

# Resilient Coastal Communities Program *Ocracoke Resilience Strategy*

**PREPARED FOR**



**NC Division of Coastal Management**  
400 Commerce Avenue  
Morehead City, NC 28557

**PREPARED BY**

**Kimley»Horn**

NC License #F-0102

421 Fayetteville St., Suite 600  
Raleigh, NC 27601  
(919) 653-2961

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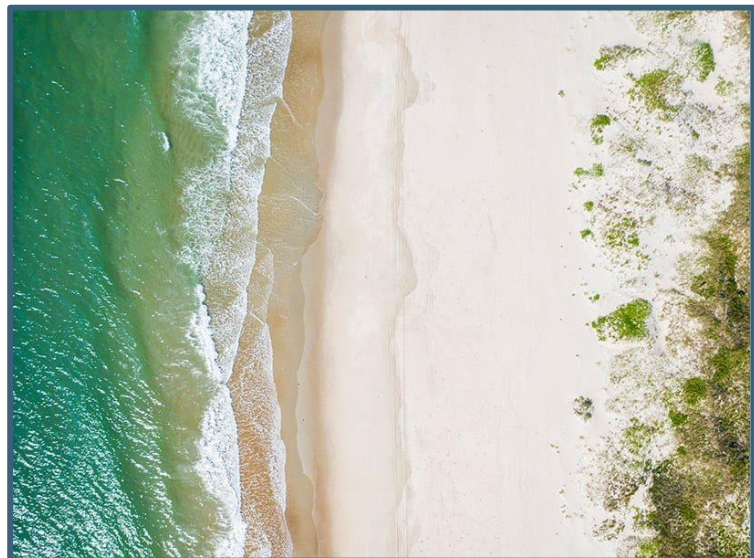


Photo Source: Visit Ocracoke NC Website

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The costs shown herein are planning level and not based on any itemization of project elements. Use of the costs contained herein should include additional contingency as determined by user to cover project actual cost of design, construction, administration, easement or right-of-way acquisition, etc.

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## A. Introduction

### A.1 Overview

The Resilient Coastal Communities Program (RCCP) was developed by the North Carolina Division of Coastal Management with the goal of helping to build more resilient communities through thorough planning with technical and financial assistance. This document outlines the deliverables created during Phases 1 and 2. Phase 1 focuses on performing a risk and vulnerability assessment for coastal hazards. Phase 2 focuses on identifying and prioritizing projects to improve the community's response to coastal hazards. Throughout both phases, steps were taken to engage the community through a Community Action Team (CAT) and stakeholder engagement strategy. Additionally, existing efforts, plans, and policies were reviewed.

### A.2 Community Description

Ocracoke Village is a community on Ocracoke Island in Hyde County, NC. The village has a year-round population of approximately 900 residents and has many seasonal residents and tourists in the summer. The northern part of the island is part of the Cape Hatteras National Seashore and is maintained by the National Park Service. The island has shops, businesses, a school, and infrastructure to support the year-round population. Additionally, it has many seasonal businesses and tourism businesses that mainly operate during the tourism season in the summer. Ocracoke has had 8 hurricanes pass within 60 miles of the island in the last 10 years and 7 tropical storms [1]. The island was notably impacted by Hurricane Dorian in 2019. The island experienced about 7 feet of storm surge in the village from Hurricane Dorian [2]. The village experienced widespread impacts with critical facilities such as the health center being closed for a month. Following Dorian, most of the Ocracoke School was severely damaged. The school is currently in the process of being rebuilt. Dorian impacted the island on September 6, 2019 and the island was not able to open to visitors until December 2, 2019. Ocracoke Island is only accessible by ferry and NC 12. Due to increasing coastal hazards, residents have reported frequent ferry cancellations and road washouts that isolate them from their community. The following figures show examples of flooding experienced on Ocracoke Island.



Figure 1: NC 12 on Ocracoke Island following Hurricane Dorian



Figure 2: Intersection in Ocracoke Village during high tide event.



Figure 3: Back Road in Ocracoke Village following a rainstorm.

### A.3 Definitions and Terms

Throughout the document, the following definitions and terms will be referenced.

1. *Resiliency* [3]– The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption
2. *Community Action Team (CAT)* [4] – A group of key stakeholders that provided targeted input throughout the program
3. *Vulnerability* [3]– The propensity or predisposition of assets to be adversely affected by hazards.
4. *Risk* [3]– The potential for negative consequences where something of value is at stake.
5. *Hazard* [3] – An event or condition that may cause injury, illness, or death to people or damage to assets.

**B. Vision and Goals**

The vision and goals for the project were developed with the Community Action Team (CAT) as described in Step 2 of Phase 1 [4]. The vision focuses on where the community wants to be in the next 10 years in relation to coastal hazards. The goal statements identify the steps the community wants to take to reach the vision. The vision and goals were designed to consider the triple bottom line approach to resilience by considering people, the planet, and profit. Vision and Goals statements developed by the CAT are shown in **Figure 4**.



**Figure 4: Ocracoke Resilient Coastal Communities Program Vision and Goals**

The vision and goals were developed at the first CAT meeting. The CAT was presented with examples and definitions of vision and goal statements. Additionally, the consulting team explained the triple bottom line approach. The CAT reviewed the example statements and highlighted any pieces that they thought were applicable to their community. Following the review of the examples, the project consultants lead a brainstorming discussion. The CAT was presented with a series of questions and discussion points related to the vision and goals statements. Examples included discussions on coastal hazards faced by the community and ranking of community priorities. The consulting team then presented the CAT with draft statements which the CAT revised for their community as appropriate. Following the meeting, the consulting team sent out a shared document for the CAT to continue revising the goal statements. After feedback was provided, the statements were selected.



**C. Community Action Team Report**

**C.1 Introduction**

The Community Action Team (CAT) was developed in line with Step 1 of Phase 1 [4]. Members were selected with the goal of identifying key stakeholders to provide targeted input and champion the efforts. Additionally, an effort was made to create a diverse team with a variety of experience. Throughout the project, CAT meetings were held to get targeted input from the community throughout the process. These meetings were focused on the community vision and goals, critical assets and critical natural infrastructure, local hazards and calls for action, and vulnerability solutions. Additionally, the consulting team reached out to the CAT for assistance engaging the community throughout the project and providing local knowledge.

**C.2 Community Action Team Development**

The Community Action Team (CAT) was selected by the Grant Administrator and County Manager after reviewing the requirements of the Program Handbook with Kimley-Horn staff. Kimley-Horn provided the Grant Administrator and County Manager with a form that detailed the CAT selection guidelines and criteria and worked with the village to select the Community Action team. The table below reflects the selected members of the CAT for Ocracoke Island:

**Figure 5: Ocracoke CAT Members**

| <i>Name</i>      | <i>Organization/ Stakeholder Group</i>  | <i>Title</i>                            | <i>Contribution / Reason Proposed</i>   |
|------------------|---|---|---|
| Randal Mathews   | Hyde County Board of Commissioners  | Commissioner                            | Hyde County BOC- Ocracoke Township, NC 12 Task Force Member                         |
| Dave Hallac      | Cape Hatteras National Seashore, National Parks Service (NPS)                 | Superintendent, NPS of Eastern NC       | Decision maker for park service. NC 12 Task Force Member                            |
| Bob Chestnut     | Surf Ocracoke / Ocracoke Civic and Business Association / Occupancy Tax Board | Business owner, Community Member        | Community Leader on Ocracoke. NC 12 Task Force Member                               |
| Jennifer Garrish | Hyde County School Systems Teacher / Mosquito Control Board                   | President of the Mosquito Control Board | Retired Science teacher and on the Mosquito Control Board.                          |
| Susie Rockel     |   | Small business owner                    | Family history in Ocracoke, small business owner, past work with resiliency issues. |
| Sara Teaster     | Hyde County   | Grant Administrator                     | Administrative lead for tasks associated with CAT group.                            |
| Tom Pahl         | Hyde County   | Former County Commissioner              | Former County Commissioner that served during Hurricane Dorian                      |

C.3 Meeting Summaries

C.3.1 CAT Meeting 1 – Community Vision and Goals

*Meeting Agenda*

Location: Microsoft Teams  
 Time / Date: 11 am 10/12/2021  
 Subject: RCCP CAT Meeting 1

Introduction of CAT members

- Welcome and Introduce CAT Members
- Summary of RCCP project and goals
- Role of CAT members

Introduction of Meeting Topic: Vision and Goals

- Example statements and goals from other communities

Drafting of Community Specific Vision and Goal Statements

- Discussion on community specific vision and goal statements
- Draft community specific vision and goal statements
- Finalization of vision and goal statements if consensus reached

Next Steps

- CAT framework
- Project next steps

*Attendees*

- |                                |                        |                          |
|--------------------------------|------------------------|--------------------------|
| • Travis Crissman (KHA)        | • Danielle Curri (KHA) | • Tancred Miller (DCM)   |
| • Bob Chestnut (CAT)           | • Dave Hellac (CAT)    | • Jennifer Garrish (CAT) |
| • Sara Teaster (Administrator) | • Randal Mathews (CAT) | • Susie Rockel (CAT)     |

*Minutes*

The consulting team began the meeting by giving an overview of the project and the steps outlined in the Planning Guide. Each of the steps in Phases 1 and 2 were highlighted and the final deliverables were reviewed. Next, the consulting team reviewed the role of a CAT member. CAT members were asked to provide local insight and expertise, help set vision and goals, provide targeted input, and encourage community engagement. The consulting team requested that the members actively participate, be transparent, consider alternative ideas, work towards an optimal solution, and think big. The consulting team then shifted to the main objective of the meeting of setting the project vision and goals. The CAT team was presented with definitions of vision and goal statements and an explanation of the triple bottom line approach. They were then shown examples from the Pamlico Sound Regional Hazard Mitigation Plan (PSRHMP) and other community plans. They were asked to reflect on the statements and highlight anything that resonated with their community. Next, the consulting

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team led a brainstorming session to frame the discussion towards their specific community. The CAT discussed challenges they have faced from coastal hazards and priorities of the community. Following the discussion, the consulting team shared some draft vision and goal statements. The community action team reviewed the statements and revised them per their community.

From the discussion and formation of the vision and goals, the following key points were identified:

- Ocracoke Island is only accessible via ferry and NC 12. The South Dock Ferry Terminal and NC 12 Dune System are already facing frequent impacts and stops in service due to tidal flooding. This has been the focus of a NCDOT Task Force.
- There has been a lot of focus on NC 12 which is crucial to the village and maintaining the island community. However, there are increasing flooding problems within the village on secondary roads that have not been studied.
- Since a large part of the island is the Cape Hatteras National Seashore, the community and National Parks Service are both stakeholders on the island.
- The mosquito ditches serve as the main drainage system throughout the island, and they are managed by the Mosquito Board.
- The CAT stressed the importance of maintaining quality of life on the island. Quality of life has been impacted due to accessibility issues from the ferry system and NC 12. Additionally, secondary roads in the village are frequently flooded blocking access. This impacts businesses and residents' daily lives.

Following the drafting of the vision and goals, the consulting team reviewed the next steps of the project and the CAT.

A consensus was not reached at the meeting and the drafting continued over a shared document. The community action team ultimately selected the following statements:

Vision: "To plan for a community ready to actively prepare for increasing coastal hazards while promoting accessibility, economic welfare, and high quality of life for residents."

Goals: "Prepare village infrastructure and community for the effects of long-term rising sea levels and to respond to more frequent flooding. Promote community welfare by reducing road and ferry downtime, business impacts, and disruptions to daily life caused by coastal hazards."

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C.3.2 CAT Meeting 2 – Critical Assets and Critical Natural Infrastructure

*Meeting Agenda*

Location: Email  
 Time / Date: 11/9/2021 – 11/17/2021  
 Subject: Critical Assets and Public Engagement

Critical Assets and Infrastructure

- Review of list prepared by Sara and consulting team

*Attendees*

- |                                |                        |                          |
|--------------------------------|------------------------|--------------------------|
| • Travis Crissman (KHA)        | • Danielle Curri (KHA) | • Tancred Miller (DCM)   |
| • Bob Chestnut (CAT)           | • Dave Hellac (CAT)    | • Jennifer Garrish (CAT) |
| • Sara Teaster (Administrator) | • Randal Mathews (CAT) | • Susie Rockel (CAT)     |

*Minutes*

Given the delay starting the Ocracoke RCCP, the critical asset CAT Meeting was held through an interactive exercise via email. First, the consulting team met with grant administrator, Sara Teaster, to identify critical assets within the community. These assets were mapped using Google My Maps. The map and some directions were sent to the CAT members to provide additions or edits.

The following input was provided through the exercise (paraphrased for documentation):

- Local telecommunications should be added.
- The school should be included as a critical asset. Additionally, the Hispanic Community and others on the island have expressed a need for an island shelter for those that cannot leave during the storm. Some community members that do not have vehicles, live in trailers, or have no place off the island to shelter are not able to evacuate. A designated shelter and functional resource hub for services is needed.
- Churches on the island have functioned as emergency assistance centers and shelters. Additionally, National Park Service (NPS) and Coast Guard facilities should be included. The convenience site for trash should be included.
- There are several critical assets maintained on National Seashore lands within island. These include the Ocracoke Sanitary District, NCDOT Road Maintenance Operations Facility, Viper Radio Station (emergency communications), Ferry Terminals, K96 Cape Hatteras National Seashore Ocracoke Island Airport, Tideland EMC Transmission Corridor. Dave Hallac provided these locations with descriptions of their functionality.

- 
- Based on the feedback provided, the critical assets list was augmented to include the additions. The list was mapped to share at the next in person CAT for final review.
-

C.3.3 CAT Meeting 3 – Local Hazards and Calls for Action

*Meeting Agenda*

Location: Berkley Manner (58 Water Plan Road, Ocracoke, NC)  
 Time / Date: 1:30 pm 12/13/2021  
 Subject: Local Hazards and Calls for Action

- Overview of risk and vulnerability assessment
- Review Critical Assets list
- Review identified local hazards
- Discuss identified local hazards and calls to action
- Discuss Community Engagement
- Project Next Steps

*Attendees*

- |                                |                        |                          |
|--------------------------------|------------------------|--------------------------|
| • Travis Crissman (KHA)        | • Danielle Curri (KHA) | • Mackenzie Todd (DCM)   |
| • Bob Chestnut (CAT)           | • Dave Hellac (CAT)    | • Jennifer Garrish (CAT) |
| • Sara Teaster (Administrator) | • Randal Mathews (CAT) | Susie Rockel (CAT)       |

*Minutes*

To start the meeting, the consulting team gave an overview of the vulnerability assessment portion of the project. They reviewed the steps detailed by the planning guide, input needed from the CAT, and how the vulnerability assessment relates to Phase 2. The consulting team presented the critical assets list that was created over the email exercise and paused for any additional feedback. Next, the consulting team shifted to discussing the objective of the meeting, to get feedback on identified local hazards and calls to action. To begin identifying hazards, the consulting team reviewed the required hazard considerations detailed in the planning guide (flooding (rainfall, tidal, and riverine), storm surge, and sea level rise). Maps of sea level rise/ tidal flooding and storm surge were shown. For rainfall, local knowledge was relied on to identify hot spots. The hazards were presented to the CAT in the form of preliminary maps showing the community and the hazard extents. Members held a discussion regarding the geographic extents of the hazards and related it to their personal experience. During the Community Action Team meeting, an emphasis was placed on discussing calls to action for the community or events that initiate a community response.

Several Key Points were identified from this discussion:

- The area near the Variety Store and Bank is a hot spot for flooding.
- Back Road frequently has drainage problems and flooding issues.
- Sunset Drive has flooding issues from housing being built up and the water running down into the road.

- 
- School has been canceled recently due to the flooding on Back Road and Sunset Drive.
  - The culverts have aged throughout the village without being maintained. Drainage ditches are not well maintained.
  - A map of rainfall flooding was created in the past. Community action team members will reach out regarding this.
  - Compounding flooding is a large issue from the high tidal flooding, rainfall flooding, and the high-water table.
  - Businesses have had to close because of flooding blocking access to them or the ferry not running.
  - Wind should also be considered in this study.

Following the completion of the hazard identification section, the consulting team gave an overview of the next steps for the CAT and the requirement for the upcoming public meeting. An approach was agreed on to send out a questionnaire and flyer for the public meeting via mail and the community's online resources. The CAT noted that realty companies on the island should be included to make sure non-resident property owners receive the information.

Following the meeting, the consulting team and CAT went on a tour of the village to view hot spots. The following key points were identified.

- NCAT buildings is one of the few large gathering places on the island and is one of the newest and sturdiest buildings. The school was moved here after it was destroyed in Dorian. It should be a critical asset.
  - After Dorian, many critical workers were in long term temporary housing due to destruction in residential areas.
  - Recently Ocracoke Island has had an increase of Hispanic residents. The community has reported many of these residents being unable to evacuate because they do not have cars or a place to stay off the island. Additionally, many of these residents live in trailers that are not safe during storms. During the last storm, the gym was set up for shelter, but it flooded during the storm.
  - The community docks were the main access point for aid following Dorian. Helpers and materials coming to the island were able to access via the docks.
  - Ocracoke Seafood is a hot spot for flooding and is culturally and economically significant to the community.
  - The school is in the process of being rebuilt after Dorian. The new school building will be raised and the gym has flood gates.
  - There is not an existing map of the drainage system. There was a map previously, but it was destroyed from hurricane flooding.
-

- 
- The Mosquito Board does its best to maintain the drainage system but much of the system is not maintained or unknown due to loss of existing map. The Mosquito Board is funded by a tax on the Island.
  - Many properties have been raised over the years. The result is the properties are much higher than the roadway causing the roadways to flood.
  - Hot Spots for roadway flooding include: Back Road at Cedar Drive, Sand Dollar at Old Beach Road, Sunset Drive, Cutting Sage Road at Trent Road, Back Road (North of Mark's Path near Zillies), Oyster Creek Bridges
  - Hot Spots for mosquito ditch flooding include: Widgeon Woods and Loop Road
  - The culverts behind the school frequently flood.

Additional critical assets that should be included: Community Square docks (used as an access point after Dorian), New EMS Station (to be opened May 2023), Local Radio Station, and NCAT Building.

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C.3.4 CAT Meeting 4 – Vulnerability Solutions

*Meeting Agenda*

Location: Microsoft Teams  
 Time / Date: 9:30 am 5/6/2022  
 Subject: Vulnerability Solutions

- Share vulnerability score results
- Discuss project portfolio
- Prioritize projects

*Attendees*

- |                                |                               |                          |
|--------------------------------|-------------------------------|--------------------------|
| • Travis Crissman (KHA)        | • Danielle Curri (KHA)        | • Tancred Miller (DCM)   |
| • Mackenzie Todd (DCM)         | • Dave Hellac (CAT)           | • Jennifer Garrish (CAT) |
| • Sara Teaster (Administrator) | • Randal Mathews (CAT)        | • Susie Rockel (CAT)     |
| • Tom Pahl (CAT)               | • Kris Noble (County Manager) |                          |

*Minutes*

To start the meeting, the consulting team gave an overview of the results of the vulnerability assessment. The CAT compared the results to their local experience. The following key points were identified:

- The CAT expected that the Highway 12 Dunes would be more vulnerable.
- The Fire station was expected to be lower due to it being on a higher elevation parcel.
- The regulatory flood protection elevation has been increased to 9 feet. The new EMS Station plans have been updated to meet his requirement.
- The CAT wants to revisit some of the buildings identified as critical assets. Particularly some of the included privately owned assets.
- Some buildings may have additional adaptive features that were not recognized in the building elevation data. The CAT has been asked to provide feedback on these.

Based on the results, the CAT had questions about some of the data utilized. The consulting team noted they could send the data utilized and the scoring tables to the CAT to review. These were sent following the meeting for additional input.

Next the consulting team, reviewed the identified projects in the project portfolio to gain feedback. From the discussion the following key points were identified:

- 
- While the focus of this project is on the village, the near-term and feasibility projects identified by the Highway 12 Task Force should be included in the resiliency plan. However, the goal is for this project to still focus on localized problems in the village.
  - The CAT agrees that a drainage improvements are needed including short term and long term projects. Before any long-term projects are taken on, they agree that a study of the existing drainage system needs to be performed and a study of alternatives for the drainage system given the complexities of the flooding faced by Ocracoke. They would like to give the Mosquito Board more engineering assistance to continue their role and utilize their funding mechanisms.
  - The CAT did not want to pursue signage-based projects given that it might encourage drivers to proceed through flooded areas.
  - The CAT was interested in pursuing the raising of road grades. However, they noted that there is limited right of way for many of the DOT roads on Ocracoke Island. Additionally, coordination would be required to get the approval of property owners that would be impacted. Studies would need to be done to decide to raise roads above more frequent flooding impacts (tidal flooding, rainfall flooding) or larger flooding impacts such as (riverine flooding and storm surge).
  - The CAT does not want to designate high ground parking areas because they do not want to encourage people to stay on the island. They have had issues of people not evacuating during storms and do not want to give people a false sense of safety. Dave Hellac mentioned the NPS has dealt with large numbers of abandoned cars after storm events, and they do not want to encourage people leaving their cars.
  - The CAT was interested in pursuing portable pumping systems. Dave Hellac mentioned that a permit is required for pumping. The NPS has tried to get a permit in the past but has been unable to do so. The CAT agrees that this would be a good solution if the proper permits could be acquired even if just for a few areas. Tancred mentioned he could provide more information about the permits.
  - County Manager, Kris Noble, mentioned that they are working on adding statutory requirements to the Development Ordinance to make it more enforceable.
  - Following the meeting, a form was sent out for the CAT to prioritize the projects.
-

## D. Stakeholder Engagement Strategy

### D.1 Introduction

The Resilient Coastal Communities Program (RCCP) was developed by the North Carolina Division of Coastal Management with the goal of helping to build more resilient communities through thorough planning with technical and financial assistance. As stated by the *North Carolina Resilient Coastal Communities Program Planning Handbook*,

*“Getting from resilience planning to action requires jointly created ideas, buy-in, and commitment from a diverse group of stakeholders.”*

This document outlines a community engagement strategy to ensure participation from public stakeholders in the program during the risk and vulnerability assessment and project planning, prioritization, and selection.

### D.2 Engagement Approach

The engagement approach was designed with the following four goals in mind based on the *North Carolina Resilient Coastal Communities Program Planning Handbook*:

1. Promote representation and equitable outcomes for marginalized communities and vulnerable populations
2. Build trust, relationships, and partnerships
3. Gain feedback and validation during the risk and vulnerability assessment
4. Gain local assistance with the prioritization of projects

#### D.2.1 Strategies

The engagement approach includes several strategies to ensure the goals are met. The first strategy is to *inform and empower*. Resiliency is a complicated issue and solutions will vary for each community. The engagement plan will work to effectively communicate with participants regardless of their background and empower them to share their own experiences, solutions, and priorities. The engagement will highlight the importance of implementing resiliency strategies and costs of inaction.

The engagement approach is also designed to integrate *online and offline engagement*.

Throughout the process, the engagement plan will work to ensure community members without internet access are given opportunities to participate and engage. The plan will also leverage online engagement tools to reach the community.

As stated in the goals, the engagement approach places an emphasis on *outreach to vulnerable and historically underrepresented community members*. Ocracoke is a village of approximately 900 year-round residents. The northern part of the island is part of the Cape Hatteras National Seashore and is maintained by the National Park Service. Ocracoke Island is a popular tourist destination and is only accessible by ferry. Based on Community Action Team feedback and the historic vulnerability of the entire community, an approach was created with the intention of reaching out to all residents.

Lastly, the engagement approach will include *measurable outreach*. For Ocracoke, the intention is to reach out to all property owners and residents, therefore the measured outreach will be near 100%. Steps are being taken to reach both year-round and seasonal residents. Every household will have the opportunity to provide feedback both via a questionnaire (online or hard copy) and via 2 public meetings to be conducted.

D.3 Elements for Outreach

D.3.1 Community Engagement Stage A: Risk and Vulnerability Assessment

Community Engagement Stage A is focused on getting community feedback and suggestions on identified local hazards during the risk and vulnerability assessment. The Web Content and Print media will leverage *online and offline engagement* to ensure all community members are reached regardless of internet access and to reach seasonal residents that may not be on the island. This will also allow for outreach to *vulnerable and historically underrepresented community members* by aiming to reach all Ocracoke residents. Public meeting materials will be developed to *inform and empower* community members regardless of their knowledge of resiliency. In Stage A, a questionnaire will be used, and public meeting attendance will be tracked to allow for *measurable outreach*.

| Outreach Method   | Schedule      | Intended Audience   | Purpose   | Responsibilities  |  |
|-------------------|---------------|---------------------|---|---|--|
|                   |               |                     |   | Consultant Team   | Grantee Administrator  |
| Web Content       | Early January | Community Members   | <ul style="list-style-type: none"> <li>• Provide background information on the project</li> <li>• Notify the community about the upcoming public meeting</li> <li>• Gather information on a questionnaire</li> </ul>          | <ul style="list-style-type: none"> <li>• Create content (Text, graphics, and questionnaire)</li> <li>• Analyze questionnaire responses</li> </ul> | Upload content to the community’s website and social media outlets.  |
| Print Media       | Early January | All Property Owners | <ul style="list-style-type: none"> <li>• Provide background information on the project</li> <li>• Notify the community about the upcoming public meeting</li> <li>• Gather information on a questionnaire</li> </ul>          | <ul style="list-style-type: none"> <li>• Create content (Mailer and/or questionnaire)</li> <li>• Analyze questionnaire responses</li> </ul>       | <ul style="list-style-type: none"> <li>• Distribute content to all property owners (year-round and seasonal residents)</li> <li>• Display content on community bulletin board</li> <li>• Collect questionnaire in drop box or via mail.</li> </ul> |
| Public Meeting #1 | Late January  | Community Members   | <ul style="list-style-type: none"> <li>• Give an overview on the program and project vision / goals</li> <li>• Collect community feedback on identified local hazards and suggestions on additional local hazards.</li> </ul> | Create meeting materials, facilitate meeting, and summarize feedback.   | Secure meeting location and promote / publicize the meeting.   |

D.3.2 Community Engagement Stage B: Project Development

Community Engagement Stage B is focused on getting community feedback and suggestions on identified potential solutions during the project prioritization. The Web Content and Print media will leverage *online and offline engagement* to ensure all community members are reached regardless of internet access and to reach seasonal residents that may not be on the island. This will also allow for outreach to *vulnerable and historically underrepresented community members* by aiming to reach all Ocracoke residents. Public meeting materials will be developed to *inform* community members about identified projects and *empower* them to share their own ideas and give feedback.

| Outreach Method   | Schedule      | Intended Audience   | Purpose   | Responsibilities  |   |
|-------------------|---------------|---------------------|---|---|---|
|                   |               |                     |   | Consultant Team   | Grantee Administrator   |
| Web Content       | Early-mid May | Community Members   | <ul style="list-style-type: none"> <li>• Provide a summary of the first Public Meeting</li> <li>• Notify the community about the upcoming public meeting</li> <li>• Share results from the questionnaire</li> </ul>         | Create content (Text, graphics)                                       | Upload content to the community's website and social media outlets. |
| Print Media       | Early-mid May | All Property Owners | <ul style="list-style-type: none"> <li>• Provide a summary of the first Public Meeting</li> <li>• Notify the community about the upcoming public meeting</li> <li>• Share results from the questionnaire</li> </ul>         | Create content (Text, graphics)                                       | Distribute content.   |
| Public Meeting #2 | Late May      | Community Members   | <ul style="list-style-type: none"> <li>• Share results from the first questionnaire</li> <li>• Collect community feedback on identified potential solutions.</li> <li>• Summarize the next steps of the project.</li> </ul> | Create meeting materials, facilitate meeting, and summarize feedback. | Secure meeting location and promote / publicize the meeting.        |

#### D.4 Community Involvement Results

In Stage A, a questionnaire and public meeting were used to engage the community. The public meeting was held in the Ocracoke Community Center with a virtual option. Approximately 20 residents participated in the public meeting. The questionnaire received 113 responses which accounts for approximately 13% of the community. Detailed questionnaire results have been provided to DCM. Overall key points from the questionnaire and public meeting are highlighted below:

- 63% of residents reported experiencing temporary limited access to their residence during a non-hurricane related rainfall or high-tide event.
- Residents reported access being limited by water on subdivision street (33%), water on main road (37%), and road washout/ failure at stream crossing (22%).
- 32% of residents reported temporary limited access to a critical facility during a non-hurricane related rainfall or high-tide event. The services most frequently reported included hospital/medical, cable or internet service, school, fuel for automobile, and food / water, respectively.
- 63% of residents completing the questionnaire reported experiencing limited access to their residence during an extreme weather event. The most frequently reported causes were water on main road outside subdivision (55%), downed power lines (50%), downed trees or other debris (50%), and water on subdivision street (44%).
- 55% of residents completing the questionnaire reported limited access to a critical facility or service during an extreme weather event. The most frequent reported critical facility or service affected included cable or internet service (44%), fire department (44%), and hospital / medical (39%).
- When asked if they would donate easements to the village for drainage, 44% responded yes, 44% responded maybe, and one responded no.
- During the public meeting, residents drew hot spots for flooding on a series of mapping products. These were utilized by the consulting team to identify rainfall flooding.
- Residents reiterated the problems with roadway flooding that lasts for days following rainstorms and high tides.

The second public meeting was held on May 25,2022. There were approximately 4 attendees however, the recorded video gained over 140 views online. The consultants presented the proposed project portfolio and provided time for feedback from the community. Overall, the participants agreed on the importance of drainage solutions in the village and partnering with the Mosquito Board. Nature Based Solutions were discussed to identify projects eligible for future RCCP funding.

E. Review of Existing Local and Regional Efforts

E.1 Existing Local and Regional Efforts

As outlined in Step 3 of the Planning Guide, a review of existing plans, ordinances, policies, and programs was performed. During this process, existing resiliency measures in place were identified. These existing measures were built upon and gaps were identified for the completion of the vulnerability and risk assessment. The documents reviewed are listed in **Figure 6**. Summaries of the documents are enclosed in **Appendix A**.

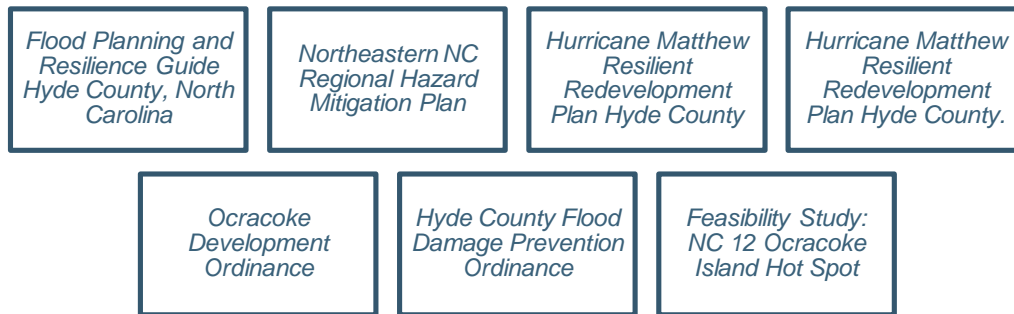


Figure 6: Reviewed documents

E.2 Identified Gaps

From the review of existing local and regional efforts, a series of gaps were identified. These gaps were considered throughout the plan. The identified gaps are shown below in **Figure 7**.

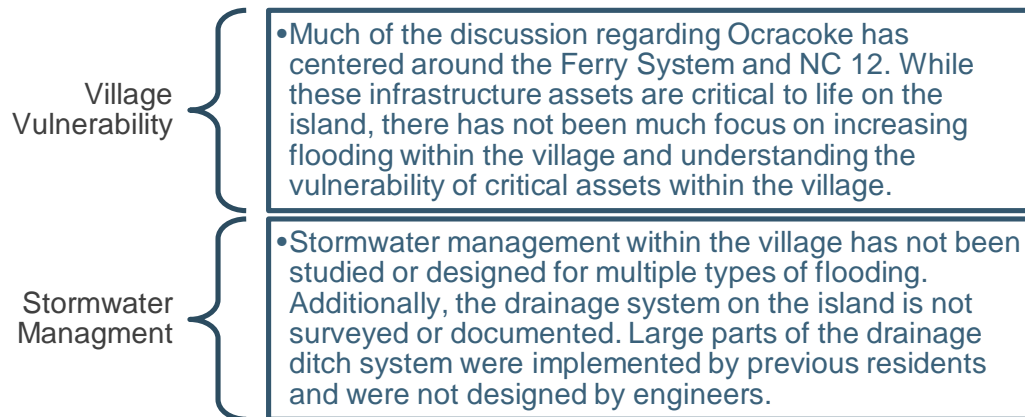


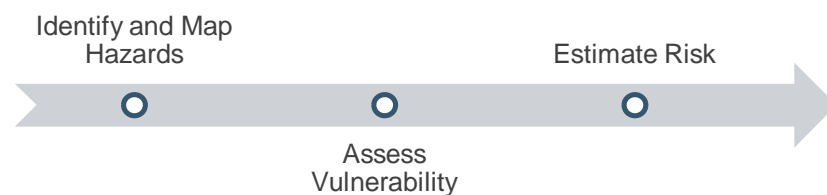
Figure 7: Identified Gaps in Current Local Efforts

## F. Risk and Vulnerability Assessment Report

### F.1 Introduction

The main deliverable of Phase 1 is the Risk and Vulnerability Assessment (RVA) Report. This document outlines process taken to complete the RVA and the results of the RVA. As described in the *Resilient Coastal Communities Program Planning Handbook* [4], the assessment will evaluate risks to the community’s vulnerable populations and critical assets from a number of coastal and climate hazards, including flooding (rainfall, tidal, and riverine), storm surge, sea level rise, and other locally relevant hazards.

The following process was taken to complete the RVA as shown in **Figure 8**. First, hazards were identified with the Community Action Team (CAT) based on their experience and the requirements in the planning guide. Additionally, the consulting team reviewed hazards that were included by existing plans. The consulting team then mapped the hazards and their spatial relationship to the critical assets. This information was used to assess vulnerability based on a vulnerability scoring protocol developed specifically for the RVA. Following the vulnerability assessment, risk was estimated for the critical assets.



**Figure 8: Risk and Vulnerability Assessment Process**

The report and maps created in the RVA will be used to complete Phase 2 of the RCCP which is focused on Planning, Project Identification, and Prioritization. Project needs will be identified based on the vulnerability and risk of the community.

### F.2 Critical Assets

The Critical Assets included in the assessment were identified in conjunction with the CAT based upon FEMA’s Community Lifelines Framework [5]. Minutes of this process are included in **C.3.2**. A community lifeline “enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security” [5]. The critical assets identified in this study focus on the assets within the community and maintaining community accessibility to resources outside of Ocracoke. Since Ocracoke is an island, access is dependent on the ferry system. Additionally, there is a small airport on the island that is also used for emergency medical evacuations. NC 12 is the highway used to access the village via the Hatteras Ferry. A hotspot along NC 12 has been studied and identified by NCDOT. This area is frequently flooded and over washed blocking access to the ferry. It has been included as a critical asset. Descriptions and geolocation of critical assets are provided in **Appendix B**.



### F.3 Hazard Identification

#### F.3.1 Methods

To calculate vulnerability and risk for a community, the hazards faced by the community must be identified and mapped. In conjunction with the CAT, the consulting team identified a series of hazards faced by the community. Minutes of this meeting are included in **C.3.3**. Additionally, an emphasis was placed on understanding community *calls to action* or events that initiate a community response or need for assistance. To begin identifying hazards, the consulting team reviewed the required hazard considerations and located data sources. As required by the RCCP Planning Guide, the following hazards are included in this study: *flooding (rainfall, tidal, and riverine), storm surge, and sea level rise (minimum 30-year projection)* [4]. For rainfall, local knowledge was relied on to identify hot spots. The consulting team also consulted the NERHMP [6] to review hazards identified for the community. Based on the discussion with the CAT, *wind* was added as a hazard considered in this study due to the influence of wind on the tides and high winds faced from frequent storms. The following hazards are considered as a part of this study and the referenced sources to quantify these hazards are shown in **Figure 9**:

**Figure 9: Ocracoke identified Hazards and Utilized Sources.**

| <i>Hazard</i>                  | <i>Source</i>  |
|--------------------------------|--|
| Rainfall Flooding              | NC Spatial Data Download QL2 Digital Elevation Model [7]<br>/CAT Feedback/Public Meeting Questionnaire |
| Tidal Flooding/ Sea Level Rise | NC Spatial Data Download QL2 Digital Elevation Model [7]   |
| Riverine Flooding              | North Carolina Flood Risk Information System [8]   |
| Storm Surge                    | National Storm Surge Hazard Maps [9]   |
| Wind                           | CAT Feedback   |

From discussions with the CAT throughout the project, the following calls to action were identified as shown in **Figure 10**. These events necessitate a response from the community.

**Figure 10: Ocracoke Calls to Action**

| <i>Call to Action</i>    | <i>Response</i>   |
|--------------------------|---|
| Hurricane/Tropical Storm | <ul style="list-style-type: none"> <li>Residents are ordered to evacuate the island. Most residents leave but the CAT is reporting increased residents staying. CAT interested in making sure as many residents leave as possible.</li> </ul> |
| Rainfall Flooding        | <ul style="list-style-type: none"> <li>Many roads within the village are flooded frequently. School has been canceled in the past due to the bus not being able to safely drive through the village.</li> </ul>                               |
| Debris from Storm Event  | <ul style="list-style-type: none"> <li>Community Members clean up debris and try to clear out drainage system. Mosquito Board leads maintenance efforts for mosquito ditches.</li> </ul>  |
| Ferry or NC 12 Closure   | <ul style="list-style-type: none"> <li>Notification to island residents that other travel arrangements will be needed. If ferries are unable to run, mainland access is unavailable.</li> </ul>   |

### F.3.2 Hazard Extents

The identified Hazards were mapped using GIS as shown in **Appendix D**. From the mapping of the hazards and questionnaire responses, the following trends were identified:

- Rainfall can cause roads within the village to be blocked for days by large puddles.
- Tidal flooding / sea level rise impacts properties and roadways in low-lying areas including parts of NC 12. The NC 12 Hotspot and South Ferry Terminal are already being impacted by tidal flooding. During high tides, residents report saltwater flooding within the village.
- Most of the island falls into the 1% Flood Hazard Zone.
- For Category 2 Hurricanes and greater, the entire village is impacted by storm surge.

## F.4 Vulnerability Assessment

### F.4.1 Introduction

The vulnerability assessment focuses on quantifying the vulnerability of critical assets and natural infrastructure to the previously identified hazards. Vulnerability is determined in relation to exposure, sensitivity, and adaptive capacity as defined by the Planning Guide [4] below:

1. *Exposure* – The probability of physical contact between an asset and a hazard.
2. *Sensitivity* – The degree to which asset is impacted by a hazard
3. *Adaptive Capacity* – The current ability of an asset to change its characteristics or behavior in response to a hazard.

Vulnerability is calculated for an asset utilizing the function shown in **Figure 11**.

$$\text{Vulnerability} = \text{Exposure} + \text{Sensitivity} - \text{Adaptive Capacity}$$

**Figure 11: Vulnerability Function**

Additionally, the CDC's Social Vulnerability Index (SVI) was mapped and supplemented with local insight. Ultimately, a vulnerability index was developed to score the cumulative vulnerability for the critical assets while considering social vulnerability.

### F.4.2 Metrics

Based on the Planning Guide and available data sources, a vulnerability index was developed to quantify exposure, sensitivity, and adaptive capacity for each of the identified hazards. The vulnerability index was then used to score the vulnerability for each critical asset and each hazard. For exposure, sensitivity, and adaptive capacity, the scoring for each ranged from 0 to 3. Using the vulnerability equation, the vulnerability score ranged from 0 to 6. High vulnerability is demonstrated by a score greater than 4. Medium vulnerability is demonstrated by a score between 2 and 4. Low vulnerability is demonstrated by a score less than 2. To start, overall general guidelines for exposure, sensitivity, and adaptive capacity were developed as shown in **Figure 12**.

Figure 12: Overall Vulnerability Guidelines

| Score | Exposure                      | Sensitivity                                 | Adaptive Capacity                                       |
|-------|-------------------------------|---|---|
| 0     | Unlikely to occur             | Asset not impacted                          | No implemented solutions                                |
| 1     | Low probability of contact    | Asset minimally impacted (retains function) | Implemented solution to reduce sensitivity              |
| 2     | Medium probability of contact | Asset impacted (loses some function)        | Implemented solution to reduce exposure                 |
| 3     | High probability of contact   | Asset destroyed (loses all function)        | Implemented solution to reduce exposure and sensitivity |

These guidelines were used to define vulnerability indices for each identified hazard to score exposure, sensitivity, and adaptive capacity. The indices were developed based on available GIS data and feedback from the CAT. Boundaries for the scoring were set for each hazard based on the guidelines and data type. The scoring metrics for each hazard are shown in **Appendix F**.

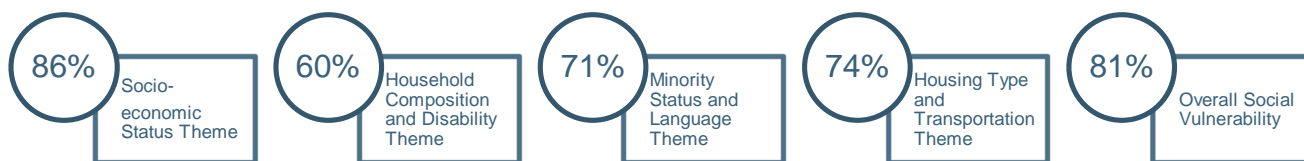
The following assumptions were made when developing the scoring indices.

- When quantifying adaptive capacity on Ocracoke Island, the most frequent type of adaptive capacity encountered was raised buildings. In these cases, the adaptive capacity was assumed to be the same for each type of flooding.
- It was assumed that assets could not have a total vulnerability score less than zero.
- An adjustment was provided to account for *social vulnerability* in the adaptive capacity metrics. If an asset was in a high socially vulnerable area, the adaptive capacity was reduced to represent the difficulty the community faces in recovery due to social vulnerability factors.
- For storm surge, the depth of storm surge from a Category 2 Hurricane was utilized to quantify sensitivity. The storm surge from a Category 2 Hurricane was utilized because in the last 20 years the highest category hurricanes to pass within a 60-mile radius of Ocracoke were Category 2 Storms [9]. In the last 20 years, seventeen tropical storms and hurricanes have passed within a 60-mile radius of Ocracoke Island. Four of these storms were Category 2 events.
- For wind, a data set of sufficient resolution was not located to allow for assessment of Ocracoke. Given the small size of the community and frequency of hurricanes, tropical storms, and tropical depressions, it was assumed that all the critical assets have a high exposure to wind.

F.4.3 Social Vulnerability Findings

The CDC’s Social Vulnerability Index (SVI) quantifies factors that impact a community’s ability to respond and recover from disasters [10]. There are four themes quantified to reach the SVI which include Socioeconomic Status, Household Composition, Race/Ethnicity/Language, and Housing/Transportation. Examples of these factors used to quantify the themes include household income, access to transportation, housing type, housing composition, and language barriers. The themes are mapped in GIS and displayed in quartiles compared to other areas. In the Northeastern NC Regional Hazard Mitigation Plan [6], social vulnerability was not included but community profiles including history, population, housing, and economy were identified.

As a part of the RCCP, social vulnerability was reviewed using social vulnerability data from 2018 [11]. Given the small size of Ocracoke Island, the island is made up of one census tract. Overall, Ocracoke Island has high social vulnerability with the total social vulnerability being in the highest quartile. The Social Vulnerability is mapped in **Appendix C**. In **Figure 13**, the social vulnerability ranking variables are shown, detailing the ranking of the census tract compared to other census tracts in North Carolina. For example, for Overall Social Vulnerability Ocracoke Island is more socially vulnerable than 81% of other census tracts within North Carolina.



**Figure 13: Census Tract including Ocracoke Social Vulnerability**

Some of the variables that contributed to the high social vulnerability included: mobile home estimate, percentage of residents without a vehicle, percentage of persons who speak English “less than well”, percentage minority, percentage over 65, percentage single parent, percentage unemployed and per capita income.

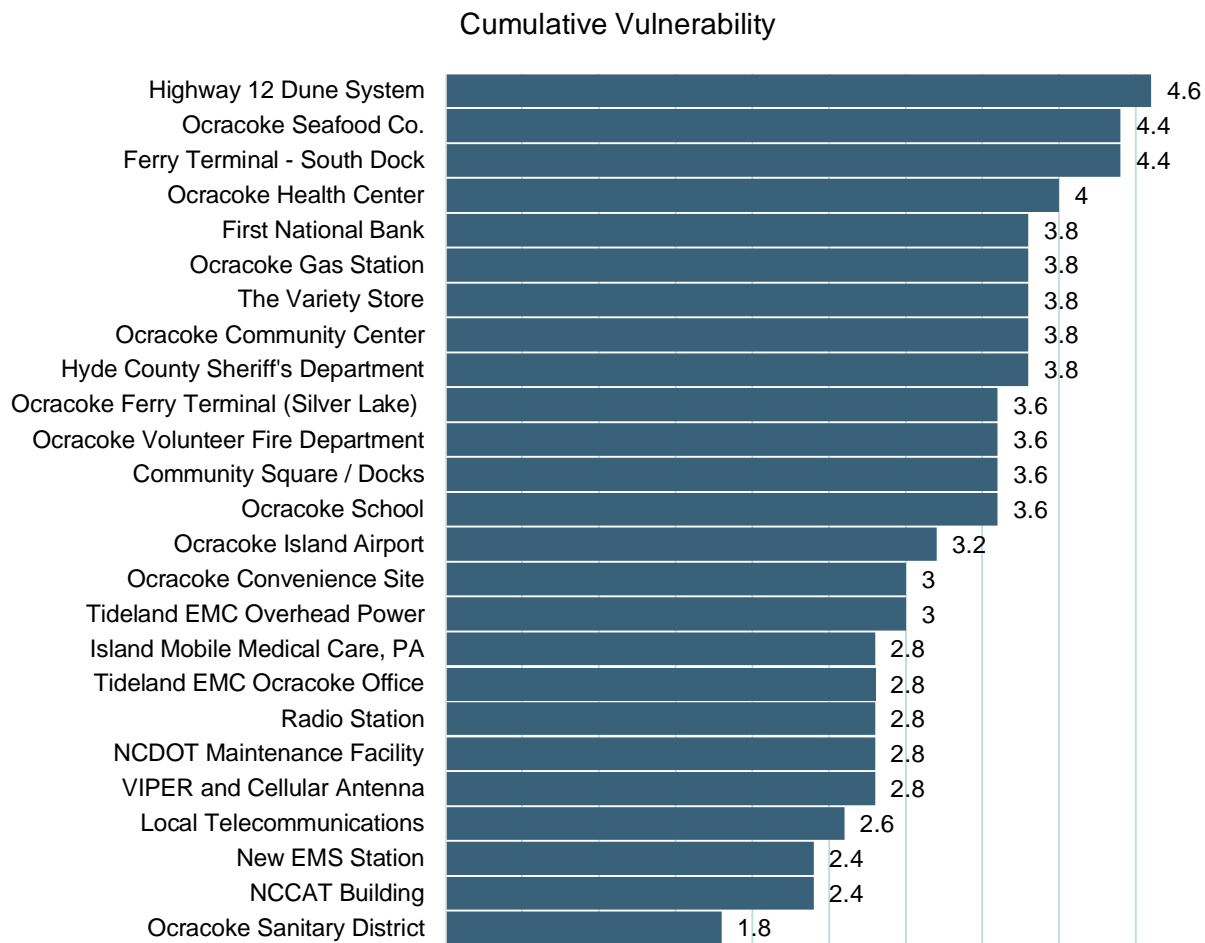
As a part of the RCCP, the social vulnerability for Ocracoke Island was reviewed and supplemented with local knowledge. The community has struggled with responding to coastal hazards due to several factors. The following factors have been noted throughout the planning process that hamper response: transportation access, housing conditions, and property ownership. The factors are described in **Figure 14**. By identifying social vulnerability within the community, officials and responders can identify which areas are more likely to require assistance during hazardous events.

**Figure 14: Factors contributing to Social Vulnerability in Ocracoke Village**

| <i>Factor</i>         | <i>Description</i>   |
|-----------------------|--|
| Transportation Access | <ul style="list-style-type: none"> <li>• Ocracoke Island is only accessible via ferry. The ferry is frequently out of service due to severe weather and high tides. Parts of the South Dock Ferry Terminal have already been lost to erosion and tidal flooding.</li> <li>• Not all residents on the island own vehicles. CAT members report some lower income residents not being able to evacuate because they do not have access to vehicles.</li> </ul>  |
| Housing Conditions    | <ul style="list-style-type: none"> <li>• There are mobile and modular homes on the island that are not built to withstand storms. Additionally, many residents live in temporary structures following a storm while the island rebuilds.</li> <li>• CAT members report that many lower income residents that live in mobile homes do not have vehicles so they cannot evacuate. Their homes are not built to withstand storms.</li> </ul>  |
| Property Ownership    | <ul style="list-style-type: none"> <li>• Given that Ocracoke Island has a large tourism industry, there are many non-resident property owners on the island and many short-term renters. Short term renters are not equipped to handle extreme weather events. Additionally, many non-resident property owners are not equipped to handle extreme weather events because they do not live on the island full time.</li> <li>• CAT members have reported issues with non-resident property owners not evacuating or not being prepared for storms.</li> </ul> |

F.4.4 Vulnerability Findings

Each of the critical assets was run through the scoring metrics to quantify exposure, sensitivity, and adaptive capacity. This was used to calculate the total vulnerability for the critical assets on Ocracoke Island. The cumulative scores for vulnerability, exposure, sensitivity, and adaptive capacity are shown in **Appendix E**. The scoring, vulnerability indices, and results by hazard are shown in **Appendix F**. The cumulative vulnerability score for each critical asset is shown in **Figure 15**.



**Figure 15: Cumulative Vulnerability**

For total vulnerability, *4 critical assets have high vulnerability, 20 critical assets have medium vulnerability, and 1 critical asset has low vulnerability*. Highly vulnerable critical assets include the Highway 12 Dune System, Ocracoke Seafood Co., Ferry Terminal – South Dock, and the Ocracoke Health Center. The average vulnerability score is 3.3 and the median vulnerability score is 3.6. Both values represent the medium vulnerability range. Variations in the scores can be seen in the scoring of their exposure, sensitivity, and adaptive capacity as shown in **Appendix E**.

*Highly vulnerable critical assets include the South Dock Ferry Terminal and the Highway 12 Dune System hotspot which protects NC 12.* These assets are crucial to maintaining access to

the island. The South Dock Ferry Terminal is the main access to Ocracoke Island. The terminal serves the most frequent ferry service to the island and connects the island to the Outer Banks which has many services needed by the community. The South Dock Ferry Terminal is highly vulnerable to all hazards except rainfall flooding. The terminal has already experienced impacts from tidal flooding resulting in the loss of the stacking lanes. These impacts will increase with sea level rise. The terminal is in the 100-year floodplain and projected to experience at least 3 feet of storm surge during a Category 2 Hurricane. For the Highway 12 Dune System, scoring focused on the identified hot spot that is subject to frequent over wash. The Highway 12 Dune System was highly vulnerable to all hazards except rainfall flooding. The hot spot is already frequently breached by tidal flooding which will increase with sea level rise. Additionally, it is in Flood Zone VE (100-year floodplain with storm-induced velocity wave action). The dune hotspot is projected to experience at least 3 feet of storm surge during a Category 2 Hurricane. Over wash or breaching of the dune result in the village being blocked from the South Dock Ferry Terminal.

As a part of the scoring process, adaptive capacity was reviewed while considering social vulnerability. *Most critical assets have low adaptive capacity.* Few building critical assets are raised to the current Regulatory Flood Protection Elevation of 9 feet [12]. Additionally, the high social vulnerability of the community reduces the adaptive capacity of the critical assets. Ocracoke Island is in the highest quartile for overall social vulnerability.

In addition to the critical assets, a high-level review of the road network in relation to hazards was performed. *Most roads within Ocracoke Village are vulnerable to flooding including rainfall flooding, riverine flooding, tidal flooding/ sea level rise and storm surge.* This isolates residents and critical assets. Residents identified a series of hot spots that flood frequently due to rainfall flooding through CAT meetings and public meetings. Key internal village roads such as Back Road have areas that are frequently flooded for days following a rain event. Additionally, most roads on the island are within the 100-year floodplain. Residents report roads flooding during high tides. Many roads within the village have elevations equal to MHHW or +1' above MHHW. These low elevations make them more susceptible to tidal flooding. All roads on Ocracoke Island are modeled to experience storm surge during a Category 2 Hurricane. The vulnerability of the roadway network to flooding is detailed throughout **Appendix F**.

In summary, the key findings of the overall vulnerability assessment include:

- 4 critical assets have high vulnerability, 20 critical assets have medium vulnerability, and 1 critical asset has low vulnerability
- Highly vulnerable critical assets include the South Dock Ferry Terminal and the Highway 12 Dune System hotspots which protects NC 12.
- Most critical assets have low adaptive capacity.
- Most roads within Ocracoke Village are vulnerable to flooding including rainfall flooding, riverine flooding, tidal flooding/ sea level rise and storm surge.



F.5 Risk Assessment

F.5.1 Metrics

After quantifying vulnerability, a risk assessment was performed. Risk is defined as “the potential for negative consequences where something of value is at stake” [3]. Estimating values on Ocracoke Island is difficult given the remote nature of the island, high construction costs, and varying property value records. Additionally, some assets such as the Highway 12 Dune System are critical to access the village so defining the value of the dune is comparable to the island community. Therefore, an approach was taken to estimate the range of the value at risk for each one of the critical assets as shown in **Figure 16**. Hyde County Tax Data [13], NCEM Building Footprint Data [14], and local news articles [15] [16] were utilized where applicable to estimate the building value range. For assets without data available, the range was estimated based on comparable assets and reasonable judgement. These ranges represent best estimate by the engineering team. For future project development and use, a detailed cost estimate should be performed given the unique challenges of Ocracoke Island.

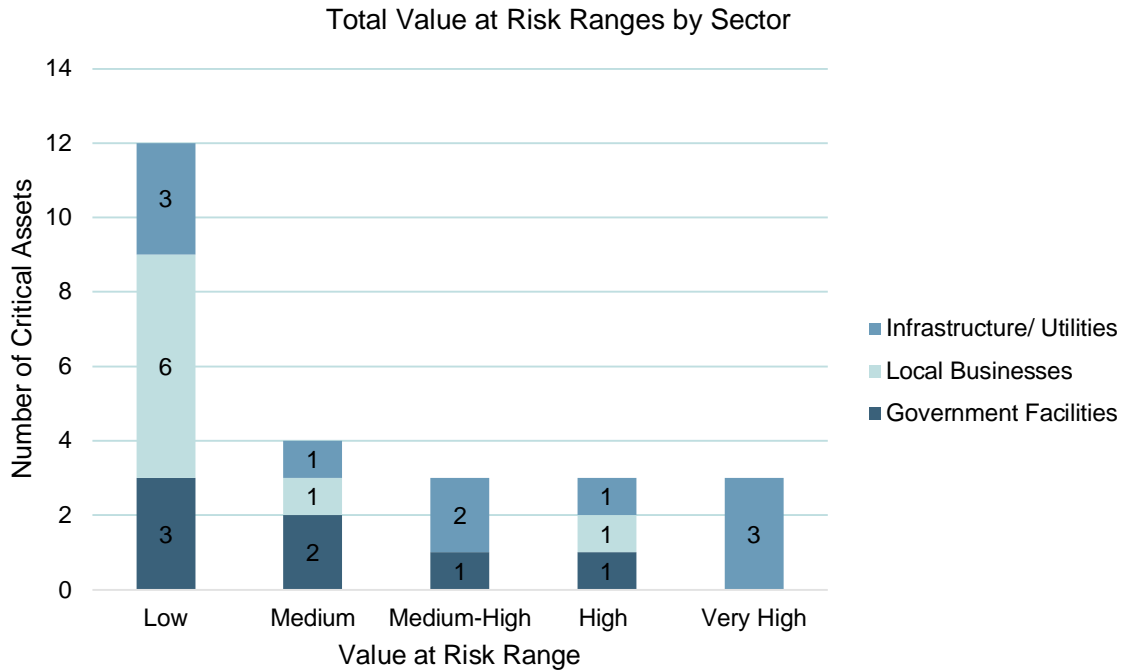


**Figure 16: Value at risk ranges**

The critical assets were grouped into three sectors to quantify damages. The three sectors evaluated were government facilities, local businesses, and infrastructure/ utilities. The classification of each critical asset by sector is shown in **Appendix G**.

F.5.2 Risk Findings

The value at risk range was quantified for each critical asset as shown in **Appendix G**. The total for each sector was compared as shown in **Figure 17**.



**Figure 17: Total Value at Risk by Sector**

Overall, the sector with the highest value at risk was Infrastructure/Utilities. This sector includes three assets in the Very High Category. These assets are critical to maintaining a community on the island and are large pieces of infrastructure including the Highway 12 Dune System, Ferry Terminal – South Dock, and the Ocracoke Ferry Terminal (Silver Lake). The value of these assets is very high in addition to them being necessary to maintain the village on the island. Infrastructure/ Utilities had the highest number of critical assets (11/25) of the three sectors.

The sector with the second highest value at risk was Government Facilities. This sector includes large government facilities such as the Ocracoke School, New EMS Station, and Volunteer Fire Department. While these assets do not provide for island access like the Infrastructure/Utilities sector, they are important to maintaining community operations. The Government Facilities sector contained the least number of critical assets (7/25).

The final sector is the Local Businesses Sector. This sector includes privately run businesses and nonprofits. This sector contained 8 critical assets. Most of the critical assets in the Local Business Sector were in the low value range because of small or limited facilities. Many of the critical assets in this sector are housed in singular buildings. These facilities are important for community life, but temporary loss of access is less urgent than other critical assets.

## F.6 Conclusion

The RVA validated the feedback given by the community throughout the planning process. Ocracoke Island is vulnerable to coastal hazards including riverine flooding, tidal flooding, storm surge, rainfall flooding, and wind. Overall, 4 critical assets have high vulnerability, 20 critical assets have medium vulnerability, and 1 critical asset has low vulnerability. Highly vulnerable critical assets include the South Dock Ferry Terminal and the Highway 12 Dune System hotspots which protects NC 12. These critical assets are crucial to provide access to Ocracoke Island. Most critical assets have low adaptive capacity which is influenced by the high social vulnerability of Ocracoke Island. Lastly, most roads within Ocracoke Village are vulnerable to flooding including rainfall flooding, riverine flooding, tidal flooding/ sea level rise and storm surge.

**G. Project Portfolio**

**G.1 Introduction**

During Phase 2, the consulting team worked with the CAT and community members to identify, plan, and prioritize projects to increase the resiliency of the community. The identified projects address vulnerabilities identified in the RVA. In addition to infrastructure actions, policy based, and nature-based solutions were considered. For each of the projects, the type of solution, cost, timeline, and priority rating were defined in the ranges shown in **Figure 18**.

**Figure 18: Project Portfolio Ranges**

| <i>Type of Solution</i> | <i>Cost</i>                 | <i>Projected estimated timeline</i> | <i>Priority Rating</i> |
|-------------------------|-----------------------------|-------------------------------------|------------------------|
| Infrastructure          | Low (\$0-\$50,000)          | 0-6 months                          | Low                    |
| Plans and policies      | Medium (\$50,000-\$200,000) | 6-12 months                         | Medium                 |
| Ordinances              | High (\$200,000-\$500,000)  | 12-24 months                        | High                   |
| Non-regulatory programs | Very High (\$500,000+)      | 24+ months                          |                        |

Additionally, funding opportunities were identified for each project. The following funding opportunities were reviewed. The funding program, acronym, and source are shown in **Figure 19**.

**Figure 19: Reviewed Funding Opportunities**

| <i>Acronym</i> | <i>Funding Opportunity</i>                                     | <i>Information</i>  |
|----------------|--|---|
| HSGP           | Homeland Security Grant Program                                | <a href="https://www.fema.gov/authorized-equipment-list-item/10ge-00-genr">https://www.fema.gov/authorized-equipment-list-item/10ge-00-genr</a>   |
| HM             | FEMA Hazard Mitigation   | <a href="https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning">https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning</a>             |
| AFG            | FEMA Assistance to Firefighters Grant                          | <a href="https://www.fema.gov/grants/preparedness/firefighters">https://www.fema.gov/grants/preparedness/firefighters</a>   |
| DOECEDS        | Department of Energy Cybersecurity for Energy Delivery Systems | <a href="https://www.energy.gov/ceser/office-cybersecurity-energy-security-and-emergency-response">https://www.energy.gov/ceser/office-cybersecurity-energy-security-and-emergency-response</a> |
| EECBGP         | Energy Efficiency and Conservation Block Grant Program         | <a href="https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program">https://www.energy.gov/eere/wipo/energy-efficiency-and-conservation-block-grant-program</a>   |

| <i>Acronym</i> | <i>Funding Opportunity</i>  | <i>Information</i>  |
|----------------|---|---|
| ECWAG          | USDA Rural Development Community Water Assistance Grants                | <a href="https://www.rd.usda.gov/programs-services/water-environmental-programs/emergency-community-water-assistance-grants">https://www.rd.usda.gov/programs-services/water-environmental-programs/emergency-community-water-assistance-grants</a>   |
| NFWF           | National Fish and Wildlife Federation Emergency Coastal Resilience Fund | <a href="https://www.nfwf.org/programs/emergency-coastal-resilience-fund">https://www.nfwf.org/programs/emergency-coastal-resilience-fund</a>   |
| EHP            | Environmental Planning and Historic Preservation                        | <a href="https://www.fema.gov/grants/mitigation/floods/when-you-apply">https://www.fema.gov/grants/mitigation/floods/when-you-apply</a>   |
| BRIC           | Building Resilient Infrastructure and Communities                       | <a href="https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities">https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities</a>   |
| GL             | Golden Leaf   | <a href="https://www.goldenleaf.org/opengrants/">https://www.goldenleaf.org/opengrants/</a>   |
| DWI ARPA       | Division of Water Resources ARPA  | <a href="https://deq.nc.gov/news/press-releases/2022/05/04/state-seeks-public-comment-proposed-plan-administer-american-rescue-plan-acts-funding-stormwater">https://deq.nc.gov/news/press-releases/2022/05/04/state-seeks-public-comment-proposed-plan-administer-american-rescue-plan-acts-funding-stormwater</a> |
| NCLWF          | NC Land and Water Fund  | <a href="https://nclwf.nc.gov/flood-risk-reduction-program-guidelines-and-rating-system">https://nclwf.nc.gov/flood-risk-reduction-program-guidelines-and-rating-system</a>   |

G.2 Identified Projects

| Project Name                             | Drainage System Inventory   |  |
|--|---|--|
| Project Description                      | Develop survey grade GIS inventory of drainage pipes, inlets, tide gate valves, junctions, pumps, etc.        |  |
| Natural/Nature-Based?                    | No  |  |
| Hazard(s) addressed by project           | Flooding (rainfall/tidal/riverine)  |  |
| Type of Solution                         | Plans and policies  |  |
| Project Estimated Cost                   | Low (\$0-\$50,000)  |  |
| Potential Implementation Funding Sources | None identified   |  |
| Projected Estimated Timeline             | 6-12 months   |  |
| Priority Rating                          | High  |  |
| Project Map or Location                  | Approximate mapping done during RCCP as shown in <b>Figure 20</b> ; formalize system inventory in the village |  |



Figure 20: Approximate Drainage Mapping Completed During RCCP

| <i>Project Name</i>                      | <i>Culvert/Drainage Improvements</i>   |   |
|--|--|---|
| Project Description                      | Clean/maintain existing culverts and ditches. Conduct feasibility study for flooded areas and ability to add drainage and/or improve existing drainage. Feasibility study should consider elevation, pipe sizes, groundwater, tide gates, etc. Develop long term financial model and plan for inlet, pipe, culvert, and ditch maintenance. |   |
| Natural/Nature-Based?                    | No   |   |
| Hazard(s) addressed by project           | Flooding (rainfall/tidal/riverine)   |   |
| Type of Solution                         | Infrastructure   | Plans and policies  |
| Project Estimated Cost                   | High (\$200,000-\$500,000)   | High initial cost and ongoing cost for perpetual maintenance. |
| Potential Implementation Funding Sources | EHP, GL, DWI ARPA, NCLWF   |   |
| Projected Estimated Timeline             | 24+ months   |   |
| Priority Rating                          | High   |   |
| Project Map or Location                  | See <b>Figure 20</b>   |   |

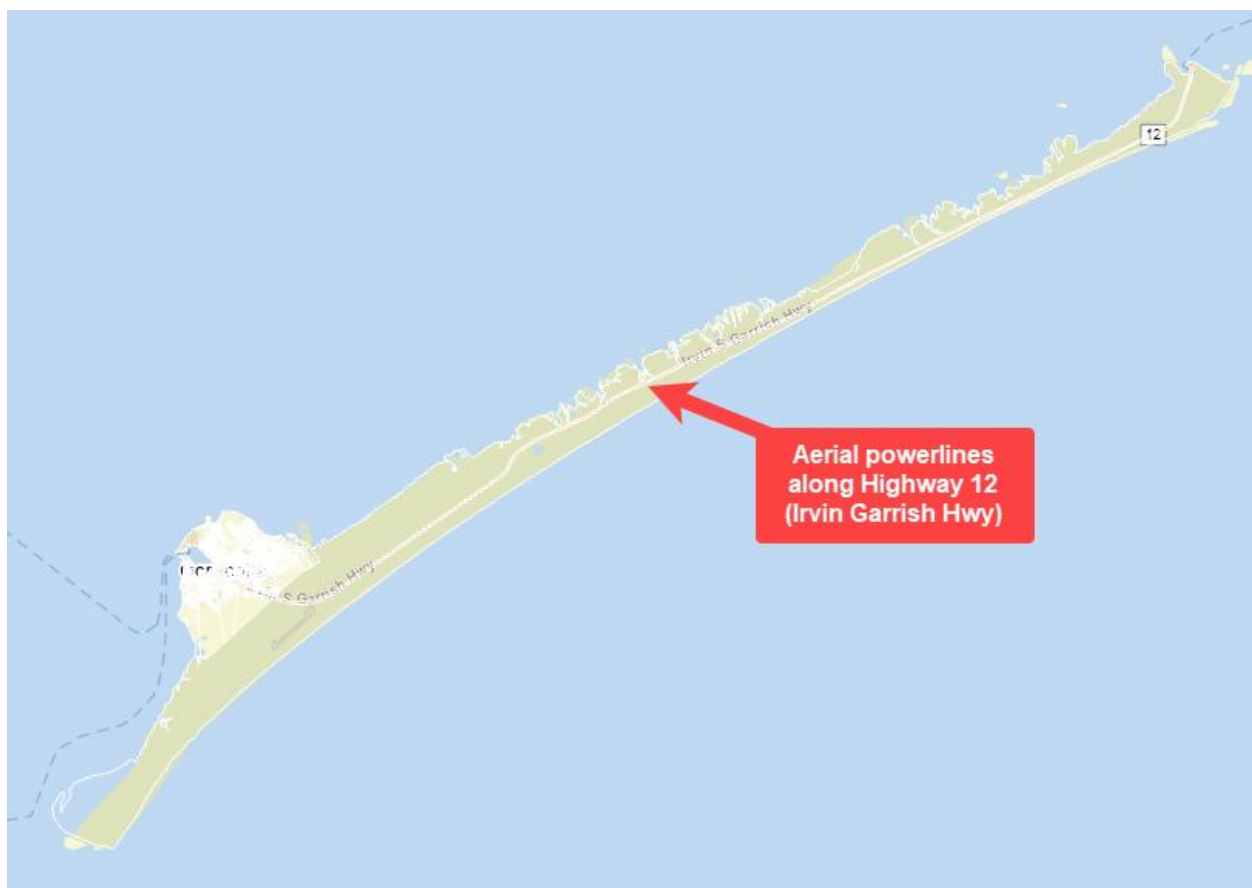
|  |  |  |
|--|--|--|
| <i>Project Name</i>                      | <i>Raise roads to target elevation</i>   |  |
| Project Description                      | Conduct elevation study to identify target minimum road elevation that would improve post-rainfall vehicular access. Implement program to begin raising roads.   |  |
| Natural/Nature-Based?                    | No   |  |
| Hazard(s) addressed by project           | Flooding (rainfall/tidal/riverine)   | Sea level rise                         |
| Type of Solution                         | Infrastructure   |  |
| Project Estimated Cost                   | High (\$200,000-\$500,000)   | Varies depending on amount to elevate. |
| Potential Implementation Funding Sources | BRIC, EHP, GL, DWI ARPA, NCLWF   |  |
| Projected Estimated Timeline             | 24+ months   |  |
| Priority Rating                          | Medium   |  |
| Project Map or Location                  | <b>Figure 21</b> shows green areas that are 0-1' above MHHW to identify low areas along roads. Widgeon Woods, Oneal, Elizabeth, Tom Neal, British Cemetery, Back, Sunset/Cabana/Trent, Pamlico Shore, Cutting Sage, Silver Lake. |  |



Figure 21: Ocracoke Village areas that are within 1' above Mean Higher High Water (MHHW)



|  |   |  |
|--|---|--|
| <i>Project Name</i>                      | <i>Undergrounding of Electric</i>   |  |
| Project Description                      | Move electrical service lines from aerial to underground along Highway 12.  |  |
| Natural/Nature-Based?                    | No  |  |
| Hazard(s) addressed by project           | Wind  |  |
| Type of Solution                         | Infrastructure  |  |
| Project Estimated Cost                   | Very High (\$500,000+)  |  |
| Potential Implementation Funding Sources | FEMA Hazard Mitigation  |  |
| Projected Estimated Timeline             | 24+ months  |  |
| Priority Rating                          | Medium  |  |
| Project Map or Location                  | Power lines located along Highway 12 starting at South Dock Ferry terminal to Ocracoke Village. Around 12 miles in length. See <b>Figure 22</b> |  |



**Figure 22: Location of aerial powerlines**

| <i>Project Name</i>                      | <i>Portable Pumps</i>   |                                      |
|--|---|--------------------------------------|
| Project Description                      | Community owned/maintained trailer mounted pumps. Deployed after rain event to pump down areas with limited/no drainage pipes/channels. Significant permitting challenges. See <b>Figure 23</b> |                                      |
| Natural/Nature-Based?                    | No  |                                      |
| Hazard(s) addressed by project           | Flooding (rainfall)   | Flooding (riverine)                  |
| Type of Solution                         | Infrastructure  |                                      |
| Project Estimated Cost                   | High (\$200,000-\$500,000)  | Depends on size and number of pumps. |
| Potential Implementation Funding Sources | None identified   |                                      |
| Projected Estimated Timeline             | 24+ months  |                                      |
| Priority Rating                          | High  |                                      |
| Project Map or Location                  | Varies across Ocracoke Village. Special permitting required for discharge directly into sound or ocean.   |                                      |



Figure 23: Trailer mounted pump

| <i>Project Name</i>                      | <i>Development Ordinance Changes</i>  |                     |
|--|---|---------------------|
| Project Description                      | Revise ordinances to improve resiliency: lot elevating, impervious surface, easements for drainage, low impact development. |                     |
| Natural/Nature-Based?                    | Yes - LID/GSI related ordinance revisions   |                     |
| Hazard(s) addressed by project           | Flooding (rainfall)   | Flooding (riverine) |
| Type of Solution                         | Infrastructure  | Ordinances          |
| Project Estimated Cost                   | Medium (\$50,000-\$200,000)   |                     |
| Potential Implementation Funding Sources | None identified   |                     |
| Projected Estimated Timeline             | 12-24 months  |                     |
| Priority Rating                          | High  |                     |
| Project Map or Location                  | Not applicable  |                     |

| <i>Project Name</i>                      | <i>Elevate buildings to 9' EL or higher</i>   |   |
|--|---|---|
| Project Description                      | Elevate critical assets to elevation 9' per latest applicable codes for Ocracoke Island.                |   |
| Natural/Nature-Based?                    | No  |   |
| Hazard(s) addressed by project           | Flooding (rainfall/tidal/riverine)  | Sea level rise  |
| Type of Solution                         | Infrastructure  |   |
| Project Estimated Cost                   | Very High (\$500,000+)  | Cost varies depending on number of buildings and amount of elevation. |
| Potential Implementation Funding Sources | None identified at this time for commercial/governmental facilities.                                    |   |
| Projected Estimated Timeline             | 24+ months  |   |
| Priority Rating                          | Medium  |   |
| Project Map or Location                  | Various critical assets across the island. Select based on local priority and risk/vulnerability score. |   |

|  |  |  |
|--|--|--|
| <i>Project Name</i>                      | <i>Large Scale Beach Nourishment</i>   |  |
| Project Description                      | Import approximately 2 million cubic yards of sand to increase distance between HW12 and shoreline. Approximately 4.65 miles |  |
| Natural/Nature-Based?                    | No   |  |
| Hazard(s) addressed by project           | Storm Surge  | Sea level rise   |
| Type of Solution                         | Infrastructure   |  |
| Project Estimated Cost                   | Very High (\$500,000+)   | \$32.2M according to NCDOT "NC 12 Ocracoke Island Hot Spot" document |
| Potential Implementation Funding Sources | None identified  |  |
| Projected Estimated Timeline             | 24+ months   |  |
| Priority Rating                          | High   |  |
| Project Map or Location                  | See <b>Figure 24</b>   |  |



|  |  |                             |   |          |
|--|--|-----------------------------|---|----------|
|  | NC 12 IMPROVEMENTS PROJECT<br>FEASIBILITY STUDY  | Hyde County<br>NCDOT Div. 1 | <b>5-Year Alternative:</b><br><b>Option 1 – Large Scale Beach Nourishment</b> | Figure 4 |
|  | NORTH CAROLINA DEPARTMENT OF TRANSPORTATION<br>DIVISION OF HIGHWAYS<br>PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH |                             |   |          |

Figure 24: Highway 12 Task Force Large Scale Beach Nourishment Map

|  |  |   |
|--|--|---|
| <i>Project Name</i>                      | <i>Dune Nourishment</i>  |   |
| Project Description                      | Increase dune protection along HW 12 by importing 140,000 cubic yards of dredged sand. Approximately 3.65 miles in length. |   |
| Natural/Nature-Based?                    | No   |   |
| Hazard(s) addressed by project           | Storm Surge  | Sea level rise  |
| Type of Solution                         | Infrastructure   |   |
| Project Estimated Cost                   | Very High (\$500,000+)   | \$6.4M according to NCDOT "NC 12 Ocracoke Island Hot Spot" document |
| Potential Implementation Funding Sources | None identified  |   |
| Projected Estimated Timeline             | 24+ months   |   |
| Priority Rating                          | High   |   |
| Project Map or Location                  | See <b>Figure 25</b>   |   |



|  |   |                             |  |          |
|--|---|-----------------------------|--|----------|
|  | <b>NC 12 IMPROVEMENTS PROJECT</b><br><b>FEASIBILITY STUDY</b> | Hyde County<br>NCDOT Div. 1 | <b>5-Year Alternative:</b><br><b>Option 2 – Dune Nourishment</b> | Figure 5 |
|  |   |                             |  |          |

**Figure 25: Highway 12 Task Force Dune Nourishment Map**

|  |   |  |
|--|---|--|
| <i>Project Name</i>                      | <i>Roadway Relocation and Dune Nourishment</i>  |  |
| Project Description                      | Import approximately 265,000 cubic yards of sand to increase distance between HW12 and shoreline and to increase dune protection. |  |
| Natural/Nature-Based?                    | No  |  |
| Hazard(s) addressed by project           | Storm Surge   | Sea level rise   |
| Type of Solution                         | Infrastructure  |  |
| Project Estimated Cost                   | Very High (\$500,000+)  | \$22.5M according to NCDOT "NC 12 Ocracoke Island Hot Spot" document |
| Potential Implementation Funding Sources | None identified   |  |
| Projected Estimated Timeline             | 24+ months  |  |
| Priority Rating                          | High  |  |
| Project Map or Location                  | See <b>Figure 26</b>  |  |



|   |                                     |  |                 |
|---|-------------------------------------|--|-----------------|
| <p>NC 12 IMPROVEMENTS PROJECT<br/>FEASIBILITY STUDY</p> | <p>Hyde County<br/>NCDOT Div. 1</p> | <p><b>5-Year Alternative:<br/>Option 3 – Roadway Relocation and Dune<br/>Nourishment</b></p> | <p>Figure 6</p> |
|   |                                     |  |                 |

Figure 26: Highway 12 Task Force Roadway Relocation and Dune Nourishment Map

|  |  |  |
|--|--|--|
| <i>Project Name</i>                      | <i>Bridge over Hot Spot and Road Relocation</i>  |  |
| Project Description                      | Elevate HW12 along most of hot spot. Relocate in some locations. Eliminate need for dune construction/nourishment along some stretches. Approximately 66,000 cubic yards of sand import. |  |
| Natural/Nature-Based?                    | No   |  |
| Hazard(s) addressed by project           | Storm Surge  | Sea level rise   |
| Type of Solution                         | Infrastructure   |  |
| Project Estimated Cost                   | Very High (\$500,000+)   | \$62.6M according to NCDOT "NC 12 Ocracoke Island Hot Spot" document |
| Potential Implementation Funding Sources | None identified  |  |
| Projected Estimated Timeline             | 24+ months   |  |
| Priority Rating                          | High   |  |
| Project Map or Location                  | See <b>Figure 27</b>   |  |



|   |   |                             |   |                 |
|---|---|-----------------------------|---|-----------------|
| <p>NC 12 IMPROVEMENTS PROJECT<br/>FEASIBILITY STUDY</p> | <p>NORTH CAROLINA DEPARTMENT OF TRANSPORTATION<br/>DIVISION OF HIGHWAYS<br/>PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH</p> | Hyde County<br>NCDOT Div. 1 | <p><b>5-Year Alternative:<br/>Option 4 – Bridge Over Hot Spot</b></p> | <p>Figure 7</p> |
|   |   |                             |   |                 |

Figure 27: Highway 12 Task Force Bridge Over Hot Spot Map

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## Appendix A – Existing Local and Regional Efforts

The following documents are the relevant documents reviewed to identify existing local and regional efforts. They represent a variety of sources from existing hazard mitigation plans, ordinances, and engineering plans.

|  |   |
|--|---|
| <p><i>Flood Planning and Resilience Guide Hyde County, North Carolina [17]</i></p> | <p>The informational document is a guide for residents before, during, and after a flood. It includes maps of multiple flood types in relation to Hyde County.</p>  |
| <p><i>Northeastern NC Regional Hazard Mitigation Plan [6]</i></p>                  | <p>Hazard Mitigation Plan including a risk and vulnerability assessment and identified mitigation strategies for the Northeastern Region of North Carolina which includes Hyde County.</p>  |
| <p><i>Hurricane Matthew Resilient Redevelopment Plan Hyde County [18]</i></p>      | <p>The Hurricane Matthew Resilient Redevelopment Plan was developed as part of the North Carolina Redevelopment Planning program to provide a roadmap for community rebuilding and revitalization assistance for communities damaged by Hurricane Matthew.</p>  |
| <p><i>Hurricane Matthew Resilient Redevelopment Plan Northeast Region [19]</i></p> | <p>The Hurricane Matthew Resilient Redevelopment Plan was developed as part of the North Carolina Redevelopment Planning program to provide a roadmap for community rebuilding and revitalization assistance for communities damaged by Hurricane Matthew. Regional plans were developed to coordinate planning and the use of resources at the regional level.</p> |
| <p><i>Ocracoke Development Ordinance [20]</i></p>                                  | <p>The Ocracoke Development Ordinance guides development on the island. It was been under review recently for strengthening and modification involving free boarding and the use of temporary trailers.</p>   |
| <p><i>Hyde County Flood Damage Prevention Ordinance [12]</i></p>                   | <p>The Hyde County Flood Damage Prevention Ordinance details ordinances to minimize losses due to flooding and promote public health, safety, and general welfare.</p>  |
| <p><i>Feasibility Study: NC 12 Ocracoke Island Hot Spot [21]</i></p>               | <p>The Highway 12 Task Force shared a series of documents for consideration in this study. The most relevant document was the Feasibility Study for the NC 12 Ocracoke Island Hot Spot. The study details options for maintaining Highway 12 operations ranging from dune renourishment to relocating South Dock.</p>   |

## Appendix B – Critical Assets

### Critical Assets Locations

In the table below, the critical assets are listed with their current address. Additionally, a description is provided to detail the selection of the critical asset.

| <i>Critical Asset</i>                 | <i>Approximate Address</i>                  | <i>Description</i>                        |
|---------------------------------------|---|---|
| Community Square / Docks              | 284 Irvin Garrish Hwy, Ocracoke, NC 27960   | Community Access Point / Aid Distribution |
| Ocracoke Sanitary District            | 159 Water Plant Rd, Ocracoke, NC 27960      | Water and Wastewater Treatment            |
| Ocracoke Island Airport               | 1731 Irvin Garrish Hwy Ocracoke, NC 27960   | Community Access Point                    |
| Ocracoke Ferry Terminal (Silver Lake) | 38 Irvin Garrish Hwy, Ocracoke, NC 27960    | Community Access Point                    |
| Ocracoke Convenience Site             | 1140 Irvin Garrish Hwy, Ocracoke, NC 27960  | Waste Disposal                            |
| Ferry Terminal - South Dock           | North end of island on NC 12 (NPS Property) | Community Access Point                    |
| Radio Station                         | 215 Back Rd, Ocracoke, NC 27960             | Community Communication                   |
| New EMS Station                       | 36 Lighthouse Road, Ocracoke, NC 27960      | Emergency Services                        |
| NCCAT Building                        | 2 Irvin Garrish Hwy, Ocracoke, NC 27960     | Gathering Place                           |
| Ocracoke Volunteer Fire Department    | 822 Irvin Garrish Hwy Ocracoke, NC 27960    | Emergency Services                        |
| Hyde County Sheriff's Department      | 1156 Irvin Garrish Hwy Ocracoke, NC 27960   | Emergency Services                        |
| Ocracoke Health Center                | 305 Back Rd Ocracoke, NC 27960              | Health Services                           |
| Ocracoke Community Center             | 999 Irvin Garrish Rd Ocracoke, NC 27960     | Aid Distribution/ Gathering Place         |

|                                   |   |                               |
|-----------------------------------|---|-------------------------------|
| Tideland EMC<br>Ocracoke Office   | 30 Oddfellows Rd,<br>Ocracoke, NC 27960                                       | Electric Provider             |
| The Variety Store                 | 950 Irvin Garrish Hwy<br>Ocracoke, NC 27960                                   | Grocery Store                 |
| Ocracoke Gas<br>Station           | 990 Irvin Garrish Hwy<br>Ocracoke, NC 27960                                   | Fuel                          |
| Island Mobile<br>Medical Care, PA | 425 Cutting Sage Rd,<br>Ocracoke, NC 27960                                    | Health Services               |
| Ocracoke Seafood<br>Co.           | 416 Irvin Garrish<br>Hwy, Ocracoke, NC<br>27960                               | Historic Business             |
| First National Bank               | 782 Irvin Garrish<br>Hwy, Ocracoke, NC<br>27960                               | Bank                          |
| Ocracoke School                   | 120 Schoolhouse Rd,<br>Ocracoke, NC 27960                                     | Gathering Place               |
| Local<br>Telecommunications       | 124 Cedar Rd,<br>Ocracoke, NC 27960   | Community Communications      |
| NCDOT<br>Maintenance Facility     | 89 Water Plant Rd,<br>Ocracoke, NC 27960                                      | Maintenance                   |
| Highway 12 Dune<br>System         | Hot spot<br>approximately 2.25<br>miles south of South<br>Dock Ferry Terminal | Critical to maintaining NC 12 |
| Tideland EMC<br>Overhead Power    | Along NC 12   | Electricity                   |
| VIPER and Cellular<br>Antenna     | 121 Water Plant Rd,<br>Ocracoke, NC 27960                                     | Emergency Services            |



PAMLICO SOUND

- Island Mobile Medical Care, PA
- NCDOT Maintenance Facility
- VIPER and Cellular Antenna
- Ocracoke Sanitary District
- Ocracoke Ferry Terminal (Silver Lake)
- NCCAT Building
- SILVER LAKE
- Community Square / Docks
- Ocracoke Health Center
- Ocracoke Seafood Co.
- Ocracoke School
- Radio Station
- New EMS Station
- Tideland EMC Ocracoke Office
- First National Bank
- Ocracoke Volunteer Fire Department
- Ocracoke Community Center
- Local Telecommunications
- The Variety Store
- Ocracoke Gas Station
- Hyde County Sheriff's Department
- Ocracoke Convenience Site
- Ocracoke Island Airport

Ocracoke Vulnerability and Risk Assessment  
Figure 28.1  
Critical Assets Map

0 400 800 1,600  
Feet

1 inch = 800 feet

**Kimley»Horn**

**Legend**

- ★ Critical Assets
- Buildings

Ocracoke Vulnerability  
and Risk Assessment

Figure 28.2  
Critical Assets Map

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn

Ferry Terminal - South Dock



Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

Legend

★ Critical Assets

■ Buildings

## Appendix C – Social Vulnerability Maps

The following maps detail the overall social vulnerability for Ocracoke when compared to other census tracts within North Carolina. Additionally, the maps are broken into the four social vulnerability themes: Socioeconomic Vulnerability, Household Composition and Disability Vulnerability, Minority Status and Language Vulnerability, and Housing Type and Transportation Vulnerability.



PAMLICO SOUND

SILVER LAKE

**Legend**

- ★ Critical Assets
- Buildings

**Overall Vulnerability**

- 0 to <25% SVI
- 25 to <50% SVI
- 50 to <75% SVI
- 75 to 100% SVI

Island Mobile Medical Care, PA ★  
NCDOT Maintenance Facility ★  
VIPER and Cellular Antenna ★  
Ocracoke Sanitary District  
Ocracoke Ferry Terminal (Silver Lake) ★  
NCCAT Building ★  
Community Square / Docks ★  
Ocracoke Health Center  
Ocracoke Seafood Co. ★  
Ocracoke School  
Radio Station ★  
New EMS Station ★  
Tideland EMC Ocracoke Office ★  
First National Bank ★  
Ocracoke Volunteer Fire Department ★  
Local Telecommunications ★  
Ocracoke Community Center  
The Variety Store ★  
Ocracoke Gas Station  
Hyde County Sheriff's Department ★  
Ocracoke Convenience Site

Ocracoke Island Airport ★

Ocracoke Vulnerability and Risk Assessment  
Figure 29.1  
Total Social Vulnerability

0 400 800 1,600  
Feet

1 inch = 800 feet

**Kimley»Horn**



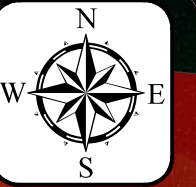
Ocracoke Vulnerability and Risk Assessment

Figure 29.2  
Total Social Vulnerability

0 400 800 1,600 Feet

1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

Legend

★ Critical Assets

Buildings

Overall Vulnerability

0 to <25% SVI

25 to <50% SVI

50 to <75% SVI

75 to 100% SVI



PAMLICO SOUND

Island Mobile Medical Care, PA

NCDOT Maintenance Facility  
VIPER and Cellular Antenna

Ocracoke Sanitary District

Ocracoke Ferry Terminal (Silver Lake)

NCCAT Building

SILVER LAKE

Community Square / Docks

Ocracoke Health Center

Ocracoke Seafood Co.

Ocracoke School

Radio Station

New EMS Station

Tideland EMC Ocracoke Office

First National Bank

Ocracoke Community Center

Local Telecommunications

The Variety Store

Ocracoke Gas Station

Hyde County Sheriff's Department

Ocracoke Convenience Site

Ocracoke Island Airport

**Legend**

- ★ Critical Assets
- Buildings

**Socioeconomic Vulnerability**

- 0 to <25% SVI
- 25 to <50% SVI
- 50 to <75% SVI
- 75 to 100% SVI

**Ocracoke Vulnerability and Risk Assessment**

Figure 30.1  
Socioeconomic Social Vulnerability

0 400 800 1,600 Feet  
1 inch = 800 feet

**Kimley»Horn**

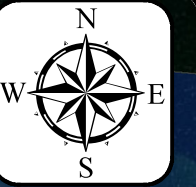
# Ocracoke Vulnerability and Risk Assessment

Figure 30.2  
Socioeconomic Social Vulnerability

0 400 800 1,600 Feet

1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

## Legend

★ Critical Assets

Buildings

### Socioeconomic Vulnerability

0 to <25% SVI

25 to <50% SVI

50 to <75% SVI

75 to 100% SVI



PAMLICO SOUND

Island Mobile Medical Care, PA

NCDOT Maintenance Facility  
VIPER and Cellular Antenna

Ocracoke Sanitary District

Ocracoke Ferry Terminal (Silver Lake)

NCCAT Building

SILVER LAKE

Community Square / Docks

Ocracoke Health Center

Ocracoke Seafood Co.

Ocracoke School

Radio Station

New EMS Station

Tideland EMC Ocracoke Office

First National Bank

Ocracoke Community Center

Local Telecommunications

The Variety Store

Ocracoke Gas Station

Hyde County Sheriff's Department

Ocracoke Convenience Site

Ocracoke Island Airport

**Legend**

- ★ Critical Assets
- Buildings

**Household Composition & Disability**

- 0 to <25% SVI
- 25 to <50% SVI
- 50 to <75% SVI
- 75 to 100% SVI

Ocracoke Vulnerability and Risk Assessment

Figure 31.1  
Household Composition & Disability Social Vulnerability

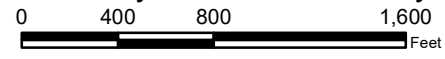
0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn

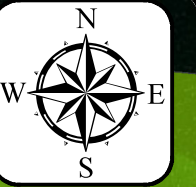
# Ocracoke Vulnerability and Risk Assessment

Figure 31.2  
Household Composition  
& Disability Social Vulnerability



1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

## Legend

★ Critical Assets

Buildings

### Household Composition & Disability

0 to <25% SVI

25 to <50% SVI

50 to <75% SVI

75 to 100% SVI



PAMLICO SOUND



**Legend**

- ★ Critical Assets
- Buildings

**Minority Status & Language**

- 0 to <25% SVI
- 25 to <50% SVI
- 50 to <75% SVI
- 75 to 100% SVI

Ocracoke Vulnerability and Risk Assessment

Figure 32.1

Minority Status & Language Vulnerability

0 400 800 1,600 Feet

1 inch = 800 feet

**Kimley»Horn**

Ocracoke Vulnerability and Risk Assessment

Figure 32.2  
Minority Status & Language  
Vulnerability

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

Legend

★ Critical Assets

Buildings

SVI2018\_NORTHCAROLINA\_tract

Minority Status & Language

0 to <25% SVI

25 to <50% SVI

50 to <75% SVI

75 to 100% SVI



PAMLICO SOUND

Island Mobile Medical Care, PA  
NCDOT Maintenance Facility  
VIPER and Cellular Antenna  
Ocracoke Sanitary District  
Ocracoke Ferry Terminal (Silver Lake)  
NCCAT Building  
SILVER LAKE  
Community Square / Docks  
Ocracoke Health Center  
Ocracoke Seafood Co.  
Ocracoke School  
Radio Station  
New EMS Station  
Tideland EMC Ocracoke Office  
First National Bank  
Ocracoke Volunteer Fire Department  
Local Telecommunications  
Ocracoke Community Center  
The Variety Store  
Ocracoke Gas Station  
Hyde County Sheriff's Department  
Ocracoke Convenience Site  
Ocracoke Island Airport

**Legend**

- ★ Critical Assets
- Buildings

**Housing Types & Transportation**

- 0 to <25% SVI
- 25 to <50% SVI
- 50 to <75% SVI
- 75 to 100% SVI

Ocracoke Vulnerability and Risk Assessment  
Figure 33.1  
Housing Type & Transportation Vulnerability

0 400 800 1,600  
Feet

1 inch = 800 feet

**Kimley»Horn**



Ocracoke Vulnerability and Risk Assessment

Figure 33.2  
Housing Type &  
Transportation Vulnerability

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn

Ferry Terminal - South Dock ★



Tideland EMC Overhead Power ★

Highway 12 Dune System ★

ATLANTIC OCEAN

Legend

★ Critical Assets

Buildings

Housing Types & Transportation

0 to <25% SVI

25 to <50% SVI

50 to <75% SVI

75 to 100% SVI

## Appendix D – Hazard Maps

The following maps show the identified hazards in relation to the critical assets for Ocracoke. The hazards mapped include Category 1 Storm Surge, Category 2 Storm Surge, Riverine Flooding, and Sea Level Rise / Tidal Flooding.



PAMLICO SOUND

Island Mobile Medical Care, PA  
NCDOT Maintenance Facility  
VIPER and Cellular Antenna  
Ocracoke Sanitary District  
Ocracoke Ferry Terminal (Silver Lake)  
NCCAT Building  
SILVER LAKE  
Community Square / Docks  
Ocracoke Health Center  
Ocracoke Seafood Co.  
Ocracoke School  
Radio Station  
New EMS Station  
Tideland EMC Ocracoke Office  
First National Bank  
Ocracoke Volunteer Fire Department  
Local Telecommunications  
Ocracoke Community Center  
The Variety Store  
Ocracoke Gas Station  
Hyde County Sheriff's Department  
Ocracoke Convenience Site

**Legend**

- ★ Critical Assets
- Buildings

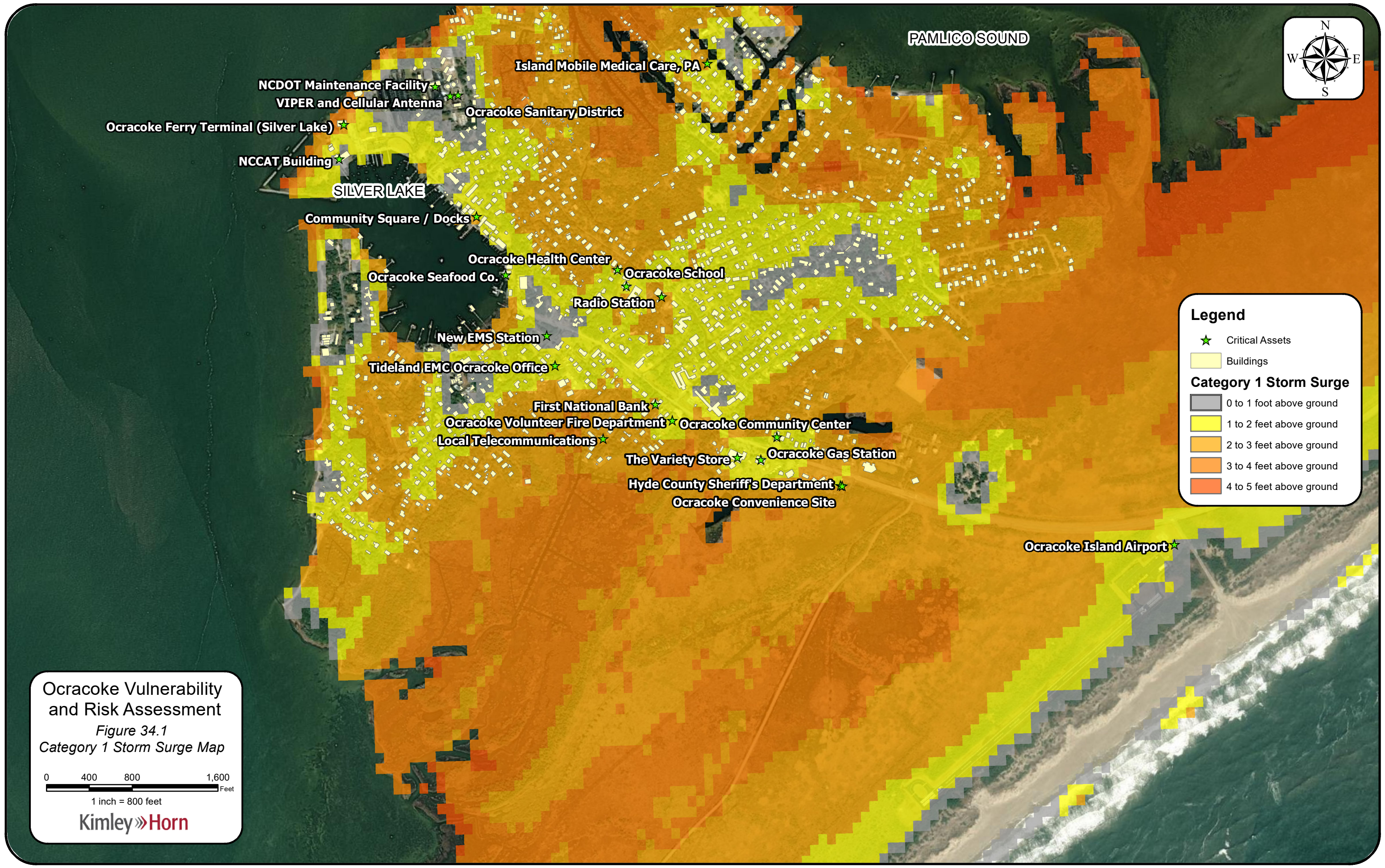
**Category 1 Storm Surge**

- 0 to 1 foot above ground
- 1 to 2 feet above ground
- 2 to 3 feet above ground
- 3 to 4 feet above ground
- 4 to 5 feet above ground

Ocracoke Vulnerability and Risk Assessment  
Figure 34.1  
Category 1 Storm Surge Map

0 400 800 1,600 Feet  
1 inch = 800 feet

**Kimley»Horn**



Ocracoke Vulnerability and Risk Assessment

Figure 34.2  
Category 1 Storm Surge Map

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

Legend

★ Critical Assets

Buildings

Category 1 Storm Surge

0 to 1 foot above ground

1 to 2 feet above ground

2 to 3 feet above ground

3 to 4 feet above ground

4 to 5 feet above ground

PAMLICO SOUND



NCDOT Maintenance Facility  
VIPER and Cellular Antenna  
Ocracoke Ferry Terminal (Silver Lake)  
NCCAT Building

Island Mobile Medical Care, PA

Ocracoke Sanitary District

SILVER LAKE

Community Square / Docks

Ocracoke Health Center

Ocracoke Seafood Co.

Ocracoke School

Radio Station

New EMS Station

Tideland EMC Ocracoke Office

First National Bank

Ocracoke Volunteer Fire Department

Ocracoke Community Center

Local Telecommunications

The Variety Store

Ocracoke Gas Station

Hyde County Sheriff's Department

Ocracoke Convenience Site

Ocracoke Island Airport

**Legend**

- ★ Critical Assets
- Buildings

**Category 2 Storm Surge**

- 0 to 1 foot above ground
- 1 to 2 feet above ground
- 2 to 3 feet above ground
- 3 to 4 feet above ground
- 4 to 5 feet above ground
- 5 to 6 feet above ground
- 6 to 7 feet above ground

Ocracoke Vulnerability and Risk Assessment  
 Figure 35.1  
 Category 2 Storm Surge Map

0 400 800 1,600 Feet  
 1 inch = 800 feet

**Kimley»Horn**

Ocracoke Vulnerability and Risk Assessment

Figure 35.2  
Category 2 Storm Surge Map

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn



Ferry Terminal - South Dock

Tideland EMC Overhead Power

Highway 12 Dune System

ATLANTIC OCEAN

Legend

★ Critical Assets

Buildings

Category 2 Storm Surge

0 to 1 foot above ground

1 to 2 feet above ground

2 to 3 feet above ground

3 to 4 feet above ground

4 to 5 feet above ground

5 to 6 feet above ground

6 to 07 feet above ground

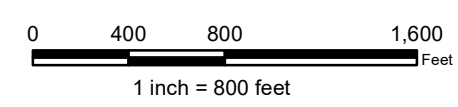


PAMLICO SOUND

Island Mobile Medical Care, PA ★  
 NCDOT Maintenance Facility ★  
 VIPER and Cellular Antenna ★★  
 Ocracoke Sanitary District  
 Ocracoke Ferry Terminal (Silver Lake) ★  
 NCCAT Building ★  
**SILVER LAKE**  
 Community Square / Docks ★  
 Ocracoke Health Center ★  
 Ocracoke Seafood Co. ★  
 Ocracoke School ★  
 Radio Station ★  
 New EMS Station ★  
 Tideland EMC Ocracoke Office ★  
 First National Bank ★  
 Ocracoke Volunteer Fire Department ★  
 Local Telecommunications ★  
 Ocracoke Community Center ★  
 The Variety Store ★  
 Ocracoke Gas Station ★  
 Hyde County Sheriff's Department ★  
 Ocracoke Convenience Site

Ocracoke Island Airport ★

Ocracoke Vulnerability and Risk Assessment  
 Figure 36.1  
 Riverine Flooding Map



Kimley»Horn

**Legend**

- ★ Critical Assets
- Buildings
- FEMA FLOOD ZONE**
- 0.2% FLOOD HAZARD
- 1% FLOOD HAZARD (AE)
- VE

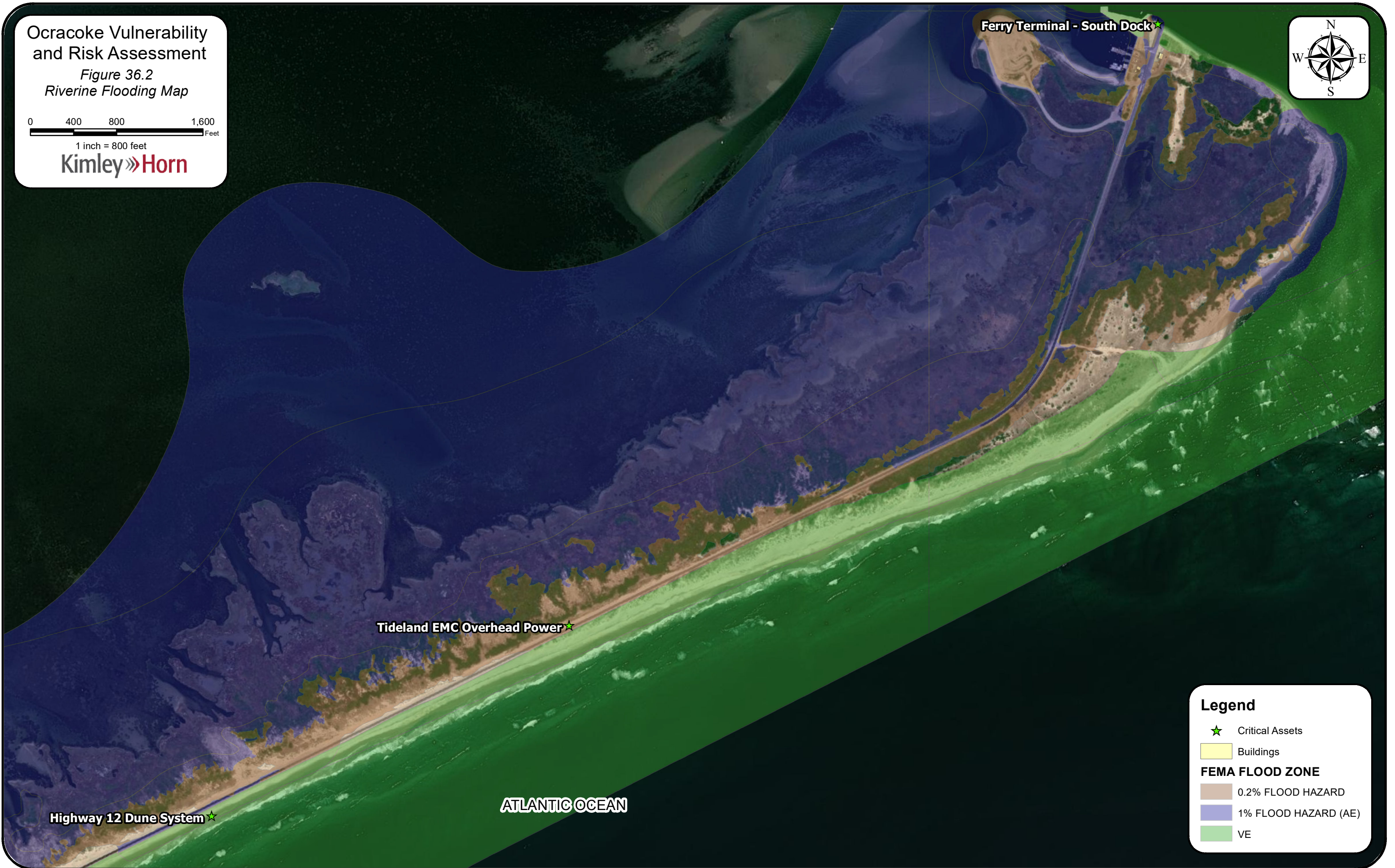
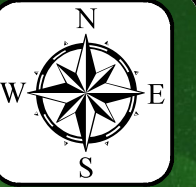
Ocracoke Vulnerability and Risk Assessment  
and Risk Assessment

Figure 36.2  
Riverine Flooding Map

0 400 800 1,600  
Feet

1 inch = 800 feet

Kimley»Horn



**Legend**

★ Critical Assets

■ Buildings

**FEMA FLOOD ZONE**

■ 0.2% FLOOD HAZARD

■ 1% FLOOD HAZARD (AE)

■ VE

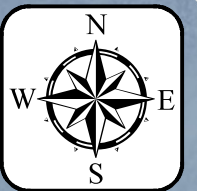
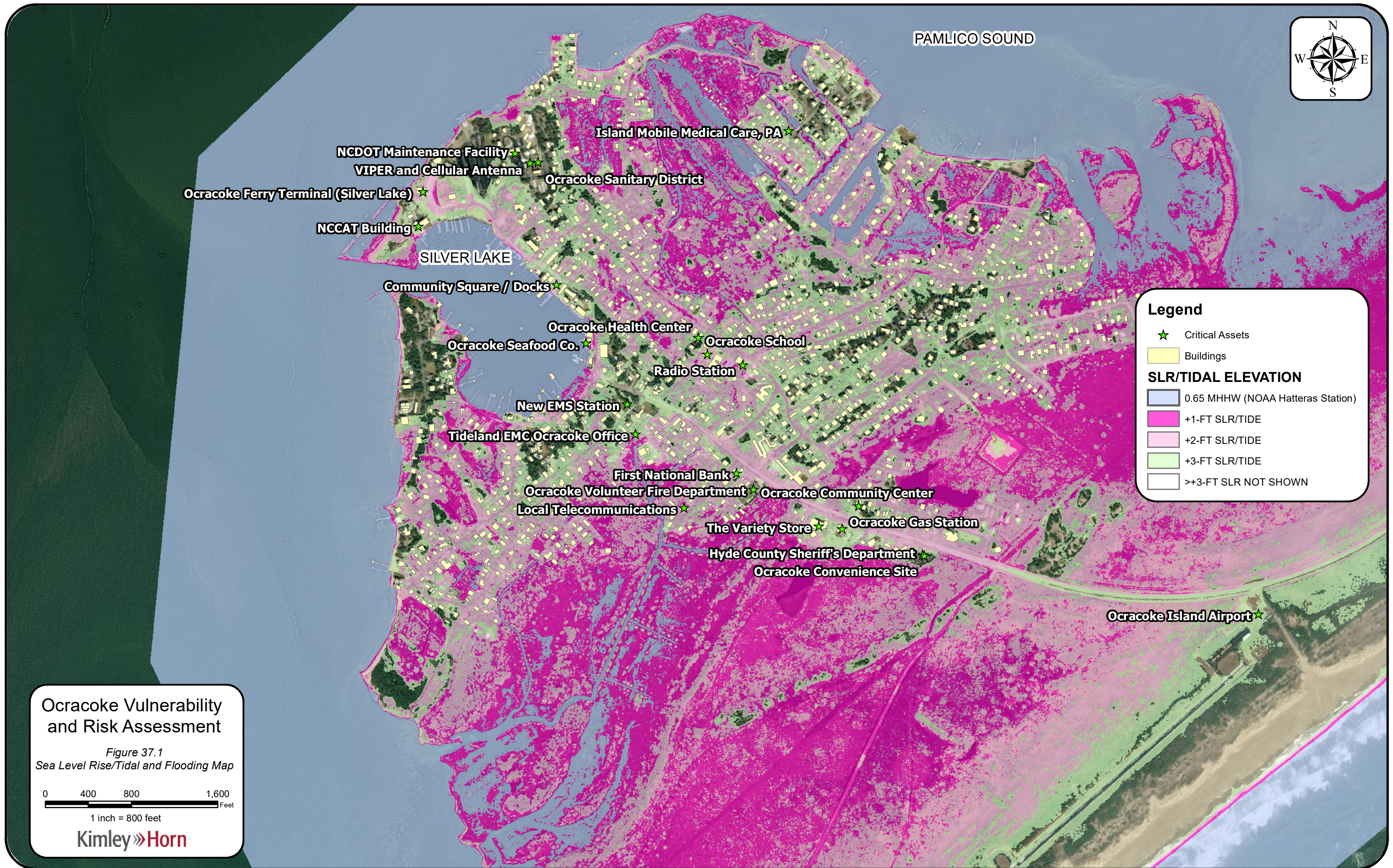
ATLANTIC OCEAN

Highway 12 Dune System ★

Tideland EMC Overhead Power ★

Ferry Terminal - South Dock ★





**Legend**

- ★ Critical Assets
- Buildings

**SLR/TIDAL ELEVATION**

- 0.65 MHHW (NOAA Hatteras Station)
- +1-FT SLR/TIDE
- +2-FT SLR/TIDE
- +3-FT SLR/TIDE
- >+3-FT SLR NOT SHOWN

**Ocracoke Vulnerability and Risk Assessment**

Figure 37.1  
Sea Level Rise/Tidal and Flooding Map

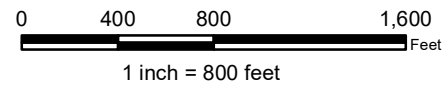
0 400 800 1,600  
Feet

1 inch = 800 feet

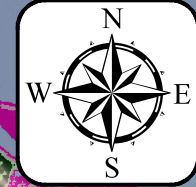
**Kimley»Horn**

# Ocracoke Vulnerability and Risk Assessment

Figure 37.2  
Sea Level Rise/Tidal Flooding Map



Kimley»Horn



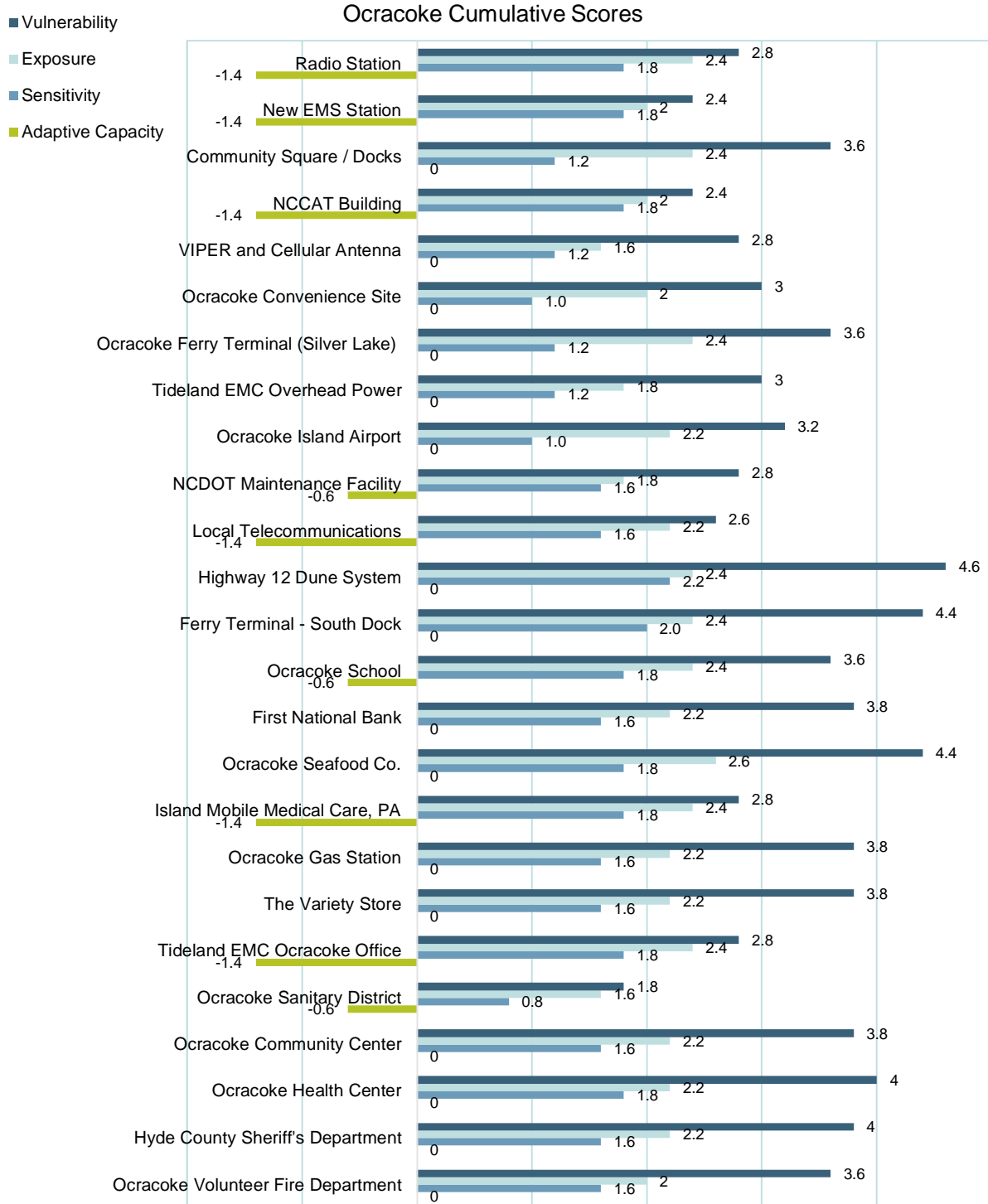
### Legend

- ★ Critical Assets
  - Buildings
- SLR/TIDAL ELEVATION**
- 0.65 MHHW (NOAA Hatteras Station)
  - +1-FT SLR/TIDE
  - +2-FT SLR/TIDE
  - +3-FT SLR/TIDE
  - >+3-FT SLR NOT SHOWN

# Appendix E – Cumulative Vulnerability

## Results

The graph below displays the cumulative vulnerability of the critical assets in relation to exposure, sensitivity, and adaptive capacity. Adaptive capacity is shown as a negative value given that it reduces vulnerability.



### Vulnerability Index

In the table below, the developed vulnerability index is shown with the total scores for each critical asset.

| <i>Critical Asset</i>                 | <i>Exposure<br/>(0-3)</i> | <i>Sensitivity<br/>(0-3)</i> | <i>Adaptive<br/>Capacity<br/>(0-3)</i> | <i>Vulnerability<br/>(0-6)</i> |
|---------------------------------------|---------------------------|------------------------------|--|--------------------------------|
| Ocracoke Volunteer Fire Department    | 2                         | 1.6                          | 0                                      | 3.6                            |
| Hyde County Sheriff's Department      | 2.2                       | 1.6                          | 0                                      | 3.8                            |
| Ocracoke Health Center                | 2.2                       | 1.8                          | 0                                      | 4                              |
| Ocracoke Community Center             | 2.2                       | 1.6                          | 0                                      | 3.8                            |
| Ocracoke Sanitary District            | 1.6                       | 0.8                          | 0.6                                    | 1.8                            |
| Tideland EMC Ocracoke Office          | 2.4                       | 1.8                          | 1.4                                    | 2.8                            |
| The Variety Store                     | 2.2                       | 1.6                          | 0                                      | 3.8                            |
| Ocracoke Gas Station                  | 2.2                       | 1.6                          | 0                                      | 3.8                            |
| Island Mobile Medical Care, PA        | 2.4                       | 1.8                          | 1.4                                    | 2.8                            |
| Ocracoke Seafood Co.                  | 2.6                       | 1.8                          | 0                                      | 4.4                            |
| First National Bank                   | 2.2                       | 1.6                          | 0                                      | 3.8                            |
| Ocracoke School                       | 2.4                       | 1.8                          | 0.6                                    | 3.6                            |
| Ferry Terminal - South Dock           | 2.4                       | 2                            | 0                                      | 4.4                            |
| Highway 12 Dune System                | 2.4                       | 2.2                          | 0                                      | 4.6                            |
| Local Telecommunications              | 2.2                       | 1.6                          | 1.4                                    | 2.6                            |
| NCDOT Maintenance Facility            | 1.8                       | 1.6                          | 0.6                                    | 2.8                            |
| Ocracoke Island Airport               | 2.2                       | 1                            | 0                                      | 3.2                            |
| Tideland EMC Overhead Power           | 1.8                       | 1.2                          | 0                                      | 3                              |
| Ocracoke Ferry Terminal (Silver Lake) | 2.4                       | 1.2                          | 0                                      | 3.6                            |
| Ocracoke Convenience Site             | 2                         | 1                            | 0                                      | 3                              |
| VIPER and Cellular Antenna            | 1.6                       | 1.2                          | 0                                      | 2.8                            |
| NCCAT Building                        | 2                         | 1.8                          | 1.4                                    | 2.4                            |
| Community Square / Docks              | 2.4                       | 1.2                          | 0                                      | 3.6                            |
| New EMS Station                       | 2                         | 1.8                          | 1.4                                    | 2.4                            |
| Radio Station                         | 2.4                       | 1.8                          | 1.4                                    | 2.8                            |

# Appendix F – Vulnerability by Hazard

## Rainfall Flooding

### Scoring Metrics

|   | <i>Exposure</i>                                 | <i>Sensitivity</i>                              | <i>Adaptive Capacity</i>                                     |
|---|---|---|--|
| 0 | Not Exposed to Culvert Flooding                 | Not impacted by Culvert Flooding                | No implemented solutions                                     |
| 1 | Within 500' of reported rainfall flooding point | Within 500' of reported rainfall flooding point | Raised but below the Regulatory Flood Protection Elevation   |
| 2 | -   | -   | Raised to or above the Regulatory Flood Protection Elevation |
| 3 | -   | -   | -  |

### Results

#### Rainfall Flooding Vulnerability

|                                       |   |   |
|---------------------------------------|---|---|
| Community Square / Docks              |   | 2 |
| Ocracoke Ferry Terminal (Silver Lake) |   | 2 |
| Ocracoke Seafood Co.                  |   | 2 |
| Ocracoke Health Center                |   | 2 |
| NCDOT Maintenance Facility            |   | 2 |
| Ocracoke School                       |   | 2 |
| New EMS Station                       | 1 |   |
| Radio Station                         | 1 |   |
| NCCAT Building                        | 1 |   |
| Island Mobile Medical Care, PA        | 1 |   |
| Tideland EMC Ocracoke Office          | 1 |   |

### Key Findings:

- From the mapped rain fall flooding hot spots, 11 critical assets were identified as being within 500 feet of a reported hot spot.
- None of the critical assets were directly exposed but may lose access due to rainfall flooding.
- Rainfall hot spots identified by the CAT include: Back Road at Cedar Drive, Sand Dollar at Old Beach Road, Sunset Drive, Cutting Sage at Trent Road, Back Road (near Zillies), Oyster Creek Bridges, the mosquito ditches in Widgeon Woods, the mosquito ditches near Loop Road, and Back Road behind the Ocracoke School.
- Additional hotspots were identified through the Questionnaire and Public Meeting #1. The full responses have been provided to DCM.

Scores:

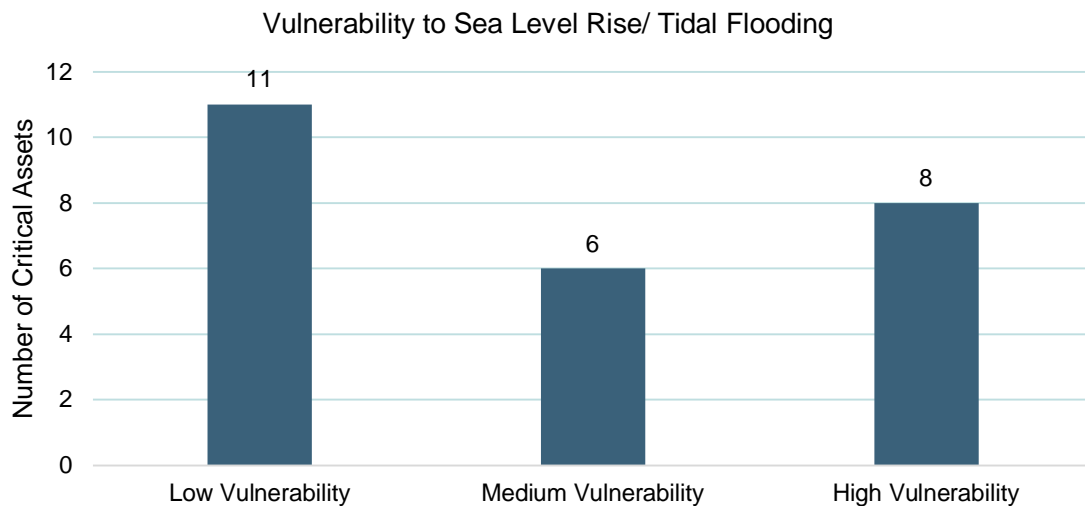
| <i>Critical Asset</i>                 | <i>Exposure</i> | <i>Sensitivity</i> | <i>Adaptive Capacity</i> | <i>Vulnerability</i> |
|---------------------------------------|-----------------|--------------------|--------------------------|----------------------|
| Ocracoke Volunteer Fire Department    | 0               | 0                  | 0                        | 0                    |
| Hyde County Sheriff's Department      | 0               | 0                  | 0                        | 0                    |
| Ocracoke Community Center             | 0               | 0                  | 0                        | 0                    |
| Ocracoke Sanitary District            | 0               | 0                  | 0                        | 0                    |
| The Variety Store                     | 0               | 0                  | 0                        | 0                    |
| Ocracoke Gas Station                  | 0               | 0                  | 0                        | 0                    |
| First National Bank                   | 0               | 0                  | 0                        | 0                    |
| Ferry Terminal - South Dock           | 0               | 0                  | 0                        | 0                    |
| Highway 12 Dune System                | 0               | 0                  | 0                        | 0                    |
| Local Telecommunications              | 0               | 0                  | 1                        | 0                    |
| Ocracoke Island Airport               | 0               | 0                  | 0                        | 0                    |
| Tideland EMC Overhead Power           | 0               | 0                  | 0                        | 0                    |
| Ocracoke Convenience Site             | 0               | 0                  | 0                        | 0                    |
| VIPER and Cellular Antenna            | 0               | 0                  | 0                        | 0                    |
| Tideland EMC Ocracoke Office          | 1               | 1                  | 1                        | 1                    |
| Island Mobile Medical Care, PA        | 1               | 1                  | 1                        | 1                    |
| NCCAT Building                        | 1               | 1                  | 1                        | 1                    |
| Radio Station                         | 1               | 1                  | 1                        | 1                    |
| New EMS Station                       | 1               | 1                  | 1                        | 1                    |
| Ocracoke School                       | 1               | 1                  | 0                        | 2                    |
| NCDOT Maintenance Facility            | 1               | 1                  | 0                        | 2                    |
| Ocracoke Health Center                | 1               | 1                  | 0                        | 2                    |
| Ocracoke Seafood Co.                  | 1               | 1                  | 0                        | 2                    |
| Ocracoke Ferry Terminal (Silver Lake) | 1               | 1                  | 0                        | 2                    |
| Community Square / Docks              | 1               | 1                  | 0                        | 2                    |

## Tidal Flooding / Sea Level Rise

### Scoring Metrics

|   | <i>Exposure</i>                               | <i>Sensitivity</i>  | <i>Adaptive Capacity</i>                                     |
|---|---|---|--|
| 0 | Mean Higher High Water                        | -   | No implemented solutions                                     |
| 1 | Greater than +3 water level increase          | Infrastructure  | -  |
| 2 | +3 to +1 water level increase                 | Buildings   | Raised but below the Regulatory Flood Protection Elevation   |
| 3 | Less than or equal to +1 water level increase | Protective Natural Feature or Demonstrated Historic Sensitivity | Raised to or above the Regulatory Flood Protection Elevation |

### Results



### Highly Vulnerable Critical Assets:

- Hyde County Sheriff's Department
- Ocracoke Community Center
- The Variety Store
- Ocracoke Gas Station
- First National Bank
- Ocracoke Seafood Co.
- Ferry Terminal - South Dock
- Highway 12 Dune System

### Key Findings:

- The Highway 12 Dune System and Ferry Terminal – South Dock had a maximum vulnerability score of 6 to Sea Level Rise/ Tidal Flooding. These assets are already being impacted by sea level rise/ tidal flooding.
- The other highly vulnerable critical assets represented buildings that have medium to high exposure to tidal flooding/ sea level rise but are not raised above the regulatory flood protection elevation.
- Roads that have points at MHHW or +1' above MHHW include Widegeon Woods, Oneal, Elizabeth, Tom Neal, British Cemetery, Back, Sunset/Cabana/Trent, Pamlico Shore, Cutting Sage, and Silver Lake as shown in **Appendix D**.

Scores:

| <i>Critical Asset</i>                 | <i>Exposure</i> | <i>Sensitivity</i> | <i>Adaptive Capacity</i> | <i>Vulnerability</i> |
|---------------------------------------|-----------------|--------------------|--------------------------|----------------------|
| Ocracoke Sanitary District            | 1               | 1                  | 1                        | 1                    |
| NCCAT Building                        | 1               | 2                  | 2                        | 1                    |
| New EMS Station                       | 1               | 2                  | 2                        | 1                    |
| NCDOT Maintenance Facility            | 1               | 2                  | 1                        | 2                    |
| Tideland EMC Overhead Power           | 1               | 1                  | 0                        | 2                    |
| VIPER and Cellular Antenna            | 1               | 1                  | 0                        | 2                    |
| Tideland EMC Ocracoke Office          | 2               | 2                  | 2                        | 2                    |
| Island Mobile Medical Care, PA        | 2               | 2                  | 2                        | 2                    |
| Local Telecommunications              | 2               | 2                  | 2                        | 2                    |
| Ocracoke Convenience Site             | 1               | 1                  | 0                        | 2                    |
| Radio Station                         | 2               | 2                  | 2                        | 2                    |
| Ocracoke School                       | 2               | 2                  | 1                        | 3                    |
| Ocracoke Volunteer Fire Department    | 1               | 2                  | 0                        | 3                    |
| Ocracoke Health Center                | 1               | 2                  | 0                        | 3                    |
| Ocracoke Island Airport               | 2               | 1                  | 0                        | 3                    |
| Ocracoke Ferry Terminal (Silver Lake) | 2               | 1                  | 0                        | 3                    |
| Community Square / Docks              | 2               | 1                  | 0                        | 3                    |
| Hyde County Sheriff's Department      | 2               | 2                  | 0                        | 4                    |
| Ocracoke Community Center             | 2               | 2                  | 0                        | 4                    |
| The Variety Store                     | 2               | 2                  | 0                        | 4                    |
| Ocracoke Gas Station                  | 2               | 2                  | 0                        | 4                    |
| First National Bank                   | 2               | 2                  | 0                        | 4                    |
| Ocracoke Seafood Co.                  | 3               | 2                  | 0                        | 5                    |
| Ferry Terminal - South Dock           | 3               | 3                  | 0                        | 6                    |
| Highway 12 Dune System                | 3               | 3                  | 0                        | 6                    |

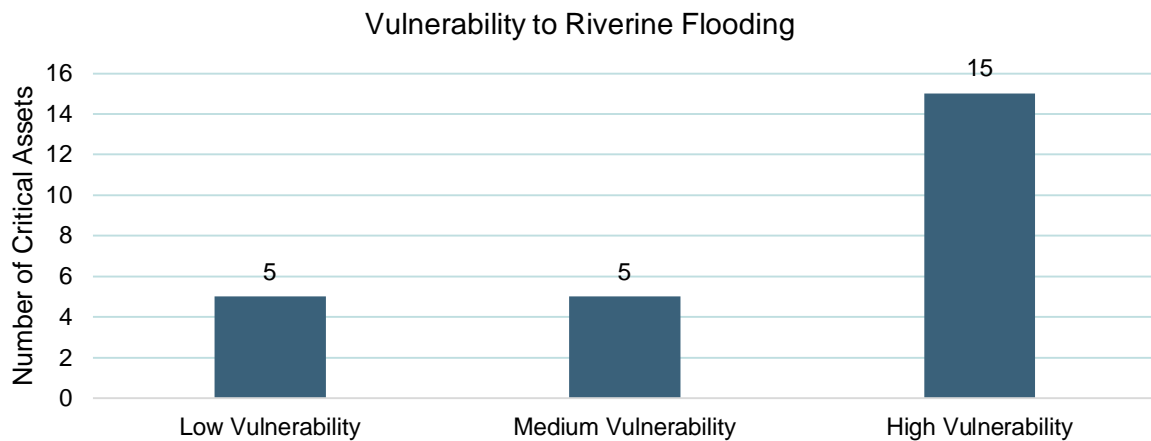


## Riverine Flooding

### Scoring Metrics

|   | <i>Exposure</i>            | <i>Sensitivity</i>  | <i>Adaptive Capacity</i>                                     |
|---|----------------------------|---|--|
| 0 | No Exposure                | -   | No implemented solutions                                     |
| 1 | Zone X                     | Infrastructure  | -  |
| 2 | .2% Flood Hazard           | Buildings   | Raised but below the Regulatory Flood Protection Elevation   |
| 3 | 1% Flood Hazard (AE) or VE | Protective Natural Feature or Demonstrated Historic Sensitivity | Raised to or above the Regulatory Flood Protection Elevation |

### Results



### Highly Vulnerable Critical Assets:

- Ocracoke School
- Ocracoke Island Airport
- Ocracoke Ferry Terminal (Silver Lake)
- Ocracoke Convenience Site
- Community Square / Docks
- Ocracoke Volunteer Fire Department
- Hyde County Sheriff's Department
- Ocracoke Health Center
- Ocracoke Community Center
- The Variety Store
- Ocracoke Gas Station
- Ocracoke Seafood Co.
- First National Bank
- Ferry Terminal - South Dock
- Highway 12 Dune System

### Key Findings:

- Overall, the assets ranked highly for exposure to riverine flooding. 76% of the Critical Assets are within the 100-year floodplain (AE or VE). 88% of the Critical Assets are in either the 100-year or 200-year floodplain.
- Many of the high vulnerability critical assets are buildings that are within the 100-year floodplain but are not raised above the Regulatory Flood Protection Elevation.
- Most roads on the island are within the 100-year floodplain. Critical roads within the 100-year floodplain include Back, Sunset, NC 12, Irvin Garrish, British Cemetery and Trent. This is shown in **Appendix D**.

Scores:

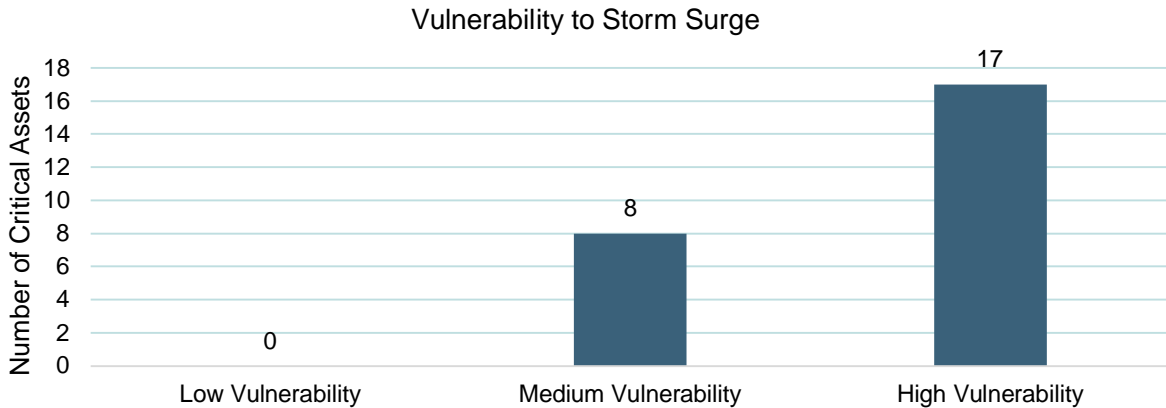
| <i>Critical Asset</i>                 | <i>Exposure</i> | <i>Sensitivity</i> | <i>Adaptive Capacity</i> | <i>Vulnerability</i> |
|---------------------------------------|-----------------|--------------------|--------------------------|----------------------|
| Ocracoke Sanitary District            | 1               | 1                  | 1                        | 1                    |
| NCDOT Maintenance Facility            | 1               | 2                  | 1                        | 2                    |
| VIPER and Cellular Antenna            | 1               | 1                  | 0                        | 2                    |
| NCCAT Building                        | 2               | 2                  | 2                        | 2                    |
| New EMS Station                       | 2               | 2                  | 2                        | 2                    |
| Tideland EMC Overhead Power           | 2               | 1                  | 0                        | 3                    |
| Tideland EMC Ocracoke Office          | 3               | 2                  | 2                        | 3                    |
| Island Mobile Medical Care, PA        | 3               | 2                  | 2                        | 3                    |
| Local Telecommunications              | 3               | 2                  | 2                        | 3                    |
| Radio Station                         | 3               | 2                  | 2                        | 3                    |
| Ocracoke School                       | 3               | 2                  | 1                        | 4                    |
| Ocracoke Island Airport               | 3               | 1                  | 0                        | 4                    |
| Ocracoke Ferry Terminal (Silver Lake) | 3               | 1                  | 0                        | 4                    |
| Ocracoke Convenience Site             | 3               | 1                  | 0                        | 4                    |
| Community Square / Docks              | 3               | 1                  | 0                        | 4                    |
| Ocracoke Volunteer Fire Department    | 3               | 2                  | 0                        | 5                    |
| Hyde County Sheriff's Department      | 3               | 2                  | 0                        | 5                    |
| Ocracoke Health Center                | 3               | 2                  | 0                        | 5                    |
| Ocracoke Community Center             | 3               | 2                  | 0                        | 5                    |
| The Variety Store                     | 3               | 2                  | 0                        | 5                    |
| Ocracoke Gas Station                  | 3               | 2                  | 0                        | 5                    |
| Ocracoke Seafood Co.                  | 3               | 2                  | 0                        | 5                    |
| First National Bank                   | 3               | 2                  | 0                        | 5                    |
| Ferry Terminal - South Dock           | 3               | 3                  | 0                        | 6                    |
| Highway 12 Dune System                | 3               | 3                  | 0                        | 6                    |

## Storm Surge

### Scoring Metrics

|               | <i>Exposure</i>         | <i>Sensitivity</i>             | <i>Adaptive Capacity</i>                                     |
|---------------|-------------------------|--------------------------------|--|
| <i>Metric</i> | Hurricane Return Period | CAT 2 Storm Surge              | No implemented solutions                                     |
| 0             | Greater than 50 Years   | Not exposed                    | -  |
| 1             | 12-49 Years             | Less than 3 feet above Ground  | Raised but below the Regulatory Flood Protection Elevation   |
| 2             | 8-11 Years              | 3 feet or greater above ground | Raised to or above the Regulatory Flood Protection Elevation |
| 3             | 7 or less Years         | 6 feet or greater above ground | No implemented solutions                                     |

### Results:



### Highly Vulnerable Critical Assets:

- Ocracoke School
- Tideland EMC
- VIPER and Cellular Antenna
- Ocracoke Volunteer Fire Department
- Ocracoke Health Center
- Ocracoke Community Center
- The Variety Store
- Ocracoke Gas Station
- Hyde County Sheriff's Department
- Ocracoke Seafood Co.
- First National Bank
- Ferry Terminal - South Dock
- Highway 12 Dune System
- Ocracoke Island Airport
- Ocracoke Ferry Terminal (Silver Lake)
- Ocracoke Convenience Site
- Community Square / Docks

### Key Findings:

- Overall, all the critical assets ranked highly vulnerable for storm surge.
- All the assets had a high exposure to storm surge given the hurricane return period and size of Ocracoke.
- The most sensitive assets were assets near the shoreline and/or in low lying areas.
- All roads on Ocracoke Island are modeled to experience storm surge during a Category 2 Hurricane. Critical roads within shown to experience 2 to 5 feet of storm surge include Back, Sunset, NC 12, Irvin Garrish, British Cemetery and Trent. This is shown in **Appendix D**.

Scores:

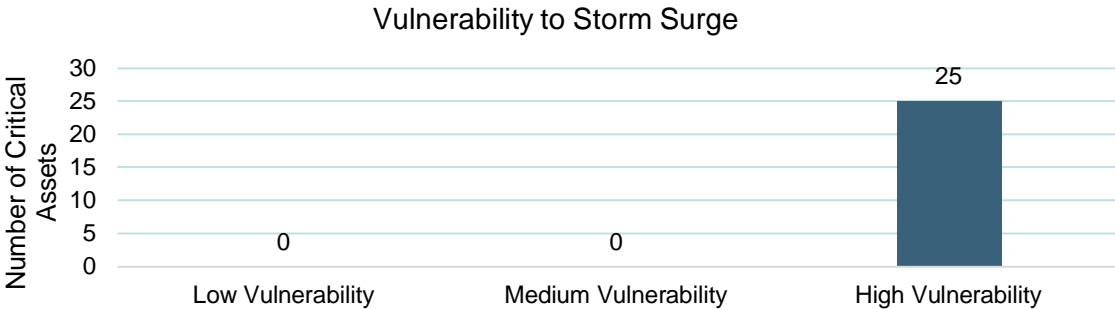
| <i>Critical Asset</i>                 | <i>Exposure</i> | <i>Sensitivity</i> | <i>Adaptive Capacity</i> | <i>Vulnerability</i> |
|---------------------------------------|-----------------|--------------------|--------------------------|----------------------|
| NCDOT Maintenance Facility            | 3               | 1                  | 1                        | 3                    |
| Ocracoke Sanitary District            | 3               | 1                  | 1                        | 3                    |
| Tideland EMC Ocracoke Office          | 3               | 2                  | 2                        | 3                    |
| Island Mobile Medical Care, PA        | 3               | 2                  | 2                        | 3                    |
| Local Telecommunications              | 3               | 2                  | 2                        | 3                    |
| NCCAT Building                        | 3               | 2                  | 2                        | 3                    |
| Radio Station                         | 3               | 2                  | 2                        | 3                    |
| New EMS Station                       | 3               | 2                  | 2                        | 3                    |
| Ocracoke School                       | 3               | 2                  | 1                        | 4                    |
| Tideland EMC Overhead Power           | 3               | 1                  | 0                        | 4                    |
| VIPER and Cellular Antenna            | 3               | 1                  | 0                        | 4                    |
| Ocracoke Volunteer Fire Department    | 3               | 2                  | 0                        | 5                    |
| Hyde County Sheriff's Department      | 3               | 2                  | 0                        | 5                    |
| Ocracoke Health Center                | 3               | 2                  | 0                        | 5                    |
| Ocracoke Community Center             | 3               | 2                  | 0                        | 5                    |
| The Variety Store                     | 3               | 2                  | 0                        | 5                    |
| Ocracoke Gas Station                  | 3               | 2                  | 0                        | 5                    |
| Ocracoke Seafood Co.                  | 3               | 2                  | 0                        | 5                    |
| First National Bank                   | 3               | 2                  | 0                        | 5                    |
| Ferry Terminal - South Dock           | 3               | 2                  | 0                        | 5                    |
| Highway 12 Dune System                | 3               | 2                  | 0                        | 5                    |
| Ocracoke Island Airport               | 3               | 2                  | 0                        | 5                    |
| Ocracoke Ferry Terminal (Silver Lake) | 3               | 2                  | 0                        | 5                    |
| Ocracoke Convenience Site             | 3               | 2                  | 0                        | 5                    |
| Community Square / Docks              | 3               | 2                  | 0                        | 5                    |

# Wind

*Scoring Metrics*

|   | <i>Exposure</i> | <i>Sensitivity</i>  | <i>Adaptive Capacity</i>  |
|---|-----------------|---|---|
| 0 | Not Exposed     | Minimal impact  | No implemented solutions  |
| 1 | -               | low impact from wind - i.e., roads, infrastructure assets | Implemented solution to reduce sensitivity                      |
| 2 | -               | medium impact from wind - i.e., buildings                 | Implemented solution to reduce exposure                         |
| 3 | Exposed         | high impact from wind - i.e., power communication lines   | Implemented solution that reduces both exposure and sensitivity |

*Results:*



*Most Vulnerable Critical Asset:*



*Key Findings:*

- Overall, all the critical assets ranked highly vulnerable for wind.
- The Highway 12 Dune System, Tideland EMC Overhead Power, and Viper and Cellular Antenna reached a maximum vulnerability score of 6.
- All the assets had a high exposure to wind given size of Ocracoke.

Scores:

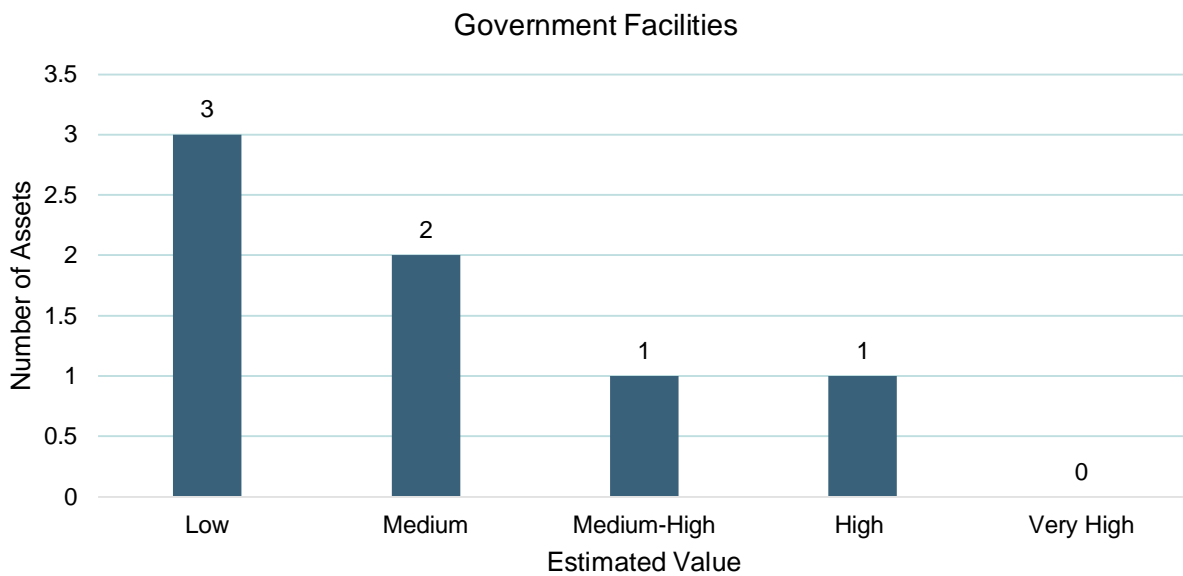
| <i>Critical Asset</i>                 | <i>Exposure</i> | <i>Sensitivity</i> | <i>Adaptive Capacity</i> | <i>Vulnerability</i> |
|---------------------------------------|-----------------|--------------------|--------------------------|----------------------|
| Community Square / Docks              | 3               | 1                  | 0                        | 4                    |
| Ocracoke Sanitary District            | 3               | 1                  | 0                        | 4                    |
| Ocracoke Island Airport               | 3               | 1                  | 0                        | 4                    |
| Ocracoke Ferry Terminal (Silver Lake) | 3               | 1                  | 0                        | 4                    |
| Ocracoke Convenience Site             | 3               | 1                  | 0                        | 4                    |
| Ferry Terminal - South Dock           | 3               | 2                  | 0                        | 5                    |
| Radio Station                         | 3               | 2                  | 0                        | 5                    |
| New EMS Station                       | 3               | 2                  | 0                        | 5                    |
| NCCAT Building                        | 3               | 2                  | 0                        | 5                    |
| Ocracoke Volunteer Fire Department    | 3               | 2                  | 0                        | 5                    |
| Hyde County Sheriff's Department      | 3               | 2                  | 0                        | 5                    |
| Ocracoke Health Center                | 3               | 2                  | 0                        | 5                    |
| Ocracoke Community Center             | 3               | 2                  | 0                        | 5                    |
| Tideland EMC Ocracoke Office          | 3               | 2                  | 0                        | 5                    |
| The Variety Store                     | 3               | 2                  | 0                        | 5                    |
| Ocracoke Gas Station                  | 3               | 2                  | 0                        | 5                    |
| Island Mobile Medical Care, PA        | 3               | 2                  | 0                        | 5                    |
| Ocracoke Seafood Co.                  | 3               | 2                  | 0                        | 5                    |
| First National Bank                   | 3               | 2                  | 0                        | 5                    |
| Ocracoke School                       | 3               | 2                  | 0                        | 5                    |
| Local Telecommunications              | 3               | 2                  | 0                        | 5                    |
| NCDOT Maintenance Facility            | 3               | 2                  | 0                        | 5                    |
| Highway 12 Dune System                | 3               | 3                  | 0                        | 6                    |
| Tideland EMC Overhead Power           | 3               | 3                  | 0                        | 6                    |
| VIPER and Cellular Antenna            | 3               | 3                  | 0                        | 6                    |

# Appendix G – Risk Results

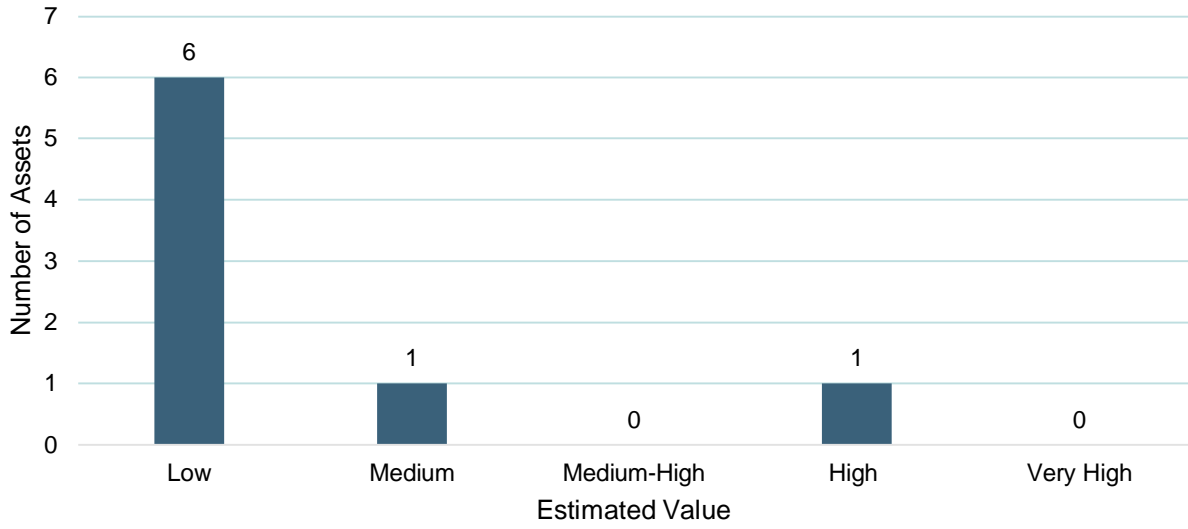
The quantified value at risk for each critical asset and the defined sector is shown in the figure below.

| <i>Critical Asset</i>                 | <i>Sector</i>             | <i>Estimated Value Range</i> |
|---------------------------------------|---------------------------|------------------------------|
| Ocracoke Volunteer Fire Department    | Government Facilities     | Medium                       |
| Hyde County Sheriff's Department      | Government Facilities     | Low                          |
| Ocracoke Health Center                | Local Businesses          | Low                          |
| Ocracoke Community Center             | Government Facilities     | Low                          |
| Ocracoke Sanitary District            | Infrastructure/ Utilities | Medium-High                  |
| Tideland EMC Ocracoke Office          | Infrastructure/ Utilities | Low                          |
| The Variety Store                     | Local Businesses          | Medium                       |
| Ocracoke Gas Station                  | Local Businesses          | Low                          |
| Island Mobile Medical Care, PA        | Local Businesses          | Low                          |
| Ocracoke Seafood Co.                  | Local Businesses          | Low                          |
| First National Bank                   | Local Businesses          | Low                          |
| Ocracoke School                       | Government Facilities     | High                         |
| Ferry Terminal - South Dock           | Infrastructure/ Utilities | Very High                    |
| Highway 12 Dune System                | Infrastructure/ Utilities | Very High                    |
| Local Telecommunications              | Infrastructure/ Utilities | Low                          |
| NCDOT Maintenance Facility            | Government Facilities     | Medium                       |
| Ocracoke Island Airport               | Infrastructure/ Utilities | Medium-High                  |
| Tideland EMC Overhead Power           | Infrastructure/ Utilities | High                         |
| Ocracoke Ferry Terminal (Silver Lake) | Infrastructure/ Utilities | Very High                    |
| Ocracoke Convenience Site             | Government Facilities     | Low                          |
| VIPER and Cellular Antenna            | Infrastructure/ Utilities | Low                          |
| NCCAT Building                        | Local Businesses          | High                         |
| Community Square / Docks              | Infrastructure/ Utilities | Medium                       |
| New EMS Station                       | Government Facilities     | Medium-High                  |
| Radio Station                         | Local Businesses          | Low                          |

The graphs below show the estimated value at risk range for each sector.



### Local Businesses



### Infrastructure/ Utilities

