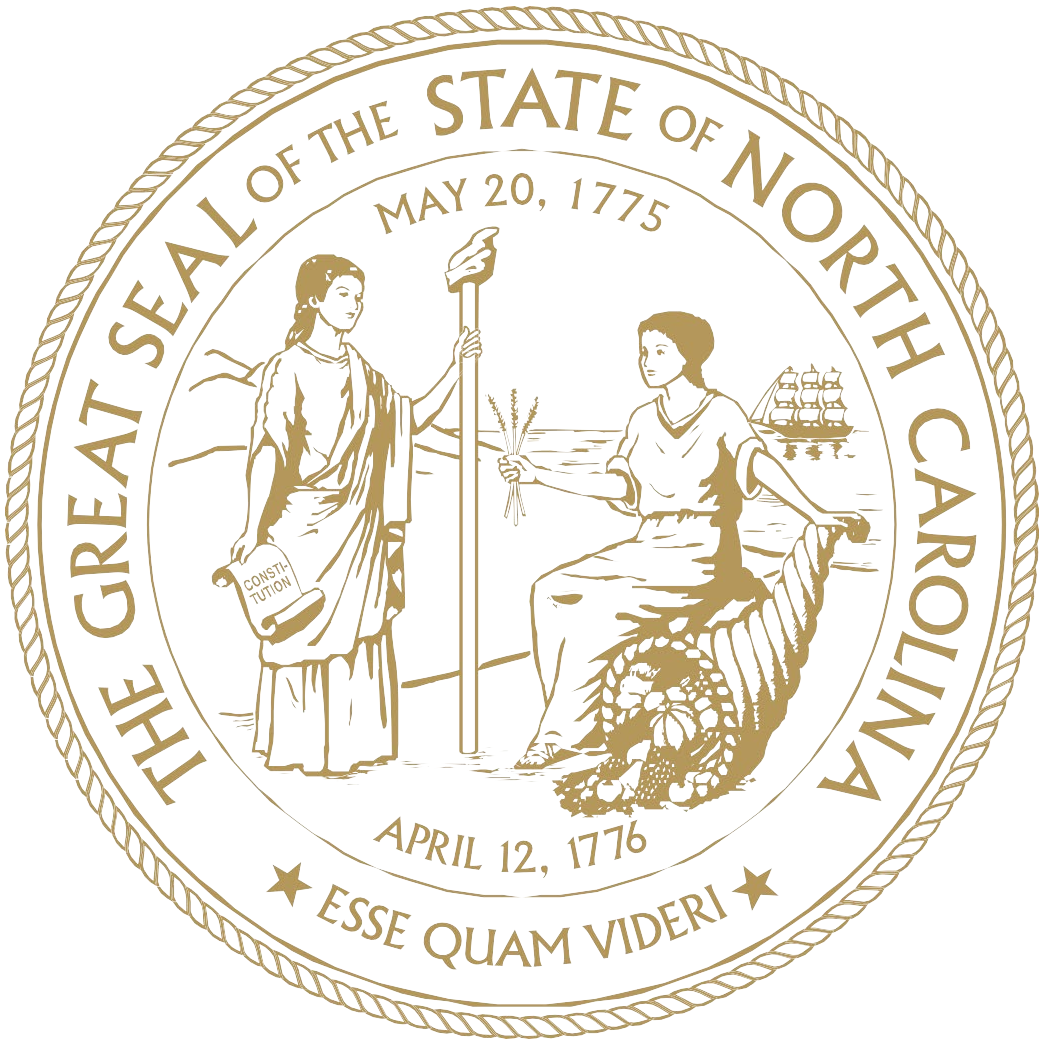

Data-Driven Collaboration

2020 Annual Report to the Governor and to the Joint Legislative Commission on Governmental Operations

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N.C. Department of Information Technology

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September 2021

Contents

Executive Summary 1

Introduction 1

About the Council 1

- Data-Driven Collaboration 2
- Adding Value 3
- Geospatial Maturity Assessment: A Report Card for Framework Datasets 3
- Emergency Response and Coordination 5
- The 2020 Decennial Census: A Complete, Accurate Count of Every North Carolinian 7
- Infrastructure: Exploring Opportunities 8
- Strategic Direction for the Council for Data-Driven Collaboration 10
  - Goal 1. Improve and/or expand statewide geospatial data 10
  - Goal 2. Support applications of geospatial data 11
  - Goal 3. Collaborate for more integration of geospatial data in information technology for expanded benefits 12
  - Goal 4. Collaborate with all parts of the GIS community in North Carolina 12
- Accomplishments 2019-2020 13
  - Collaboration for Consistency 13
  - Collaboration for Public Access to Geographic Information 15
  - Collaboration for Land Information 17
  - Collaboration for Imagery Quality and Efficiency 19
  - Technical Assets and Developments 22
  - Governance for Geographic Information 24
  - Sharing Information and Knowledge 25
- Future Priorities 27

Executive Summary

Introduction

The N.C Geographic Information Coordinating Council (GICC) was established by the N.C. General Assembly in August 2001 and is supported by the N.C. Department of Information Technology (NCDIT). The N.C. Center for Geographic Information and Analysis (CGIA), housed within NCDIT's Government Data Analytics Center (GDAC), staffs the council, and NCDIT's Secretary and State Chief Information Officer is responsible for supervision and support of the council.

The council is the state's central point for geospatial collaboration and mapping, supporting local and state geospatial programs and services. The council serves to improve the quality, access, and cost-effectiveness of geospatial resources for state, federal, local, academic, and private organizations while promoting the value of geographic information.

N.C.G.S. § 143B-1421(g) requires the council to report annually to the Governor and the Joint Legislative Commission on Governmental Operations. The council submits this report to share its strategic focus on data-driven collaboration, outline priorities and challenges, and update the Governor and the commission on its Fiscal Year 2019-20 accomplishments.

About the Council

The GICC meets quarterly to consider policies, issues, and initiatives. Council meetings took place on four occasions during FY 19-20: on August 14, 2019; November 6, 2019; February 12, 2020; and May 6, 2020. Alex Rankin, of CESI Civil-Geotechnical-Surveying, chairs the council.

The council is composed of a broad set of stakeholders representing perspectives from local, state, and federal government, higher education, and private business. The council's collaboration promotes better decision making across all sectors in North Carolina. The council has three user-oriented standing committees: the Local Government Committee (LGC), the State Government GIS Users Committee (SGUC), and the Federal Interagency Committee (FIC). Two technical committees, the GIS Technical Advisory Committee (TAC) and the Statewide Mapping Advisory Committee (SMAC), address policy, guidance, and technical issues in collaboration with the user-oriented committees. Chairs of all five standing committees as well as the council chair and council representative from the Office of State Budget and Management compose the Management and Operations Committee (M&O). This committee handles the council's business in between quarterly meetings. In addition to 36 Council members, more than 50 individuals contribute to committees and ad hoc working groups.

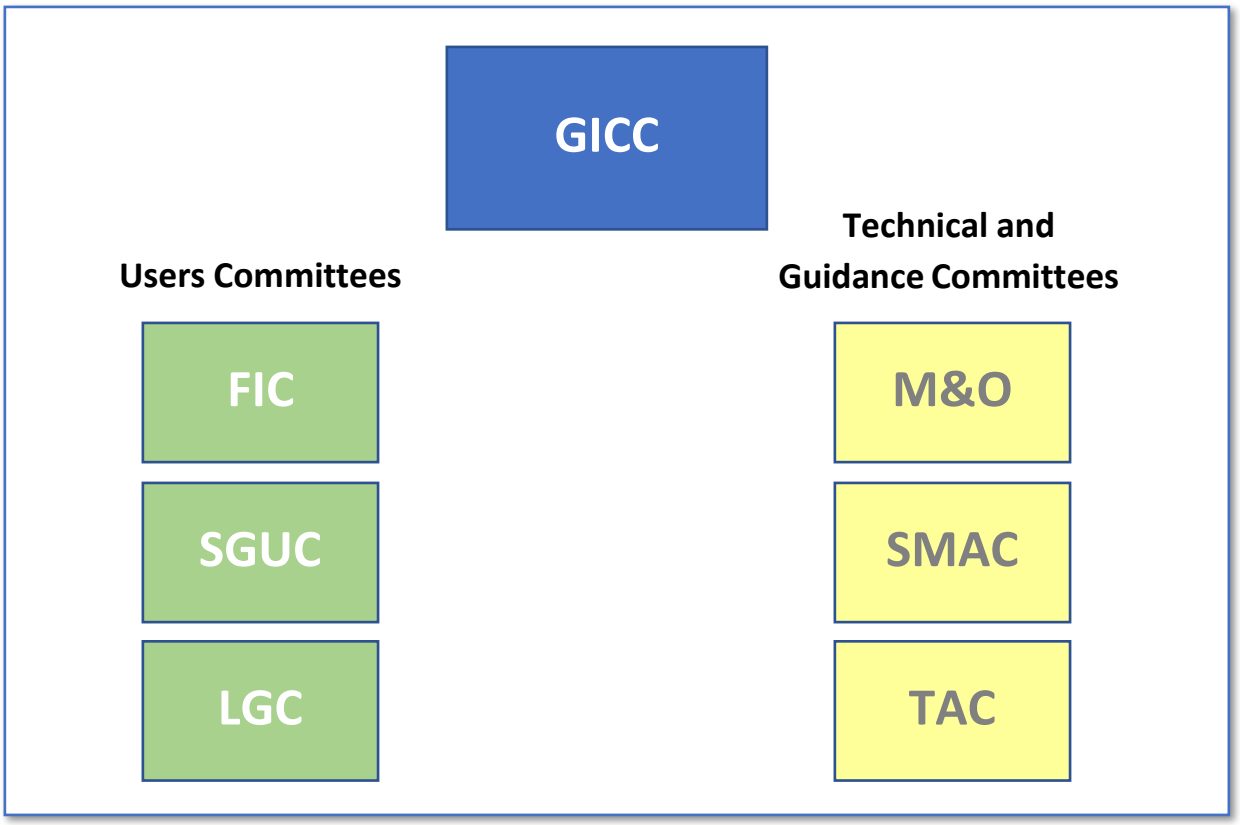

Figure 1: The Council and Council Committees

The council (https://it.nc.gov/gicc) and *NC OneMap* (https://www.nconemap.gov/) websites are widely used by committee members, the state's geographic information systems (GIS) community, and the public to keep current on initiatives, meetings, opportunities, and news about both the council and *NC OneMap*.

Data-Driven Collaboration

Spatial data tells a powerful story. The emergence of COVID-19 during this fiscal year put geospatial data in the spotlight through an extremely popular dashboard from Johns Hopkins University (https://coronavirus.jhu.edu/us-map). Suddenly, the world was viewing the real-time spread of the virus through maps, charts, and infographics driven by geospatial data. The Johns Hopkins COVID dashboard emphasized analytics to a public already used to using maps to navigate or find a restaurant, demonstrating the power of data-driven collaboration for the public good.

The state, local, federal, and regional governments, as well as the businesses, educators, and citizens represented on the council collaborate to inform decisions derived from location-based information. The shared needs of this range of stakeholders guides data-driven collaboration.

Every feature represented on a map is connected to a series of data influenced by the business needs of stakeholders collaborating to produce the dataset. Behind the rectangle representing a building on a map exists valuable information for the local fire department, county tax assessor, regional planner, floodplain administrator, state emergency manager, and federal census worker. The inclusiveness of varied stakeholders on the council and its working groups produces robust cost-effective spatial resources used to inform decisions. Feature location information creates maps, which are the basis for analysis that saves time, resources, and reduces costs for taxpayers. Residents of North Carolina may not be aware of the planning and collaboration required to produce powerful datasets, but they benefit when they discover online interactive maps that inform them about virus testing locations, polling locations, new transportation projects, residential flooding risk, or a new community park. As public awareness of the importance of spatial data grows, collaboration to produce effective geospatial resources will become even more salient.

Adding Value

As highlighted below, the council prioritizes geospatial initiatives and data sharing that add value to framework data sharing, emergency response, support for the Census 2020, and the protection of utilities infrastructure.

Geospatial Maturity Assessment: A report card for framework datasets

The National States Geographic Information Council (NSGIC) is an organization of state-level GIS coordinators from across the country. The purpose of NSGIC is to enhance collaboration among the states in pursuing geospatial issues and opportunities. States learn best practices from each other as each develops geospatial data strategies and approaches to meet their needs. NSGIC conducts the Geospatial Maturity Assessment (GMA) every two years to assess national progress on a set of common data themes and other coordination activities such as Next Generation 911. The 2019 GMA yielded a set of letter grades for the first time, as shown in Figure 2. Overall, North Carolina received a grade of B+, the highest grade received by any state. Several other states achieved that level as well. At the detailed level, geospatial investments in recent decades at both the state and local government level resulted in several A grades and no data theme received a grade lower than a B. Examples of the A grades include orthoimagery that the GICC and the NC 911 Board have championed as well as cadastre (i.e., parcels), transportation, elevation, and geodetic control. North Carolina is recognized as a national leader in these data themes. Looking ahead to the 2021 GMA, the council is investing time to develop improved strategies for addresses, hydrography, and municipal boundaries by establishing or reinvigorating working groups to focus on them.

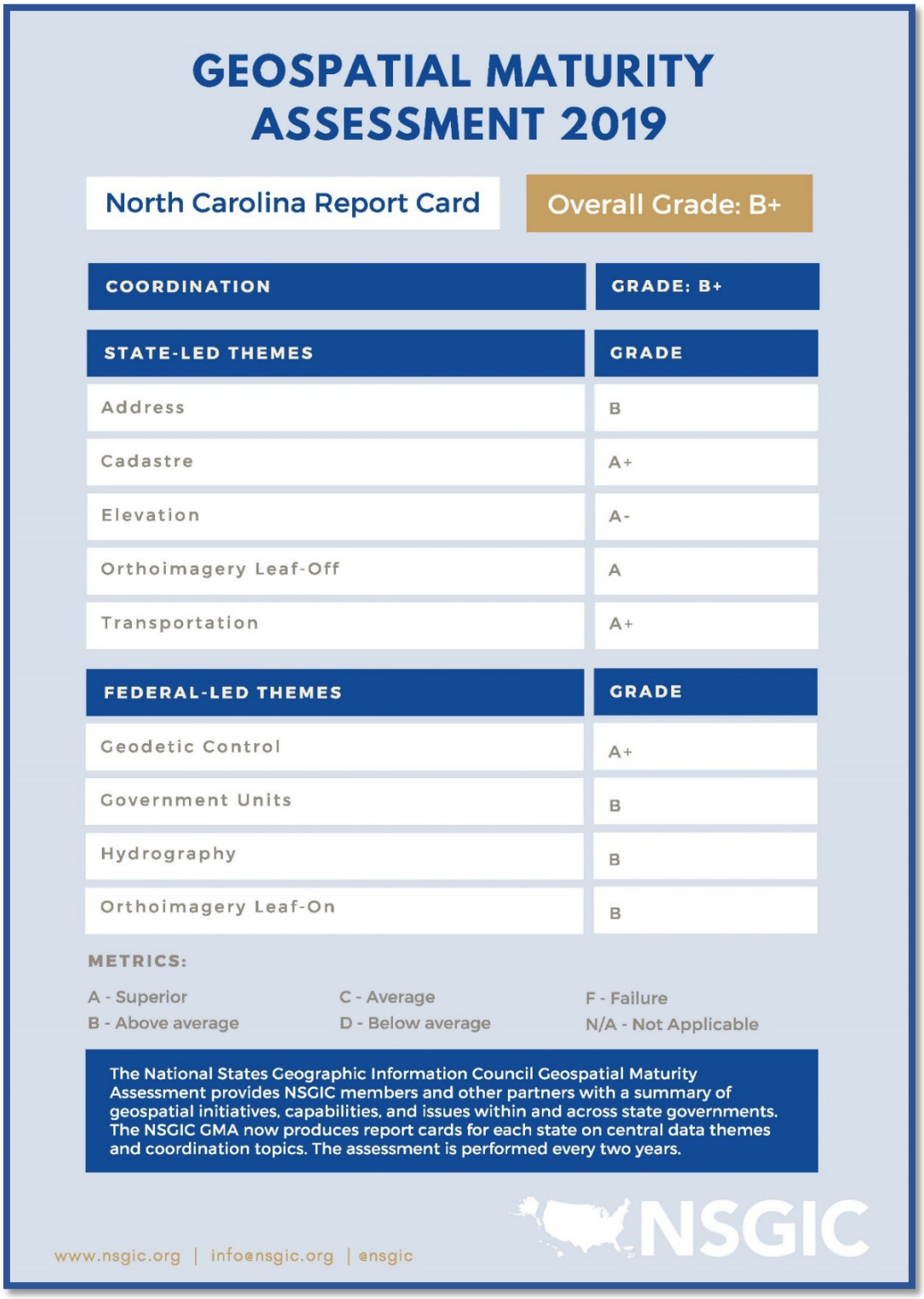

Figure 2: 2019 GMA Report Card for North Carolina (Source: NSGIC)

Emergency Response and Coordination

Efficient emergency response continues to be a GICC priority. The council continued collaboration on two important projects: North Carolina's transition from Enhanced 911 emergency communications to Next Generation 911 (NG 911) and improving coordination and planning for natural and man-made disasters.

The council continued its support of the North Carolina 911 Board and Council Member Pokey Harris to develop datasets needed to transition to NG 911. An excellent example of data-driven collaboration, the project brings together stakeholders from local Public Safety Answering Points (PSAPs), municipalities, counties, and state agencies to support more efficient and effective emergency response.

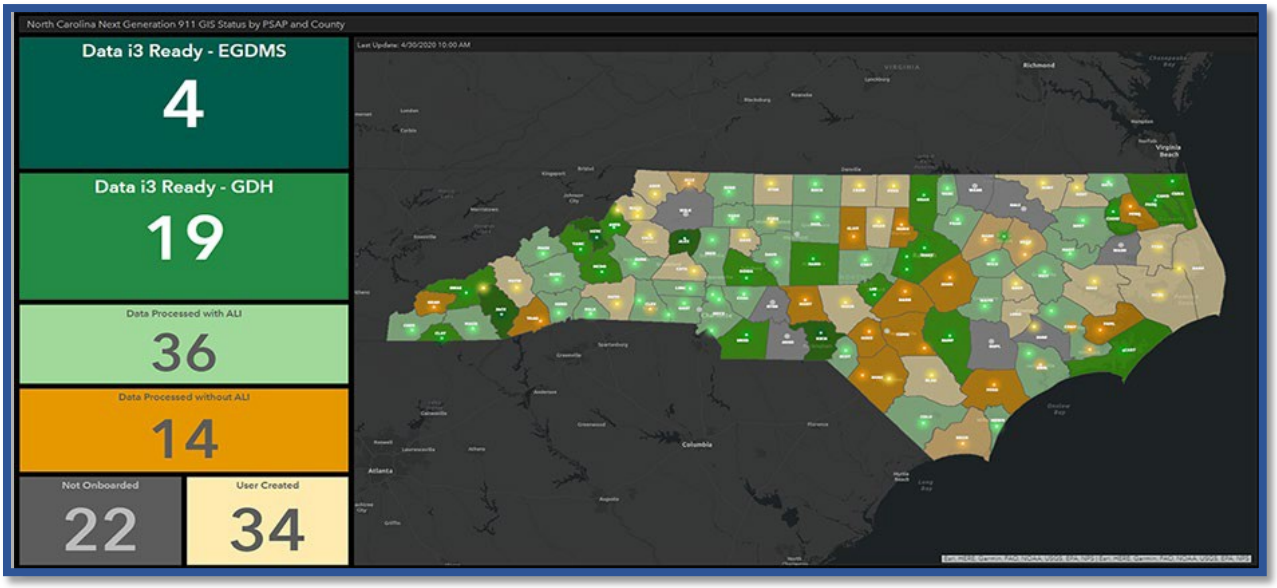

Figure 3: May 6, 2020 i3 readiness for NG911 (Source: NC 911 Board/CGIA)

The increased use of mobile technology means that when a caller dials 911, PSAPs may receive the location of the tower, the location of the caller, or a point in between, depending on such factors as terrain and technology of the caller's cellphone. In these emergencies, seconds matter and lives depend on a quick response. NG911 interconnects PSAPs and delivers improved caller location accuracy and information. Council coordination has concentrated on statewide framework datasets that support NG911 including roads, address, emergency service boundaries, and orthoimagery. NG911 collaboration included the LGC, the SMAC, and ad-hoc working groups, including the Orthoimagery and Elevation Working Group, the Seamless Parcels Working Group, and the Working Group for Enhanced Emergency Response.

To prepare the PSAPs, the NG911 GIS project team met virtually with the GIS data stewards across the state to ensure GIS deadlines were met for the migration onto the Internet Protocol-based Emergency Services Network. Data is considered i3 ready once all critical errors have been resolved and the telephone company's Automatic Location Identification (ALI) database (a list of landline phone numbers and their associated address) matches against the road centerline dataset with a match rate of 98% or greater. By June of 2020, all 115 primary PSAPs had been onboarded and received training on how to prepare their data for NG 911 and how to upload it into the GIS Data Hub. More than 35% of the primary PSAPs GIS data was considered i3 ready in June 2020. Work will continue into the FY 20-21.

Hurricane Florence struck North Carolina in September 2018 and caused weeks of flooding, highlighting the importance of existing geospatial information and the proficiency and grit of North Carolina's GIS professionals. The existence of accurate elevation, flood prediction, transportation, parcel, and address geospatial layers, in the hands of a skilled GIS workforce, saved lives and property. Based on lessons from this experience, the council's Working Group for Enhanced Emergency Response (WGEER) was chartered to develop a common emergency response data-sharing platform and design a method for mobilizing GIS professionals from unaffected areas of the state to assist colleagues in responding to disasters. The WGEER includes stakeholders from local, state, federal, and private industry. The group developed a secure cloud-based sharing platform that connects analysts and decision makers with up-to-date authoritative data. The platform saves time and resources, and ensures decision makers at all levels are utilizing the same data during events.

The 2020 Decennial Census: A Complete Accurate Count of Every North Carolinian

The GICC played a key role in preparation and support for the 2020 Decennial Census in North Carolina, leading multiple projects to achieve the goal of a complete, accurate, data-driven, defendable count of North Carolina residents.

The council formed a working group for Census Geospatial Data in 2013, chaired by Bob Coats, the Governor's Census Liaison in the Office of State Budget and Management (OSBM). The U.S. Census Bureau relies on geospatial data, including orthoimagery, to verify a large percentage of residential addresses. In preparation for Census 2020, the Local Update of Census Addresses Operation (LUCA) relied heavily on the framework AddressNC data to verify a complete accurate address dataset. The council supported tribal, state, and local governments in reviewing and commenting on the Census 2020 address list.

MAKE NC COUNT

CENSUS 2020

Accurate municipal boundaries are a second framework layer priority supporting the census. The census conducts the Boundary and Annexation Survey (BAS) annually to collect selected legally defined geographic areas. This data is used to support congressional and state redistricting, Census tabulation and statistics, as well as Community Block Group Grant program eligibility and various rural housing and economic development programs. The council recognized that improved coordination and data flows can increase the accuracy of municipal boundary geospatial data, and it formed the Municipal Boundary Workgroup to review the current process and identify efficiencies and improvements with the goal of an authoritative, locally maintained, statewide municipal boundary layer that can be shared with the BAS annually. North Carolina statute requires the Department of the Secretary of State (SOS) to approve municipal boundaries. The council's OSBM representative, Bob Coats, is leading the Municipal Boundary Workgroup in this effort.

Differential Privacy is a method used to protect the privacy of individuals through noise injection or data swapping. For Census 2020, the census bureau announced a new Disclosure Avoidance System (DAS) designed to protect individual privacy against advanced computing technology. The council discussed the impacts of the proposed

census product changes and coordinated through the LGC to review how the proposed changes could impact local and state government. Using results from the review, the council contributed a letter to the census bureau outlining the impacts of the proposal to the citizens of North Carolina and recommending improvements to the proposed products.

Infrastructure: Exploring Opportunities

Accurate infrastructure location and descriptive data is critical to transportation planning, economic development, and emergency response. Council members requested a review of how infrastructure data is shared across the state. The council began its review with a facilitated discussion that included a presentation by Jessica Middlebrooks, NCDIT Legal Counsel for the GICC, on applicable statutes, directives, and case law covering the distribution and protection of infrastructure data. Council members discussed the following topics:

- What business needs require access to infrastructure data?
- Which data layers are needed and why?
- What is the impact of not having the data available?
- Do we need full public access to the data, or can it be limited and still meet the need?

After the fall meeting discussion, the council identified key topics that warranted additional review, and devoted time during the winter meeting to a presentation by Advisory Council member Amy Barron, GIS manager for Duke Energy, on the topic of best practices for sharing publicly available GIS infrastructure data. At the request of the council, Ms. Barron presented a plan to share electrical easement data, an important layer that has not been available to this point. During the same meeting, the North Carolina Department of Transportation (NCDOT) reviewed all the infrastructure data layers needed for transportation planning and discussed the impacts of data availability and quality to transportation projects. The council requested that the LGC review data sharing practices at the local level across the state, and the LGC polled members about local infrastructure data availability, quality, and data sharing practices. During the spring meeting, the LGC reviewed the findings which revealed that there is no consistency in data availability, quality, and methods of sharing. In addition, each data provider sets standards and practices that meet their individual needs.

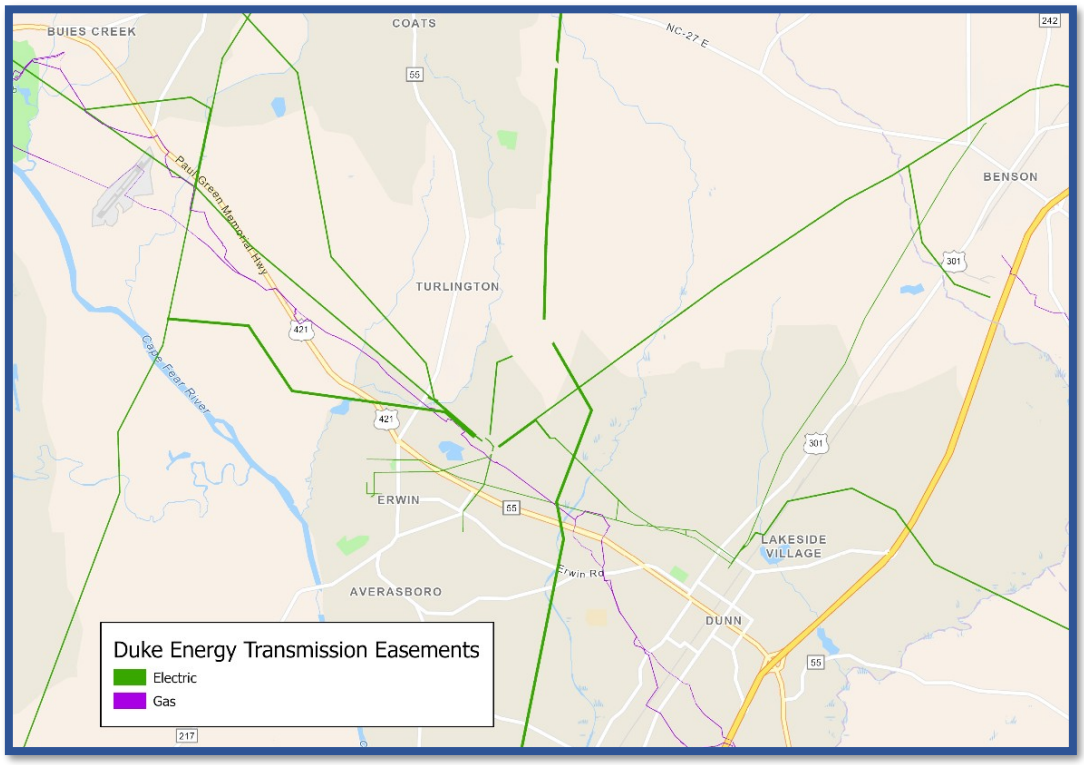

Figure 4: Example of Duke Energy Transmission Easements to be added to NC OneMap

Because access to infrastructure data is crucial for economic development, planning, and emergency response, and initial discussions revealed an array of additional questions on the topic, the council directed the TAC to investigate data sharing practices more fully and produce an infrastructure data best practices document outlining what data can be shared, how it can be shared, and what data must be kept secure. The TAC assembled stakeholders from four state agencies, four municipalities, four counties, and five private utilities or developers. The TAC will be reviewing best practices during FY 20-21 and report findings to the council.

Strategic Direction for the Council for Data-Driven Collaboration

Every two years, the council begins a new process of evaluating its goals and priorities for the biennium. Council members discuss the existing goals, consider stakeholder priorities, and propose new goals to meet the needs of GIS community.

Goal 1. Improve and/or expand statewide geospatial data

1.1. Promote free and open discovery of and access to geospatial data created and maintained by local governments.

Status: Local government data distribution policies vary from open data access to offline copies by request

Lead: Local Government Committee

Tasks: Summarize business needs and value; promote through professional organizations

1.2. Find solutions for consumers to discover and gain access to public geospatial datasets that local governments currently withhold from public access for concern about homeland security.

Status: Local government policies vary

Leads: Local Government Committee and Technical Advisory Committee

Tasks: Research and clarify federal, local, and public utility policies; summarize business needs and value versus risk; define alternative geospatial datasets (e.g., corridors, easements, service areas) and their appropriate uses and disclaimers; start a conversation with local data managers

1.3. Continue to support initiatives that compile and maintain statewide geospatial datasets that are priority data themes of the council.

Status: Priority statewide datasets available to the public include NC Roads, NC Parcels, Statewide Orthoimagery, county and municipal boundaries, LiDAR elevation, surface waters, and geodetic control.

Lead: Statewide Mapping Advisory Committee

Tasks: Prioritize efforts to improve municipal boundaries and surface waters; sustain working groups to advise data programs and projects; support NG 911 and the local government role in data sharing.

1.4. Find solutions to make data sharing local-to-state more efficient to meet the needs of multiple statewide datasets and not place undue burden on local geospatial data managers.

Status: NC Roads and Parcels have achieved full participation by local governments, but others use a variety of processes at different times
Lead: Statewide Mapping Advisory Committee
Task: Maintain data content standards
Assist: State Government GIS Users Committee
Task: Define common data requirements from multiple state agencies
Assist: CGIA and NG 911 project team
Task: Define data requirements and a workflow in collaboration with contractor and the Local Government Committee

1.5. Request all state agencies to make the council's priority geospatial datasets discoverable and accessible through the *NC OneMap* Geospatial Portal.

Status: Most, but not all, priority datasets are discoverable and accessible through the first-stop state geospatial data portal
Lead: State Government GIS Users Committee
Task: Identify priority datasets currently not discoverable and accessible through *NC OneMap* and find solutions with host agencies

1.6. Promote geospatial metadata for standard documentation.

Status: Metadata standard is in place, training materials are prepared, and implementation in more GIS operations will add value
Lead: Statewide Mapping Advisory Committee
Task: Metadata Committee—reach out to local governments, promote online videos, and provide onsite training

Goal 2. Support applications of geospatial data

2.1. Support creation of services that publish results through online applications that include address validation, from single requests to batch processing.

Status: Ongoing initiative refresh of AddressNC using NG 911 data
Lead: Statewide Mapping Advisory Committee
Task: Assist in analysis of business requirements and benefits for application development and geospatial services related to NC Roads and AddressNC
Assist: Local Government Committee
Task: Help promote local government data sharing for statewide datasets for roads and address points

2.2 Support other applications that derive business value from geospatial data assets and analytics.

Status: Ongoing initiative

Lead: State Government GIS Users Committee

Task: Identify common opportunities and requirements

Assist: Local Government Committee

Goal 3. Collaborate for more integration of geospatial data in information technology for expanded benefits

3.1. Identify opportunities to collaborate on GIS solutions in state departments and divisions not directly represented on the council to add value to state business processes.

Status: Negotiated and implemented a Statewide Enterprise License Agreement for GIS software available to all state Agencies. Surveyed State GIS users to prioritize GIS training needs.

Lead: State Government GIS Users Committee

Tasks: Survey state agencies to learn more about GIS and training needs and opportunities; Prioritize and host GIS training; collaborate with the DIT on optimization of IT resources.

Goal 4. Collaborate with all parts of the GIS community in North Carolina

4.1. Identify opportunities to collaborate on geospatial data and technical solutions on a regional basis, engaging councils of government.

Status: Ongoing efforts

Lead: Local Government Committee

Task: Representatives participate on SMAC and working groups to identify opportunities for regional solutions

4.2. Reach out to jurisdictions with the least resources to find ways to add value with geospatial data and applications.

Status: CGIA supported the LUCA program on behalf of a few local governments that did not participate directly in the program

Lead: Local Government Committee

Tasks: Identify jurisdictions in need, priority business needs and data needs, and practical ways to assist; engage professional organizations in outreach and solutions

Assist: Statewide Mapping Advisory Committee

Accomplishments 2019-2020

Collaboration for Consistency

Accomplishment: The Working Group for Enhanced Emergency Response (WGEER) developed a data sharing platform that will direct local, state, and federal emergency management partners to a single authoritative source for GIS data layers, maps, and applications.

Born from a need for a current, accurate, and authoritative source of emergency response data, and the need for decision makers to use the same data sources, the WGEER was chartered in 2019. The working group is chaired by council member Hope Morgan and is composed of public and private sector stakeholders. The WGEER identified data needs and applications from previous events and investigated technologies that would make the data and applications available to emergency management GIS professionals. The working group set up a cloud-based data sharing platform that allows GIS users in different locations to securely share critical data layers for each event. The WGEER Hub allows each authoritative data producer to share data with stakeholders statewide. The Hub ensures that analysis and decision makers across agencies use the same data sources. The WGEER Hub has the added benefit of allowing data providers to stream real-time data and allows data users to continually update situational analysis and reporting. This feature eliminates the need to download data throughout an event and prevents the analysis of stale downloaded data.

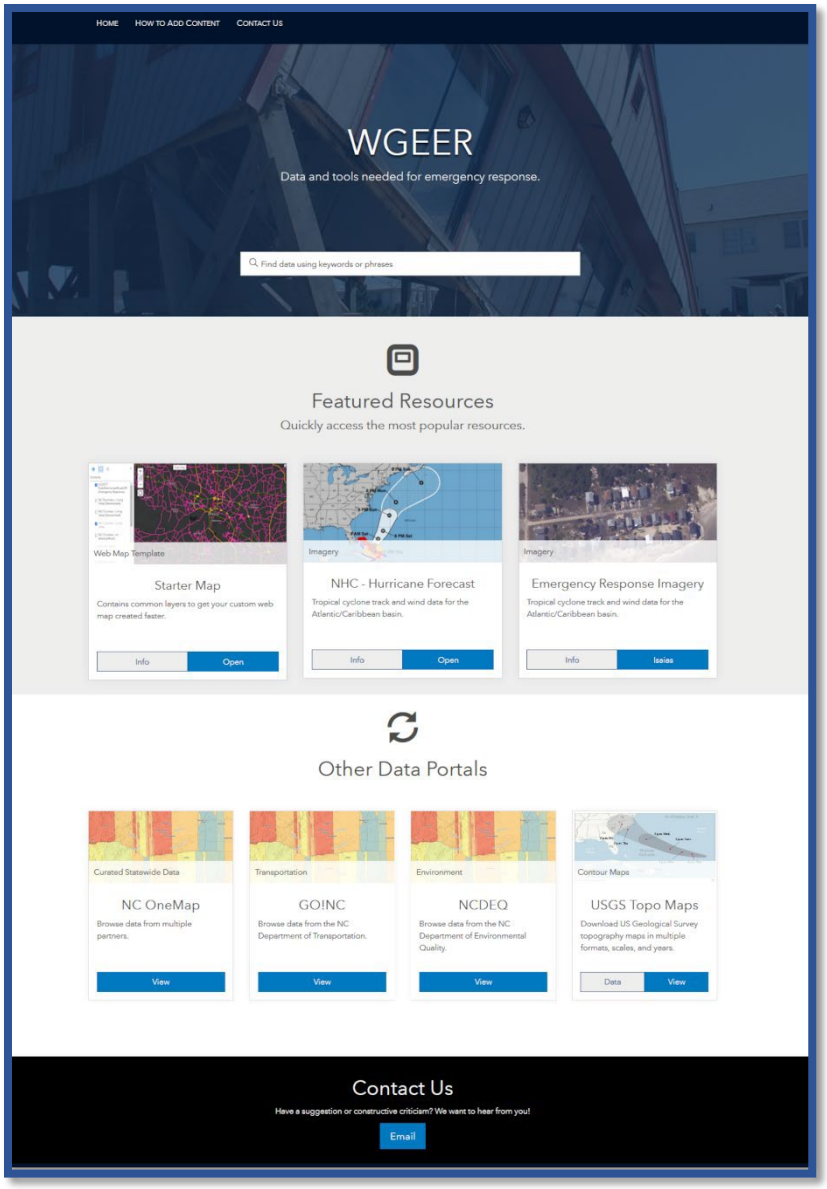

Figure 5: WGEER Hub Site

The WGEER is represented by local, state, federal, and private industry stakeholders, and the core team has reached out to the LGC, SGUC, and FIC to recruit membership in the WGEER data Hub. The WGEER is also recruiting volunteers across the state to register to assist overwhelmed local communities during events. The WGEER has outlined GIS staffing roles and volunteers register for roles according to their skills and experience. When help is needed, local communities will request assistance from pre-defined roles. The WGEER expects to continue outreach during the FY 20-21 to expand awareness of the tool as well as hold blue sky testing to allow members to familiarize themselves with the tools.

Collaboration for Public Access to Geographic Information

Accomplishment: Responding to private sector requests, the GICC investigated the availability and security aspects of infrastructure data. The SMAC led an effort to standardize Digital Elevation Models (DEM) created from the completion of high-quality Light Detection and Ranging (LiDAR) data collection. *NC OneMap* continues to provide nationally recognized access to North Carolina datasets.

NC OneMap is a national model as a state data-sharing platform, winning a Special Achievement Award at the 2020 ESRI User Conference. *NC OneMap* promotes the council's work through easy access to more than 400 datasets. Public investment in geographic information and services continues to generate new benefits to a range of public and private projects when the data is readily available, properly documented, and maintained. Through the *NC OneMap* Geospatial Portal, users discover relevant datasets and download data or stream data through web services into desktop or web applications. Users easily find data through keyword searches or by spatial extent.

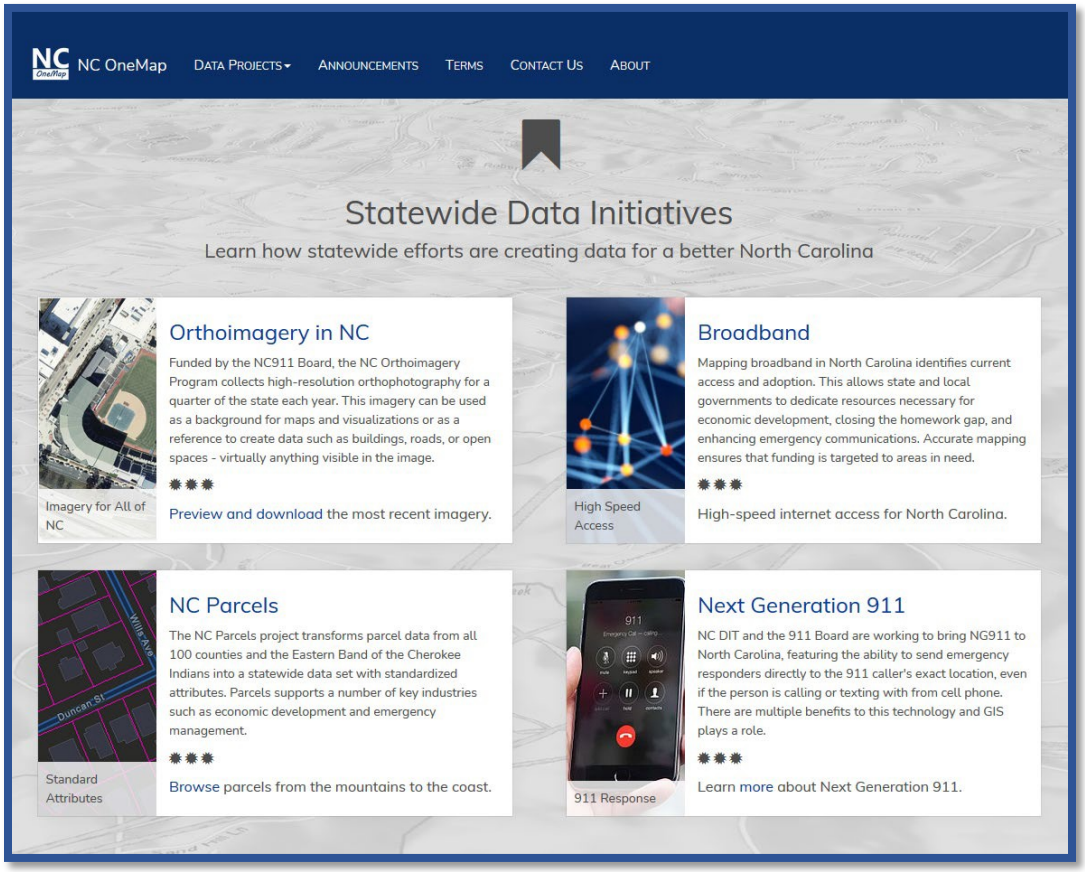

Figure 6 NC OneMap Statewide Data Initiative Portal

The effectiveness of *NC OneMap* stems from the extensive content and collaboration with state, local, and private data producers to provide geospatial information used by surveyors, engineers, land developers, transportation planners, emergency managers, and conservation organizations. Consumption of geographic data continues to grow, and the council continually reviews the data needs of government and private citizens to prioritize framework datasets for update and development.

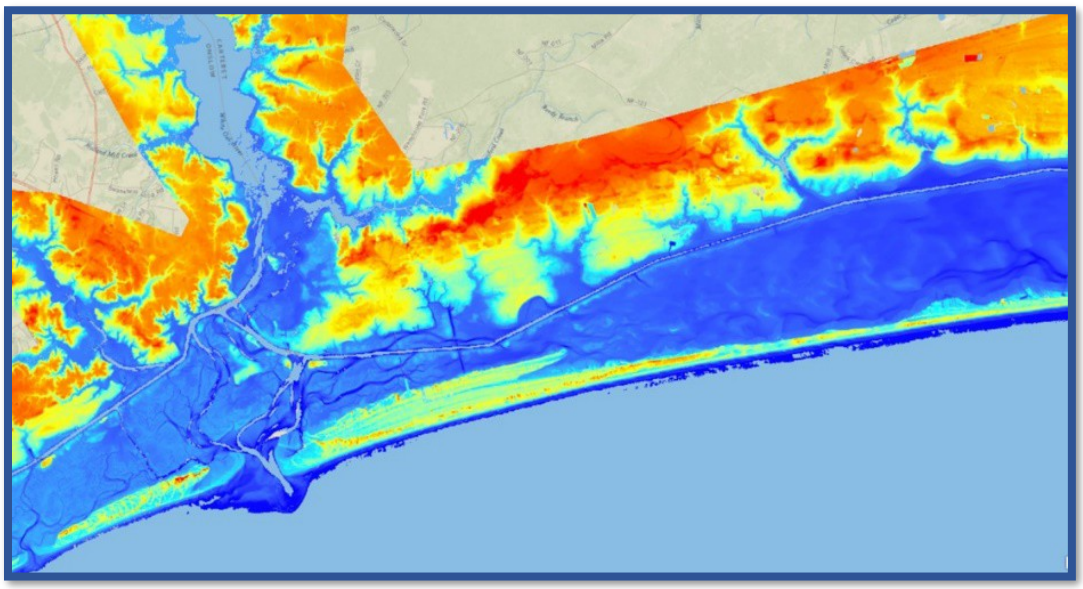

Figure 7: Example of topobathy product with high areas in warm colors and low areas in cool colors.

The SMAC and its many working groups document user needs and propose specifications to standardize framework datasets. The committee works with federal, state, local, and regional organizations to coordinate data development to serve through *NC OneMap*. An ongoing state and federal collaboration has collected and maintained LiDAR data in North Carolina. NCDOT, the U.S. Geological Survey, and the N.C. Floodplain Mapping Program (NCFMP) collaborated to collect high quality elevation data, with the FIC, SMAC, and Orthoimagery and Elevation Working Group setting standards and best practices for the projects. North Carolina's mature elevation program and strong relationships with the federal geospatial community made it an ideal location for the collection of coastal topobathy LiDAR in collaboration with the National Oceanic and Atmospheric Administration. Combined topobathy and coastal LiDAR products collected in FY 19-20 are expected to be available in the fall of 2021. Responding to requests from the surveying community, the SMAC coordinated with the NCFMP to create a contour dataset, a value-added product from existing investments. Additionally, the data managers at NCFMP have been using LiDAR data to extract

building footprints that will update the current framework building footprint layer used by emergency managers, local planners, and PSAPs. LiDAR building extraction is far less time intensive than tracing building outlines on orthophotography and is another example of the savings provided by the availability of high-quality data.

Collaboration for Land Information

Accomplishment: In 2019, all 100 counties in NC updated their parcels in the seamless parcel dataset, and many began updating quarterly into 2020. Support for Census 2020 continued with data collection and quality review assistance for the Local Update of Census Addresses (LUCA) and Boundary Annexation Survey (BAS).

Figure 8 2019 orthoimagery with addresses and seamless parcel datasets in Charlotte, NC

North Carolina is a national leader in maintaining a seamless parcel dataset achieving an "A+" in the NSGIC Geospatial Maturity Assessment. The council collaborated with all 100 counties and the Eastern Band of Cherokee Indians to realize a longtime goal to compile, publish, and maintain statewide standardized parcels (boundaries and property information). The dataset is in a maintenance phase and has become a model for other

framework datasets and relies on close local-to-state cooperation and coordination. For FY 19-20, a goal of updating all 100 counties was met, with many counties encouraged to begin updating quarterly instead of annually. The LGC is a primary partner in collaborating with counties to encourage more frequent parcel data updates.

Consistent, complete, current, accessible parcel boundaries with information about location, use, size, and value saves time and money for public and private business processes. Statewide parcel data informs decisions in economic development, emergency management, transportation planning, land development, utility management, public health, and forestry, among other applications. Businesses benefit from the collection of parcels across county boundaries. For example, Duke Energy uses parcels to determine land ownership when creating and maintaining utility rights of way and when engineering new transmission lines.

Current parcel data for all counties are available from *NC OneMap* in the event of a natural disaster that might interrupt county data operations. N.C. Emergency Management (NCEM) used this parcel data to assess damage from recent hurricanes. The North Carolina Office of Recovery and Resiliency uses parcel information in identification of targeted mitigation and recovery efforts. The U.S. Census Bureau is applying parcel boundaries to improve census geography in support of a complete, accurate, defensible count of NC residents.

As always, counties are the authoritative sources of the most current and detailed parcel data. For detailed research on specific properties, data consumers are directed to online county map viewers and county geographic information system (GIS) contacts.

In preparation for Census 2020, the GICC directed multiple efforts to provide accurate base data to support LUCA, and the BAS. The council initiated the Municipal Boundary Workgroup to realize a single statewide accurate municipal boundary layer. Using the Statewide Seamless Parcels layer as a model, the workgroup has tested a process of sharing locally maintained municipal boundaries to a statewide layer. The new statewide layer will provide efficiencies and eliminate duplication of effort, providing an important single source for the BAS as well as state applications to support emergency management, transportation, and others going forward.

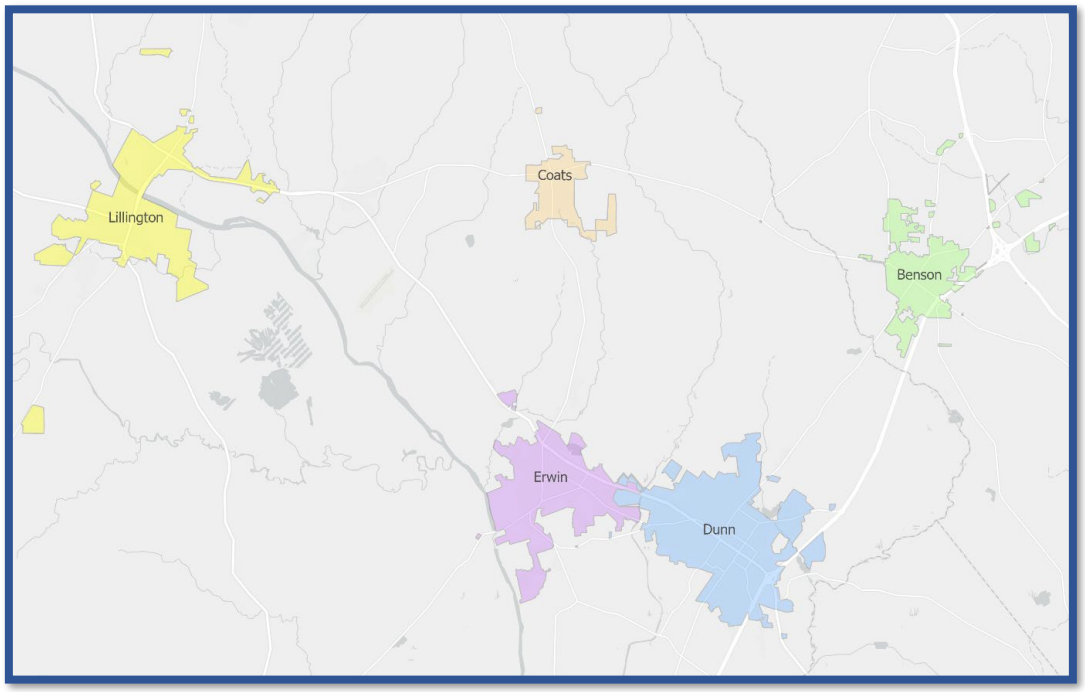

Figure 9 NCDOT Powell Bill City Boundaries: one source of city boundaries for NC

Collaboration for Imagery Quality and Efficiency

Accomplishment: The Statewide Orthoimagery Program processed phase 4 (Southern Piedmont and Mountains) completing the second four-year cycle. The program collected Phase 1 (Coastal counties) with the addition of the Color Infrared band (CIR) to enhance imagery products as it begins a new acquisition cycle.

The Statewide Orthoimagery program, funded by the N.C. 911 Board, delivers a consistent and current visual reference for emergency communications, and serves as a foundational layer for most online mapping in the state. The program updates a quarter of the state's counties each year on a rotating basis with high-resolution, consistent, and accurate orthoimagery.

The CGIA has managed the Statewide Orthoimagery Program since 2012, in collaboration with the council, its committees and working groups, and the following partners:

- N.C. 911 Board;
- N.C. Department of Transportation's Photogrammetry Unit;
- Department of the Secretary of State's Land Records Management Program;
- N.C. Department of Public Safety's Geodetic Survey; and
- Local government PSAPs and GIS units.

Prior to the statewide effort, the N.C. 911 Board received approximately $96 million in requests over a four-year period from local governments for orthoimagery projects. The four-year statewide project ending in 2019 was completed at approximately $13 million, a savings of as much as $83 million from the previous funding method. About 77% of the cost is for services by private contractors, contributing to the state's economic vitality by sustaining private jobs in photogrammetric services. The statewide collection means counties do not need to spend time and money on imagery procurement and related budget proposals, contracting, and project management. For many rural counties, the four-year state cycle provides imagery more frequently than counties could afford otherwise.

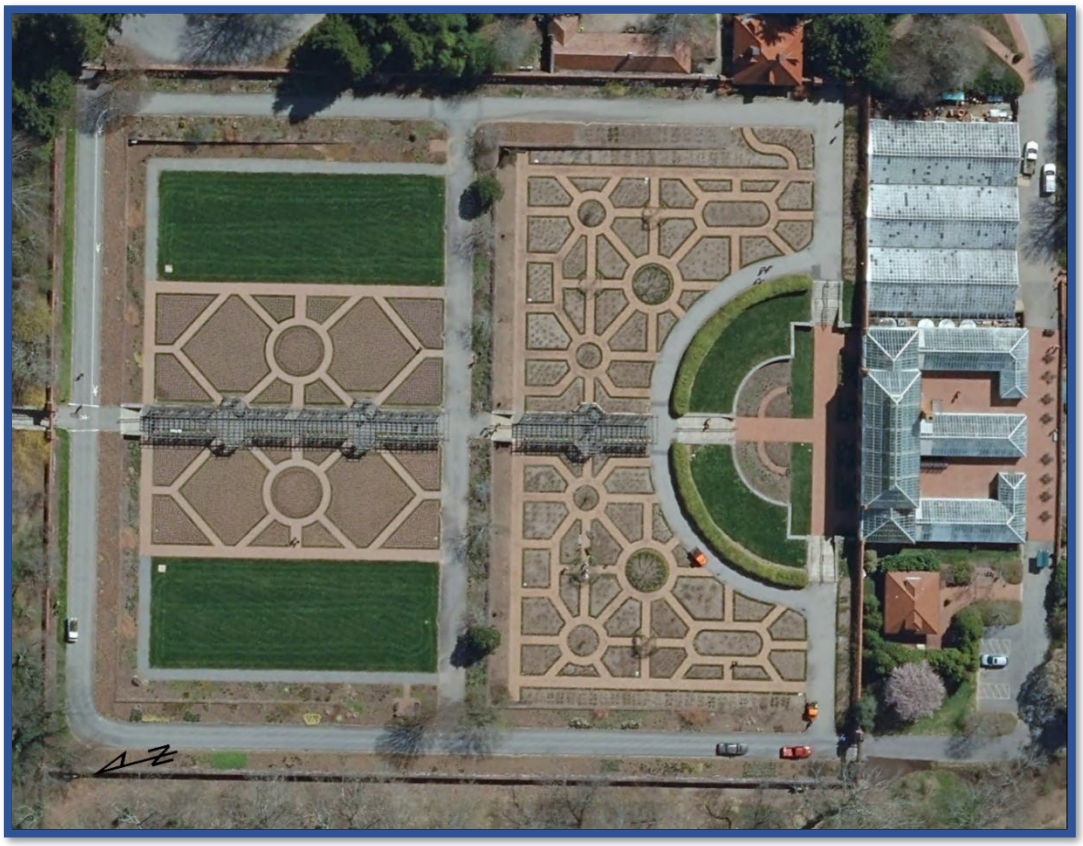

Figure 10 Biltmore Gardens orthoimagery 2019

The imagery is available to state, local, federal, and regional government agencies, as well as the private sector, the academic community, and private citizens as map services and downloadable files from *NC OneMap*. Benefits include saving time in locating and responding to emergencies, saving time informing business decisions, and avoiding the cost of erroneous information from out-of-date or less accurate imagery and map features. An example of orthoimagery with date of capture is shown in Figure 11.

The orthoimagery program distributes countywide imagery extending seven miles beyond the county border to each county. If each county acquires address data from neighboring counties to go along with imagery, PSAP operators will be more likely to (a) recognize an address via cellphone as outside their primary response areas, (b) confirm that address, and (c) transfer the call as quickly as possible to the appropriate PSAP in the adjoining jurisdiction. This data could potentially save seconds and minutes, and ultimately lives.

New to the program in FY 2019-20 was CIR imagery, the delivery of the near infrared band in addition to standard red, green, and blue (i.e., natural color) imagery. The program began a new cycle of collection on the coast in early 2020, and the fourth band

adds value for many applications. Because the internal cell structure of healthy plants reflects the near infrared wavelength, CIR imagery is useful in monitoring plant and crop health. CIR imagery can also be used to help analyze soil moisture properties, estimate timber yields, prioritize recovery efforts after forest fire, or estimate stormwater run-off. Additionally, CIR imagery produces a sharper image because there is better penetration through atmospheric haze than normal color imagery. North Carolina was able to provide this value-added product at a minimal increase, less than 1.5% of the approved budget of $4.1 million.

Figure 11 Coastal Golf Community next to salt marsh. Photo on the left is CIR imagery, and the right is true color imagery.

Technical Assets and Developments

Accomplishment: The GICC, LGC, and individual council members reviewed the introduction of Differential Privacy into the 2020 census and made recommendations regarding impact to local governments and state agencies.

Confidentiality of census data is protected by Title 13 of the U.S. Code, but with the sophistication of new computing algorithms, the Census Bureau determined that additional measures are necessary to safeguard individual privacy. The census has always taken measures to safeguard individual identities, and the new method of "differential privacy" brings privacy protection to modern levels. Since 2000, the Census Bureau has used data swapping as a primary method to protect personal identities. This disclosure avoidance system means that published data are not the same as raw data.

With differential privacy, the Census Bureau will report state populations as enumerated, but other levels of geography will vary from the raw data to varying degrees. Rural areas and smaller populations of specific racial groups are likely to see a greater variance from raw data. Bob Coats, the Governor's Census Liaison in OSBM, continually updated the council and workgroups on updates to plans for changes to differential privacy.

Accurate census data is critical to local government operations and private industries. To better understand the potential impact to the citizens of North Carolina, the council coordinated with the LGC to poll members on the ways they use census data and which data they rely upon. The poll revealed local governments use census data at multiple geographic levels including block, block group, and tract. They routinely use the data for decision making for public health, community planning, transportation planning, economic analysis, and allocation of funds. State and federal programs where funding is determined by census counts include school, transportation, Medicare, and Medicaid funding. Additionally, redistricting, sales tax distribution, and population analysis all rely on accurate census data. Inaccurate data has the potential to impact analysis and planning functions of local government and result in less efficient and effective governmental operations.

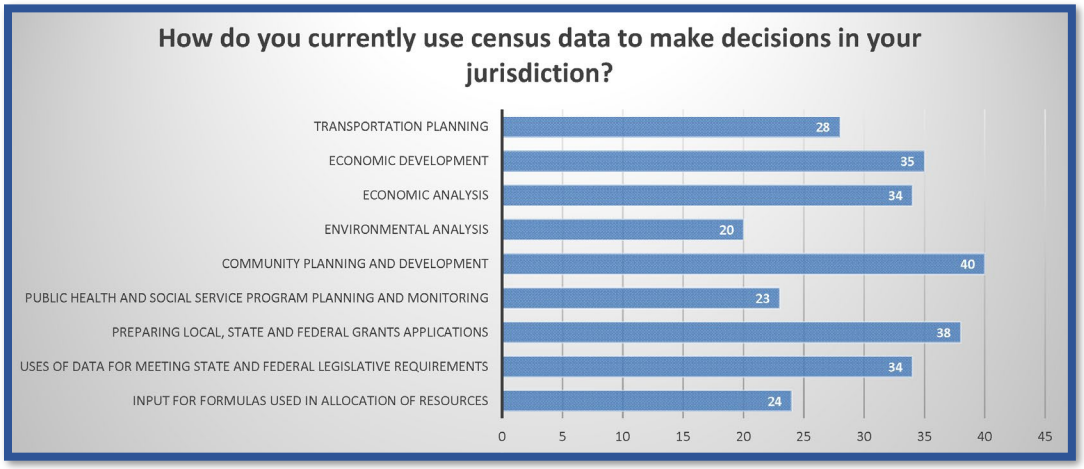

Figure 12: Local Government Committee Survey results of 50 municipalities indicating the number using census data for the applications listed. Differential privacy changes could affect the results of these applications.

The council review of differential privacy resulted in a letter to the Census Bureau outlining the survey responses of impacts to local government services and funding. The council continues to monitor and communicate the changing landscape as the Census Bureau refines its new method of differential privacy.

Governance for Geographic Information

Accomplishment: The council met regularly and engaged committees and working groups in carrying out initiatives. It continues to be the focal point for engagement in collaboration opportunities, as envisioned by the General Assembly.

The council brings together stakeholders from state, local, regional, and federal government, educators, and private businesses to provide collaborative coordination for geospatial governance. Committees and working groups, composed of producers and consumers of geographic information, recommend plans, strategies, priorities, and initiatives for geographic data and technologies. Through engagement with stakeholders at all levels, quarterly meetings, and working groups, the council continually reviews state and federal developments that could affect the geospatial community.

At the state level, the council continued a process of defining the current practice of GIS professionals in consideration of changes in geospatial technology that enable greater accuracy in the digital representation of such features as roads, buildings, fire hydrants, and timber stands. The challenge for GIS governance is to clarify differences between the practice of GIS and the practice of professional land surveying, in collaboration with the N.C. Board of Examiners for Engineers and Surveyors, in ways that meet the respective responsibilities of the council and the board. A working group of the council defined use cases and practical decision points to help guide GIS practitioners, presented the use cases at professional conferences, and sought comments and review from GIS and surveying communities.

Under the leadership of council member Gary Thompson, representing the N.C. Geodetic Survey, the council reviewed the federal changes to the upcoming 2022 Reference Frame. The new datum will replace the existing North American Datum of 1983 (NAD83) and the North American Vertical Datum of 1988 (NAVD88) and will rely primarily on global navigation satellite systems and gravimetric geoid modeling. The Statewide Mapping Advisory Committee formed the 2022 Reference Frame Working Group to evaluate the impacts of the replacement on state and local governments and the surveying and mapping industry and to recommend practical solutions for 2022 Reference Frame implementation for North Carolina's framework datasets.

Council member Thompson brought a related issue to the council concerning the reference frame change, that of the depreciation of the U.S. Survey Foot. Since 1959,

there have been two definitions of the foot in use in the U.S: the “international foot” and the “U.S. Survey foot.” The difference between the two is minimal. The U.S. Survey Foot is 2 parts per million longer than the international foot, or 0.01 foot per mile. When large distances are used, as in surveying and mapping, this seemly small difference becomes a problem and has associated costs. Council member Thompson reviewed the history of the two-foot problem with the council and presented options. The council asked the SMAC to review the issue and bring forth a recommendation. At the spring quarterly meeting, the SMAC recommended a switch to the international foot beginning with the 2022 datum and the GICC adopted the recommendation. Because of the wide-reaching effects to framework datasets in NC, educating data providers and preparing for this change will be a council priority in the coming years.

Sharing Information and Knowledge

Accomplishment: The LGC created an outreach team to better educate local government GIS professionals about GICC initiatives, available GIS resources, and statewide projects of value to local governments.

Outreach and education are keys to data-driven collaboration. The council meets quarterly to update the geospatial community in North Carolina, but the committees, members, and support staff continually reach out to relevant communities to promote GICC initiatives, educate data consumers about new products, and coordinate with local governments. Multiple council members and committee members as well as CGIA support staff presented on GICC topics at the N.C. Property Mappers Association Fall Conference in October 2019. Topics covered included updates on NextGen 911, municipal boundaries, Census 2020, the 2022 Datum change, and county boundaries. Council members also maintain a continuous conversation with the geospatial community across the state to ensure that local governments are aware of best practices, state programs, federal grants, and regional GIS initiatives, and inform state agencies of beneficial local datasets.

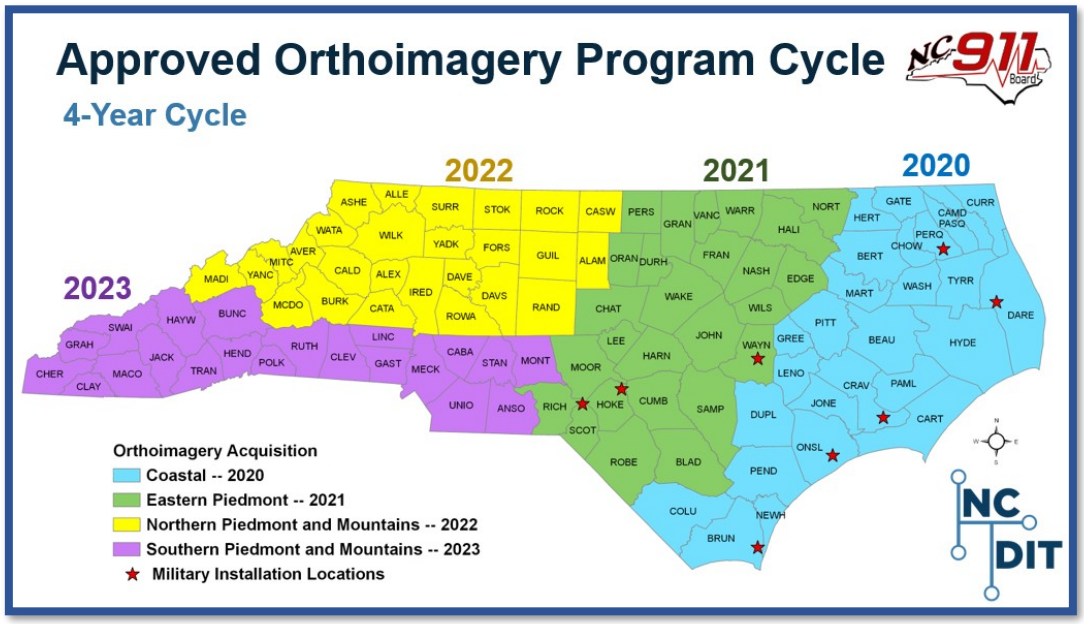

Figure 13: CGIA staff member Ben Shelton's NCAUG Fall 2019 conference Orthoimagery Program Update

The LGC created a new outreach team specifically to better reach a wider audience in the local governments. Multiple LGC members are on the board of the North Carolina ArcGIS Users Group and the Fall 2019 conference featured trainings and presentations on council priorities. Local governments attended training on "*Understanding when GIS data is ready for NG 911*" to assist them in preparing data for the NG 911 project. Updates were given on the Orthophotography program, hydrography framework dataset, and emergency response. LGC members gave updates to the statewide community on local projects including the "*Greensboro Fire SAR Assessment Application*," and "*The Role of GIS in the Aftermath of Hurricane Florence*."

The council maintains a national presence through staff support membership in the National States Geographic Information Council (NSGIC). North Carolina was represented at the Fall and Spring NSGIC meetings and participated in the Geospatial Maturity Assessment. Through these interactions on a national level, the council draws attention to its successful programs and learns from policies and initiatives in other states. For example, the council hosted representatives from South Carolina wanting to learn more about the council as they considered establishing a similar organization. In addition, North Carolina frequently attracts attention from other states based on nationally recognized geospatial efforts including statewide orthoimagery and LIDAR Programs, providing information to other states who wish to learn from its success.

The council leverages *NC OneMap* and the GICC website to provide dependable sources of geospatial data and information on its many ongoing projects.

Future Priorities

The GICC's priorities for the future remain centered around data-driven collaboration and continual improvement of access to data products. FY 20-21 priorities cover adoption of new federal standards, census support, emergency coordination, and improving access to data that will save time, money, and lives.

Data improvement

- Centralize municipal boundary data into an authoritative source, and pilot a maintenance process.
- Continue support for the collection and dissemination of vital orthophotography and elevation datasets.
- Update AddressNC address point database.
- Improve Seamless Parcel attribute consistency.
- Evaluate the feasibility of increased coverage and availability of infrastructure data layers.
- Coordinate with Duke Energy to add electrical easements to *NC OneMap*.

Community Coordination

- Update *NC OneMap* to enhance data access and GIS community engagement.
- Finalize PLS/GIS use cases and distribute findings of the workgroup to the broader community.
- Organize the 2021 NCGIS conference to educate and engage GIS professionals statewide.

Standards Development

- Develop standards for statewide hydrography and evaluate methods for more accurate stream data.
- Improve access to infrastructure data and recommend standards and best practices for data sharing.
- Update NC Metadata standards documentation and tools to reflect changes in federal metadata standards and improve metadata adoption.

For more information about the council, including the latest meeting information and contact information for members and staff, please visit the website at https://it.nc.gov/gicc .