North Carolina Department of Transportation (NCDOT)

Base Geospatial Standard

Date	Change Description	Approved By
12/3/2010	Initial document (version1.0)	GIS Implementation Team / GTAC
8/18/2011	Consistency with the GIS Data Policy Standard	GTAC

1. INTRODUCTION

Data Governance of a dataset refers to the operating discipline for managing data and information as a key enterprise asset.   Key aspects of data governance include such topics as decision making authority (roles and responsibilities), compliance monitoring, policies and standards, data inventories, full lifecycle management, content management, records management (metadata), preservation (archival), data quality, data classification (data model), data security and access, data risk management and data valuation. This standard is the first in a group of standards that defines data governance for the geospatial datasets within the NCDOT

At a high level, the processes and standards described in this document refer to transportation features which can have geographic locations and characteristics. As the NCDOT matures to include geospatial data in its everyday processes, exchange of data is a natural consequence of that maturity. Indeed, it makes sense for the business to efficiently and effectively exchange information. However, data exchange without standards can lead to excessive amount of rework of GIS datasets, and also loss of critical information about the quality of that dataset (related to how it was developed and the accuracy and timeliness of that data). The set of standards, and processes referenced in them, ensures optimal use of business resources in the delivery of information to the business.

1.1. OBJECTIVE

The objective of this standard is to create a baseline for the development and documentation of spatial (or geographic) datasets within the NCDOT. A corresponding objective is to establish a central location, available to the entire organization, that would serve as a resource center for obtaining geospatial standards,

user guides, processes, links to recommended datasets, and coordination with the NCDOT GIS community.

1.2. SCOPE AND APPLICABILITY

This standard defines geospatial data, minimally required elements that encompass recommended and best practices, and backup and archival requirements for business-critical spatial datasets. The primary purpose of this part of the standard is to identify the necessary processes and standards to ensure quality and integrity of geospatial information to meet the needs of business operations within the NCDOT.

The Base Geospatial Standard integrates with the other NCDOT geospatial standards: Geospatial Metadata, Geospatial Data Model, Geospatial Data Acquisition, and Geospatial Data Publication. It is expected that all initiatives or parts of the NCDOT organization that create/produce, maintain or acquire geospatial data for enterprise use within the NCDOT shall satisfy the requirements laid out in these standards. A partial list of geospatial datasets used by the organization can be found in Appendix A.

2. CONFORMANCE

2.1. This standard is part of a group of standards which are required for all geospatial datasets within the NCOT. Conformance to the group of standards includes conformance to the items listed in this base standard, and appropriate other parts for metadata, data model, data acquisition and/or data publication.

2.2. Conformance to this standard ensures that the spatial data used and maintained by the NCDOT delivers business value to the organization, that the data is able to be seamlessly integrated into other business datasets, that the information is maintained and timely in order to support strategic and tactical decisions, and that the data is consistently the best data available.

3. NORMATIVE REFERECES

This standard is meant to work in conjunction with the following NCDOT spatial data standards:
- Geospatial Metadata Content Standard (pending approval by GIS Steering Committee)
- Geospatial Data model Content Standard (in development by GIS Steering Committee)
- Geospatial Data Acquisition Standard (in development by GIS Steering Committee)

- Geospatial Data Publication Standard (in development by GIS Steering Committee)

This standard is compatible with the following North Carolina state standards (http://ncgicc.net/Standards/tabid/141/Default.aspx.)

- North American Vertical Datum of 1988
- Statewide Global Positioning System (GPS) Data Collection and documentation standards
- Geographic Data Content Standard for Transportation Roads Data
- Content Elements for Statewide publication of core geospatial parcel data
- Geographic Data Content Standard for Water Distribution and Sanitary Sewer Systems, Version 2.2
- A Standard Classification System for the Mapping of Land Use and Land Cover

This standard also addresses the topic of archival of GIS datasets that is more fully explained in the November 19, 2008 final report to the North Carolina Geographic Information Coordinating Council (GICC) on Archival and Long Term Access Policy (http://www.ncgicc.com/Portals/3/documents/Archival_LongTermAccess_FINAL11_08_GICC.pdf.)

3.1. STANDARDS DEVELOPMENT PROCESS

The process for development of this standard shall be in accordance with policies of the NCDOT GIS Steering Committee.

3.2. MAINTENANCE AUTHORITY

3.2.1 **Level of responsibility:** The GIS Unit and GIS Technical Advisory Group at NCDOT are responsible for maintenance of this standard.

3.2.2 **Contact Information:** Address questions concerning this standard to:

GIS Manager, NCDOT GIS Unit
NC Dept of Transportation
4101 Capital Blvd,
Raleigh, NC 27604
Telephone: (919) 707-2151

4. TERMS AND DEFINITIONS

4.1. METADATA

Metadata is information that describes the content, quality, condition, origin and other characteristics of data. Metadata for spatial data may describe and document its subject matter; how, when, where and by whom the data was collected; availability and distribution information; its projection, scale, resolution, and accuracy; and its reliability with regard to some standard.

4.2. DATA MODEL

A data model is a computer representation of the data used by the business, along with processes that the business performs. It includes such items as spatial representation of business objects (e.g., a road, imagery), attributes; integrity rules and relationships; cartographic portrayal; and metadata requirements. A common model governs how well software applications will perform using an organization's data.

3.5 VECTOR SPATIAL DATA

Spatial data can be represented generally in two ways: Vector and raster. Vector data is a representation of the data in a geometric form, such as point, line or area, and referenced to a location on the earth. Most real-world objects (such as a landmark, a road or a lake) are represented as a vector.

3.6 RASTER SPATIAL DATA

Spatial data can be represented generally in two ways: Vector and raster. Raster data is represented as a collection of grids with values, and referenced to a location on the earth. Most images are represented as raster.

3.7 LINEAR REFERENCED DATA

Geospatial data that is stored by using a relative position along an already existing line feature. In linear referencing, location is given in terms of a known line feature and a position, or measure, along the feature. Methods of referencing include (1) milepost along a unique route, (2) direction and distance offset from the intersection of two unique routes, (3) percent of total distance along a unique road segment, (4) direction and distance along a unique road segment. Linear referencing is an intuitive way to associate multiple sets of attributes to portions of linear features.

3.8 REFERENCE SYSTEM

A system for identifying positions on the globe. This is often constructed with a grid that either refers to the earth's latitude and longitude (graticule), or a planar equivalent that divides grid lines by a fixed length from a predefined point of origin. It is common practice to use coordinates to reference a location, using both the latitude/longitude reference system, as well as the North American Datum reference system.

3.9 ARCHIVAL

The long term collection and maintenance of data snapshots retained permanently that can be utilized to help manage long term risk (i.e. regulatory/ legal requirements) while allowing ongoing access to authentic historical data for the purposes of analysis.

3.10 BACKUP

The capture of active datasets with the intention of providing a means to restore changing records that have been deleted or destroyed. The purpose of a backup is to manage short term risk and address disaster recovery. Typically these snapshots are only retained for a few days or weeks before being overwritten by newer snapshots.

5. REQUIREMENTS

5.1. SPATIAL REFERENCE:

All enterprise spatial data shall use a standard spatial reference and be spatially referenced. The references listed below are NCDOT standards.

5.1.1. <u>North American Datum 1984</u>: The standard spatial reference for NCDOT vector and raster data is North American Datum 1984. Measurement units are in feet. The NCDOT's LRS is referenced to this common spatial reference.

5.1.2. <u>Linear Reference Standard</u>: Most data related to the NCDOT's business operations is referenced to the road network, commonly called the Linear Reference System (LRS). Data that uses this reference shall use a linear feature referenced to the NCDOT standard reference of the North American Datum 1984.

5.1.3. <u>Other Reference Systems:</u> Addresses and ownership identification (Tax parcel ids) are other commonly used references within the NCDOT. In general, address references shall be transformed to the LRS or standard

spatial reference before they are used by the business. Coordination with the GIS unit is recommended to accomplish the transformation.

5.2. REPRESENTATION OF FEATURES:

All enterprise spatial data shall use a standard spatial representation. Features referenced below are NCDOT standards. These do <u>not</u> refer to the cartographic representation, which describes how the data is represented on a map, not how they're represented in a database.

5.2.1. <u>Road network:</u> The standard spatial representation for the NCDOT road network is as a vector linear feature.

5.2.2. <u>Administrative Boundaries</u>: The standard spatial representation for the administrative boundaries is as a vector area feature. Examples of this type of feature are municipal, county, state, and census boundaries.

5.3. REPRESENTATION OF CHARACTERISTICS:

All enterprise spatial data related to the road network shall follow a standard representation of characteristics. The NCDOT standard for representing most characteristics referenced to a road are as linearly referenced events. That means that the data is usually kept in tables that reference line features. There are four standard methods for referencing characteristics along the road network: (1) milepost along a unique route, (2) direction and distance offset from the intersection of two unique routes, (3) percent of total distance along a unique road segment, (4) direction and distance along a unique road segment. Another NCDOT standard for representing characteristics is known as Coordinate reference.

5.3.1. <u>Route milepost reference:</u> Includes the unique route number and a milepost value for the feature. Example: A crash site is located at milepost 18.9 on route 16. The number of lanes on route 24 is 2 from milepost 26 to milepost 78.

5.3.2. <u>Intersection offset</u>: direction and distance offset from the intersection of two unique routes or road segments, and an offset along a particular route or road segment. If the characteristic is of a linear nature (e.g. an event that starts at one point and continues for some distance), then a distance along the road network is included. Examples: a sign would be a point event, located 13 feet east of the intersection of routes 1 and 2, along route 2. Number of lanes would be a linear event, located 145 feet west of the intersection of routes 3 and 4, along route 4, running for 1.5 miles.

5.3.3. <u>Percent along a road segment (G1FTseg):</u> Includes the road network segment and a percentage distance along that segment. Could be either a point or a linear event. Examples: A sign is located 34% along road segment 19. The number of lanes along road segment 20 is 4, starting at 18.1% and ending at 69.9%.

5.3.4. <u>Distance along a road segment (G1FTseg):</u> Includes the road network segment and a distance along that segment. Could be either a point or a linear event. Examples: A sign is located 1.5 miles along road segment 19. The number of lanes along road segment 20 is 4, starting at 2.3 miles continuing for 3 miles.

5.3.5. <u>Coordinate</u> : Location of a feature referenced to a grid coordinate system. Commonly referred to as "lat/long" or "X/Y". Usually this is for a point feature, such as a sign. Example: The sign is located at Northing 35°40'15" and Westing -77°25'30" .

5.4. DATA QUALITY

All enterprise spatial data shall include descriptions of the quality of data as it refers to the items below. These descriptions shall be documented in the metadata for each spatial dataset.

5.4.1. POSITIONAL ACCURACY:

All enterprise spatial data shall have a known spatial accuracy. Positional accuracy is a statement of how closely the location of a feature represents a true position on the ground. An important component of positional accuracy is a statement of precision, whereby the exactness of the data is indicated.

5.4.2. ATTRIBUTE ACCURACY

Attributes are facts tied to the Earth's surface. Attribute accuracy is the closeness of attribute values to their true values. This applies to accuracy of continuous attributes such as elevation and accuracy of categorical attributes such as number of lanes or pavement type. An important component of attribute accuracy is a statement of precision, where values are measured.

5.4.3. COMPLETENESS

Completeness is defined as the degree to which the features and their attributes represent all the instances of the entire dataset. Missing data (incompleteness) can affect logical consistency needed for correct processing and/or analysis of the data. A statement of completeness shall be documented in the metadata.

5.4.4. LOGICAL CONSISTENCY

A spatial dataset is logically consistent when it does not violate business rules and constraints for the dataset. Logical consistency is best expressed in the rules and constraints defined for a spatial data model. Data that meets rules and constraints (both spatial and non-spatial) can be used with a high level of confidence for business applications and analysis. Without consistency, additional time and effort will need to be expended to allow software to handle inconsistencies in ways that do not propagate or increase the errors. Logical consistency shall be documented in the metadata and reference the geospatial data model for the dataset.

5.4.5. LINEAGE

Lineage refers to the origin and processing history of a dataset. It includes the name of the organization that produced the data so that its policies, procedures and methods can be evaluated to see if they were biased in representing the surface of the Earth or its features. Lineage of the dataset shall be documented in the metadata.

5.5. METADATA

Metadata shall be accurate and complete, compliant to the NCDOT Metadata Content Standard for Geospatial Data (pending approval). Ownership of the dataset shall be clearly identified within the metadata, as will any publication constraints. Acquisition method shall be identified in the metadata. An automated tool to verify compliance with the metadata standard (Metadata Parser program), shall be provided to the user community by the GIS Spatial Data Management Group. Contact the GIS Unit for access to that tool.

5.6. GEOSPATIAL DATA MODEL

Data models used as part of the development of the datasets will be delivered along with the dataset. Documentation of the data model will follow the NCDOT Geospatial Data Model Content Standard (in development).

5.7. ACQUISITION

The method of acquisition of the dataset and maintenance plan will follow requirements specified in the NCDOT Geospatial Data Acquisition Standard (in development). This standard covers the following items:

5.7.1. Acceptable formats for development and acquisition of geospatial datasets.

5.7.2. Recommended sources for non-NCDOT data that may be of interest to the NCDOT business units.

5.7.3. Dependencies upon a dataset or any dependencies that a spatial dataset may have on other datasets will be clearly identified.

5.7.4. Identification of geospatial datasets critical for business operations

5.7.5. Identification of geospatial datasets as part of other applications, including documentation of workflow and dataflow for that application

5.8. PUBLICATION

Sharing of data will be in accordance with the specifications in the NCDOT Geospatial Data Publication Standard (in development). The NCDOT is subject to all state laws regarding sharing of spatial datasets. This standard covers the following items:

5.8.1. Methods of publication

5.8.2. Formats for publication

5.8.3. Restrictions or requirements for internal or external sharing of the spatial datasets.

5.8.4. Requirements for publication of datasets as services to be consumed by web browsers.

5.9. LOCATION AND RECOVERABILITY

The physical location of the dataset will be identified, as well as documentation of any backup and restore procedures. Any spatial dataset considered critical to the business functions of NCDOT will be clearly identified and a backup and recovery plan verified and implemented to ensure that NCDOT meets it's public obligations. In addition to backup and recovery, a plan for long term archival should be included

in the documentation associated with the dataset.   (For more information on state activities related to archival of spatial datasets, please refer to the document in paragraph 3.0 above.) In lieu of an archival capability, backup datasets will be stored as archives, based on business needs and best practices. Geospatial datasets related to the road network will be backed up quarterly as part of the publication cycle.

6. BEST PRACTICES

It is highly recommended that developers of spatial datasets within the NCDOT work closely with the GIS unit in the organization to submit a draft of documentation and datasets for acceptance before final delivery.

Appendix A

Below is presented a partial list of geospatial datasets in use by the NCDOT. Note: There is considerable duplication across datasets. Most of these duplicates are a result of geospatial data silos across the organization:

Data layers used by SRMU

1. dot road files (US, NC SR, Interstate, non-system)
2. dot railroad
3. county
4. hydro
5. TIP
6. Bridges
7. Gov't boundary
8. DOT railroad crossings
9. Traffic count
10. LRS
11. ISRN
12. County parcel
13. aerials
14. utilities (water, sewer, etc.) limited availability
15. contours
16. buildings
17. Geodetic control points
18. encroachments
19. driveway permits
20. road additions
21. project tracking

Data Layers used by TPB:

1. Conservation Easements, US Fish and Wildlife Service
2. Conservation Tax Credit Properties
3. CREP Properties
4. Designated Historic Properties and Districts (National Register, Study List, Determined Eligible and Locally Designated)
5. Game Lands - Wildlife Resources Commission
6. Headwater Streams
7. Headwater Wetlands

8. Hydrography - Major, arcs
9. Land Trust Conservation Properties
10. Lands Managed for Conservation and Open Space
11. National Pollutant Discharge Elimination System Sites - Major
12. National Pollutant Discharge Elimination System Sites - Minor
13. Natural Heritage Element Occurrence Sites - arcs (Authorized Use)
14. Natural Heritage Element Occurrence Sites - points (Authorized Use)
15. Natural Heritage Element Occurrence Sites - polys (Authorized Use)
16. NC-CREWS: The North Carolina Coastal Region Evaluation of Wetland Significance
17. Off-Site Mitigation Sites
18. On-Site Mitigation Sites
19. Public Water Supply Water Sources
20. Shellfish Sanitation Shoreline Survey Pollution Sources
21. Significant Natural Heritage Areas (Authorized Use)
22. Soils - Detailed County Surveys (SSURGO)
23. State Parks
24. Strategic Conservation Planning
25. Stream Mapping
26. Surveyed Historic Properties
27. Terrestrial Archaeology Sites (Points) (Restricted)
28. Terrestrial Archaeology Sites (Polygons) (Restricted)
29. Terrestrial Archaeology Surveyed Areas (Polygons) (Restricted)
30. Transportation - System and Non-System Road Linework
31. Wetland Polygons
32. Wetland Types
33. Wild and Scenic Rivers
34. Available Commercial Buildings
35. Available Commercial Sites
36. Benthic Monitoring Results
37. Dams
38. Digital Aerial Imagery (Orthophotography)
39. Federal Land Ownership
40. Fish Community Sampling Sites
41. Groundwater Incidents, unverified
42. Land Cover
43. Local Watershed Plans
44. Permitted Active and Inactive Mines
45. Potential Wetland Enhancement and Restoration Sites - North Carolina Coastal Area
46. Sanitary Sewer Systems - Pipes
47. Sanitary Sewer Systems - Type A Service Areas
48. Sanitary Sewer Systems - Type P Service Areas
49. Shellfish Growing Areas

50. Solid Waste Section (SWS) Facilities
51. State Owned Lands
52. Storm water Systems - Current Service Area
53. Storm water Systems - Future Service Area
54. Superfund Section (SFS) Facilities
55. Targeted Local Watersheds
56. Underground Storage Tank (UST) Facilities
57. Water Distribution Systems - Pipes
58. Water Distribution Systems - Type A Service Areas
59. Water Distribution Systems - Type B Service Areas
60. Water Distribution Systems - Type P Service Areas
61. Aquatic Habitat
62. Aquatic Toxicity Self-Monitoring
63. Beach and Waterfront Public Access Sites
64. Brownfields Program (BFP) Facilities
65. Building Footprints for State-Owned Buildings
66. Business Locations
67. Community College Locations
68. Dedicated and Registered Areas
69. Digital Orthophoto Quarter Quadrangles (DOQQ) - 1993 Black and White
70. Digital Orthophoto Quarter Quadrangles (DOQQ) - 1998 Color Infrared
71. Emergency Evacuation Routes
72. Emergency Operation Centers
73. Emergency Shelters, Potential
74. Fish Kills
75. Hurricane Evacuation Routes
76. Lake Monitoring
77. Landscape Habitat Indicator Guilds
78. Managed Areas
79. Macrosite Boundaries (Authorized Use)
80. Municipal Boundaries Annual
81. NPDES Storm water Permits
82. NPDES Wastewater Permits
83. Non-Public Schools
84. Oyster Sanctuaries
85. Paddle Trails Coastal Plain - points and arcs
86. Parcel Boundaries
87. Private Colleges
88. Public Libraries
89. Public Schools
90. Ridge Law
91. Underwater Archaeology Sites/Shipwrecks (Points) (Restricted)
92. Universities - point

93. Universities – polygon
94. airports
95. ambient water quality sites
96. animal operations permit
97. beach access sites
98. benthic monitoring sites
99. bridges
100.	census block groups 1990
101.	census block groups 2000
102.	census blocks 1990
103.	census blocks 2000
104.	census boundaries 1970
105.	census boundaries 1980
106.	census tracts 2000
107.	community colleges
108.	conservation tax credit properties
109.	County Boundaries
110.	County Boundaries w/shorelines
111.	discharging coalitions monitoring sites
112.	districts- NC house
113.	districts- NC senate
114.	districts-congressional
115.	emergency operations centers
116.	federal land ownership
117.	fish community sampling sites
118.	fishing designated trout waters
119.	gamelands
120.	geodetic control points
121.	geology
122.	geology- dikes
123.	geology- faults
124.	hazard substance disposal sites
125.	high quality water outstanding resource water management zones
126.	hospital locations
127.	hurricane evacuation routes
128.	hurricane storm surge areas- fast moving storms
129.	hurricane storm surge areas- slow moving storms
130.	hydraulics units- 14 digits
131.	Hydrologic Units - Albemarle-Pamlico Estuarine Study
132.	Hydrologic Units - River Basins
133.	Hydrologic Units - Sub Basins
134.	Hydrography - 1:24,000-scale
135.	Hydrography - Major

136. Hydrography - NC Streambed Mapping Project
137. Landcover - 1996
138. Landfills
139. Landslides
140. Lands Managed for Conservation and Open Space
141. Land Trust Conservation Properties
142. Local Watershed Plans - EEP
143. Municipal Boundaries (Powell Bill) - NC Dept. of Transportation
144. Medical Facilities
145. Natural Heritage Element Occurrences
146. National Pollutant Discharge Elimination System Sites
147. National Wetlands Inventory
148. Potential Emergency Shelters
149. Paddle Trails - Coastal Plain
150. Public Libraries
151. Public Municipal Storm water Systems (2004)
152. Public Sewer Systems - Current Service Areas (2004)
153. Public Sewer Systems - Future Service Areas (2004)
154. Public Water Supply Water Sources
155. Public Water Systems - Current Service Areas (2004)
156. Public Water Systems - Future Service Areas (2004)
157. Water and Sewer Systems Service Areas (2004) - Personal Geodatabase
158. Railroads
159. Roads - NC Dept. of Transportation
160. Sanitary Sewer Systems - Pipes (1997)
161. Sanitary Sewer Systems - Pumps (1997)
162. Sanitary Sewer Systems - Type A Service Areas (1997)
163. Sanitary Sewer Systems - Type B Service Areas (1997)
164. Sanitary Sewer Systems - Type P Service Areas (1997)
165. Sanitary Sewer Systems - Treatment Plants (1997)
166. Sanitary Sewer Systems - Discharges
167. Sanitary Sewer Systems - Land Application Areas
168. Schools - Non-Public
169. Schools - Public
170. Shellfish Growing Areas
171. Shoreline - 1:24,000-scale
172. Significant Natural Heritage Areas
173. Soils - General
174. Soils - Detailed (SSURGO)
175. State-Owned Lands
176. Storm water Reference
177. Surface Water Intakes
178. Swine Lagoons

179.   TIGER/Line - 1990 Census
180.   Townships
181.   Transportation - Miscellaneous
182.   Universities - Private
183.   Universities - Public
184.   Urban Areas
185.   USGS Gages
186.   Water Distribution Systems - Intakes (1997)
187.   Water Distribution Systems - Meters (1997)
188.   Water Distribution Systems - Pipes (1997)
189.   Water Distribution Systems - Pumps (1997)
190.   Water Distribution Systems - Type A Service Areas (1997)
191.   Water Distribution Systems - Type B Service Areas (1997)
192.   Water Distribution Systems - Type P Service Areas (1997)
193.   Water Distribution Systems - Tanks (1997)
194.   Water Distribution Systems - Treatment Plants (1997)
195.   Water Distribution Systems - Wells (1997)
196.   Water Supply Watersheds
197.   Wetlands Types - Coastal Area
198.   Wild and Scenic Rivers
199.   Wind power Potential
200.   Zip Codes

Data Layers used by TPB:

1. Planning Boundary
2. County Boundaries
3. Municipal Boundaries
4. Roads
5. Schools - Public (Points)
6. Schools - Non-Public (Points)
7. Schools - Colleges and Universities (Points)
8. Railroads
9. Rivers and Streams
10. Water Bodies
11. Airports (Points)
12. Ferries (Points)
13. Ports (Points)
14. Game Lands, Mountain Ranges, Parks and National/State Forests
15. Game Lands
16. Military Bases
17. Blue Ridge Parkway

18. 24k Hydro Lines
19. Beach Access Sites
20. Bike Routes - NCDOT
21. Colleges and Universities (Points)
22. Conservation Tax Credit Properties
23. Emergency Operation Centers
24. Federal Land Ownership
25. Geology
26. Geology - Dikes
27. Geology - Faults
28. Hazard Substance Disposal Sites (Polygon)
29. High Quality Water Outstanding Resource Water Management Zones
30. Hospital Locations
31. National Wetlands Inventory (poly)
32. Natural Heritage Element Occurrences
33. Paddle Trails - Coastal Plain (arcs)
34. Railroads (1:24,000)
35. Sanitary Sewer Systems - Discharges
36. Sanitary Sewer Systems - Land Application Areas
37. Sanitary Sewer Systems - Pipes
38. Sanitary Sewer Systems - Pumps
39. Sanitary Sewer Systems - Treatment Plants
40. Schools - Non-Public
41. Schools - Public
42. Significant Natural Heritage Areas
43. Water Distribution Systems - Pipes
44. Water Distribution Systems - Pumps
45. Water Distribution Systems - Tanks
46. Water Distribution Systems - Treatment Plants
47. Water Distribution Systems - Wells
48. Water Supply Watersheds
49. Wild and Scenic Rivers
50. Airport Boundaries (polygons)
51. Anadromous Fish Spawning Areas
52. Coastal Marinas
53. Fish Nursery Areas
54. Hazard Substance Disposal Sites (points)
55. Hazardous Waste Facilities
56. Hydrography - 1:24,000-scale (polygons)
57. Land Trust Priority Areas
58. NC-CREWS: N.C. Coastal Region Evaluation of Wetland Significance
59. Paddle Trails - Coastal Plain (points)
60. Recreation Projects - Land and Water Conservation Fund

61. Shellfish Strata (1:12,000)
62. State Parks
63. Submersed Rooted Vasculars (polygons)
64. Trout Streams (DWQ)
65. Trout Waters WRC (arcs)
66. Trout Waters WRC (polygons)
67. Archaeological Sites (points) - Restricted
68. Archaeological Sites (polys) - Restricted
69. Historic National Register Districts - Restricted
70. Historic National Register Structures - Restricted
71. Macrosite Boundaries (Restricted)
72. Managed Areas – Restricted
73. Megasite Boundaries (Restricted)
74. City/County Orthophotos
75. MPO Boundaries
76. Employment Data-Sept2010-Release Date
77. Census Block groups - 1990
78. Census Block groups - 2000
79. Census Blocks - 1990
80. Census Blocks - 2000
81. Census Boundaries - 1970
82. Census Boundaries - 1980
83. Census Tracts - 2000
84. Hurricane Evacuation Routes
85. Hurricane Storm Surge Areas - Fast Moving Storms
86. Hurricane Storm Surge Areas - Slow Moving Storms
87. Landslides
88. Paddle Trails - Coastal Plain (arcs)
89. Swine Lagoons
90. Townships
91. Urban Areas
92. Zip Codes
93. Average Annual Daily Traffic (AADT) [2002 - 2009]
94. AADT 1990 - 2006 (***UNOFFICIAL***)
95. Division Boundaries - NCDOT
96. Functional Classification System
97. NC Intrastate System Maps
98. National Highway System (NHS)
99. NCMIN Tier Designations
100. North Carolina Truck Network
101. Roads - Characteristic Arcs
102. Roads - Integrated Statewide Road Network (ISRN)
103. Roads - Statewide Primary & Secondary Road Routes