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Memorandum

To: Comprehensive Land Use and Community Health Plan Steering Committee

From: T. Dale Holland, AICP

Date: September 11, 2013

Re: Revised Land Suitability Analysis

Attached is the revised Land Suitability Analysis text and map for your review. The following provides the major revisions to the text:

- **100 Year Floodplain** was removed from *Least Suitable* and added to *Moderate Suitability*.
- **Floodway** was added to *Least Suitable*, including a Floodway description.
- **Prime Farmland Soils** remain in the *Low Suitability* class but are noted as being located in the ETJ only.
- Eliminated **Slope** as a suitability factor.

Please contact me if you have any questions.

TDH:cma

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Draft: Land Suitability Analysis Methodology and Data Summary

Analysis Description

The Land Suitability Analysis (LSA) is a Geographic Information Systems (GIS) based tool for evaluating the relative suitability of land for development in Roanoke Rapids, North Carolina. The end product is a generalized map showing areas of the Roanoke Rapids corporate limits and ETJ that are categorized as having either least, low, moderate, or high suitability for development. The analysis does not provide site-specific results, nor does it make recommendations about how individual landowners may or may not use their land.

Suitability, for the purpose of this analysis, can be primarily defined in terms of physical limitations and/or regulatory restrictions. Physical limitations such as poorly drained soils make land less suitable for development. Features subject to regulatory restrictions, such as water supply watersheds, also pose challenges to development.

Objectives and Limitations

The results of the LSA will be used to support planning efforts throughout the Roanoke Rapids planning area. Objectives of the LSA and appropriate uses of the final analysis include the following:

- Identify areas that are more or less suitable for development on a coarse scale;
- Inventory existing spatial information available for Roanoke Rapids;
- Identify data gaps that may be filled during later planning stages;
- Develop a tool that will assist the county in the implementation of new policies;
- Provide a base for GIS analysis to be used in other long range planning projects.

Limitations of the LSA include the following:

- The LSA results are not a zoning map, but will be used to support planning processes in Roanoke Rapids;
- Results and analyses do not support site-specific planning;
- The LSA does not make recommendations about how an individual landowner may or may not use their land;
- The LSA does not result in recommendations about where particular land uses (i.e., commercial vs. residential) should be concentrated;
- Results do not factor in projected population, carrying capacity, or commercial/housing demand.

Data Preparation

Spatial data sets were gathered from Roanoke Rapids, local, state, and federal agencies, and private organizations. Data from the following sources were used in the analysis:

- Roanoke Rapids GIS
- Halifax County Tax Records
- North Carolina Center for Geographic Information and Analysis (NCGIA)
- North Carolina Clean Water Management Trust Fund (NCCWMTF)
- North Carolina Department of Environment and Natural Resources (NCDENR)
    - Division of Water Quality (DWQ)
    - Wildlife Resources Commission (WRC)
    - Division of Parks and Recreation (DPR)
- U.S. Department of Agriculture (USDA)
    - Natural Resources Conservation Service (NRCS)
- U.S. Fish and Wildlife Service (USFWS)
    - National Wetlands Inventory (NWI)

The spatial data sets were prepared for each suitability class using the following techniques:

- Each data set was ***clipped*** to only include data within Roanoke Rapids' geographic boundary. For example, some of the data sets included information for the entire State of North Carolina. The Roanoke Rapids planning area boundary was used to remove any data outside the city.

- Some data sets were ***queried*** to select subsets of the data. Some data sets included information not relevant to the criteria developed for each suitability class. For example, distribution of data within watershed areas was queried and divided among the proper suitability classes.

- Some non-spatial data sets were ***joined*** to spatial data as a way to add information to spatial data. For example, tabular data for hydric soils and important farmland soil classifications were joined to soil polygons using unique soil map unit codes.

Technical Approach

The LSA map considers regulatory, legal, and environmental constraints to development, which are defined as follows:

- Regulatory Constraints – These constraints are created by a regulatory body to mitigate impact in designated areas. Often, these constraints are temporary and are not legally binding in nature. The following layers are classified as regulatory constraints in the analysis of land more or less suitable for development in Roanoke Rapids.

    - Water Supply IV Waters (WS – IV)

- Legal Constraints – Any legally binding or permanent agreement to preserve or conserve land areas in perpetuity. The following layers are classified as legal constraints in the analysis of land more or less suitable for development in Roanoke Rapids.

    - Lands Managed for Conservation and Open Space

- Environmental Constraints – Any natural or physical resources that limit an area's potential for development. The two main types of environmental constraints in Roanoke Rapids arise as a result of (1) the presence of valued natural resources (i.e., wetlands) that are likely to be adversely affected by development and as such should be preserved or protected where possible; and (2) a hazard issue (i.e., flooding). These areas are delineated due to the potential for adverse effects on human life or property. The following layers are classified as environmental constraints in the analysis of land more or less suitable for development in Roanoke Rapids.

    - National Wetlands Inventory
    - Surface Waters
    - 100 Year Flood Plain
    - Prime Farmland Soils
    - Hydric Soils

Suitability Classes

Suitability areas are ranked in hierarchical order from 1 to 4, with Area 1 (Least Suitability) posing the greatest constraints to development. ***Areas of least suitable land take precedence over the remaining three suitability classes as they pose the most significant challenges to development.*** For example, wetland areas (included in the least suitable category) may also include prime farmland soils or floodplain, but will be shown as least suitable because they hold a greater significance than the latter.

The following layers were used in the formation of the draft ***Land Suitability Analysis Map.***

1. Least Suitable:

Areas of Least Suitable land are more restrictive to development than other land in the city as they are either protected or environmentally sensitive areas.

- Surface Waters

    - All above ground water bodies in Roanoke Rapids.

- Lands Managed for Conservation and Open Space

    - This GIS data layer consists of lands managed for conservation and open space based on multiple source layers. This is a composite inventory that integrates digital depictions of lands from multiple sources and resolves boundary discrepancies among sources. This data layer is intended to inform the user about

the location of existing conservation lands that are in "permanent conservation" and are actively managed by a public entity.

- National Wetlands Inventory (NWI)

    - NWI digital data files are records of wetlands locations and classifications as defined by the U.S. Fish & Wildlife Service. When completed, the series will provide coverage for all of the contiguous United States, Hawaii, Alaska, and U.S. protectorates in the Pacific and Caribbean. The digital data as well as the hardcopy maps that were used as the source for the digital data are produced and distributed by the U.S. Fish & Wildlife Service's National Wetlands Inventory project. Base map dates range from Oct. 1981 to present.

  Source: The U.S. Fish & Wildlife Service, National Wetlands Inventory

- Floodway

    - The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without causing any cumulative increase in the water surface elevation. The floodway is intended to carry the dangerous and fast-moving water.

2. Low Suitability:

Areas of Low Suitability contain development limitations and are more restrictive to development than areas of moderate or high suitability.

- Prime Farmland Soils (ETJ only)

    - Prime farmland soils, as defined by the U.S. Department of Agriculture (USDA), are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. Spatial and tabular soil data was compiled by the USDA's Natural Resources Conservation Service.

- Hydric Soils (Poorly Drained Soils)

    - Hydric soils, as defined by the U.S. Department of Agriculture, are soils that are wet frequently enough to periodically produce anaerobic conditions, thereby influencing the species composition or growth, or both, of plants on those soils. Spatial and tabular soil data was compiled by the USDA's Natural Resources Conservation Service.

3. Moderate Suitability:

Areas of Moderate Suitability are more restrictive to development than areas of High Suitability.

- Water Supply IV Waters (WS – IV)

    - The North Carolina Department of Environment and Natural Resources, Division of Water Quality, in cooperation with the NC Center for Geographic Information and Analysis, developed the digital Water Supply Watersheds data to enhance planning, siting, and impact analysis in areas directly affecting water supply intakes. This file outlines the extent of protected and critical areas and stream classifications for areas around water supply watersheds in which development directly affects a water supply intake. Water Supply IV waters are used as sources of water supply for drinking, culinary, or food processing purposes. WS–IV waters are generally in moderately to highly developed watersheds or protected areas.

  Source: NC DENR, NC Division of Water Quality

- 100 Year Floodplain

    - Areas subject to a one percent or greater annual chance of flooding in any given year. Digital flood data was compiled by the North Carolina Flood Mapping program.

- Land mass not covered by an existing layer

    - Due to the hierarchical nature of the Land Suitability Analysis, areas of land not occupied by another layer are by default classified as moderately suitable for development.

4. High Suitability:

Areas of High Suitability take precedence over land classified as low or moderately suitable due to the availability of water and sewer infrastructure.

- Public Sewer Systems

    - The NC Center for Geographic Information and Analysis developed the GIS data set, as mapped by contractors to the NC Rural Center during 2004, 2005, and 2006 to facilitate planning, siting, and impact analysis in the 100 individual counties of North Carolina. This file enables the user to make various county-level determinations when used in conjunction with other data layers.

Draft: Land Suitability Analysis – Acreage:

Class	Acres	% of Total
High Suitability	4,817.92	52.22%
Moderate Suitability	1,707.52	18.50%
Low Suitability	2,261.79	24.52%
Least Suitability	439.53	4.76%
Total	9,226.49	100.00%

*Acreage includes right-of-way.

Roanoke Rapids: Land Suitability Analysis