



LELAND

RESILIENT COASTAL COMMUNITIES PROGRAM

Resilience Strategy | January 2022



PREPARED FOR
THE TOWN OF LELAND



FUNDED BY
N.C. DIVISION OF COASTAL MANAGEMENT



PREPARED BY
CONSULTANT



Town of Leland Resilience Strategy

1.0 Executive Summary

In March 2021, the Town of Leland was selected to participate in Phase 1 and 2 of the North Carolina Resilient Coastal Communities Program (RCCP), administered by the North Carolina Division of Coastal Management (NCDQM). The Program is a federal-state-local partnership designed to help overcome barriers in coastal resilience and adaptation planning, boost local government capacity, and support a proactive, sustainable, and equitable approach to coastal resilience planning and project implementation. Since March, Moffat & Nichol (M&N), in partnership with the Town, has reviewed existing plans and resources, conducted three Community Action Team (CAT) meetings, and obtained public feedback through a public survey and a public meeting to develop a Resilience Strategy. The Resilience Strategy, as described further in this report, includes a Risk & Vulnerability Assessment Report and a Project Portfolio to help better reduce exposure, reduce sensitivity, and increase adaptability to flooding and other hazards. Phase 1 and 2 of the Program were completed in January 2022. Following completion of Phase 1 and 2, the Town will be eligible for Engineering, Design, and Implementation funding through the Program's future phases, anticipated to be available in Spring 2022. The Town will continue to seek feedback from residents on priorities and implementation opportunities.

This report discusses the various components of the Leland Resiliency Strategy. It consists of the following seven subsections:

- 1.1 Vision & Goals
- 1.2 Community Action Team
- 1.3 Community Engagement Strategy
- 1.4 Review of Existing Local and Regional Efforts
- 1.5 Risk and Vulnerability Assessment Report
- 1.6 Project Portfolio
- 1.7 Additional Files

1.1 Vision & Goals

The Town of Leland, M&N, and the Community Action Team (CAT) worked together to develop a community-specific vision and set of goals which established the local context for the RCCP program and to help guide subsequent steps. The community vision and goals drew from existing sources of information, such as:

- Previously identified goals or vision statements developed by the community as part of other planning or budget processes; or
- Natural hazard events such as hurricanes, or trends such as increased flooding frequency; or
- Community demographics such as particularly vulnerable or disadvantaged populations.

The **vision** is intended to be an aspirational statement for where the Town wants to be in the future, particularly in relation to coastal hazards.

The **goals** are intended to be specific, measurable goals to help the community identify steps that can be taken to achieve the vision. The goals could relate to preparedness, recovery, community engagement, construction and restoration, etc. The community goals reflect the triple-bottom line approach to resilience, which goes beyond traditional hazard mitigation and disaster recovery to develop a holistic strategy considering social, environmental, and economic factors.

1.1.1 Vision Statement

The approved Leland RCCP Vision statement is, “To promote the health, safety, and overall well-being of the residents, visitors, and patrons of Leland by creating a more resilient community, particularly with regard to floodplain and stormwater management, sheltering and evacuation, data and research, transportation and infrastructure, community planning, communication, economy, and the environment.”

1.1.2 Goal Statements

The approved Leland RCCP Goal Themes and Statements are:

1. **Floodplain and Stormwater Management.** Evaluate and identify specific risks and vulnerabilities, particularly with regard to FEMA flood zones and stormwater problem areas, and establish projects and activities to evaluate, communicate, and provide solutions to reduce those risks
2. **Sheltering and Evacuation.** Identify, establish, and provide information on facilities for use as shelters and staging areas, and identify key roadways within the community for emergency evacuations and mobility during disaster events.
3. **Data and Research.** Update and use the most recent data and innovative research to inform and support resilience activities within the community.
4. **Transportation and Infrastructure.** Create solutions for critical building and transportation infrastructure with regard to flood hazards within the community.
5. **Plans, Policies and Ordinances.** Review, revise, and implement/enforce plans, policies, and ordinances, including land use, zoning, and inspections, and incorporate incentives for strong resilience practices within the community.
6. **Communication.** Enhance education, communication, and collaboration within the community, particularly with regard to vulnerable populations in flood-prone areas, as well as outside the community with neighboring jurisdictions, County departments, State agencies, and regional and Federal resources.
7. **Economics.** Work with appropriate stakeholders and partners to enhance the economic viability and resiliency of the local economy.
8. **Environmental.** Identify nature-based solutions that restore the natural beneficial functions of floodplains and wetlands to help alleviate flooding, reduce health and safety risks, and enhance the environmental appeal of the community.

The vision and goals are listed in further detail in *Appendix A: Vision and Goals*.

1.2 Community Action Team

To begin the Risk & Vulnerability component of Phase I, the Town of Leland created a Community Action Team (CAT) of key stakeholders to provide targeted input and champion the effort. Building relationships, trust, and shared understanding among key stakeholders set the foundation for implementing resilience action. The CAT was developed by the Town, with guidance and support from Moffatt & Nichol (M&N). In keeping with the RCCP Planning Handbook, issued by The North Carolina Division of Coastal Management (NCDCM), the CAT members were selected based on their expertise in planning and community development, hazard mitigation, utility management, engineering, the community’s economy, engaging with vulnerable and underrepresented populations, and familiarity with nature-based solutions. Members stem from roles such as municipal/county managers, planners, elected officials, utility managers, community and economic developers, business community representatives, disaster recovery coalitions/groups, councils of government (COGs), state and federal land managers, non-governmental organizations (NGOs), private organizations, and other roles which work with the community on resilience planning.

The CAT was intended to be comprised of a diverse group of at least five members. M&N worked directly with the Town of Leland to develop a CAT roster. The Town chose various individuals based on their knowledge, familiarity, and ability to contribute to the RCCP.

The following members comprised the Leland RCCP Community Action Team:

Affiliation	Contact Name*
Town of Leland	Adrianna Weber
Council of Government	Pat Batleman
Town of Leland Planning Board	Debbie Willis
Town of Leland	Neil Brooks
Town of Leland	Ben Andrea
Town of Leland	Matthew Kirkland
Town of Leland	Brannon Richards
Town of Leland	Dawn Friedman
Town of Leland	Wyatt Richardson
Town of Leland	John Grimes
NC Coastal Federation	Lauren Kolodij
Cape Fear River Watch	Kemp Burdette
H2GO	Bob Walker
WMPO	Abby Lorenzo
Brunswick County VOAD	Ed Wiehs

*Contact email is listed in Appendix B: Community Action Team.

The CAT met three times over the course of Phase I and II:

- CAT Meeting #1: July 7, 2021, from 2:00 p.m. to 3:30 p.m.
- CAT Meeting #2: September 28, 2021, from 2:00 to 3:30 p.m.
- CAT Meeting #3: December 6, 2021, from 2:30 to 4:00 p.m.

All meeting minutes, presentations, and a full list of stakeholder contact information are listed in *Appendix B: Community Action Team*.

1.3 Community Engagement Strategy

To ensure participation from public stakeholders, a community engagement strategy was developed to outline a plan for engaging communities during the risk and vulnerability assessment and project planning, prioritization, and selection. The community engagement process worked towards the following:

- Promoting representation and equitable outcomes for marginalized communities and vulnerable populations;
- Building trust, relationships, and partnerships;
- Providing feedback and validation of the Risk & Vulnerability Assessment developed by the Community Action Team; and
- Assisting with prioritizing projects for Phases 3 and 4 of the Program.

M&N developed a Community Engagement Strategy to create a roadmap of the planning process for Phases 1 and 2 of the Leland RCCP. The strategy presented the Team's initial considerations, the roles and responsibilities of the various parties, the outreach process over the course of the two (2) phases, the project schedule, and the outreach tools, techniques and strategies to be implemented by the Team. These tools, techniques and strategies included: a Community Action Team (CAT), a Risk & Vulnerability Assessment webpage, one (1) public meeting, a project information fact sheet, planning resources (available on the webpage), one (1) public participation survey, a social media campaign, and leveraging local news outlets (newspaper, press release, and printed outreach material).

As the Leland Resilient Coastal Communities Program (RCCP) kicked off and began the process moving into Phase 1, Risk & Vulnerability Assessment, the M&N Team (Moffatt & Nichol) worked in close collaboration with Adrianna Weber, Leland Town Engineer, on the various outreach components.

1.3.1 Project Website

M&N worked with Town staff to develop the website content to present information on the RCCP planning process. The Town of Leland built a project webpage, <https://www.townofleland.com/environmental-resiliency>, which launched on July 5, prior to CAT Meeting #1. The website provides latest news, introduction and background, program sponsor, ways to stay connected, the process forward, planning resources, and available presentations and downloads. The website is intended to be updated throughout the planning process with relevant news, documents, and meeting material for public record. The Town is committed to maintain the website to allow residents to receive updates on the Town's resiliency actions. The webpage outline is available in *Appendix G: Additional Files*.

1.3.2 Project Fact Sheet

A project fact sheet was developed to provide the public information on the planning process, as well as project contact information and links for interested parties to engage in the planning effort. The fact sheet was made available on the project webpage and was distributed by the Town of Leland to the community through their various outreach channels. The project fact sheet is available in *Appendix G: Additional Files*.

1.3.3 Social Media Campaign

During the community engagement strategy development, a social media campaign was created by M&N and Town staff. The campaign included posts, images, and a posting schedule to accompany the various outreach efforts of the project and align with information presented on the project webpage. The Town of Leland shared this information on their various outreach channels and were able to have others reshare the information on their respected channels for greater outreach and engagement. The social media campaign is available in *Appendix G: Additional Files*.

1.3.4 Public Survey

A public survey was created, in which the goal was to obtain concerns and priorities from the public to further inform the threats and vulnerabilities the residents and business owners within the Town of Leland feel are most critical to address. The survey was developed on SurveyMonkey. It was also provided as a hard copy survey for the Town of Leland to distribute, when appropriate. The survey launched on July 19 and was open until mid-September. The survey took approximately 12 minutes to complete. The Town of Leland shared the survey link through various outreach channels. 112 survey participants completed the survey.

The survey provided valuable information to the project team, focusing on what the community felt were their top concerns and priorities. Leland survey participants stated flooding caused by storm surge and/or rainfall from tropical systems, flooding caused by thunderstorms and intense rainfall, and stormwater are residents' top concerns. Residents indicated their top planning priorities are protecting critical facilities, preventing development in flood hazard areas, and protecting and reducing damage to utilities. The full survey report and survey summary results sheet are available in *Appendix G: Additional Files*.

1.3.5 Public Meeting

A hybrid public meeting was held on August 25 from 6:00 to 7:00 p.m. 17 attendees participated in the public meeting. The public meeting was a general presentation and discussion providing a foundation and framework of the project. The Team explained how community input will help contribute to the larger community vision for success and resilience. The community was tasked with collaborating with the Team to help develop solutions. The public meeting presentation and meeting minutes are available in *Appendix G: Additional Files*.

The Leland RCCP Stakeholder Engagement Strategy is listed in *Appendix C: Community Engagement Strategy*.

1.4 Review of Existing Local and Regional Efforts

After forming the Community Action Team (CAT), the Team conducted a review of existing plans, ordinances, policies, and programs to identify work that has already been completed by the Town. The Team began with an inventory of relevant resources, then compiled information on the following key areas:

- Critical assets and natural infrastructure
- Social vulnerability
- Risk assessments
- Resilience-related projects

The Town was advised land use/development projects may also be considered and later included in the risk assessment. Once a review of existing data and information was complete, the Team identified and documented the additional data and resources necessary to complete the community's vulnerability and risk assessment, including:

- Inventory of critical assets and natural infrastructure
- Social vulnerability data
- Best available economic data

The review of existing local and regional resources focused on the following areas of overlap: inventory of critical assets, sea level rise projections, risk assessments, and resilience-related projects. Additionally, the review identified and filled data and information gaps for risk assessment inputs.

The Leland RCCP Review of Existing Local and Regional Efforts is listed in *Appendix D: Review of Existing Local and Regional Efforts*.

1.5 Risk and Vulnerability Assessment

The risks, vulnerabilities, and degree of exposure to natural hazards within the Town of Leland and its population, built environment, and natural infrastructure now and into the future was examined. The assessment included a review of the direct impacts to critical facilities, natural infrastructure, property, and population. Responses from a community-wide public survey aided in providing information on direct impacts experienced by residents. Direct impacts from flooding are concentrated around the Town's major water bodies. Many critical assets and properties within the Town are located outside of the 100-year flood zone, however, some properties, including residential, lie within the floodplain and should be key considerations in future land use planning.

The Town of Leland is vulnerable to natural hazards including flooding, sea level rise, and storm surge due to its coastal proximity to the Cape Fear River and local watersheds. The methodology used in this assessment helps to provide a better understanding of the degree of vulnerability of certain features as well as the associated risks. Critical facilities, natural infrastructure, property, and the population are in some cases, located in areas within the Town boundary that demonstrate higher risks and vulnerabilities to these natural hazards, providing crucial information for land use and conservation planning. These features were qualitatively assessed using Geospatial Information Systems (GIS) mapping and utilizing data from a variety of sources including local, state, federal, and non-profit agencies.

Social vulnerability was assessed using the Center for Disease Control (CDC) guidelines. According to the results, the census block at the north of the Town showed the highest vulnerability followed by the growing residential area at the west end of the Town.

Loss estimates obtained using GIS were used to quantitatively assess vulnerability. Loss estimates included numbers of buildings, and critical facilities located in the identified hazard areas, an estimate of the potential losses to vulnerable structures. Additionally, an overall vulnerability score was assigned to each critical asset using input from CAT members and Town staff. The governmental buildings in the Town were ranked to have higher vulnerability according to the survey results.

The Town of Leland's Risk and Vulnerability Assessment is provided in *Appendix E: Risk and Vulnerability Assessment*.

1.6 Project Portfolio

In Phase 2, M&N worked with the Town, the CAT, and community members to identify, plan, and prioritize a combination of policy, nonstructural, structural, and hybrid actions, including the use of natural and nature-based solutions (NNBS), organized within a project portfolio. The Town of Leland's Project Portfolio is provided in *Appendix F: Project Portfolio*.

The Town of Leland had previously identified several ongoing and new solutions to be included in the Project Portfolio, resulting in fourteen projects to be further analyzed for Phase 3: Feasibility, Engineering and Design. These projects range from traditional infrastructure, such as elevating or relocating lift stations out of the floodplain, nature-based solutions such as stormwater wetlands and hybrid solutions that may require stream crossing assessments and retrofits.

The Southeast Aquatic Resources Partnership (SARP), a partner of the Cape Fear River Partnership, will support the Town of Leland's evaluation of barriers and stream crossings through funding from the National Fish and Wildlife Foundation. A standardized protocol will be used at over 35 high priority road stream crossings within the Town boundary in summer 2022 to determine if a culvert or structure is a barrier for fish, constricts flow, or is in poor condition. This inventory and feasibility analysis will help to prioritize projects for the Town of Leland for future implementation.

1.6.1. Funding Coastal Resilience

The DCM has received about \$545,000 from the National Fish & Wildlife Foundation Coastal Resilience Fund and \$1.15 million from the General Assembly to continue and expand the RCCP. DCM is currently drafting a "Request for Applications" (RFA) for Phase 3 of the RCCP. Phase 3 will fund the Engineering and Design of a prioritized project. It is estimated a total of \$40,000 will be available for each selected project. The Phase 3 RFA is anticipated to be posted in early 2022 (with an application deadline of March 2022).

Phase 4 RFA is anticipated to be posted late summer/early fall 2022.

1.7 Additional Files

1.7.1. Geospatial Information Systems Methodology

The data used in this assessment was obtained from a variety of sources, including federal, state, and local agencies, as well as nonprofit organizations. These data sources, along with their corresponding maps and feature layers are displayed in **Table 1**. Some data was not explicitly given and had to be calculated. For instance, the data obtained from the US Census provided the number of individuals in the total population for each block group as well as the number of individuals in each age range in the Census data. In the social vulnerability maps displaying vulnerable age groups (65 years and older, under five years, and under 18 years), the percent of population under/over each age range was calculated using ArcMap field calculator. In each map's attribute table, calculations were obtained by inputting "Age65Plus (or AgeUnder18 or AgeUnder5) / Total_Popu" where "Total_Popu"

indicates the total number of individuals in that block group. This number was then multiplied by 100 to obtain a percent. The same methodology was used to create the Percent Under Poverty map with Census data.

Table 1. List of Maps, feature layers displayed in each map, and data sources for each feature layer data set used for all GIS map products included in Risk and Vulnerability Assessment.

Map	Data/Feature Layer	Data Source
Natural Infrastructure	<ul style="list-style-type: none"> Streams Wetlands 	<ul style="list-style-type: none"> https://data-brunswickco.opendata.arcgis.com/ https://deq.nc.gov/about/divisions/coastal-management/coastal-management-data/setback-factor-maps-1998-shoreline/coastal-wetlands-spatial-data#Wetlands
Critical Features And Flood Zones	<ul style="list-style-type: none"> Fire Stations (proposed and existing) Medical Facilities Senior Living Facilities Day Care Centers Schools Government Buildings Lift Stations Culverts Flood Hazard (NCFRIS) 	<ul style="list-style-type: none"> https://data-brunswickco.opendata.arcgis.com/ and Town of Leland Same as above Same as above Same as above Same as above Same as above Town of Leland, and H2GO Same as above https://fris.nc.gov/fris/Download.aspx?FIPS=019&ST=NC&user=General%20Public
Municipal Zoning Parcels and Flood Zones	<ul style="list-style-type: none"> Municipal Parcels Flood Hazard (NCFRIS) 	<ul style="list-style-type: none"> https://data-brunswickco.opendata.arcgis.com/ https://fris.nc.gov/fris/Download.aspx?FIPS=019&ST=NC&user=General%20Public
Storm Surge Inundation	<ul style="list-style-type: none"> Storm Surge Inundation (SLOSH model), hurricane categories 1-5 	<ul style="list-style-type: none"> National Storm Surge Hazard Maps - Version 2 (noaa.gov)
Sea Level Rise Inundation	<ul style="list-style-type: none"> Sea Level Rise (1-10 ft) 	<ul style="list-style-type: none"> https://coast.noaa.gov/slrdata/
Previous Hurricane Flood Inundation	<ul style="list-style-type: none"> Hurricane Matthew and Hurricane Florence areas of inundation 	<ul style="list-style-type: none"> The Nature Conservancy, 2020
FEMA Flood Zones	<ul style="list-style-type: none"> 100-Year Flood Zone 500-Year Flood Zone 	<ul style="list-style-type: none"> North Carolina Flood Risk Information System (NC FRIS)

Additionally, some feature layers were created manually. For instance, the Parcel IDs were given for lift stations in the Critical Features and Flood Zones map and had to be found using Brunswick County GIS Data Viewer to identify the latitude and longitude of each point. After the coordinates were identified, these points were created manually in ArcMap by inputting the coordinates as a new point in the feature layer. Many other critical facilities were created this way as well, including some of the schools and medical facilities, seeing as Brunswick County GIS Data did not have all the newly developed facilities in its data collection. For these facilities, building addresses

were provided by Town staff. Similarly, Brunswick County GIS Data Viewer was used to identify latitude and longitude coordinates and points were created manually using these coordinates in ArcMap.

Some feature layer data was modified for the purpose of readability and simplification. For example, the SLOSH data obtained from the National Oceanic and Atmospheric Administration (NOAA) for use in the Storm Surge map displayed dozens of colors and various ranges for each hurricane category. New fields were added to the attribute table in ArcMap to collate all shapefiles within the range for each category and color coding was applied to the entire field, so that each hurricane category would be represented by a single color for easy readability.

To create the Municipal Zoning Parcels and Flood Zones map, a similar methodology to the Storm Surge Map was used. A new field was created in ArcMap to assign each parcel a category based on its zoning code (commercial, residential, industrial, or other/open space). Brunswick County zoning records as well as Town of Navassa zoning records were used to identify the various zoning codes given to each parcel and assign each a category in the new field. For example, there were numerous zoning codes, some county and some municipal, that coded for multiple types of residential parcels, and multiple types of commercial parcels, etc. The multiple county and municipal codes were categorized as one of the four designated groupings, providing for easier readability.

Additional files, such as mapping products and all outreach material, can be found in *Appendix G: Additional Files*.

PROJECT CONTACT

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