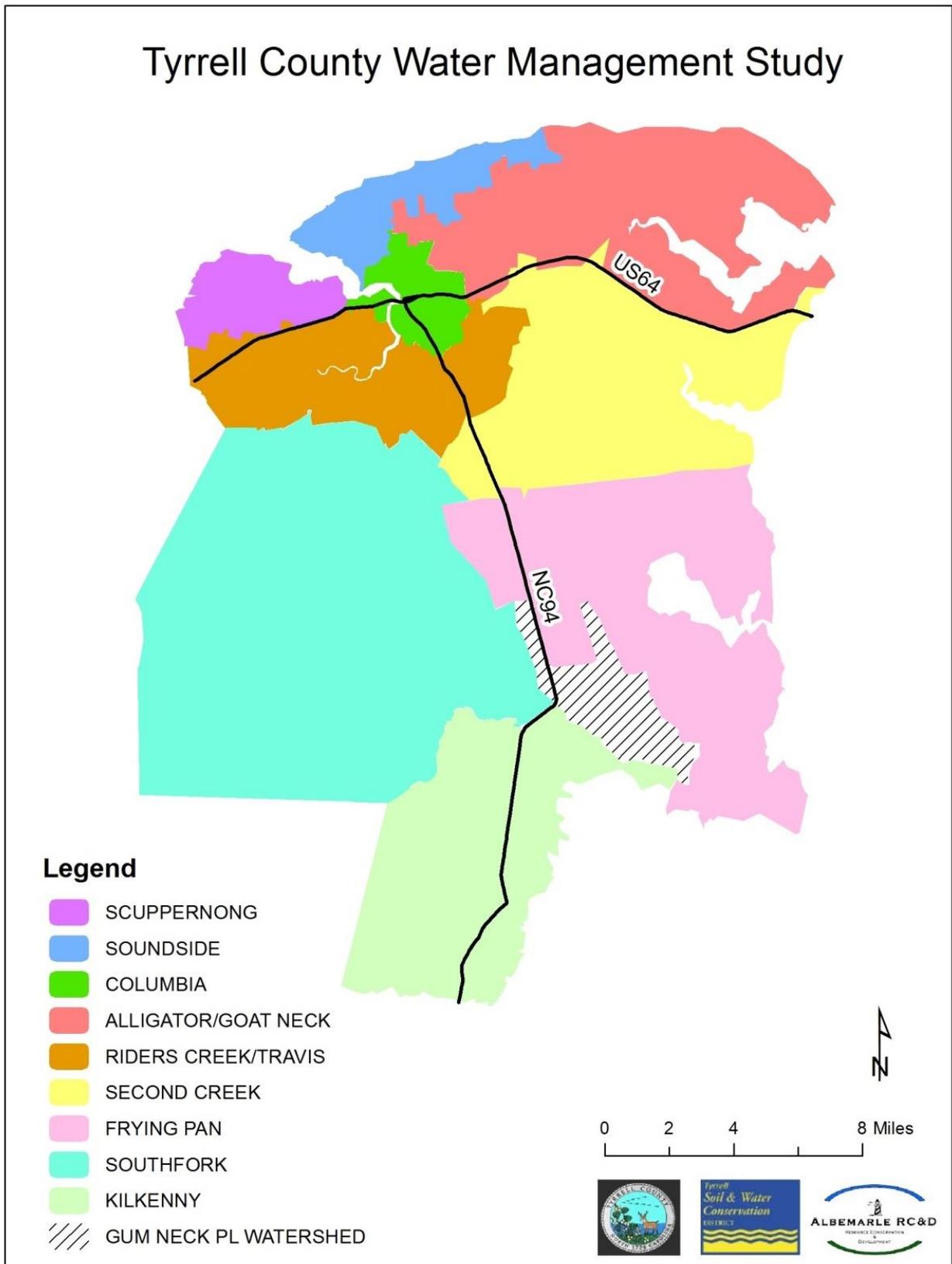
Proposed Special Use Water Management Districts

The proposed SUWMD (Figure 1) were defined mainly along sub-watershed boundaries. A few parcels were split by boundaries and these were included entirely within the most appropriate SUWMD. The proposed SUWMD are:

- Scuppernong
- Soundside
- Columbia
- Alligator/Goat Neck
- Riders Creek/Travis
- Second Creek
- Frying Pan
- Southfork
- Killenny

The Gum Neck Public Law 566 watershed shown in Figure 1 was not included in this study since it is a functioning federal watershed district.

Figure 1. Proposed Special Use Water Management Districts



County-wide water management issues and concerns were identified through the meetings with farmers and local residents and are summarized below.

County-Wide Issues and Concerns

- Need regular maintenance of drainage outlets to creeks, rivers and sound.
- Need to prioritize and schedule snagging and clearing of canals, creeks and rivers.
- Need regular schedule of alligator weed control including dip out of dead material.
- Need regular schedule of beaver control.
- Need to maintain state drainage easements.
- Much of the agricultural land in the county is managed by groups of farmers with dikes, pumps, and drainage canals.
- State and federal regulations make it difficult for the county and private citizens to clean or maintain established drainage outlets on creeks, rivers and the Sound.
- There is concern that the USFWS is not allowing enough reserve capacity on its lands for storm events, which causes stormwater to back up on private lands.
- Information on historical drainage and water management from local farmers and residents is a key to minimizing the impacts on drainage from construction or maintenance of roads.

Recommendations for Future Water Management

- Establish a permanent Water Management Committee (WMC) consisting of at least one person from each SUWMD/sub-watershed. The committee would meet regularly to address county water management issues and to update the county's water management plan through the SWCD office.
- The WMC would meet with DOT representatives to review the impact of road construction on water management.
- The WMC would meet with representatives of the Pocosin Lakes NWR to discuss the impact of water management in the NWR on private lands.
- The WMC would help set priorities for water management activities including clearing and snagging, alligator weed control, beaver control and special projects.

Descriptions of Special Use Water Management Districts

The following sections include water management information for each proposed SUWMD. As mentioned above, the 1978 drainage study (Appendix A), was used to map A, B, C, D, E, and F channels, with widths defined as:

- A – 0 to 5'
- B – 0 to 10'
- C – 0 to 15'
- D – 0 to 20'
- E – 0 to 30'
- F – 0 to 50'

Photographs of typical A, B, C, D, E and F channels are included in Appendix B.

For each SUWMD, the total length of channels was divided by five, which represents the maintenance interval. The maintenance cost for all channels was estimated at different rates per linear foot of channel. The total assessed parcel value (buildings and land) in each SUWMD was used to determine the amount of assessment per \$100 of value that would be needed to maintain all channels on a five-year maintenance interval. Realistically, not all channels will need maintenance during a five-year period. However, this study provides the baseline for estimating maintenance costs per linear foot and the method for determining the assessment that would be needed to cover the costs.

Photographs of typical water management problems across the county are shown in Appendix C. The steps for creating a SUWMD are summarized in Appendix D. Guinea Mill and Newland Special Water Management Districts are provided as examples in Appendix H.

Scuppernong SUWMD

Scuppernong SUWMD is shown in Figure 2. Concerns and issues from meetings with local farmers and residents include:

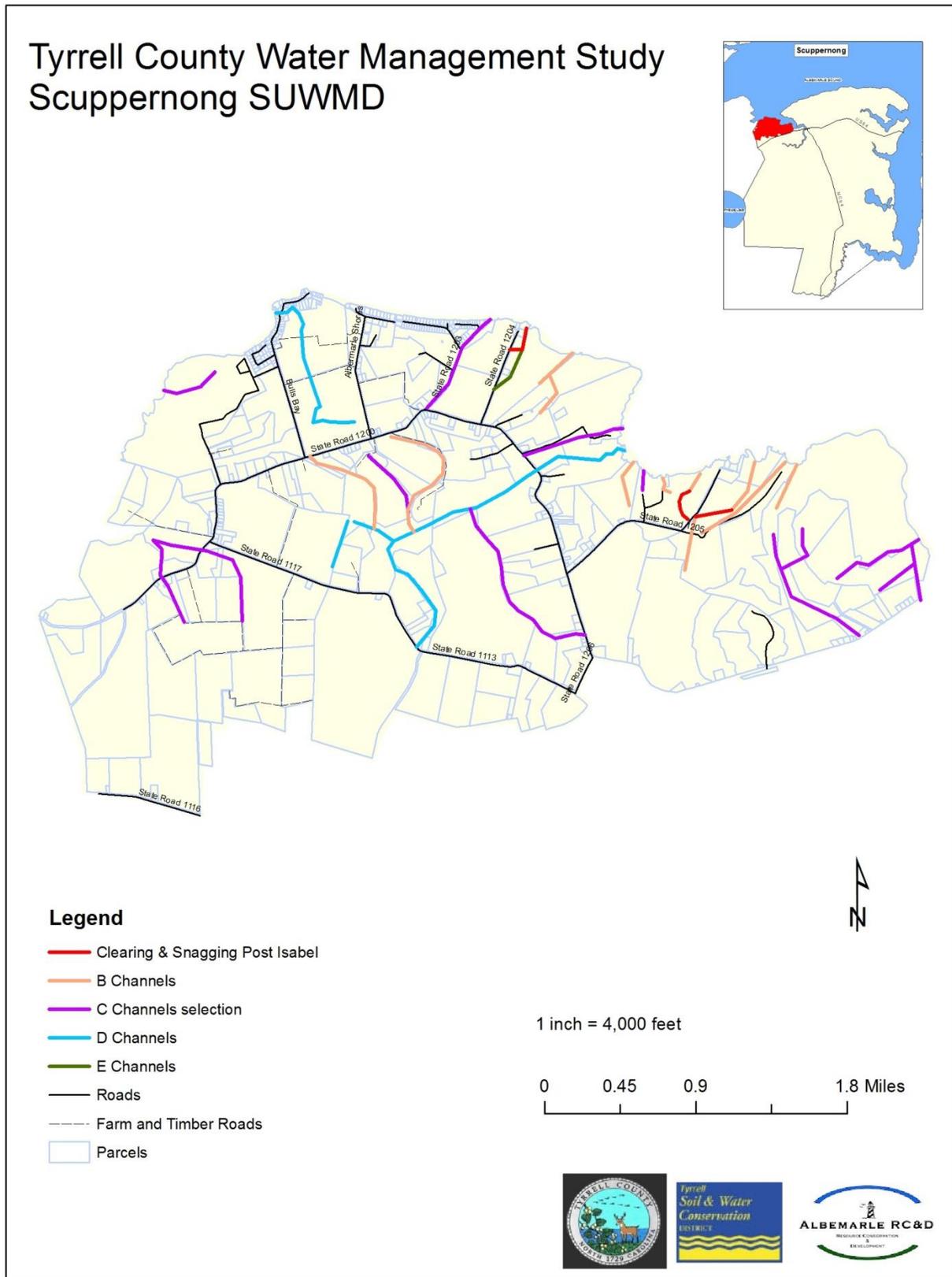
- Highway 64 acts as a dike during storm events and does not allow stormwater to disperse to the south.
- Drainage outlets to the Sound are plugged with silt, Alligator weed and tree tops.

Scuppernong SUWMD has 87,562 ft of channels with a total assessed parcel value of \$68,998,715. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 1. For example, at \$1.00 per linear foot, an assessment of approximately \$0.025 per \$100 of assessed parcel value would be needed to maintain 87,562 ft on a five-year interval.

Table 1. Scuppernong SUWMD

TOTAL ALL LENGTHS (ft)					
87,562					
FIVE YR INTERVAL					
17,512					
Assessed Parcel Value					
\$68,998,715					
Per \$100/Value		\$ 689,987			
Average Cost to Maintain 87,562 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00		\$1.25		\$1.50	
\$ 17,512		\$ 21,890		\$ 26,269	
\$ 30,647		\$ 35,025			
Cost per \$100					
\$0.025		\$0.03		\$0.04	
\$ 17,250		\$ 20,700		\$ 27,599	
\$ 31,049		\$ 34,499			

Figure 2. Scuppernong SUWMD



Soundside SUWMD

Soundside SUWMD is shown in Figure 3. Concerns and issues from meetings with local farmers and residents include:

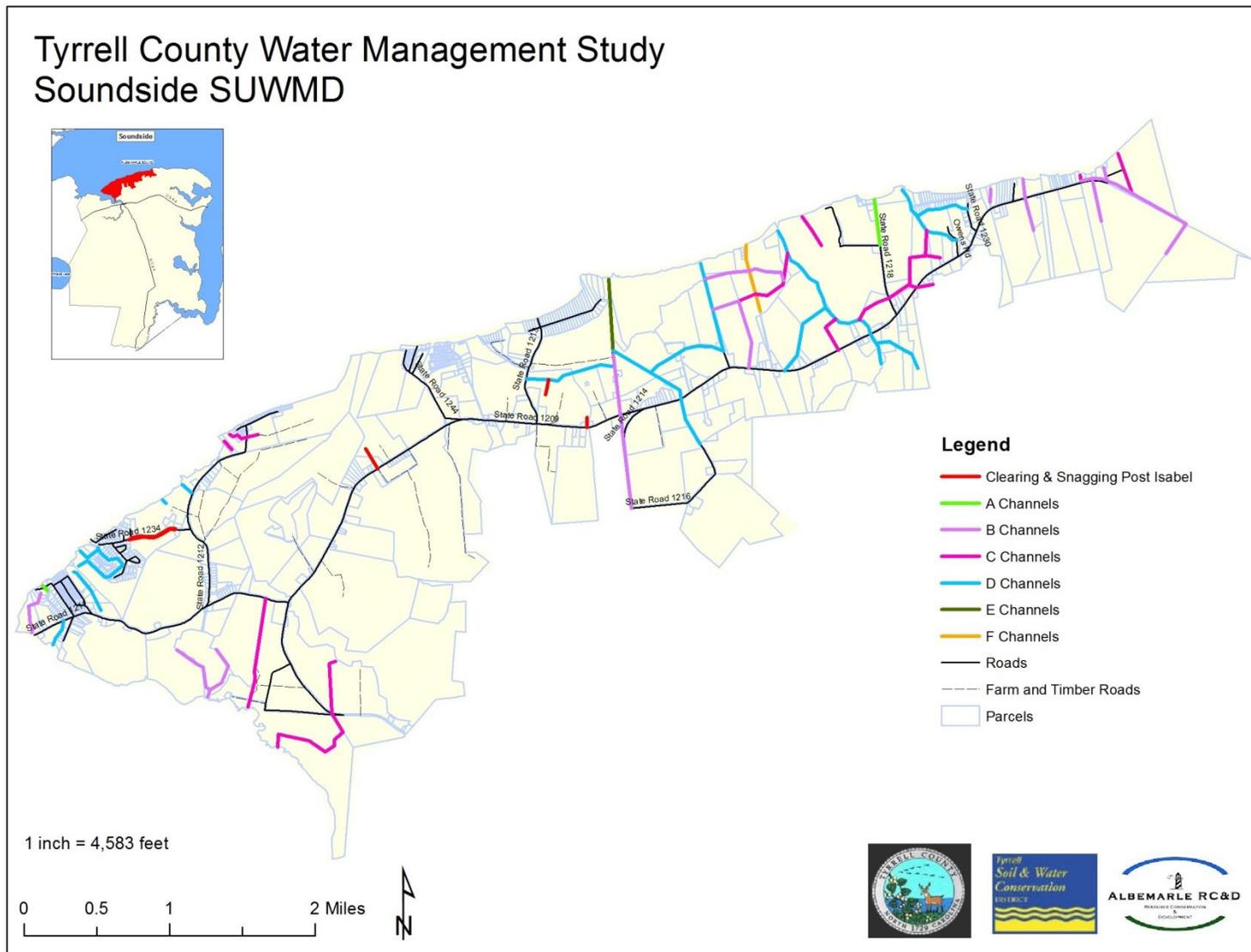
- Wind blows water in from the Sound and is slow to move out.
- High water table
- Outlets to Sound are plugged
- Road needs new culverts
- Alligator weed and beaver problems in Taylor’s Beach area.

Soundside SUWMD has 99,125 ft of channels with a total assessed parcel value of \$102,733,902. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 2. For example, at \$1.00 per linear foot, an assessment of approximately \$0.02 per \$100 of assessed parcel value would be needed to maintain 99,125 ft on a five-year interval.

Table 2. Soundside SUWMD

TOTAL ALL LENGTHS (ft)					
99,125					
FIVE YR INTERVAL					
19,825					
Soundside Assessed Parcel Value					
\$ 102,733,902					
Per \$100/Value \$ 1,027,339					
Average Cost to Maintain 99,125 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
	\$1.00	\$1.25	\$1.50	\$1.75	\$2.00
\$	19,825	\$ 24,781	\$ 29,737	\$ 34,694	\$ 39,650
Cost per \$100					
	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04
\$	20,547	\$ 25,683	\$ 30,820	\$ 35,957	\$ 41,094

Figure 3. Soundside SUWMD



Columbia SUWMD

Columbia SUWMD is shown in Figure 4. Common concerns and issues from public meetings with local farmers and residents include:

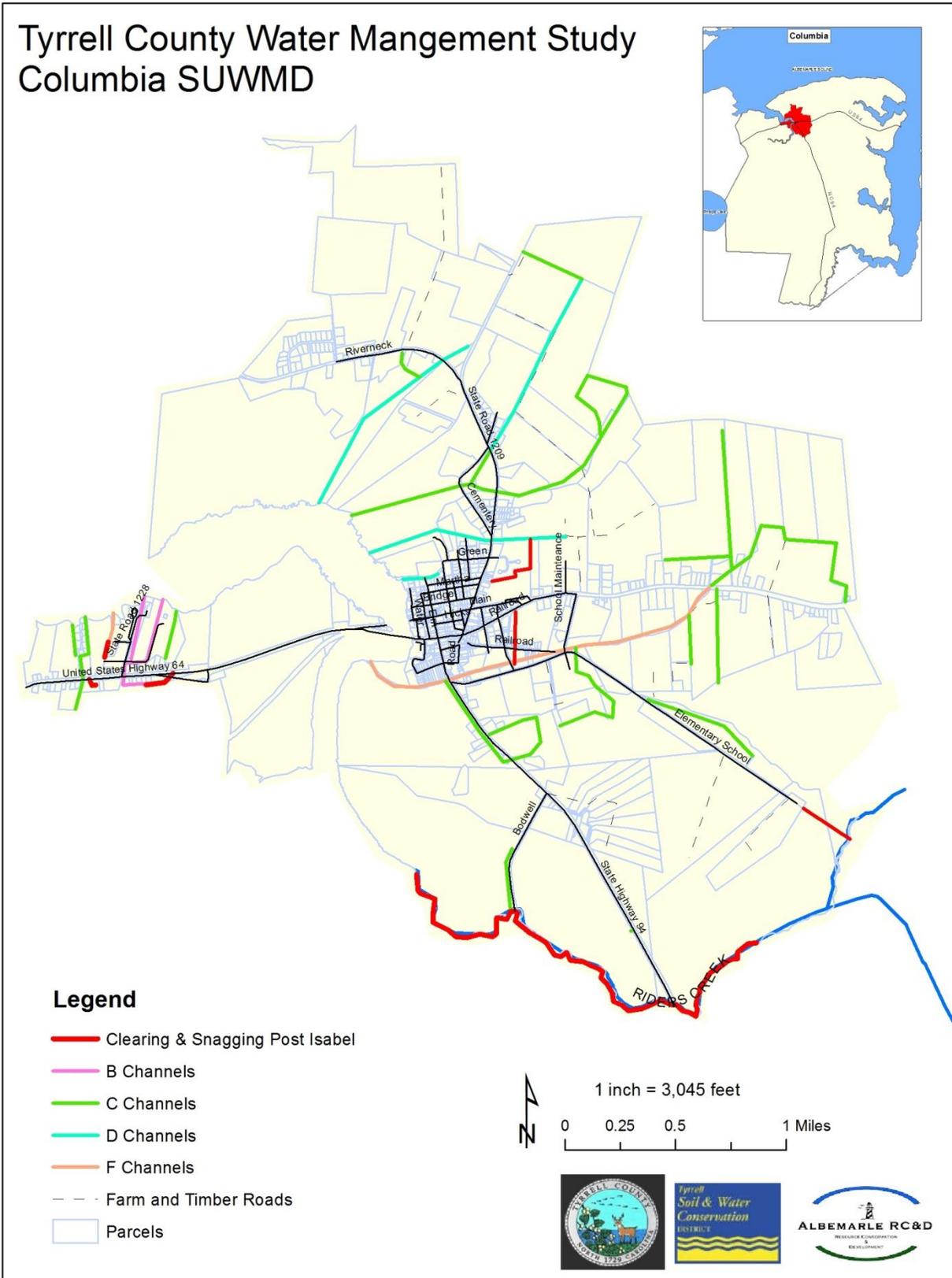
- Outlets to Riders Creek need regular maintenance
- State Highway 1209 going north out of town floods regularly and needs a new bridge.

Columbia SUWMD has 99,809 ft of channels with a total assessed parcel value of \$92,185,150. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 3. For example, at \$1.00 per linear foot, an assessment of approximately \$0.02 per \$100 of assessed parcel value would be needed to maintain 99,809 ft on a five-year interval.

Table 3. Columbia SUWMD

TOTAL ALL LENGTHS (ft)					
99,809					
FIVE YR INTERVAL					
19,962					
Assessed Parcel Value					
\$92,185,150					
Per \$100/Value		\$ 921,852			
Average Cost to Maintain 99,809 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 19,962	\$ 24,952	\$ 29,943	\$ 34,933	\$ 39,924	
Cost per \$100					
\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	
\$ 18,437	\$ 23,046	\$ 27,656	\$ 32,265	\$ 36,874	

Figure 4. Columbia SUWMD



Riders Creek/Travis SUWMD

Riders Creek/Travis SUWMD is shown in Figure 5. Concerns and issues from meetings with local farmers and residents include:

- On northeast side, natural drainage to Alligator Creek is blocked by the dike around cropland in the Second Creek SUWMD, which causes flooding on private lands.
- Water held in the mitigation bank’s timberlands is held at a high level and backs into east Riders Creek/Travis during storm events.
- Highway 64 along north boundary acts as a dike against natural drainage north to the Sound.

Riders Creek/Travis SUWMD has 166,533 ft of channels with a total assessed parcel value of \$66,315,292. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 4. For example, at \$1.00 per linear foot, an assessment of approximately \$0.05 per \$100 of assessed parcel value would be needed to maintain 166,533 ft on a five-year interval.

Table 4. Riders Creek/Travis SUWMD

TOTAL All LENGTHS (ft)					
166,533					
FIVE YR INTERVAL					
33,307					
Assessed Parcel Value					
\$66,315,292					
Per \$100/Value					
		\$ 663,153			
Average Cost to Maintain 166,533 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00		\$1.25		\$2.00	
\$ 33,307	\$ 41,633	\$ 49,960	\$ 58,286	\$ 66,613	
Cost per \$100					
\$0.05		\$0.06		\$0.10	
\$ 33,158	\$ 39,789	\$ 46,421	\$ 59,684	\$ 66,315	

Alligator/Goat Neck SUWMD

Alligator/Goat Neck SUWMD is shown in Figure 6. Concerns and issues from meetings with local farmers and residents include:

- Concern that new Highway 64 will back water up into the Alligator Community.
- Private pump helps control water on farmland in the northeast section.
- Logging roads in swamps sometimes act as dikes to impede natural drainage.
- Wind tides push water from Sound and Alligator River into Alligator and Goat Neck Communities.
- Alligator weed is a major problem in drainage ditches and canals.

In 2008, the county completed a drainage improvement project in the Alligator and Goat Neck Communities, which is summarized below and photos in Appendix G. The \$100,000 project was funded by grants from DENR Division of Water Resources and N.C. Rural Center, cash match from the communities, and in-kind support from NC Department of Transportation and The Conservation Fund. The Albemarle RC&D Council provided technical and administrative support.

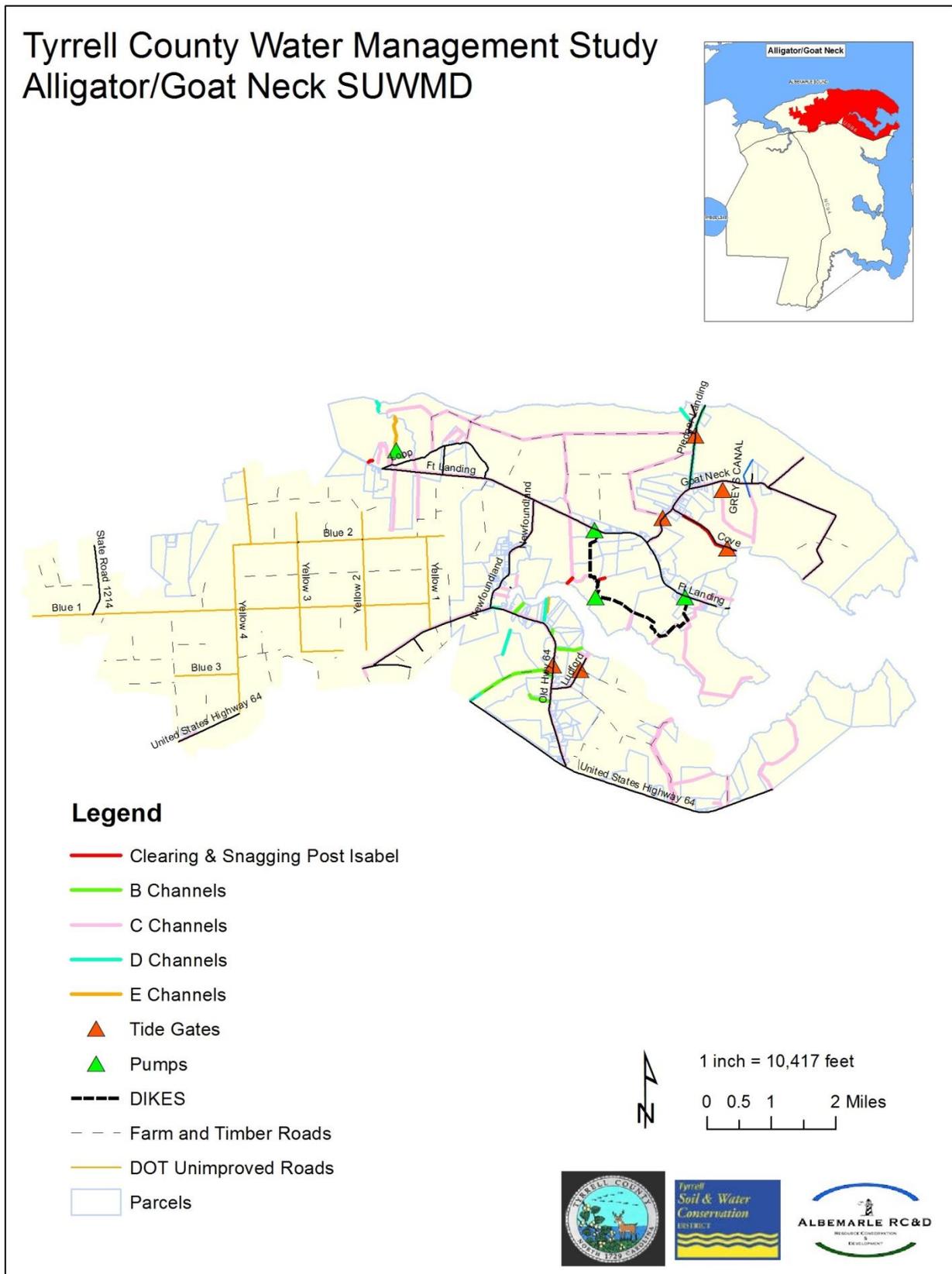
- Installed six tide gates in the two communities.
- Removed trees along 4,400 feet of canal next to State Road 1225 (Pledger Landing Rd).
- Sprayed alligator weed in both communities.
- Replaced 28 drainage pipes under driveways.
- The NC Department of Transportation (DOT) dipped out and hauled away debris from four miles of ditches in both communities.

Alligator/Goat Neck SUWMD has 283,420 ft of channels with a total assessed parcel value of \$20,408,436. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 5. For example, at \$1.00 per linear foot, an assessment of approximately \$0.27 per \$100 of assessed parcel value would be needed to maintain 283,420 ft on a five-year interval.

Table 5. Alligator/Goat Neck SUWMD

TOTAL ALL LENGTHS (ft)					
283,420					
FIVE YR INTERVAL					
56,684					
Assessed Parcel Value					
\$20,408,436					
Per \$100/Value		\$ 204,084			
Average Cost to Maintain 283,420 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 56,684	\$ 70,855	\$ 85,026	\$ 99,197	\$ 113,368	
Cost per \$100					
\$0.27	\$0.35	\$0.42	\$0.49	\$0.55	
\$ 55,103	\$ 71,430	\$ 85,715	\$ 100,001	\$ 112,246	

Figure 6. Alligator/Goat Neck SUWMD



South Fork SUWMD

Southfork SUWMD is shown in Figure 7. Concerns and issues from meetings with local farmers and residents include:

- Federal and state lands do not have reserve capacity for storm events and stormwater often backs up on private lands.
- Farmers may be interested in SUWMD to perform regular maintenance on Bee Tree and Magnolia Canals, and ditches.

A large part of the land in Southfork SUWMD is owned by state and federal agencies (Figure 7). In 1994, the USDA Soil Conservation Service (now the Natural Resources Conservation Service) completed a water management study for the Pocosin Lakes National Wildlife Refuge (NWR). The report found that flooding will be reduced downstream by managing water on the NWR. The report also described two scenarios in which flooding will occur downstream regardless of the status of water control on the NWR:

1. During wet periods, when the drainage systems of adjacent farms and the NWR are overwhelmed and water must be released from the NWR in an effort to prevent sheet flows; and,
2. When the drainage systems of the adjacent farms and the NWR are overwhelmed and sheet flow is occurring.

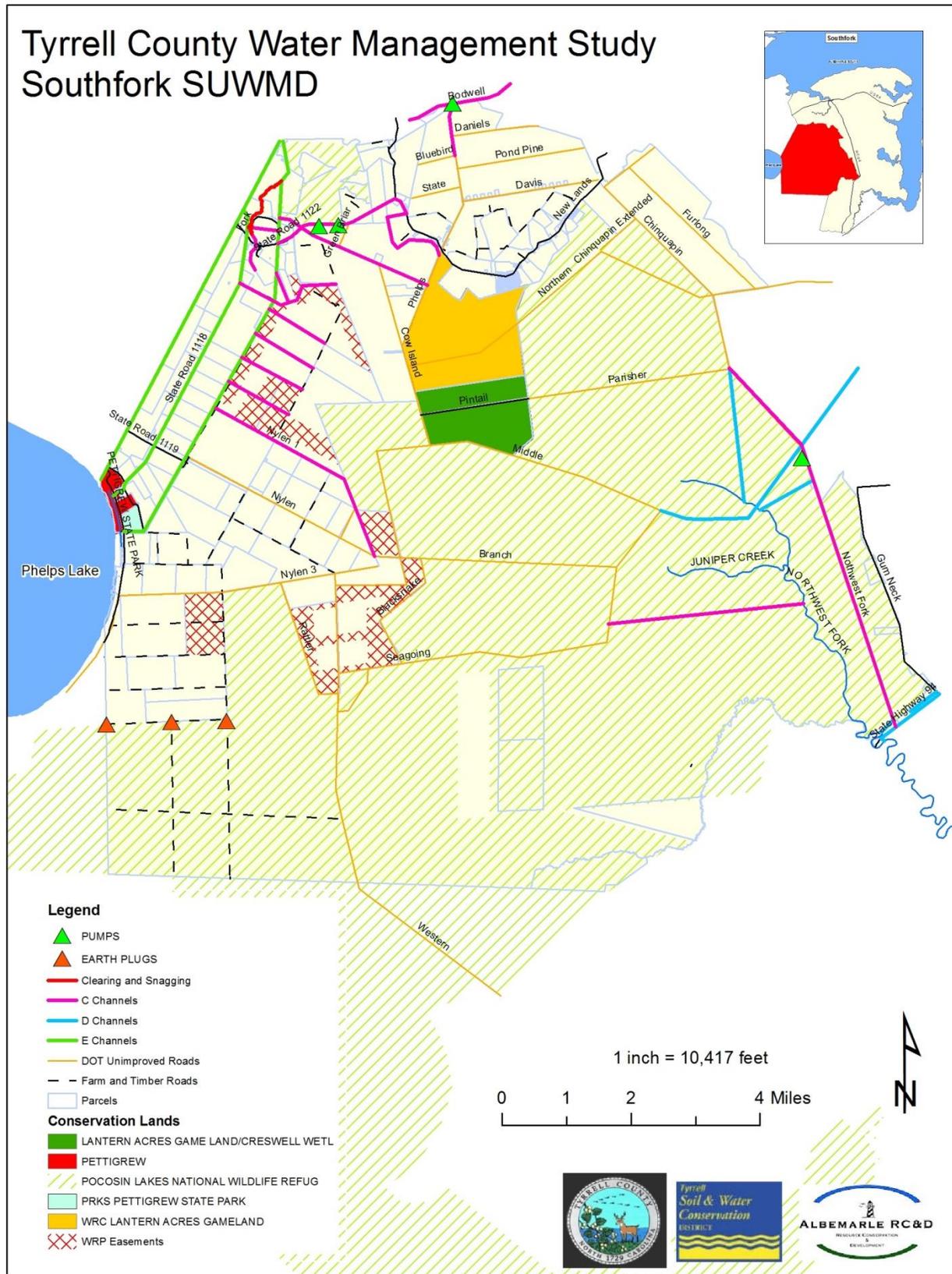
Additional information from the study is presented in Appendix F. A complete copy of the study is available at the Tyrrell County SWCD office in Columbia.

Southfork SUWMD has 305,810 ft of channels with a total assessed parcel value of \$79,185,633. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 6. For example, at \$1.00 per linear foot, an assessment of approximately \$0.08 per \$100 of assessed parcel value would be needed to maintain 305,810 ft on a five-year interval.

Table 6. Southfork SUWMD

TOTAL All LENGTHS (ft)					
305,810					
FIVE YR INTERVAL					
61,162					
Assessed Parcel Value					
\$79,185,633					
Per \$100/Value		\$ 791,856			
Average Cost to Maintain 305,810 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 61,162	\$ 76,453	\$ 91,743	\$ 107,034	\$ 122,324	
Cost per \$100					
\$0.08	\$0.09	\$0.11	\$0.13	\$0.15	
\$ 63,349	\$ 71,267	\$ 87,104	\$ 102,941	\$ 118,778	

Figure 7. Southfork SUWMD



Kilkenny SUWMD

Kilkenny SUWMD is shown in Figure 8. Concerns and issues from meetings with local farmers and residents include:

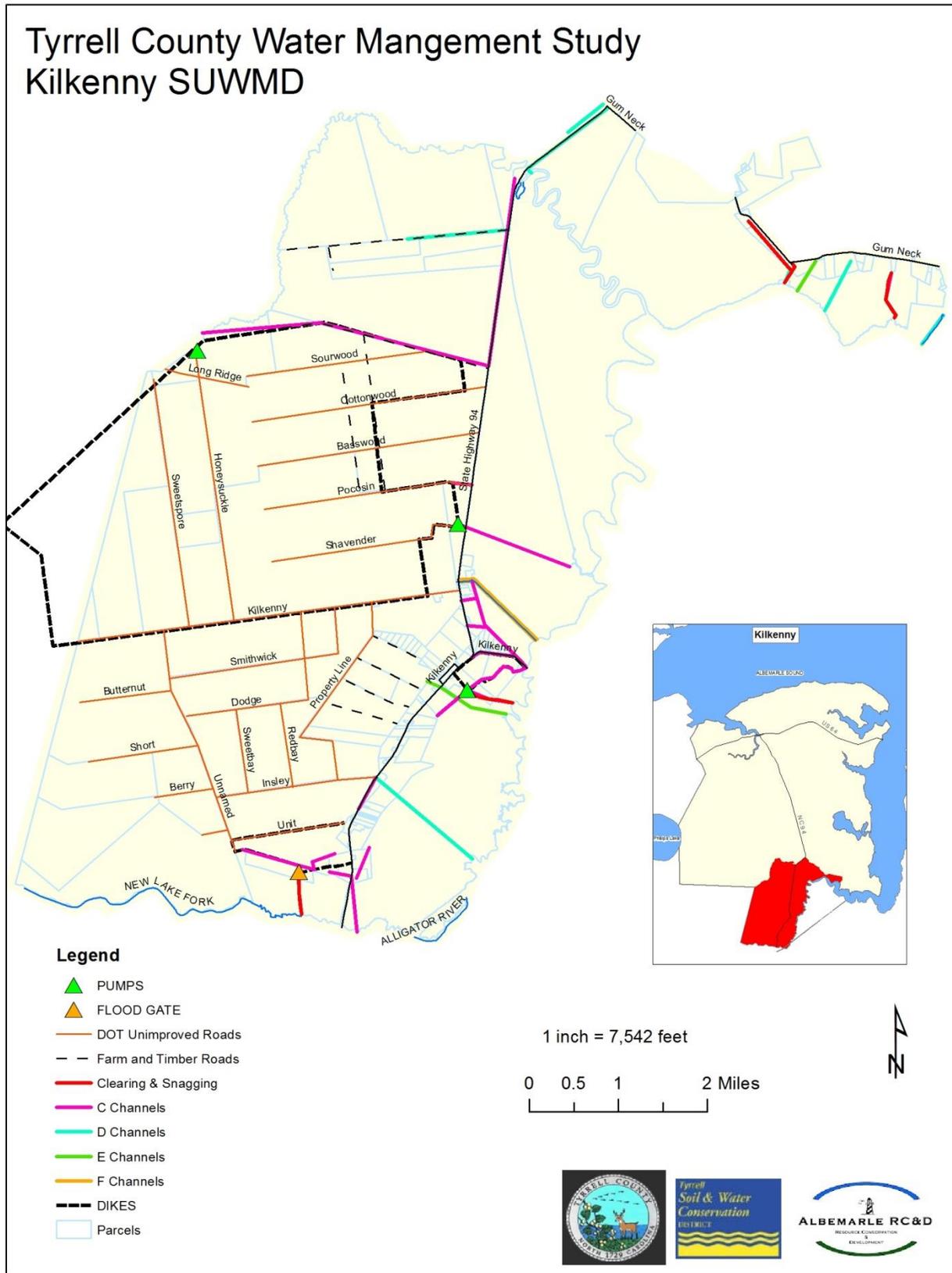
- Groups of farmers already manage water and drainage on a large part of the agricultural land in this area.

Kilkenny SUWMD has 137,877 ft of channels with a total assessed parcel value of \$43,829,575. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 7. For example, at \$1.00 per linear foot, an assessment of approximately \$0.06 per \$100 of assessed parcel value would be needed to maintain 137,877 ft on a five-year interval.

Table 7. Kilkenny SUWMD

TOTAL ALL LENGTHS (ft)					
137,877					
FIVE YR INTERVAL					
27,575					
Assessed Parcel Value					
\$43,829,575					
Per \$100/Value		\$ 438,295.75			
Average Cost to Maintain 137,877 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 27,575	\$ 34,469	\$ 41,363	\$ 48,257	\$ 55,151	
Cost per \$100					
\$0.06	\$0.08	\$0.09	\$0.11	\$0.13	
\$ 26,297.75	\$ 35,063.66	\$ 39,446.62	\$ 48,212.53	\$ 56,978.45	

Figure 8. Kilkenny SUWMD



Second Creek SUWMD

Second Creek SUWMD is shown in Figure 9. Concerns and issues from meetings with local farmers and residents include:

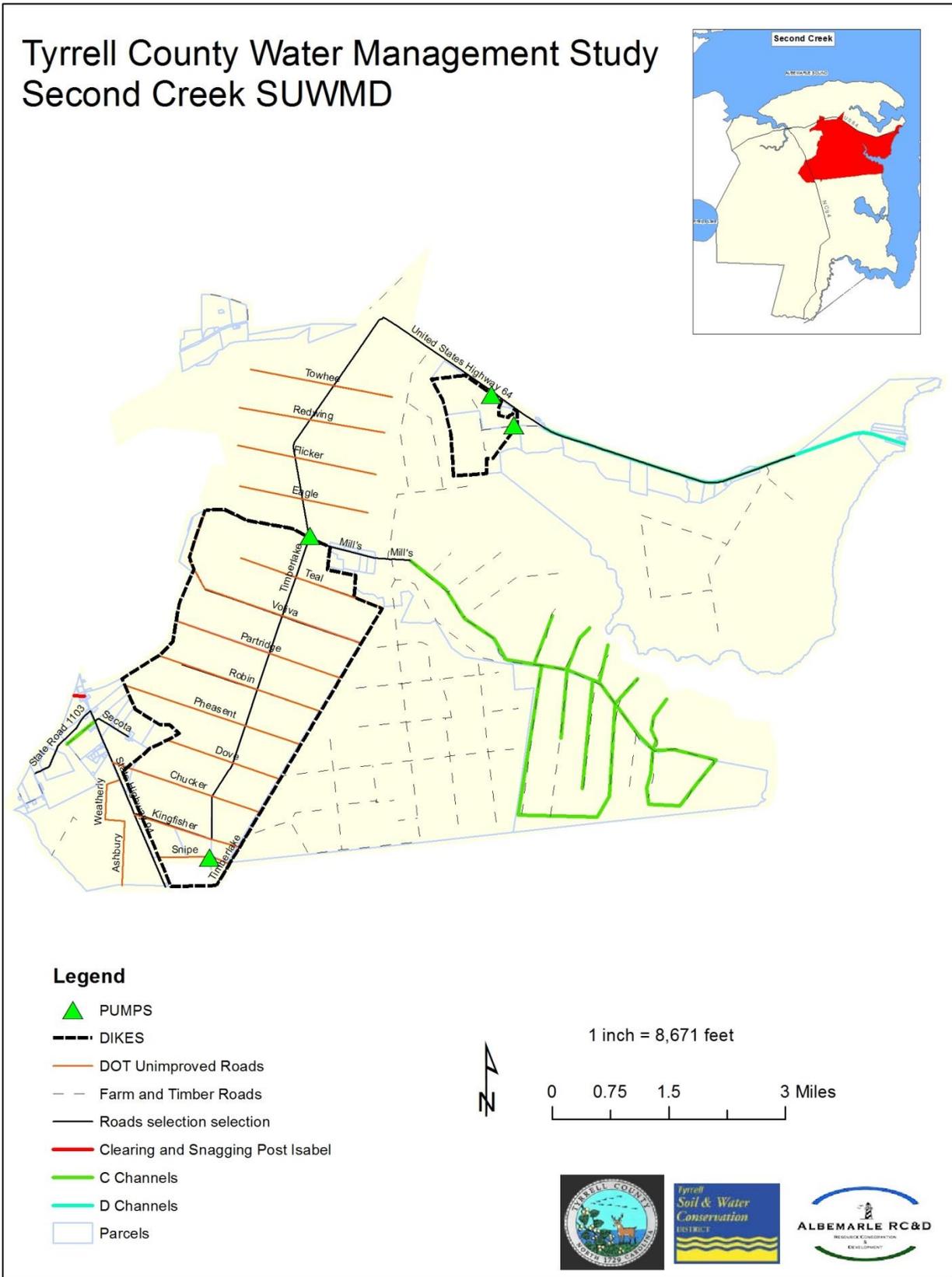
- Pumps used to push water north to Alligator Creek, and now pumps push water out of the dike area against natural drainage to the mitigation bank.
- Water in timberlands and mitigation bank is held at high levels for wildlife and there is minimal reserve capacity for storm events.
- Dike on northwest side holds water for cropland, but prevents water from east side of Riders Creek/Travis from flowing naturally to Alligator Creek.
- Concern that new Highway 64 may back water up and keep it from flowing naturally to the Alligator River.

Second Creek SUWMD has 116,481 ft of channels with a total assessed parcel value of \$29,817,167. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 8. For example, at \$1.00 per linear foot, an assessment of approximately \$0.08 per \$100 of assessed parcel value would be needed to maintain 116,481 ft on a five-year interval.

Table 8. Second Creek SUWMD

TOTAL All LENGTHS (ft)					
116,481					
FIVE YR INTERVAL					
23,296					
Assessed Parcel Value					
\$29,817,167					
Per \$100/Value		\$ 298,171.67			
Average Cost to Maintain 116,481 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 23,296	\$ 29,120	\$ 34,944	\$ 40,768	\$ 46,592	
Cost per \$100					
\$0.08	\$0.10	\$0.12	\$0.14	\$0.16	
\$ 23,853.73	\$ 29,817.17	\$ 35,780.60	\$ 41,744.03	\$ 47,707.47	

Figure 9. Second Creek SUWMD



Frying Pan SUWMD

Frying Pan SUWMD is shown in Figure 10. Concerns and issues from public meetings with local farmers and residents include:

- Small amount of land has natural drainage.
- Water management is dependent on private pumps.
- Minimal dikes on private lands.
- Saltwater intrusion is an issue in Buckridge.

Frying Pan SUWMD has 363,741 ft of channels with a total assessed parcel value of \$33,455,813. The estimated costs and assessments for maintaining the channels on a five-year interval are shown in Table 9. For example, at \$1.00 per linear foot, an assessment of approximately \$0.20 per \$100 of assessed parcel value would be needed to maintain 363,741 ft on a five-year interval.

Table 9. Frying Pan SUWMD

TOTAL ALL LENGTHS (ft)					
363,741					
FIVE YR INTERVAL					
72,748					
Assessed Parcel Value					
\$33,455,813					
Per \$100/Value		\$ 334,558			
Average Cost to Maintain 363,741 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 72,748	\$ 90,935	\$ 109,122	\$ 127,309	\$ 145,496	
Cost per \$100					
\$0.20	\$0.27	\$0.33	\$0.38	\$0.43	
\$ 66,912	\$ 90,331	\$ 110,404	\$ 127,132	\$ 143,860	

Figure 10. Frying Pan SUWMD

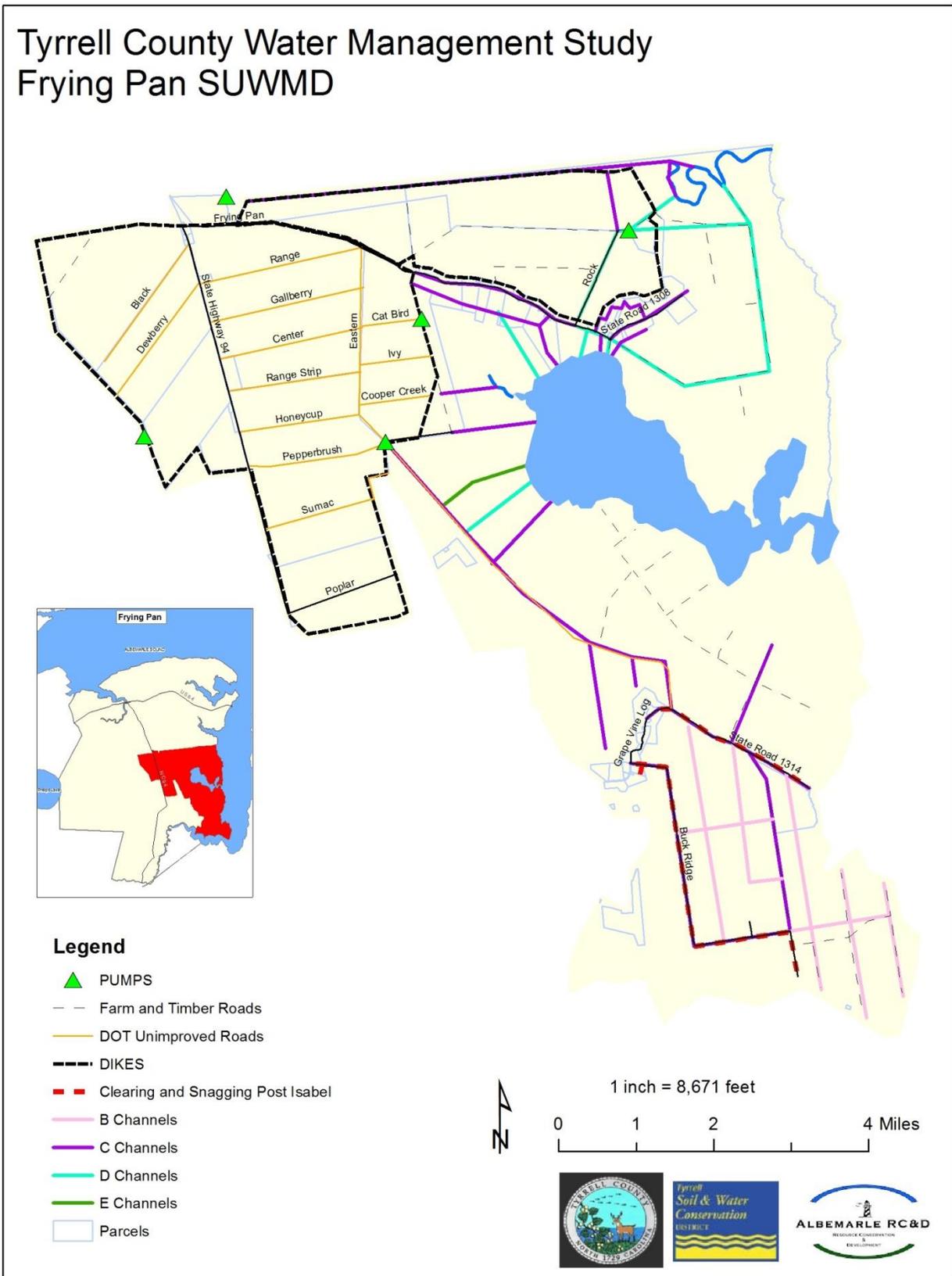


Table 10 summarizes the total lengths of channels A,B,C,D,E and F, and clearing and snagging.

Table 10.

Summary Table of Channels and Clearing and Snagging Post Isabel (ft)								
<u>SUWMD</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>C&S</u>	
Columbia	-	10,742	45,140	15,602	-	10,039	18,285	
Riders Creek	-	-	105,862	-	13,861	-	46,809	
Scuppernong	-	23,461	37,402	21,030	2,261	-	3,408	
Kilkenny	-	-	77,724	32,632	7,213	7,213	13,096	
Soundside	1,919	28,065	25,346	38,595	2,730	2,470	4,771	
Frying Pan	-	73,002	185,838	61,607	6,454	-	36,841	
Second Creek	-	-	90,007	25,777	-	-	697	
Alligator/Goat Neck	-	11,812	244,886	15,430	4,820	-	6,472	
Southfork	-	-	155,799	48,945	94,636	-	6,430	
TOTAL	1,919	147,081	968,006	259,617	131,973	19,722	136,811	
TOTAL ALL SUWMD								
1,665,129								

County-Wide SUWMD

Table 11 shows the assessments required to maintain all drainage in the SUWMD on a five-year interval. For example, at \$1.00 per linear foot, an assessment of approximately \$0.06 per \$100 of assessed parcel value would be needed to maintain 1,665,129 ft on a five-year interval.

Table 11.

TOTAL All LENGTHS (ft)					
1,665,129					
FIVE YR INTERVAL					
333,026					
Assessed Parcel Value					
\$536,929,683					
Per \$100/Value		\$ 5,369,297			
Average Cost to Maintain 1,665,129 ft of Channels per \$100 of Assessed Value on 5-Year Interval					
\$1.00	\$1.25	\$1.50	\$1.75	\$2.00	
\$ 333,026	\$ 416,282	\$ 499,539	\$ 582,795	\$ 666,052	
Cost per \$100					
\$0.06	\$0.075	\$0.09	\$0.11	\$0.12	
\$ 322,158	\$ 402,697	\$ 483,237	\$ 590,623	\$ 644,316	

Table 12 shows clearing and snagging sections after Hurricane Isabel by SUWMD.

Table 12.

Soundside	Columbia	Riders Creek/Travis	Scuppernong
Soundside 587 ft	Old US 64 250 ft	Cross Landing 390 ft	Folly Landing 1,000 ft
Soundside 350 ft	Old US 64 380 ft	Cross Landing 2,300 ft	Davenport Rd 1,143 ft
Soundside 850 ft	Old US 64 750 ft	Bodwell Rd Cross Ld 3,800 ft	Davenport Rd 1,160 ft
Taylor's Beach Rd 1,492 ft	Riders Creek 12,520 ft	Old US 64 750 ft	
Taylor's Beach Rd 1,492 ft	High School 1,130 ft	Chapell Hill Rd 2,600 ft	
	Railroad St. 1,235 ft	Newland Rd 1,975 ft	
	School Bus Garage 695 ft	Riders Creek Canal 4,400 ft	
	Dolly Field Site 1,325 ft	Second Creek 6,600 ft	
		Riders Creek 12,520 ft	
		Riders Creek Canal Swain Site 1,200 ft	
		Riders Creek Canal Popular Island 2,310 ft	
		Levels Rd 1,465 ft	
		Levels Rd/Mills Rd 2,495 ft	
		NC 94 Scotia 400 ft	
		Upper Levels Rd 1,400 ft	
		Upper Levels Rd 2,275 ft	
		Riders Creek Canal Stanton 1,260 ft	
		Levels Rd/Rhodes 1,500 ft	
		Moore Rd 550 ft	
Frying Pan	Second Creek	Alligator/Goat Neck	Southfork
Buckridge 25,056 ft	NC 94 Scotia Firetower 700 ft	Soundside Rd & Hidden Lake 350 ft	South Fork Creek 550 ft
Grapevine Landing Rd 11,375 ft		Goat Neck 5,220 Ft	South Fork Loop 5,900 ft
Buckridge Brickhouse 661 ft		Mill Ditch Fort Landing 600 ft	
		Fort Landing Pump Group 450 ft	
Kilkenny			
S Gum Neck Rd 1,350 ft			
Kilkenny 2,770 ft			
S Kilkenny 2,300 ft			
Gum Neck Pump Outlet 3,828 ft			
Tar Kiln Neck Ditch 2,300 ft			

Appendix A. Agricultural Drainage Report, 1978. Title Page and Typical Cross Sections of Channels A,B,C,D,E,F.

APPLICATION FOR A COUNTY-WIDE
DRAINAGE MAINTENANCE PERMIT
FOR
TYRRELL COUNTY, NORTH CAROLINA

in accordance with
The North Carolina General Statutes 113-229, as amended
The Rivers and Harbors Act of 1899, as amended

by

THE TYRRELL COUNTY BOARD OF COMMISSIONERS

Delmar C. Owens, Chairman

Lem Cahoon, Vice Chairman

Joseph Landino

Floyd W. Hollis

Joseph T. Liverman

AGRICULTURAL DRAINAGE REPORT
CITIZEN COMMITTEE

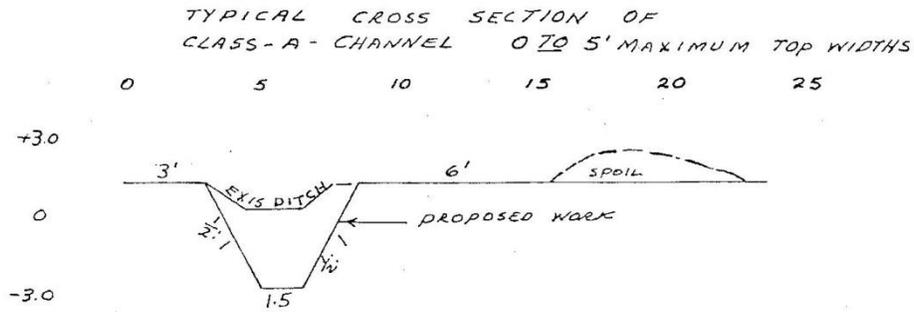
Joseph T. Liverman, Jr.
Harper Woodard
Nathan T. Everett
L.A. Keiser
Harry Spruill
James Griffin
Claud Jones
Ms. Sally Alexander

Jerry W. Brown
Roy O. Smith
Ms. Frances Voliva
Phil House
Durwood Cooper
Haywood Davenport
Golden Simpson

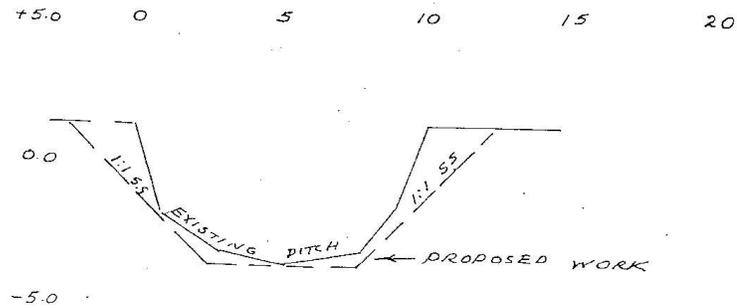
TECHNICAL ASSISTANCE PROVIDED BY:

Claud Jones, County Conservationist, SCS
R. Doug Nelson, Division of Marine Fisheries, NC NRCD
Preston Pate, Division of Marine Fisheries, NC NRCD
Robert E. Clark, Community Development Planner, NC NRCD
Kenneth Weeden, Community Development Planner, NC NRCD
Muriel Alligood, Secretary
Mary Critcher, Draftsperson

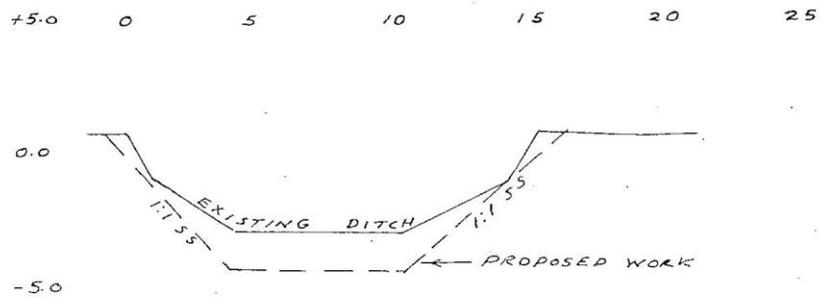
JUNE, 1978



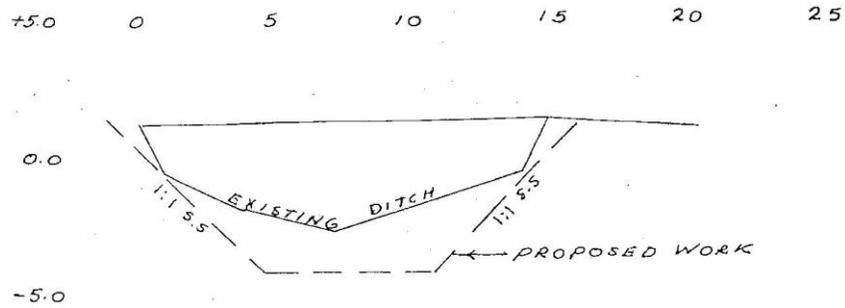
TYPICAL CROSS SECTION OF CLASS "B" CHANNEL 0 TO 10' MAXIMUM TOP WIDTHS



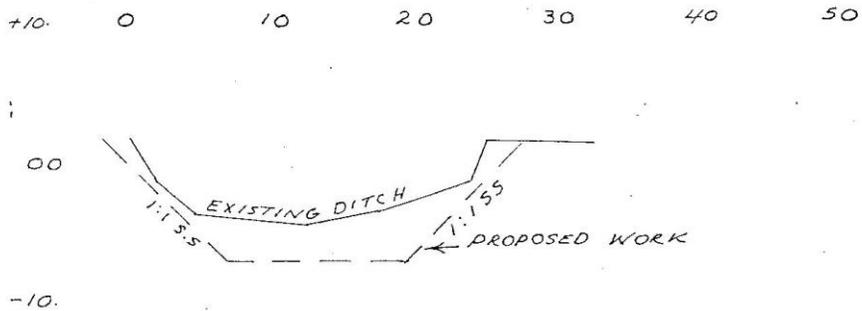
TYPICAL CROSS SECTION OF CLASS "C" CHANNEL 0 TO 15' MAXIMUM TOP WIDTHS



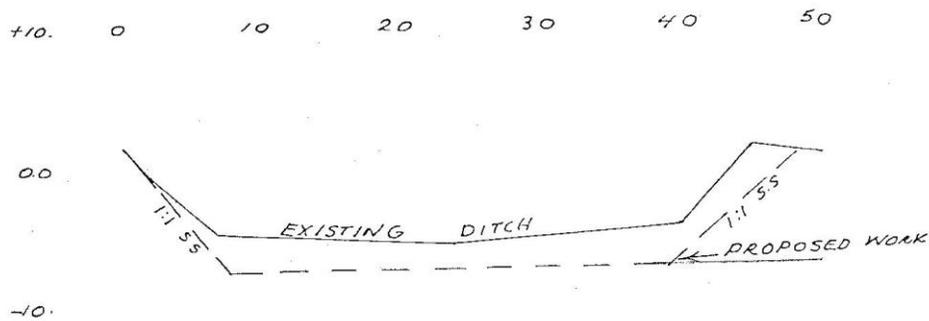
TYPICAL CROSS SECTION OF CLASS "D" CHANNEL 0 TO 20' MAXIMUM TOP WIDTHS



TYPICAL CROSS SECTION OF CLASS "E" CHANNEL 0 TO 30' MAXIMUM TOP WIDTHS



TYPICAL CROSS SECTION OF CLASS "F" CHANNEL 0 TO 50' MAXIMUM TOP WIDTHS



Appendix B. Photos of Typical A, B, C, D, E, and F Channels. Photos by Ty Fleming, Tyrrell SWCD.



A Channel



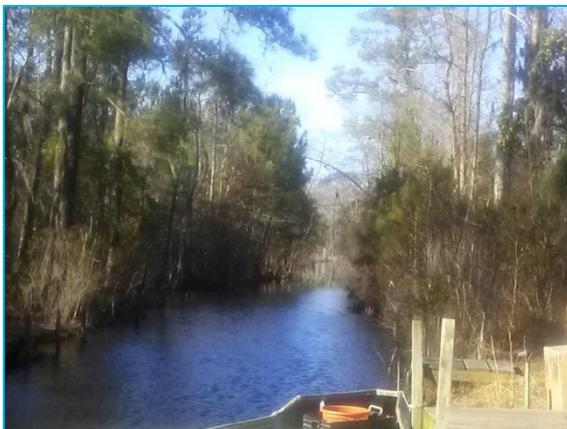
B Channel



C Channel



D Channel



E Channel



F Channel

Appendix C. Photos of Water Management Problems.

Beaver Photos

Residents identified beavers as a constant water management problem across the county. Beaver live for up to 20 years, with annual litters of up to 6 kits. One fertile female in its lifespan can produce 120 kits. *Photos by Ty Fleming, Tyrrell SWCD.*



Taylor's Beach, Soundside SUWMD



Southfork SUWMD



Frying Pan SUWMD



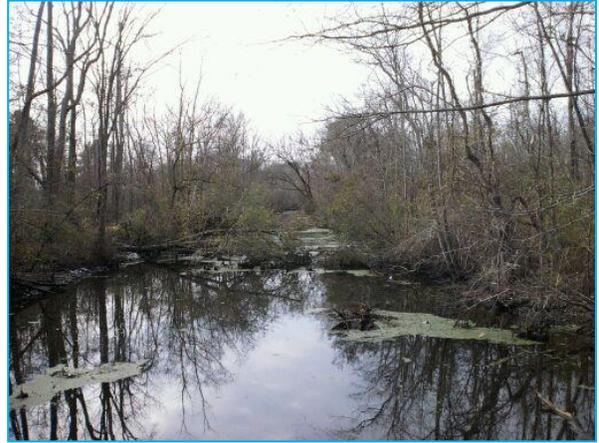
Alligator/Goat Neck SUWMD

Clearing and Snagging Photos

Residents identified downed trees in creeks and channels as a county-wide water management problem. Trees fall into creeks and channels and block drainage after thunderstorms, tropical storms and hurricanes. Creeks and channels need to be cleared and snagged on a minimum five-year interval. The following photos are typical examples. *Photos by Ty Fleming, Tyrrell SWCD.*



Hidden Lake, Alligator/Goat Neck SUWMD



Grindle Hill Canal, Columbia SUWMD



Scuppernong River, Riders Creek/Travis SUWMD



Pinner Ditch, Columbia SUWMD

Alligator Weed Photos

Residents identified alligator weed as a major county-wide water management problem. Thick concentrations of alligator weed can block drainage of streams and canals. Control of alligator weed requires regular sprayings with an approved herbicide. The following photos are typical examples. *Photos by Ty Fleming, Tyrrell SWCD.*



Pinner Ditch, Columbia SUWMD



Railroad Canal, Columbia SUWMD



Second Creek, Second Creek SUWMD



Riders Creek, Rider's Creek/Travis SUWMD

Appendix D. Creating a SUWMD. Adapted from a similar study conducted by Currituck County in 2007**STEPS FOR CREATING A COUNTY SERVICE DISTRICT (SUWMD)**
(G.S. 153A-300 et. seq)

- (1) Commissioners appoint advisory board.
- (2) Staff prepares factual information to help County Commissioners consider the matters listed in G.S. 153A-302 (a) (1-6).
- (3) County Commissioners consider matters listed in G.S. 153A-302(a) (1-6) concerning proposed service district and the standards set forth in G.S. 152A-302(a) (1-4).
- (4) County Commissioners and staff prepare a report containing a map of proposed service district boundaries, a statement that the proposed district meets the standards set forth in G.S. 153A-302(a) (1-4), and a plan providing for the proposed watershed improvement services. (Note: existing documents, such as a project feasibility report, may serve as the basis for the report of the County Commissioners.)
- (5) County Commissioners obtain agreements of governing bodies of city and sanitary district before including within the service district any territory lying within the city or sanitary district.
- (6) County Commissioners give notice of public hearing on proposed service district:
 - (a) Publish notice at least once, one week before date of hearing.
 - (b) Mail notice to property owners within proposed district at least 4 weeks before hearing date.
- (7) County Commissioners hold public hearing on proposed district.
- (8) County Commissioners adopt resolution defining the service district at a meeting after public hearing. (Suggested: not sooner than 2 weeks after hearing, to allow time for the public to file additional material.)
- (9) The service district is defined and becomes operational at beginning of next fiscal year (July 1).
- (10) County must provide services or let contracts for services within one year after the service district is defined (the following July 1).

Appendix D. Example of Public Notice for SUWMD.**PUBLIC NOTICE****FORMATION OF ?????? SPECIAL USE WATER
MANAGEMENT DISTRICT**

TAKE NOTICE that on ??? , 2008 at 7:00 p.m. the Tyrrell County Board of Commissioners will hold a public hearing in the ???? to receive public comments on the proposed creation of the ???? Special Use Water Management District. Copies of this report are available in the County Manager's office. For answers to your questions and concerns, please contact Ty Fleming with the Tyrrell Soil & Water Conservation office at ??????

**REPORT ON THE CREATION OF THE
SPECIAL USE WATER MANAGEMENT DISTRICT**

To establish an entity for the purpose of financing the maintenance of the local water management and drainage systems, and for protecting water quality.

Identify Need for Special Use Water Management District

The ????? area is rapidly changing from a rural/farming setting to residential and commercial developments, resulting in increased stormwater runoff from impervious surfaces such as rooftops, driveways and streets. Farmers and landowners traditionally have maintained the local drainage system in their normal operations. However, the rapid pace of residential and commercial development is changing the way the drainage system is managed. The ditches and drainage ways within this proposed Special Use Water Management District have had little or no maintenance in the past several years, and periodic flooding has demonstrated a need for regular maintenance. Currently, there is no local entity that manages the drainage system within the whole area.

Due to recent flooding and the lack of a local entity to manage the drainage system and to protect water quality, the Board of Commissioners has determined there is a need for this Special Use Water Management District.

Resident Population and Population Density

The residential population of the proposed Special Use Water Management District is approximately ???? people with approximately

??? houses on ??? parcels. There are ??? subdivisions in this proposed Special Use Water Management District with ??? more coming on line. Commercial properties exist along ??? and less than ??? % remains in agricultural land.

Appraisal Value of Property Subject to Taxation in the Proposed Special Use Water Management District

The assessed valuation of land subject to taxation in the proposed Special Use Water Management District is approximately \$???. The current tax rate, which includes the proposed Special Use Water Management District area, is ??? cents per \$100.00 valuation. A proposed ??? cent assessment per \$100.00 parcel valuation would raise an estimated \$??? per year.

Plan for Providing Water Management and Water Quality Improvements within the Proposed Special Use Water Management District

There are (??) major drainage ways (see map) that comprise the drainage system in the proposed Special Use Water Management District. A local advisory board appointed by the County Commissioners will schedule maintenance and improvement of the drainage ways subject to available funds. The Tyrrell County Soil & Water Conservation office will apply for grants for the installation of water quality best management practices (BMP's) such as sediment basins, in-stream constructed wetlands, stream bank stabilization, etc. The proposed Special Use Water Management District and Tyrrell County will contract with private entities to perform drainage improvements and water quality BMP's.

*This public notice and report meet the State of North Carolina Standards of the County Special Use Water Management District Act of 1973, Article 16, 153A-302.

**Map of Proposed Special Use Water Management District –
Reverse Side**



Appendix E. Example Ordinance for Establishing a Special Use Water Management District**RESOLUTION ESTABLISHING A SERVICE DISTRICT TO BE KNOWN AS SPECIAL USE WATER MANAGEMENT DISTRICT**

WHEREAS, pursuant to Chapter 153A, Article 16, of the North Carolina General Statutes the Board of Commissioners for Tyrrell County does hereby define and establish a Special Use Water Management District in order to finance, provide and maintain for the district water management and watershed improvements in addition to, and to a greater extent than those financed, provided and maintained for the entire county; and

WHEREAS, in determining whether to establish the proposed Special Use Water Management District, the Board of Commissioners for Tyrrell County, among other things, considered:

- (a) the appraised value of property subject to taxation in the proposed district;
- (b) the present tax rates of the county,
- (c) the ability of the proposed district to sustain the additional taxes necessary to provide the services planned for the district; and
- (d) other matters believed by the board of commissioners to have a bearing on whether the district should be established; and

WHEREAS, the Board of Commissioners for Tyrrell County, after due notice and as provided by the General Statutes of North Carolina, held a public hearing and in all respects complied with the required provisions of law before adopting this resolution; and

WHEREAS, the Board of Commissioners for Tyrrell County upon the information on evidence received, finds that:

- (a) there is a demonstrable need for providing in the said district water management and watershed improvements in order to preserve the water quality of water and protect residential, commercial and agricultural lands from detrimental flooding;
- (b) it is impossible or impracticable to provide those services on a county-wide basis;
- (c) it is economically feasible to provide the proposed services in the district without unreasonable or burdensome annual tax levies;
- (d) there is a demonstrable demand for the proposed services by persons residing in the district; and

(e) that all requirements for establishment of a Special Use Water Management District in the county have been complied with.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS FOR TYRRELL COUNTY, that

1. A Special Use Water Management District for water management and watershed improvements is hereby defined and established as described and shown on Exhibit "A" attached to this resolution and made a part hereof. The new district shall be named the "Special Use Water Management District".
2. This resolution shall take effect at the beginning of the "Fiscal Year".

This is the "day" of "month", 200?.

Chairman, Board of Commissioners

ATTEST:

Clerk to the Board

(SEAL)

Appendix F. Selected sections from the 1994 Pocosin Lakes National Wildlife Refuge Hydraulic and Hydrologic Study and Water Management Plan.

**POCOSIN LAKES
NATIONAL WILDLIFE REFUGE
HYDRAULIC AND HYDROLOGIC STUDY
AND
WATER MANAGEMENT STUDY**

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202)720-5881 (voice) or (202)720-7808 (TDD).

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call (202)720-7327 (voice) or (202)720-1127 (TDD).
USDA is an equal employment opportunity employer.

Prepared by

USDA-Soil Conservation Service

JUNE 1994

3.3 Recommendations (Operation And Management Objectives, Concepts, and Concerns)

Management Objectives (All Watersheds)

- A. Establish a line of formal communication between the NWR and downstream landowners to manage water cooperatively in a manner that will meet the long term goals of the NWR and protect the property of the adjacent landowners.
- B. Restore a semblance of the natural hydrology to the pocosin.

Watershed Management Concepts (All Watersheds)

- A. Water will be managed to the surface of the ground to restore the hydrologic properties of the pocosin. Water table and ditch water levels will be allowed to fluctuate naturally in accordance with rainfall and evapotranspiration. Drainage will occur if overland flows are imminent.
- B. When drainage must occur, only enough water will be released to prevent overland flows. Drainage will be stopped as soon as surface water can be contained and overland flows prevented.
- C. Water will be released in a manner that will encourage drainage to follow the natural contour and historic sheet flow patterns, or established artificial watershed boundaries.

Starting Drainage (All Watersheds)

When drainage is required, flashboard riser (riser) weirs will be set two feet below ground level. The drainage process should be started with the risers at the lowest elevation. This process should continue uphill until all of the risers have been lowered.

Several risers may be located at the same elevation throughout a given watershed. These risers should be released simultaneously to prevent water from draining against the contour.

Stopping Drainage (All Watersheds)

To stop all drainage, raise the riser weirs at the highest elevations first. This process should proceed downhill until the lowest riser weirs have been raised. If several risers are located at the same elevation within a given watershed, the weirs should be raised simultaneously.

Flooding Concerns (All Watersheds)

Adjacent downstream landowners are concerned that water released from NWR watersheds will cause flooding. This fear is well founded and reasonable. In certain situations downstream flooding will occur; however, it is important to realize that this flooding will occur even if the NWR canals are allowed to drain freely with no controls.

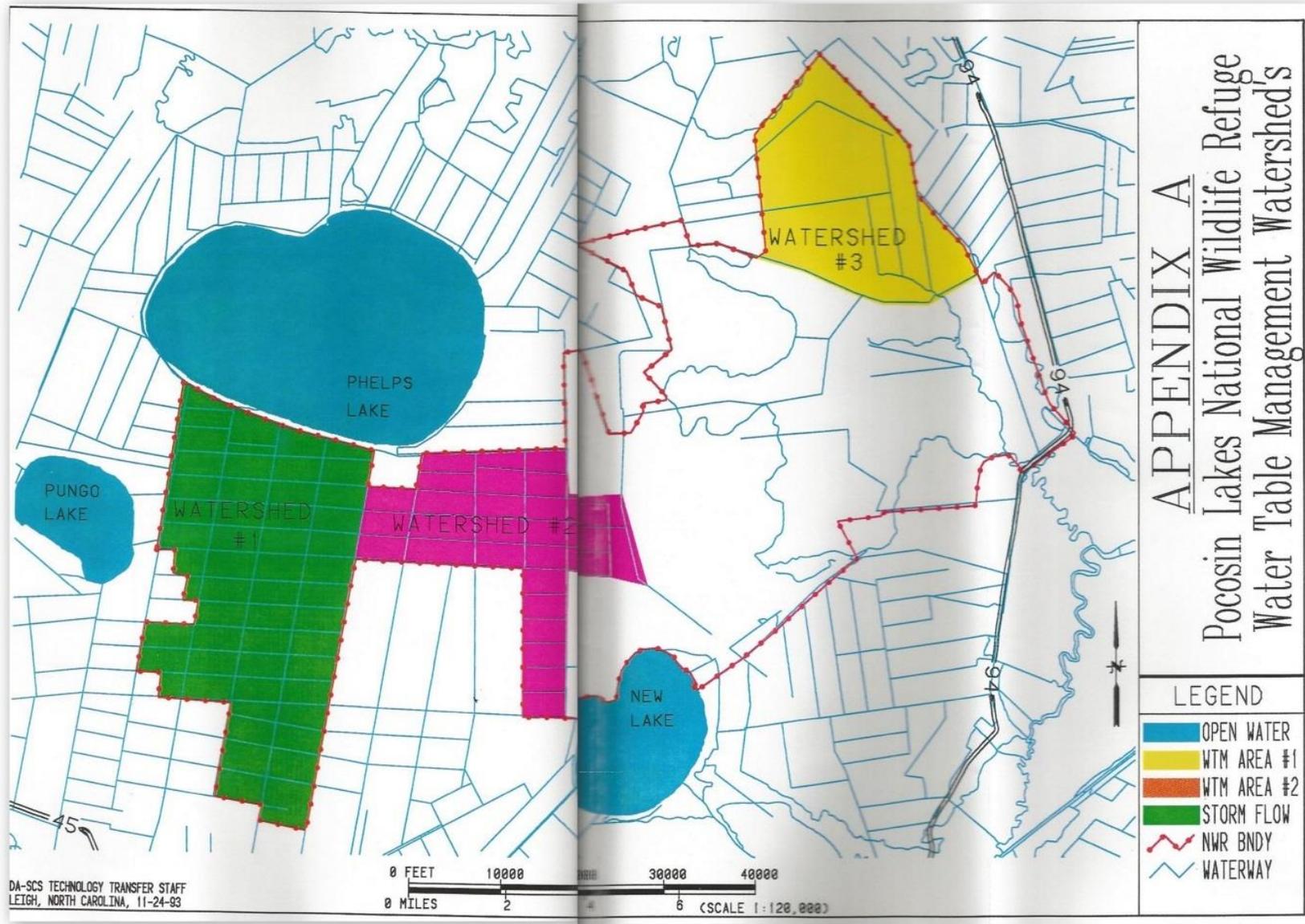
There are two scenarios in which flooding will occur downstream regardless of the status of water control on the NWR:

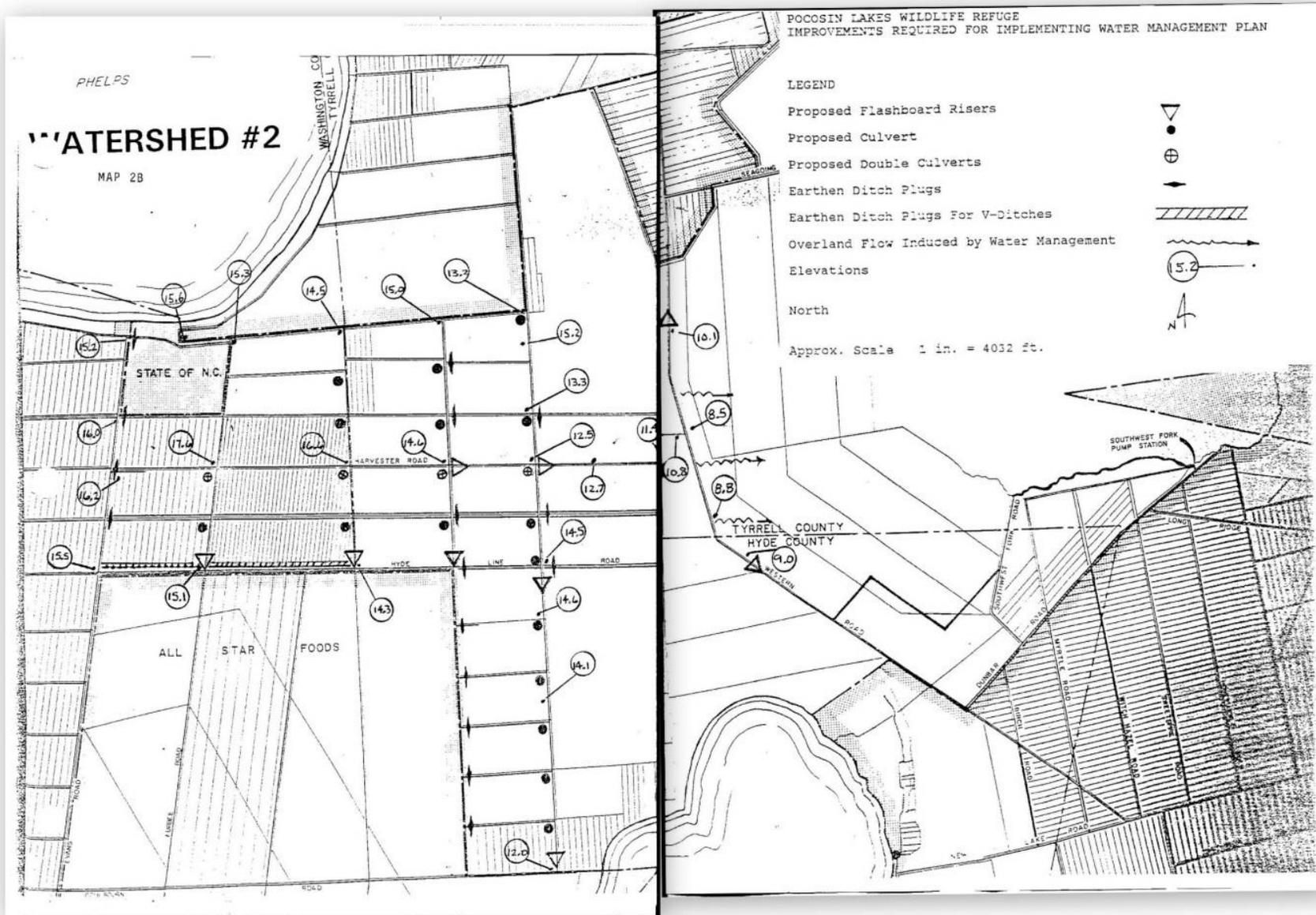
- A. During wet periods, when the drainage systems of the adjacent farms and the NWR are overwhelmed and water must be released from the NWR in an effort to prevent sheet flows.
- B. When the drainage systems of the adjacent farms and the NWR are overwhelmed and sheet flow is occurring.

Downstream Flood Prevention And Improved Drainage (All Watersheds)

Generally, flooding will be reduced downstream by managing water on the NWR:

- A. When rainfall amounts are manageable, water can be stored throughout the NWR, thus reducing total annual outflows that will drain through downstream landowners. Studies conducted by Evans, Gilliam, and Skaggs, 1991, suggest that total annual outflows can be reduced by 30% or more on fields where drainage is controlled.
- B. The duration of downstream flooding can be reduced by stopping the flow of water from the NWR as soon as the surface water flow can be controlled. As a result, a significant source of water can be controlled and stopped, allowing downstream water levels to drop more quickly, providing a greater rate of drainage for downstream landowners.

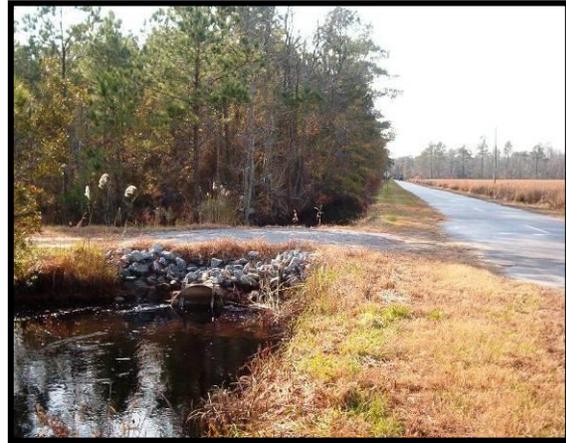




Attachment G. Tide Gates, Driveway Pipes and Ditch Cleaning in Alligator and Goat Neck.



Tide gate in Alligator Community on Old Hwy. 64



Tide gate in Alligator Community on St. Rd. 1222



Tide gate in Goat Neck Community on St. Rd. 1225



Tide gate in Goat Neck Community on Goat Neck Road



Tide gate in Goat Neck Community off of St. Rd. 1223



Tide gate in Goat Neck Community at end of Cove Road

Attachment G. Tide Gates, Driveway Pipes and Ditch Cleaning in Alligator and Goat Neck.



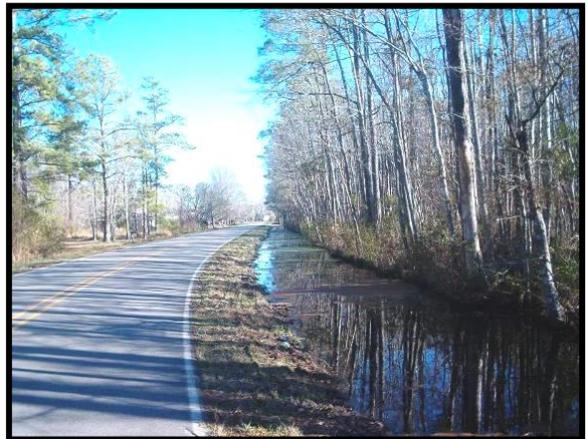
DOT dipping out ditch in Alligator Community



Tree removal along ditch on Pledger Landing Road (St. Rd. 1225)



28 driveway pipes were replaced in the two communities to improve drainage



Dipped out ditch in Goat Neck Community

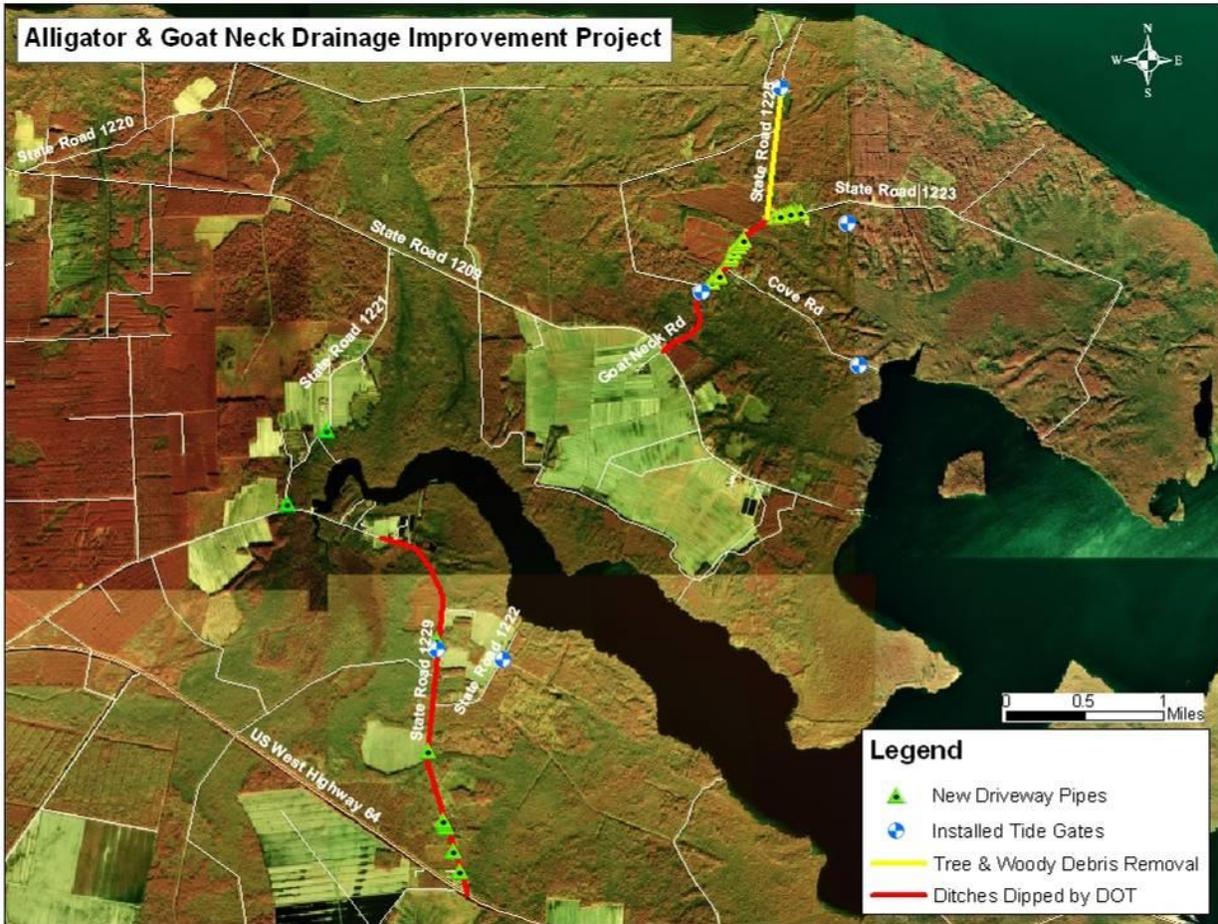


Pipe replaced in Goat Neck Community



Pipe replaced in Alligator Community

Attachment G. Tide Gates, Driveway Pipes and Ditch Cleaning in Alligator and Goat Neck.



Appendix H. Example Special Use Water Management Districts

Guinea Mill Watershed – Currituck County

Currituck County is one of the fastest growing counties in North Carolina resulting largely from urban sprawl originating in Tidewater Virginia. The Guinea Mill watershed project (approximately 2,000 ha) was initiated in 1999 to address drainage and water quality issues arising from rapid urbanization of a predominately rural county. Over half the watershed is projected to be converted from farmland to residential by 2010. Drainage systems that were generally adequate for agricultural land uses are not adequate for residential development.

As part of the Guinea Mill project, a tax-supported Water Management Service District, one of the first in North Carolina, was formed by the Currituck County commissioners. The purpose of the Service District is to generate revenue to assure the future maintenance and persistence of the project components. Under N.C. Statue, a Service District operates similar to a Drainage District in terms of establishment, taxation and governance. The advantage of a Service District is the ability to incorporate multiple objectives in the charter whereas a Drainage District by State Statue has one objective, that being drainage or flood protection. Under Drainage District law, penalties can be assessed for activities such as addition of weirs or structures to control flow. This constraint has prevented the installation of water control structures within Drainage District right-of-ways for the purpose of providing controlled drainage. In the case of a Service District, it became the responsibility of the leadership to determine on a case by case basis what activities achieve the overall goals of the District. For example, a Service District can have an objective of providing flood protection but at the same time allow installation of a water control structure to enhance water quality. If it is deemed that water quality is more important to the District than drainage; drainage can be compromised for the benefit of water quality.

There are 289 parcel owners within the Guinea Mill Watershed with the majority in eight (8) major subdivisions. Permanent conservation easements involving 20 ha along both sides of the canal were purchased and are managed by the county utilizing an advisory board comprised of five landowners in the watershed. The advisory Board is charged with the duty of investigating, studying and making recommendations to the Board of Commissioners pertaining to the construction, enlargement, improvement, maintenance, operation and regulation of the Service District. A county ordinance was established requiring all new subdivisions and any landowners encroaching on the easement and canal to submit a plan for that encroachment (i.e., culvert, drainage swale, etc) to the Service District prior to installation. Guinea Mill Canal dissects the watershed and runs the entire length of approximately 13 km.

The fourteen kilometers of riparian buffers were established along the Guinea Mill Canal. Where farming use to occur next to the stream bank, buffers are established with vegetation maintained 0.3 to 1 m high. In-stream constructed wetlands were installed on 3.4 ha within the Guinea Mill Canal. In the wetland section, the canal was widened from 10 to 20 m. The widened channel section increased the cross sectional area of the channel to offset the increased flow resistance resulting from the wetland plants. Two in-stream wetland cells were constructed one approximately 2 km and the second about 1 km in length. The wetland cells were planted with a variety of wetland plants on a 1 m by 1 m spacing.

A rock weir water control structure was installed to enhance hydrologic function at low flows. The rock weir (1 m high by 1.2 m top width by 21 m length) was located just downstream of a 15 ha hardwood swamp. The hydrology of the swamp had been significantly altered by channelization of Guinea Mill Canal. The rock weir raised the base flow elevation by approximately 1 m, restoring some hydrologic function to the riparian swamp. In addition, scour pools formed downstream of the rock weirs which enhanced aquatic habitat. As in previous examples, the channel was widened in the vicinity of the rock weirs to offset the reduction in flow depth resulting from the weir. Annual inspections of all conservation easements are made by the Advisory Board and the Currituck SWCD Board with their respective reports submitted to the County commissioners.

Newland Watershed Project – Pasquotank County

A similar tax supported Service District project was initiated in the Newland Watershed in Pasquotank County in 1998. The watershed Service District encompasses approximately 7,000 ha. The US Hwy158 Canal and Sheppard Ditch are the primary outlets for the southeastern section of the Dismal Swamp Wildlife Refuge. In recent years, landowners downstream of the refuge have been subjected to flooding resulting from failure and overtopping of the refuge dyke. This project involved development of a conceptual water management plan for the refuge that balanced the water management needs of the refuge with the drainage and water quality needs of the downstream landowners and citizens. Debris was cleared and snagged in the upper Pasquotank River, which is the outlet for both the 158 and Sheppard Ditch canals. Both canals were excavated to stabilize stream banks. The ditch bottoms were excavated to create a ledge for establishment of 2.6 acres of in stream constructed wetlands.

Five associated rock weir water control structures were installed to enhance base flow hydrology and ecological function. At the rock weirs, the channel is widened to maintain the same cross sectional area as existed prior to the project so that the channel capacity will not be reduced at high flows. Vegetative buffers were established along 4.2 km of the 158 Canal and 3.6 m on Sheppard Ditch. Annual inspections are made by the Advisory Board and the Pasquotank SWCD Board with their respective reports submitted to the County commissioners.

Source:

Robert O. Evans, Bass, K.L., Burchall, M. R., Hinsoin, D.R., Johnson, R.J., and Doxey, M. 2004. Management Alternatives to Enhance Water Quality and Ecological Function of Channelized Streams and Drainage Canals. In Proceedings: ASABE Specialty Conference “Self-Sustaining Solutions for Streams, Wetlands, and Watersheds”, St Paul, Minnesota, USA; and In Proceedings of the 19th ICID Congress “Improving Water and Land Management for Increasing Efficiency in Irrigated Agriculture”, Beijing China, 2005.

Ordinance No. 2014-05-01**An Ordinance
Amending the Camden County
Code of Ordinances****Camden County, North Carolina**

BE IT ORDAINED BY THE CAMDEN COUNTY BOARD OF COMMISSIONERS as follows:

Article I: Purpose

The purpose of this Ordinance is to add new Chapter 53 of the Camden County Code of Ordinances of Camden County, North Carolina.

Article II. Construction

For purposes of this Ordinance, underlined words (underline) shall be considered as additions to existing Ordinance language and strikethrough words (~~strikethrough~~) shall be considered deletions to existing language. New language of proposed ordinance shall be shown in italics (*italics*) and underlined.

**Article III. Add Chapter 53 to the Camden County Code of Ordinances
which shall read as follows:****CHAPTER 53: STORMWATER MANAGEMENT UTILITIY****§ 53.01 FINDINGS.**

(A) Stormwater runoff is a critical concern for Camden County due to the potential for flood damage to residential and commercial structures and productive agricultural land as well as its potential pollutant damage to the surrounding creeks, rivers, and sound.

(B) Water quality standards by state and federal law requiring that local governments develop more detailed, advanced, and costly stormwater programs are being mandated in an ever increasing number of cities and counties in North Carolina.

(C) Heretofore maintenance of conveyances has been the sole responsibility of private property owners, with the exception of road side ditches maintained by the NCDOT, with no concern for the overall performance of the natural water courses and manmade ditches and canals that make up the stormwater system.

(D) Effective stormwater management should be provided to protect, to the extent practicable, the citizens of the County from the loss of life and property damage from flooding.

(E) Chapter 153A, Article 15 of the North Carolina General Statutes, authorizes the County to acquire, construct, establish, enlarge, improve, extend, maintain, own, operate, and contract for the operation of Stormwater Management Programs designed to protect water quality by controlling the level of pollutants in, and the quantity and flow of, stormwater and structural and natural stormwater and Drainage Systems of all types.

(F) The establishment of a Stormwater Management Utility that would be accounted for as a separate enterprise fund and would facilitate the provision of a Stormwater Management Program is reasonable and in the public interest.

(G) North Carolina General Statute 153A-277 authorizes Camden County to establish and revise from time to time, a schedule of rates and charges to fund the Stormwater Management Program activities including both structural and natural stormwater conveyance and Drainage System services provided by the Stormwater Management Utility.

§ 53.02 PURPOSE:

(A) A Stormwater Management Utility is hereby created as an identified fiscal and accounting fund for the purpose of comprehensively addressing the Stormwater management needs of the County. The County's Stormwater management needs are met herein (1) through programs designed to protect and manage water quality and quantity by controlling the level of pollutants in Stormwater runoff, and the quantity and rate of Stormwater received and conveyed by structural and natural Stormwater and Drainage Systems of all types, (2) by establishing a schedule of charges, (3) by defining the control, collection, and disbursal of funds, and (4) by setting forth penalties, methods of appeals and exemptions.

§ 53.03 DEFINITIONS:

(A) For the purpose of this Article, the following words, terms, and phrases shall have the meanings given to them in this section, except where the context clearly indicates a different meaning:

DEVELOPED LAND. A land parcel altered from its Natural State.

DRAINAGE SYSTEM. Natural and structural channels, swales, ditches, swamps, rivers, streams, creeks, wetlands, branches, reservoirs, ponds, drainage ways, inlets, catch basins, gutters, pipes, culverts, bridges, head walls, storm sewers, lakes, and other physical works, properties, and improvements that transfer, control, convey or otherwise influence the movement of storm water runoff.

EQUIVALENT RESIDENTIAL UNIT (ERU). A unit of measure of impervious surface (in square feet) that represents the impervious surface area on the average Single Family Residential Parcel in the underlying jurisdiction as a unit of comparison. ERU shall mean for the purposes of this Ordinance 4,500 square feet of impervious surface.

GROSS PARCEL AREA. The property area contained within the legally described boundaries of a property or the total lot size of a property, in acres.

IMPERVIOUS SURFACE. Developed areas of land that prevent or significantly impede the infiltration of Stormwater into the soil. Typical Impervious Surfaces include, but are not limited to: roofs, sidewalks, walkways, patios, private driveways, parking lots, access extensions, alleys and other paved, engineered, compacted or gravel surfaces containing materials that prevent or significantly impede the natural infiltration of Stormwater into the soil. Impervious Surface Area is synonymous with *Built Upon Area* (“BUA”) as defined by the North Carolina Department of environment and natural Resources.

NATURAL STATE. Existing undeveloped land where the soil and vegetation characteristics have not been substantially modified or disturbed by human activities and the hydrologic function is in an unaltered or natural condition.

SERVICE AREA. All land within Camden County and will be divided based on the topography and outfalls, into 4 watershed subareas as shown in Exhibit A as South Mills Sawyers Creek, Shiloh, and North River watersheds.

SERVICE CHARGE. A stormwater management service charge, applicable to a land parcel, which generally reflects the impact on or demand for Stormwater management services provided by the County to properly control and manage stormwater runoff quantity and/or quality associated with the land parcel. The Service Charge will vary from one land parcel to another based on the impervious surface and gross parcel areas. The Service Charge may vary for the same class of service in different areas of the Service Area and may vary according to classes of service.

SINGLE FAMILY RESIDENTIAL PARCEL. A parcel with a single family residential structure used as a single family dwelling and whose primary use is as a single family residence.

STORMWATER. The runoff from precipitation that travels over natural state or developed land surfaces and enters a drainage System.

STORMWATER MANAGER. A person working for or on behalf of the County to administer the Stormwater Management Program

STORMWATER MANAGEMETN PROGRAM. An identified set of measures and activities designed to reduce and/or manage stormwater quantity by controlling velocity, volume, and rate – and to protect, restore and/or manage stormwater quality by controlling and/or reducing pollutant.

STORMWATER MANAGEMENT UTILITY. An organizational structure that is responsible for funding, administering, and operating the County’s Stormwater Management Program, and that is supported through a rate structure based on the impervious surface area and gross area found on land parcels located within the service area.

UNDEVELOPED LAND. All land that is not altered from its natural state.

§ 53.04 ESTABLISHMENT OF A STORMWATER MANAGEMENT UTILITY AND STORMWATER MANAGEMENT ENTERPRISE FUND.

(A) There is hereby established a Camden County Stormwater Management Utility that shall be responsible for implementing, operating, and administering the County's Stormwater Management Program as defined herein.

(B) There is hereby established a Camden County Stormwater Management Enterprise Fund for the purpose of dedicating and protecting funding applicable to the responsibilities of the Stormwater Management Utility including, but not limited to, rents, rates, fees, charges, and penalties as may be established after due notice having been given and a public hearing held by the Board of Commissioners. Funding may also include other funds transferred or allocated to the Stormwater Management Utility by the Board of Commissioners. All revenues and receipts of the Stormwater Management Utility shall be placed in the Stormwater Management Enterprise Fund and all expenses of the Stormwater Management Utility shall be paid from the Stormwater Management Enterprise Fund, except that other revenues, receipts, and resources not accounted for in the Stormwater Management Enterprise Fund may be applied to stormwater management activities as deemed appropriate by the Board. The Stormwater Management Enterprise Fund accounting shall include the revenues and expenses attributed to each watershed subarea as separate departments and no inter-departmental transfers shall be permitted without the consent of the respective watershed committees and approval by the Board of Commissioners.

§ 53.05 JURISDICTION.

(A) The jurisdiction of the Stormwater Management Utility shall extend throughout the Service Area.

(B) The countywide stormwater program shall be managed as four (4) distinct watersheds with an advisory committee for each: South Mills, Shiloh, Sawyers Creek, and North River.

(C) The Board of Commissioners shall appoint or reappoint 5 members to each watershed advisory committee with 2 year terms, with 2 members appointed in even years and 3 members in the odd years. These committees shall make recommendations to the Board of Commissioners related to Level and Extent of Services and the annual program and budget.

§ 53.06 RATE STRUCTURE.

(A) Every parcel within the Service Area shall be subject to a Stormwater Management Utility Service Charge derived from the rate structure described below. The rate structure to distribute the cost of services associated with the operation, repair, improvement and maintenance of public drainage systems and facilities through a schedule of rates, fees, charges, and penalties related to the operation of a Stormwater Management Utility and Stormwater Management Enterprise Fund as established in Section 4 shall be based on the following 3 rate components:

(1) Fixed Charge Per Account (**FCPA**) based on account existence which directly relates to certain administrative, billing, collections, public outreach, and other charges as may be allocated on a per parcel basis. **The FCPA shall be the same for each account throughout the county. Expenses for Stormwater Technician, GIS Mapping, and Floodplain Program Officer shall not be included in the FCPA.**

(2) Gross Parcel Area **Component** on a given land parcel, which is related to quantity of runoff and total pollutant loading of stormwater runoff discharged from that land parcel. ~~The gross area of parcels will be fall into 5 tiers of parcel size and will be assigned Gross Acre Units (GAUs) as follows:~~ **The Gross Acreage Component shall equal the total number of acres per parcel multiplied by Watershed Rate Per Acre..**

- ~~(a) A parcel of 0 to <2 acres in gross area is 1 GAU.~~
- ~~(b) A parcel of 2 to <5 acres in gross area is 2 GAUs.~~
- ~~(c) A parcel of 5 to <10 acres in gross area is 3 GAUs.~~
- ~~(d) A parcel of 10 to <100 acres in gross area is 4 GAUs.~~
- ~~(e) A parcel of 100 or greater acres in gross area is 5 GAUs.~~

(3) Impervious Surface Area **Component** on a given land parcel, which directly relates to the volume, rate and pollutant loading of Stormwater runoff discharged from that land parcel to the County's structural and natural drainage systems and facilities. An Impervious Area Units Charge for stormwater costs shall be allocated to impervious area on an Equivalent Residential Unit (ERU) basis. Impervious Surface Area rates will apply to each unit or part thereof of impervious area.

(a) Based on an analysis by the County of Impervious Surface Area on properties throughout the County, an Impervious Surface Area of 4,500 square feet is hereby designated as one (1) Equivalent Residential Unit (ERU).

(b) Each single family residential parcel shall be charged for one (1) ERU of impervious area.

(c) Each residential unit in a townhome, condominium, or other multifamily structure with individual unit ownership and duplexes shall be billed for one (1) ERU of impervious area.

(d) There will be no Impervious Area Units Charge for land parcels with fewer than 450 square feet of Impervious Surface Area.

~~(E) The Fixed Cost Per Account (FCPA) component shall be the same for each account throughout the county.~~

(e) All public and private parcels shall be billed for impervious surface by the number of ERU's multiplied by 40 times the Watershed Rate.

~~(F) The Gross Acreage component represented by Gross Acreage Units (GAU), and Impervious Area component represented by Equivalent Residential Units (ERU) shall sThe~~

Watershed Rate Per Acre used to determine the Gross Acre Component and Impervious Surface Component shall be set by the Board of Commissioners, upon recommendation by each of the watershed advisory committees and may vary for each watershed based on the level of service and annual budget for the respective watershed.

§ 53.07 SCHEDULE OF FEES AND CHARGES.

(A) The schedule of rates, fees, charges, and penalties related to this Ordinance shall be adopted after notice and a public hearing as required by N.C. Gen. Stat. §153A-277. As set out in N.C. Gen. Stat. §153A-277, the hearing may be held concurrently with the public hearing on the County's proposed budget. The schedule of rates, fees, charges, and penalties shall apply to all land parcels within the Service Area, except as may be altered by credits or exemptions provided in this Article.

§ 53.08 BILLING AND COLLECTION.

(A) Method of billing. Billing and collection of the Stormwater Management Utility Service Charges for stormwater management services and facilities shall be billed annually under the general administration of the County Manager and shall be payable in the same manner as property taxes.

(B) Delinquencies. Stormwater Management Utility Service Charge billings that are not paid within the time allowed for the payment of property taxes shall be collected by any remedy provided by law for collecting and enforcing private debts or in any other manner authorized by law.

(C) Application of payment. Payment will be applied to a customer's bill in the following order:

- (1) Civil penalties assessed pursuant to this Ordinance.
- (2) Stormwater Management Utility Service Charge.

(D) Appeal of disputed bills and adjustments. If any citizen wishes to dispute a Stormwater Utility Service Charge billing or any other rents, rates, fees, charges, or penalties adopted pursuant to this Article, that citizen must submit a written appeal within 60 days from the date of billing, stating the reasons for the appeal, and providing information pertinent to the calculation of the billed charge. A timely appeal shall stay the penalty deadlines. An appeal of a disputed bill shall be filed with the Stormwater Manager for review and disposition. The appeal will follow a three step process as follows:

(1) Over the shoulder appeals – Property owners are welcome to visit the Planning Department and view their own individual properties to see what was drawn and measured as impervious surface. Obvious errors will be corrected administratively.

(2) Formal Appeal - Contested areas will be identified and the owner may complete a petition form and pay a fee to initiate a formal appeal. Upon a formal appeal Stormwater

Manager will visit the property and physically measure impervious surfaces. The staff measurement will be used to correct the calculation whether there is a decrease or increase.

(3) Final Appeal - If the owner still contests the measurement, the owner may submit a survey performed and sealed by a North Carolina licensed professional a surveyor or engineer, or landscape architect. The surveyor shall use the definition of impervious surface from the state Division of Water Quality.

§ 53.09 DISPOSITION OF SERVICE CHARGES AND FEES.

(A) Stormwater Management Utility Service Charge and fee revenues shall be assigned and dedicated solely to the Stormwater Management Enterprise Fund in the County budget and accounting system, which shall be and remain separate from other funds, and shall be used only to fund identified Stormwater Management Program activities. The services charges and fees paid to and collected by virtue of the provision of this Article shall not be used for general or other governmental or proprietary purposes of the County, except to pay for costs incurred by the County in rendering services associated with the Stormwater Management Utility. The Stormwater Management Enterprise Fund accounting shall include the revenues and expenses attributed to each watershed subarea as separate departments and inter-departmental transfers shall not be permitted without the consent of the respective watershed committees and approval by the Board of Commissioners.

§ 53.10 EXEMPTIONS AND CREDITS APPLICABLE TO STORMWATER MANAGEMENT SERVICE CHARGES.

(A) Statement of Policy. Except as provided in this section, no public or private property shall be exempt from Stormwater Management Service Charges or receive a credit or offset against such Stormwater Management Service Charges. No exemption or reduction in Stormwater Management Service Charges shall be granted based on the age, tax or economic status, race, or religion of the customer, or other condition unrelated to the cost of providing stormwater services and facilities.

(B) Exemptions. No public or private property shall be exempt from Stormwater Management Utility Service Charges, with the following exceptions:

(1) Publically dedicated roads, streets, greenways, sidewalks and other publically dedicated rights of way and easements for vehicular or pedestrian traffic that are available for use by the general public for transportation purposes, shall be exempt from County Stormwater Management Utility Service Charges. This exemption shall not apply to internal site roadways within public facilities.

(2) Railroad rights-of-way used or formerly used for trackage shall be exempt from County Stormwater Management Utility Service Charges. This exemption shall not be construed to apply to railroad stations, maintenance buildings, or other developed land used for railroad purposes.

(C) Credits. The following credits may be allowed upon adoption of a Credit Application Instruction Manual by the Board:

(1) Non single family residential parcels that provide measures to mitigate the impacts of runoff on the stormwater system may be eligible for one or more credits to the Impervious Area Units or the Gross Acre Units Charge portions of the Stormwater Management Utility Service Charge, proportional to the extent those measures address the impacts of peak discharge and total runoff volume from the site.

(2) The Credit Application Instruction Manual may be approved by the Board and placed on file with the County Clerk at which time it shall be followed in establishing applicable credits to a customer's Impervious Area Units Charge or Gross acre Units portion of the Stormwater Management Utility Service Charge.

(3) Each credit allowed against a portion of the Stormwater Management Utility Service Charge shall be conditioned on continuing compliance with the performance standards set forth in the Credit Application Instruction Manual and/or the applicable standards set out in the County's Unified Development Ordinance existing at the time of construction of such facilities and may be rescinded for noncompliance with those standards.

(4) **The calculation of Gross Acreage Component for each parcel shall not include the number of acres of the parcel which are at or below 0.00 foot elevation as these areas provide storage and filtering areas for their respective watersheds.**

(5) Each credit for which a customer applies shall be subject to review and approval by the Stormwater Manager. The Stormwater Manager may approve or reject any application for a credit in whole or in part.

§ 53.11 JOYCE CREEK ADDENDUM.

(A) The Joyce Creek Special Assessment Tax for property owners within the tax district boundaries shall be eliminated, and replaced with the Stormwater Utility Fee for the South Mills Watershed, provided, however in the event that the stormwater utility fee for South Mills Watershed is itself eliminated or discontinued, the Joyce Creek special assessment tax for property owners within the tax district boundaries would be automatically reinstated under the same terms and conditions as it exists at the time this Ordinance is approved.

(B) The Joyce Creek Management Board shall remain in place to and shall have complete autonomy and discretion in carrying out maintenance activities on Joyce Creek, and the Cypress and Mill Run tributary canals in accordance with standards established by the Army Corp of Engineers. The Joyce Creek Management Board will use its best efforts to coordinate activities with the South Mills Watershed Advisory Committee but shall not be controlled by nor answer to said Committee.

(C) The South Mills Watershed budget shall include a line item referred to as the Joyce Creek Project equal to a two cent (\$0.02) ~~annual tax on the value of properties within the~~

boundaries of the Joyce Creek Service Area. Per One Hundred Dollar value which will be an annual fee based on the value of all property, both real and personal, with all current and/or future improvements as same may change each year, located within the boundaries of the Joyce Creek service area and a Any balances remaining at the end of each fiscal year shall be carried forward in that line item from year to year in addition to the annual tax calculation fee to be utilized for the Joyce Creek Project in the sole discretion of the Joyce Creek Management Board.

(D) The Camden County Tax Department shall maintain and manage the Joyce Creek Service Area fee information. The Joyce Creek serviced area fee shall be calculated annually by the Camden County Tax Department for the property located in the Joyce Creek Service Area. The calculated fee information will then be forwarded by the Tax Department to the South Mills Watershed District for their budget line item called the Joyce Creek Project.

(~~D~~ E) The Joyce Creek Management board shall have sole autonomy and discretion in the utilization of the Joyce Creek Project line item. The Joyce Creek Management Board shall continue to be elected and operate in the same manner as it has operated in the past pursuant to the Camden County Ordinance establishing said management board.

§ 53.12 MISCELLANEOUS.

(A) This Ordinance supersedes all other County ordinances, or parts of ordinances in conflict herewith.

(B) Any part or provision of this Ordinance found by a court of competent jurisdiction to be in violation of the Constitution or laws of the United States or of the State of North Carolina is hereby deemed severable and shall not affect the validity of the remaining provisions of the Ordinance.

(C) This Ordinance shall become effective upon adoption.

Adopted by the Board of Commissioners for the County of Camden this _____ day of _____, 2013

County of Camden

Garry Meiggs, Chairman
Board of Commissioners

ATTEST:

Ashley Honaker
Clerk to the Board

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