Jordan Lake Watershed
Stage I Adaptive Management Program

TOWN OF APEX, NC

December 2009

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BACKGROUND:

The B. Everett Jordan Reservoir Water Supply Nutrient Strategy is a comprehensive set of rules intended to reduce nutrient over-enrichment in Jordan Lake. Jordan Lake is a multi-use lake located in the piedmont region of central North Carolina in the upper Cape Fear River Basin. It contains large portions of the Triangle and Triad regions as well as significant areas of pasture and other agricultural lands. The lake was originally commissioned for the purposes of flood control, downstream water quality, fish and wildlife conservation, recreation, and drinking water supply. It was created in 1983 by damming of the Haw River upstream of its confluence with the Deep River. The three sub-watersheds of the Jordan Lake Reservoir include the Haw, Upper New Hope, and Lower New Hope arms.

Since its creation, Jordan Lake has experienced an over-abundance of nutrients, primarily nitrogen and phosphorus, resulting in algal blooms and overall poor water quality. Nutrients enter the lake from sources such as wastewater discharges, rainfall runoff from agriculture, and stormwater runoff from new and existing developed lands throughout the entire watershed. Excessive nutrient loading results in a greenish, murky appearance to the water, causes taste and odor problems in potable water, and depletes oxygen levels which stresses or kills fish and other aquatic life.

The State began taking action to address the nutrient problems early in the lake's history. The NC Environmental Management Commission (EMC) designated the lake a Nutrient Sensitive Water (NSW) the year of its impoundment, and imposed phosphorus limits on wastewater dischargers. The lake did not respond to these controls and in 2002, the EMC determined that the Upper New Hope arm was impaired after it exceeded the State's chlorophyll-*a* standard. The rest of the lake exceeded this standard in 2006. The Haw River arm also exceed the pH standard in 2006. Both chlorophyll-*a* and pH are used as indicators of excess nutrients in bodies of water.

While the B. Everett Jordan Reservoir Water Supply Nutrient Strategy is similar in form to previous nutrient strategies implemented in the Neuse and Tar-Pamlico River Basins, differences from those strategies include stormwater requirements for all local governments in the watershed, local implementation of buffer rules, a rule requiring local governments to achieve loading reductions from existing developed lands, a separate stormwater rule for *s*tate and federal entities*,* and a separate rule outlining a trading framework to maximize options for cost-effective reductions. The rules also include the concept of adaptive management, given the combination of the long-term nature of any such restoration initiative, the potential costs associated with each management action, and uncertainties associated with the lake's response to lower nutrient inputs.

PURPOSE:

Session Law 2009-216 requires subject local governments to develop and submit a Stage I Adaptive Management Program to the EMC by December 31, 2009. The new program will address excessive nutrient loading from existing development within their jurisdiction. This Session Law replaced the original Jordan Reservoir Water Supply Nutrient Strategy. As stated in the Session Law, the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) will accept local government implementation of other stormwater programs in meeting the Stage I standards.

The Town of Apex (Town) received an NPDES Phase II stormwater permit (NCS000446) from the State in 2005. The existing permit covers 4 of the 5 measures required in the Stage I Adaptive Management Program. The covered measures include:

- A public education program to inform the public of the impacts of nutrient loading and measures that can be implemented to reduce nutrient loading from stormwater runoff from existing development.
- A mapping program that includes major components of the municipal separate storm sewer system (MS4), including the location of major outfalls and the names and location of all waters of the U.S. that receive discharges from those outfalls, land use types, and location of sanitary sewers.
- A program to identify and remove illegal discharges.
- A program to ensure maintenance of best management practices implemented by the Town.

The only measure that is not addressed by existing Town stormwater programs is:

- The development of a program to identify retrofit opportunities and other projects to reduce nutrient loading from existing developed lands.

In order to be compliant with Session Law 2009-216, the Town offers the following information that will be used to identify opportunities for retrofits and other projects intended to reduce nutrient loading to the Jordan Lake reservoir from existing developed lands.

CURRENT POPULATION:

As of October 31, 2009 the current population of Apex is approximately 34,997. The population estimate reflects a 74% increase since the 2000 census. Averaging 2.73 persons per single-family and multi-family unit, it is estimated that Apex added approximately 231 residents so far in 2009, or an average of 0.76 residents per day. Based on information obtained from the Town's Planning Department, there are 8,302 occupied dwelling units located in the corporate limits that lie within the Jordan Lake watershed. Using the population multiplier of 2.73 yields a current Apex corporate limit population within the Jordan Lake watershed of 22,665. Table 1 below summarizes the current population.

Table 1. Population Data

Apex Corporate Limits	Apex Corporate Limits (Jordan Lake Watershed)	% Population in Jordan Lake Watershed
34,997	22,665	65%

CURRENT LAND AREA:

Apex lies along the ridge between the Cape Fear and Neuse River Basins with the majority of Apex land area located in the Cape Fear River Basin. The Town corporate limits currently occupies approximately 15.38 square miles (mi^2) of land area in the Cape Fear and Neuse River Basins.

A significant portion of the Apex corporate limits drains to the Jordan Lake reservoir. The area of corporate limits within the Jordan Lake watershed is approximately 9.97 mi^2. Table 2 below summarizes the Town's current land area.

Table 2. Land Area

Apex Corporate Limits	Apex Corporate Limits (Jordan Lake Watershed)	% Land Area in Jordan Lake Watershed
15.38 mi^2	9.97 mi^2	65 %

RECEIVING STREAMS:

Table 3 below shows all named streams located in Apex and within the Jordan Lake watershed.

Table 3. Streams in Jordan Lake Watershed

Receiving Stream Name	Stream Segment	Water Quality Classification	Use Support Rating	Water Quality Issues
White Oak Creek	16-41-6-(0.3)	WS-V[1]; NSW	NR	Nutrients [2]
White Oak Creek	16-41-6-(0.7)	WS-IV; NSW	NR	Nutrients [2]
Jack Branch	16-41-6-1-(1)	WS-V[1]; NSW	NR	Nutrients [2]
Jack Branch	16-41-6-1-(2)	WS-IV; NSW	NR	Nutrients [2]
Clark Branch	16-41-6-3	WS-IV; NSW	NR	Nutrients [2]
Reedy Branch	16-41-10-1	WS-IV; NSW	NR	Nutrients [2]
Beaver Creek	16-41-10-(0.3)	WS-V[1]; NSW	NR	Nutrients [2]
Beaver Creek	16-41-10-(0.5)	WS-IV; NSW	NR	Nutrients [2]
Little Beaver Creek	16-41-11-(1)	WS-IV; NSW	NR	Nutrients [2]

Information for Table 3 was obtained from the October 2005 Cape Fear River Basinwide Water Quality Plan and the draft 2008 303(d) list.

1 – Streams previously classified as "C" have now been modified to WS-V per the Jordan Watershed Rules.

2 – Excessive nitrogen and phosphorous loading from point and non-point sources has been identified as the biggest issue facing water quality in Jordan Lake.

EXISTING DEVELOPMENT RETROFIT OPPORTUNITIES:

Retrofit opportunities will be evaluated and considered acceptable by the Town if the following conditions have been met:

- The retrofit clearly has the potential to reduce nitrogen or phosphorus loading to the receiving water.
- The watershed is clearly contributing nitrogen or phosphorous loading above background levels.
- The landowner (if applicable) is willing to have the retrofit installed on their property.
- There is adequate space and access for the retrofit.
- It is technically practical to install a retrofit at that location.

Based on the October 13, 2009 guidance memorandum and the approximate Apex population of 22,665 located within the Jordan Lake watershed, the minimum number of existing development nutrient load-reducing projects to be identified on an annual basis for the Town is 2. The Town will use the Retrofit Opportunity Table shown below in Table 4 to summarize critical data collection related to potential retrofit opportunities.

Table 4. Retrofit Opportunity Table

Location description, including directions from a major highway:	
Type and description of retrofit opportunity:	
Current property owner:	
Is the property owner willing to cooperate?	
Land area available for retrofit (sq. ft):	
Accessibility to retrofit site:	
Drainage area (acres):	
Land use in drainage area (% of each type of land use):	
Average slope in drainage area (%):	
Environmentally sensitive areas in drainage area (steep slopes, wetlands, riparian buffers, endangered/ threatened species habitat):	
Approximate annual N and P loading from drainage area (lbs/ac/yr):	
Potential N reduction (lbs/ac/yr):	
Potential P reduction (lbs/ac/yr):	
Estimated cost of retrofit ($):	
Receiving water :	
DWQ classification of receiving water:	
Use support rating for receiving water:	
Other important information:	

MAPPING:
Every potential retrofit opportunity will include detailed maps (electronic and hard copy) showing their location. In addition, the maps will include the following information:

- Drainage area to retrofit;
- Land uses within drainage area;
- Locations of retrofit opportunities;
- Property boundaries in the vicinity of retrofit;
- Significant hydrography (as depicted on USGS topographic maps and USDA-NRCS Soil Survey maps) and applicable MS4 data;
- Roads;
- Wetlands, buffers, etc;
- Public parks, recreation areas, and other open lands.

REPORTING:
The Town will begin annual reporting consistent with EMC approval and other requirements set forth by DWQ. The Town requests DWQ to consider allowing subject municipalities to incorporate their annual reports for the Stage I – Adaptive Management Program with the existing NPDES Phase II annual reporting requirement.

CONCLUSION:
Apex has a significant portion of its population and land area located within the Jordan Lake watershed. The Town will rely on existing NPDES Phase II stormwater programs to satisfy 4 of the 5 required measures set forth in the Jordan Lake Stage I – Adaptive Management Strategy. The program methods outlined in this document will streamline the process for Town and other governmental staff when identifying potential retrofit opportunities and other projects. The NPDES Phase II stormwater programs already implemented by the Town along with the potential retrofit opportunities identified in this document should help to reduce nutrient loading to the Jordan Lake Reservoir.

APPENDIX A

STAGE I ADAPTIVE MANAGEMENT PROGRAM: GENERAL INFORMATION SHEET

APPENDIX B

STAGE I ADAPTIVE MANAGEMENT PROGRAM: BMP SUMMARY TABLE

State of North Carolina
Department of Environment & Natural Resources
Division of Water Quality

OFFIC USE ONLY	
Date Rec'd	

JORDAN NUTRIENT STRATEGY STAGE 1
ADAPTIVE MANAGEMENT PROGRAM FOR EXISTING DEVELOPMENT

This form is for use by local governments in the Jordan Lake watershed that are required to submit a Stage 1 adaptive management program for their existing development according to Session Law 2009-216. A complete submittal package includes this form and three copies of the Stage 1 adaptive management program narrative. Incomplete submittals may be returned to the applicant.

I. APPLICANT STATUS INFORMATION

Name of Local Government	
County(s)	
Approximate Jurisdictional Area in Watershed (square miles)	
Approximate Population in Watershed	

II. EXISTING LOCAL WATER QUALITY PROGRAMS

Local Water Supply Watershed Program	☐ Yes ☐ No
NPDES Phase II Stormwater Program	☐ Yes ☐ No
NPDES Phase II Permit #:	

III. RELIANCE ON ANOTHER ENTITY TO SATISFY ONE OR MORE OF YOUR PERMIT OBLIGATIONS

(If more than one, attach additional sheets)

a. Do you intend that another entity perform one or more of your permit obligations?	☐ Yes ☐ No
b. If yes, identify each entity and the element they will be implementing	
• Name of Entity	
• Element they will implement	
• Contact Person	
• Contact Address	
• Contact Telephone Number	
c. Are legal agreements in place to establish responsibilities?	☐ Yes ☐ No

IV. CONTACT INFORMATION

Provide the following information for the person/position that will be responsible for day to day implementation and oversight of the Stage I adaptive management program.

a. Name of Contact Person	
b. Title	
c. Street Address	
d. PO Box	
e. City	
f. State	
g. Zip	
h. Telephone Number	
i. Fax Number	
j. E-Mail Address	

Stage I *Adaptive Management Program: BMP Summary Table*

	BMP	Measurable Goals	YR 1	YR 2	YR 3	YR 4	YR 5	Responsible Person(s)
1	Retrofit Assessment & Identification	Evaluate properties and identify two (2) potential retrofit opportunities on an annual basis using criteria developed and outlined in the Town's Stage I Adaptive Management Program Report.	X	X	X	X	X	Environmental Programs Manager
2	Retrofit Location Map	Use GIS/GPS information to develop an electronic map identifying potential retrofit opportunities.	X	X	X	X	X	Environmental Programs Manager
3	Informational Website	Add information regarding the Town's Stage I Adaptive Management Program to existing stormwater website. Post retrofit location map on website along with any newsletters and brochures that may be developed for this program. Also provide contacts for reporting and questions.	X	X	X	X	X	Environmental Programs Manager
4	Annual Reporting	Submit two (2) retrofit opportunity tables to DWQ consistent with the timelines set by the DWQ and EMC.	X	X	X	X	X	Environmental Programs Manager