PLANNING COMMISSION
September 11, 2024

The public may view the public meeting at:
www.youtube.com/user/cityofisleofpalms

**Public Comment:** Citizens may provide public comment here:
https://www.iop.net/public-comment-form

## AGENDA

The Isle of Palms Planning Commission will hold its regular meeting on Wednesday, September 11, 2024, at 4:00 p.m**.** in Council Chambers of City Hall, 1207 Palm Boulevard.

A. Call to order and acknowledgment that the press and the public were duly notified in accordance with state law.

B. Approval of minutes June 12, 2024

C. New business review DRAFT Sea Level Rise Adaptation Plan

D. Old business

E. Miscellaneous business

F. Adjourn

**Planning Commission Meeting**
**4:00pm, Wednesday, June 12, 2024**
**1207 Palm Boulevard, Isle of Palms, SC and**
**broadcasted live on YouTube: https://www.youtube.com/user/cityofisleofpalms**

# MINUTES

1. **Call to Order**

Present: Ron Denton, Sue Nagelski, David Cohen, Rich Steinert, Sandy Stone, Tim Ahmuty, Jeffrey Rubin

Staff present: Director Kerr, Zoning Administrator Simms

2. **Approval of minutes**

**MOTION: Mr. Cohen made a motion to approve the minutes of the May 8, 2024 meeting. Ms. Nagelski seconded the motion. The motion passed unanimously.**

3. **New Business**

**Discuss and develop recommendation for Ordinance 2024-03 prohibiting political signs in the right-of-way**

Director Kerr explained that City Council has passed 2024-03 at First Reading and it now comes to the Planning Commission for their recommendation. He noted that State law prohibits political signage in the public right-of-way, and most of the roads on the island are State-owned roads.

Discussion ensued as to the conflict between Section 5-4-138(d) in Ordinance 2024-03 and sections 5-4-136(a) and 5-4-141(14). Mr. Cohen noted the conflict: "I think the intent behind this was right, but when they changed this paragraph [5-4-138(d)] now to say temporary signs having a 30-day limit, it is in conflict with the one that says I can have them at any time."

Commissioners discussed ways to make the intent of the ordinance change clearer for administrative purposes but also for the end user to understand the rules involving signs.

**MOTION: Mr. Stone made a recommendation that City Council amend Ordinance 2024-03 by replacing the text under 5-4-138(d) with references to 5-4-136(a) and 5-4-141(14). Ms. Nagelski seconded the motion. The motion passed unanimously.**

4. **Old Business**

**Update regarding 2024-05 stormwater management requirements**

Director Kerr reported that the stormwater management recommendations made by the Planning Commission went through the Public Services & Facilities Committee who recommended that pools be included in the square footage that would trigger the need for a stormwater management plan. City Council has passed the recommendations with that change at First Reading. There will be a Public Hearing prior to Second Reading.

He also mentioned a concern expressed by one Council member about allowing low lying lots to elevate up to 7.4'. He and Zoning Administrator Simms are preparing internal administrative policies following the passing of the ordinance.

5. **Miscellaneous**

Dr. Rubin asked about the status of the changing of the striping on the Isle of Palms Connector. He expressed concern about the safety of the Connector. Director Kerr stated that the City shared its preference of wanting two lanes exiting the Isle of Palms. However, when SCDOT approached the Town of Mt. Pleasant with that preferred change, the Town of Mt. Pleasant did not support it. Director Kerr said that SCDOT was very supportive of the City during their efforts to make a change, but they will not make any changes when there is a conflict between neighboring towns.

The next meeting of the Planning Commission will be Wednesday, July 10, 2024 at 4:00pm.

6. **Adjournment**

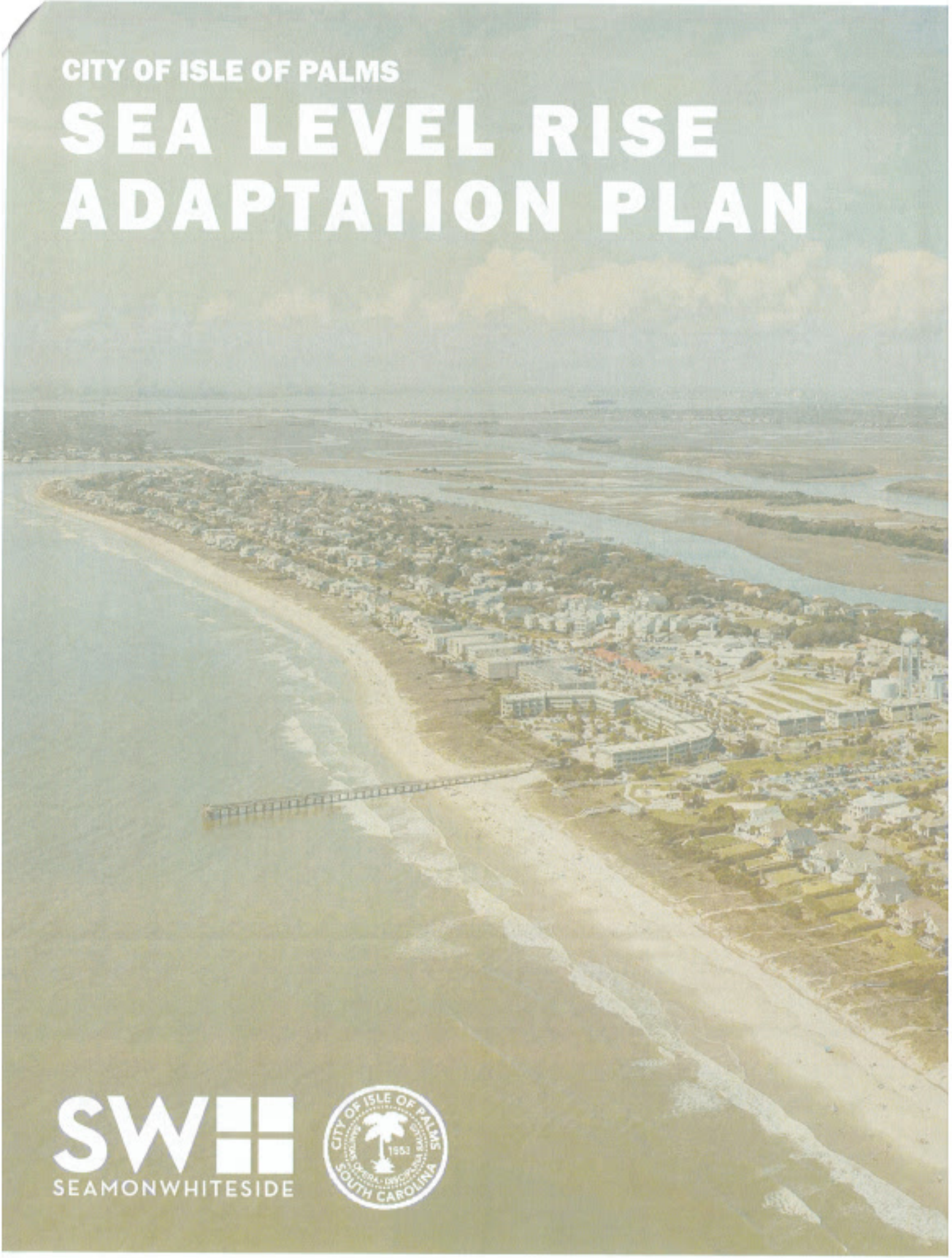
Mr. Stone made a motion to adjourn, and Mr. Cohen seconded the motion. The meeting was adjourned at approximately 4:45pm.

Respectfully submitted,

Nicole DeNeane
City Clerk

CITY OF ISLE OF PALMS

# SEA LEVEL RISE ADAPTATION PLAN



SEAMONWHITESIDE

# CONTENTS

# INTRODUCTION

# PROJECT BACKGROUND

The City of Isle of Palms is a focal point for the Charleston area, is home to thousands of residents, and serves as a vacationing playground for millions around the globe. Life on Isle of Palms depends on a pristine landscape and flowing coastal waterways. However, sea level rise may cause those recreational waterways to become the city's greatest threat if ignored.

Based on the premonition of future flooding from sea level rise, the City has made an instrumental decision to begin planning for the future.

The purpose of this sea level rise adaptation plan is to outline the potential flood risk of sea level rise, provide strategies for adapting to sea level rise both ethically and cost effectively, outline potential projects that will mitigate against sea level rise, and identify potential funding sources the city can leverage to implement adaptation strategies and improvement projects.

# CURRENT & ONGOING PROJECTS

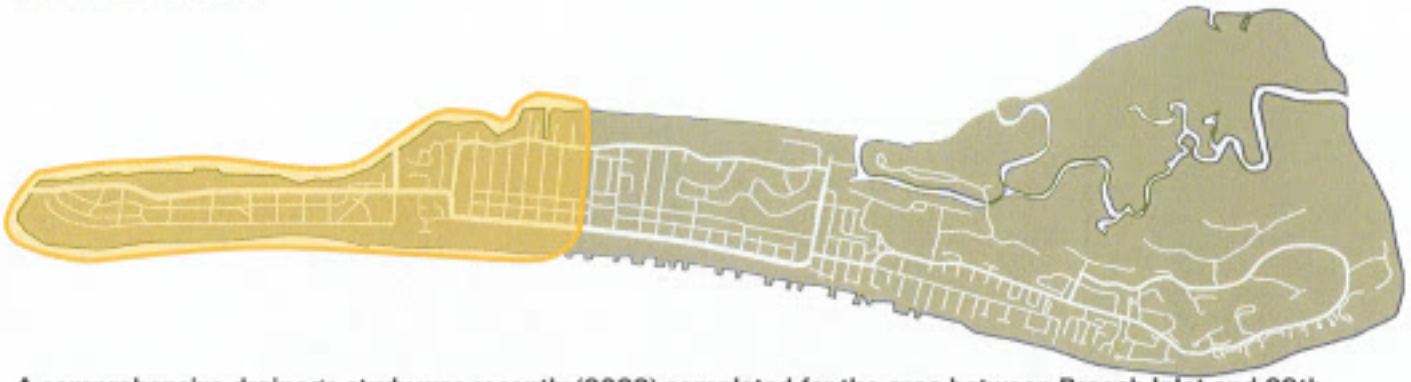
1. **DRAINAGE STUDY & MASTER PLAN**

2. **WATERWAY BLVD. IMPROVEMENTS**

3. **BEACH PRESERVATION**

# 1 DRAINAGE STUDY & MASTER PLAN

COMPLETED 2023



**A comprehensive drainage study was recently (2023) completed for the area between Breach Inlet and 29th Avenue. The purpose of this study was to complete a full inventory and assessment (including documentation and recommendations of immediate maintenance priorities) of existing drainage infrastructure and develop solutions to address systemic rainfall and coastal-driven flooding.**

**Additional project components included providing resilience planning to address future climate change conditions in the final project recommendations, public engagement and involvement using stakeholder meetings and web-based tools, deploying real-time monitoring stations to calibrate/validate hydraulic analyses, reviewing and recommending changes to existing stormwater ordinances, and assessing potential funding avenues/sources (i.e., state or federal grants) for recommended projects.**

**This project resulted in approximately 31 drainage improvement projects (with priority established) being recommended to mitigate flooding and sea level rise. These projects included a diverse mix of infrastructure improvements including low impact development, green infrastructure, pipe upgrades, cleaning out interior canals/ditches, installation of tide gates, dune infiltration systems, and vegetated berms. The next step will be for the city to secure funding for the design and construction of the high priority improvements (primarily the outfall and major improvements seen in Figure 1).**

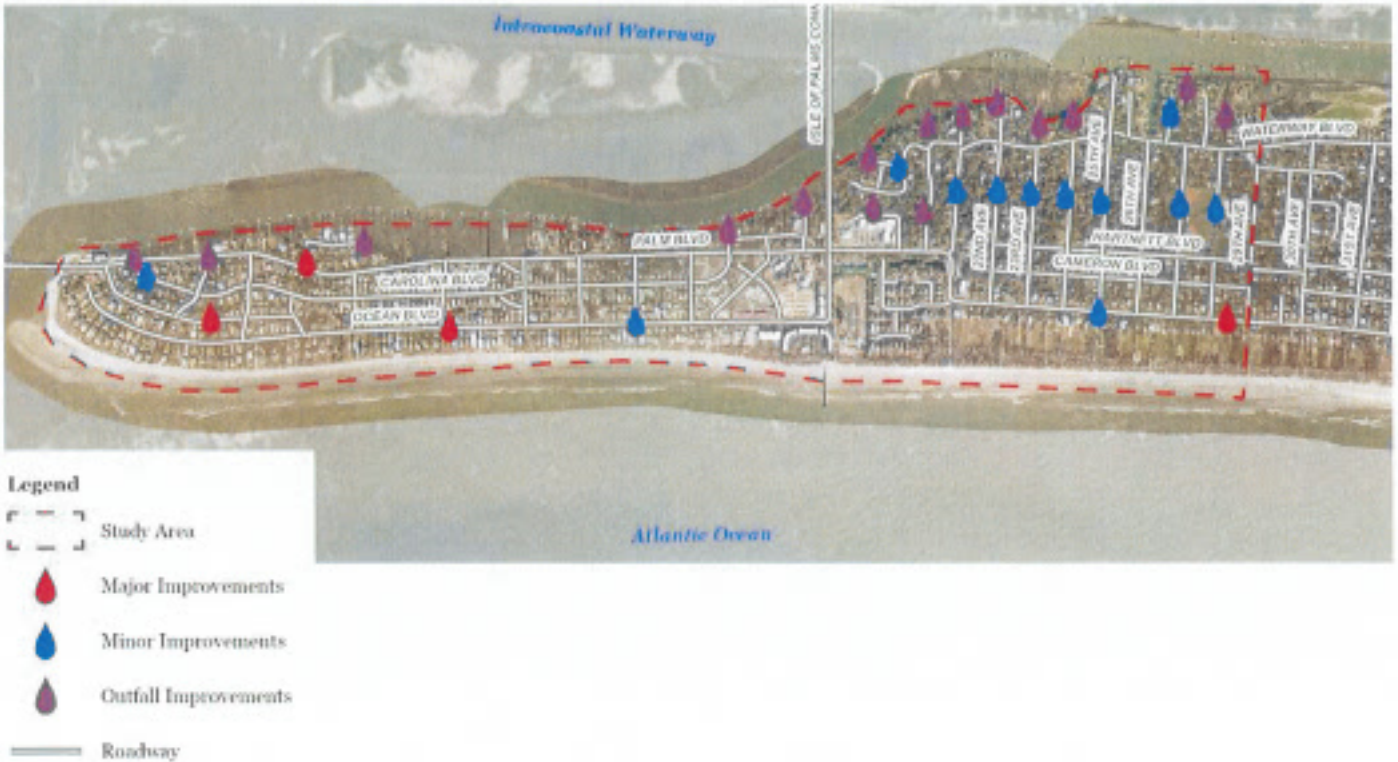
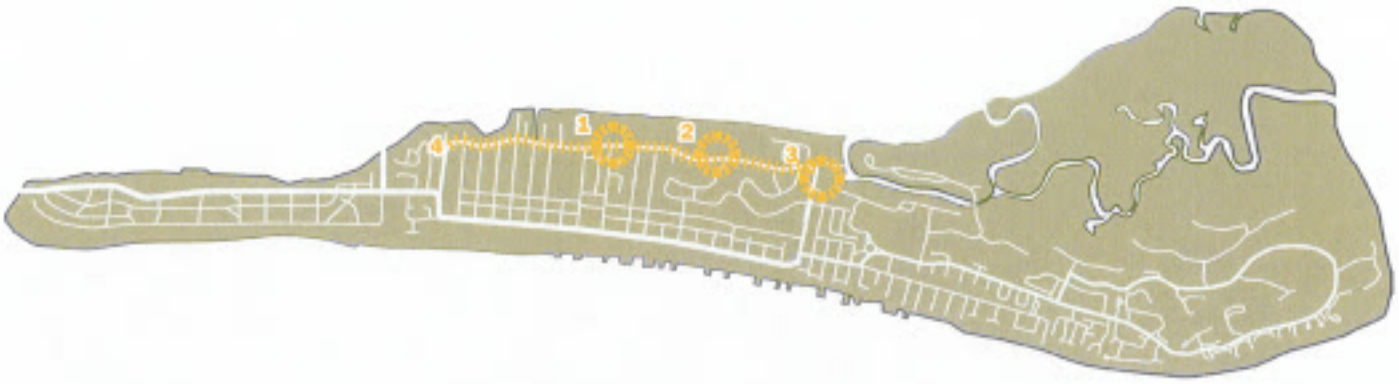



**Figure 1**

Approximate locations of project recommendations (Davis & Floyd, 2023).

# 2 WATERWAY BLVD. IMPROVEMENTS

ONGOING + FUTURE




## 1 30th Street Improvements

## 2 Forest Trail Improvements

## 3 41st Avenue Improvements

Originally initiated by City Council in 2017, a drainage study was completed for the area between 29th Avenue and 41st Avenue. Outfall improvements recommended as part of this study have been completed for the drainage systems at 30th Avenue, 36th Avenue, and 41st Avenue. These outfall improvements will provide significant mitigation for tidal flooding as well as provide ancillary benefits to the performance of the upstream drainage infrastructure.

Additional smaller drainage improvements are also planned for areas around Sparrow Drive, Forest Trail, Cross Lane, and 32nd Avenue.

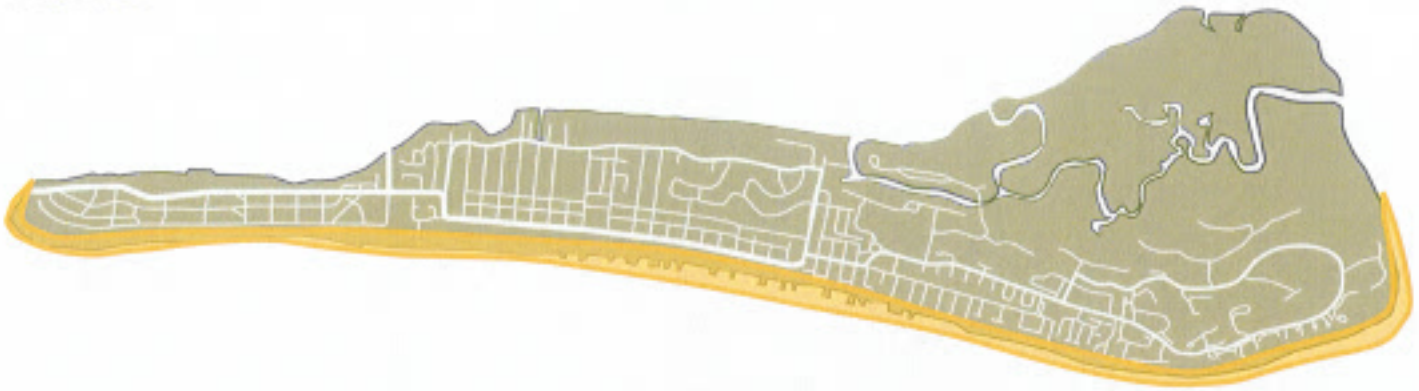
## 4 WATERWAY BLVD. MULTI-USE PATH ELEVATION PROJECT

The City is currently working on the design and engineering of the 1.7 mile Waterway Blvd. Multi-Use Path, which seeks to raise the path, while also improving local drainage and adding tide gates and valves to eliminate tidal intrusion.

The original study recommended a plan to improve tidal flooding protection to elevations 6 (NAVD 88), which would protect the City from most king tides. The City is evaluating the feasibility of increasing the level of protection by elevating the path an additional foot and pursuing grant funding to implement this project.

## 3 BEACH PRESERVATION

ONGOING



In 2018 1.6M cubic yards of sand was placed on the north end of the ocean facing beach near the Dewees Inlet side of the Island. This was a beach renourishment effort to help mitigate sever erosion spots as well as a shifting shoal in that area.

**North Wild Dunes**

Breach Inlet has been suffering from episodic erosion caused by a shifting and widening channel in the inlet. In 2023, the US Army Corps of Engineers placed sand between Breach Inlet and 10th Ave. to prevent further erosion on that section of beach.

**Breach Inlet**

In combination with expected natural migration of sand, IOP intends to seek additional sources of sand for large scale nourishment. Sand search analysis would be in coordination with SHPO and BOEM and would include placement at both ends of the island.

**Front Beach**

# COMMUNITY & ENGAGEMENT

# PUBLIC SURVEY

**As part of this Sea Level Rise Adaptation Plan, community feedback was gathered via an online survey with the following questions:**

## PART 1: SEA LEVEL RISE IMPACTS & STRATEGIES

**1. How concerned are you about the long term impacts of sea level rise on Isle of Palms?**

1. Not at all concerned
2. Somewhat concerned, but other issues feel more pressing
3. Concerned - this is as important as many other issues facing IOP
4. Very concerned - this is the most critical issue
5. Other/Need more information

**2. Please select the concerns related to increasing water levels you are most worried about:**

1. Storm and tidal flooding
2. Road closures and infrastructure damage from flooding
3. Loss of native ecological habitat
4. Septic and waste water contamination
5. Displacement of residents
6. Other

**3. Please select the sea level rise strategies you would like to see on Isle of Palms:**

1. Dune renourishment
2. Improved storm drains
3. Underground stormwater storage
4. Living shorelines
5. Tidal control structures on drainage pipes
6. Vegetated berms along the marsh
7. Clean out interior canals for better drainage
8. Low impact drainage (rain gardens and bioswales)
9. Other/Need more information

**4. The following are potential incentive programs targeted at encouraging homeowners and residents to bolster their property and neighbors' property from sea level rise. What, if any, of would you consider participating in?**

1. Using rain barrels (to capture runoff for yard irrigation)
2. Adding rain gardens or bioswales in flood prone yards
3. Replacing lawn with native planting
4. Increasing tree canopy
5. Upgrading from septic to sewer
6. Reducing impervious surfaces
7. Installing a green roof
8. Adding a pollinator garden
9. Other

**5. Please provide any additional comments or concerns related to sea level rise strategies.**

## PART 2: SITE SPECIFIC CONCERNS

**1. Which of the following categories best describes your concerns:**

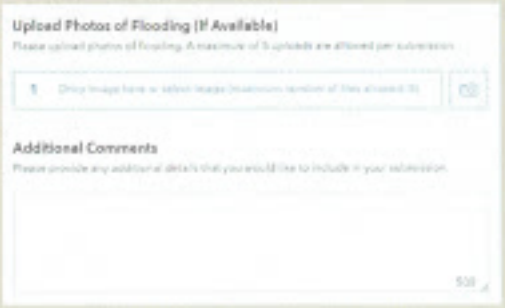
1. Flooding
2. Septic tank concern
3. Natural/critical habitat concern
4. Beach erosion
5. Damage to structures
6. Damage to infrastructure (including pipes, drains, sidewalks, roads)
7. Other

**2. Please locate on this map your area(s) of concern:**


**3. Severity of concern:**

1. Nuisance
2. Minor
3. Severe

**4. Photo upload and additional comments:**



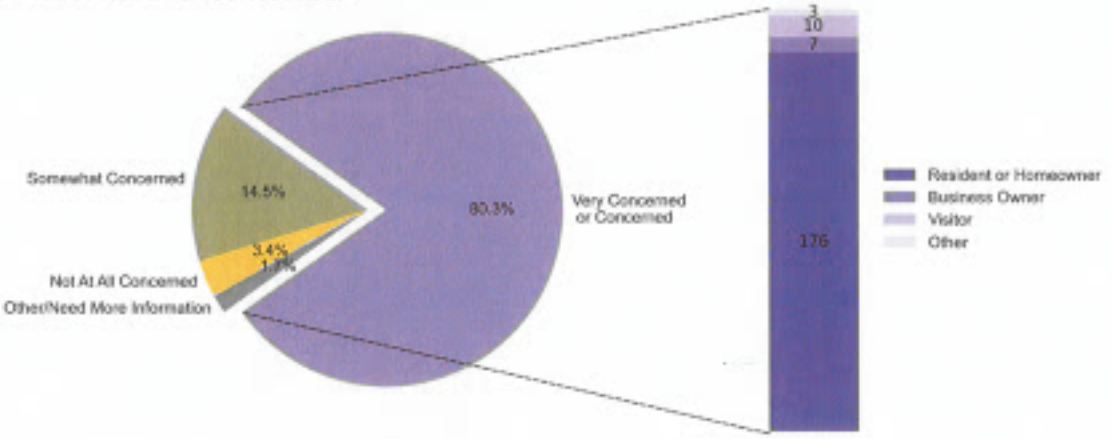
# SURVEY RESULTS

**233 RESPONSES**

**221** Residents/Homeowners
**9** Business owners
**10** Visitors
**4** Other

## Level of Concern

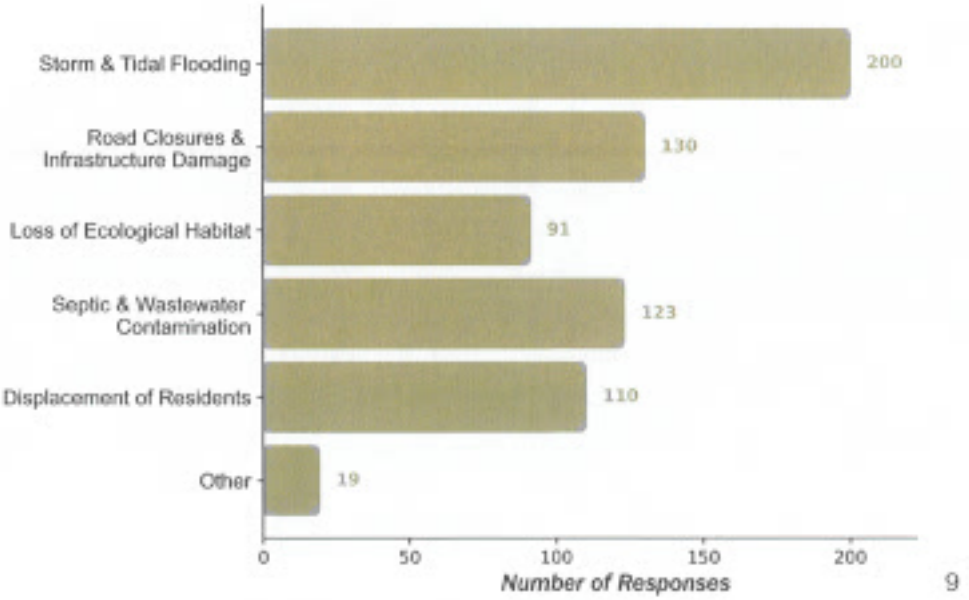
Of the 233 responses, the vast majority of respondents were very concerned or concerned about the impacts of sea level rise. Of those respondents who were concerned or very concerned, most were residents or homeowners. A small fraction of the respondents were somewhat or not at all concerned.




## Areas of Concern

Respondents were asked to choose what sea level rise impacts they were most concerned about. Storm and tidal flooding was identified as the highest area of concern amongst respondents. Road and infrastructure damage as well as septic contamination received the next most selections.

***"We are worried about the long-term viability of living on the island. It's our home and we don't want to go anywhere else..."***

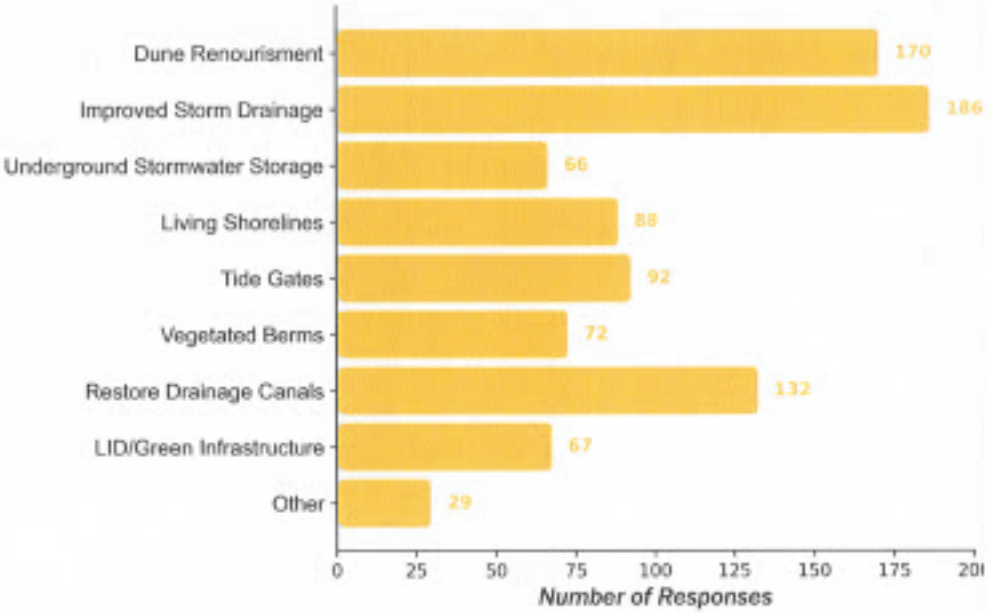


# SURVEY RESULTS

***"Extremely concerned about flooding in our area. The extent of water intrusion into our yard and garage has increased significantly over the past few years..."***

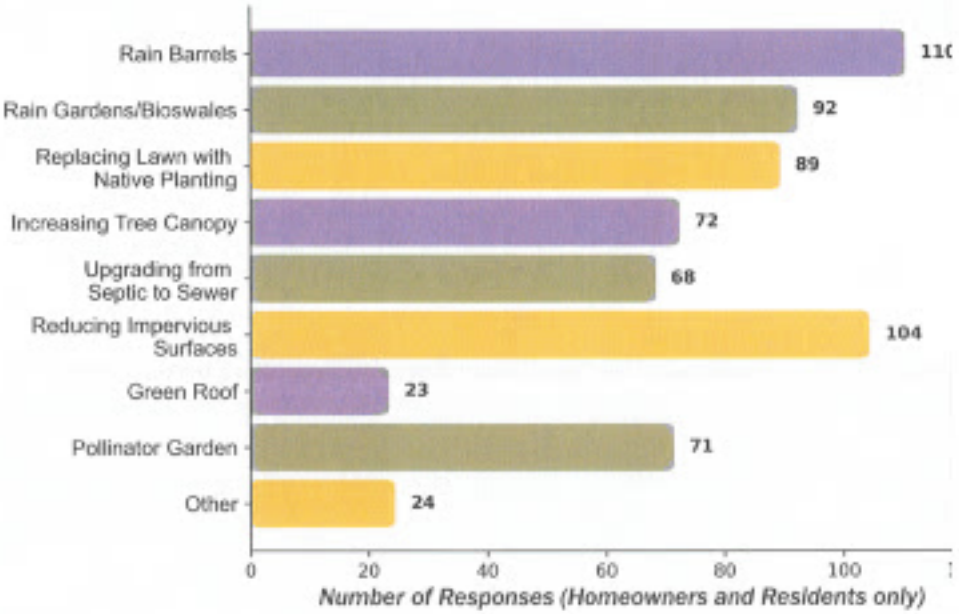
## SLR Strategy Interest

Respondents were asked to select the adaptation strategies they would most like to see the City take on. Grey infrastructure like improved storm drainage and restoring drainage canals were a top selection. Dune renourishment was the second highest chosen strategy. While green infrastructure strategies were not selected as frequently, they should still be considered for a holistic adaptation approach.




## Incentive Program Interest

Respondents were asked to select incentive programs they would be interested in participating in that would involve strategies to help mitigate the impacts of sea level rise on their properties. The top selections were rain barrels, reducing impervious surfaces, rain gardens/bioswales, and replacing lawn with native panting. These strategies should be most considered if the City were to adapt incentive programs moving forward.



# COMMITTEE MEETINGS

**The following meetings happened during the spring of 2024 to help guide the creation of this planning document and establish the known concerns regarding sea level rise on Isle of Palms.**

## TECHNICAL REVIEW COMMITTEE

2/22/2024

The Isle of Palms Technical Review Committee discussed the goals and strategies for the Sea Level Rise Adaptation Plan, emphasizing actionable steps to protect infrastructure and maintain community livability amidst rising sea levels and coastal flooding.

The committee reviewed existing data, completed and ongoing projects, and considered strategies from other communities like Folly Beach and Charleston to guide their efforts.

The meeting concluded with plans for future community engagement and coordination with the Planning Commission.

## PLANNING COMMISSION

5/08/2024

During the Isle of Palms Planning Commission workshop on the Sea Level Rise Adaptation Plan, the Planning Commission reviewed the project background, sea level rise projections through 2050 and discussed actionable strategies.

The workshop focused on the results from a preliminary vulnerability analysis and potential policies, programs, and projects which may mitigate these risks.

## ENVIRONMENTAL ADVISORY COUNCIL

5/09/2024

During the Environmental Advocacy Council meeting, the same feedback was generated as the Planning Commission Workshop. See the Planning Commission Meeting for details.

Additionally, the Environmental Council provided valuable feedback on environmental issues facing the island including subsidence, areas of known flooding, and the importance of low-impact development. Their feedback was instrumental in guiding the key elements of the plan.

# SEA LEVEL RISE AND VULNERABILITY ANALYSIS

# INTRODUCTION OF TIDAL DATUMS

Tidal datums are the elevation reference used for measuring local water levels and communicating this data to the public. The specific elevation reference used to establish common tidal datums is based on different statistical interpretations of observed tidal data within the most recent tidal epoch, or 19-year observation window. The current established tidal epoch is from 1983 through 2001 and is considered for revision every 20-25 years.

Tidal data is commonly presented as a height relative to Mean Lower-Low Water (MLLW). MLLW is a tidal datum whose reference elevation is set as the average of the daily lowest tide measurements observed during the most current tidal epoch. For example, if it is forecasted that an 8-foot tide will occur, this water level is equivalent to 8 feet above the MLLW reference elevation for a location. Given that the current tidal epoch ended in 2001, an updated tidal epoch and subsequent reference elevations are possible. Therefore, tides expressed in MLLW today may not be equivalent to tides expressed in MLLW in the future.

To provide consistency for this sea level rise adaptation plan and simplify planning and engineering design efforts, tidal data presented herein are benchmarked to a fixed reference of the North American Vertical Datum 1988 (NAVD 88).

For additional information regarding tidal datums please visit the following NOAA webpage: https://tidesandcurrents.noaa.gov/datum_options.html

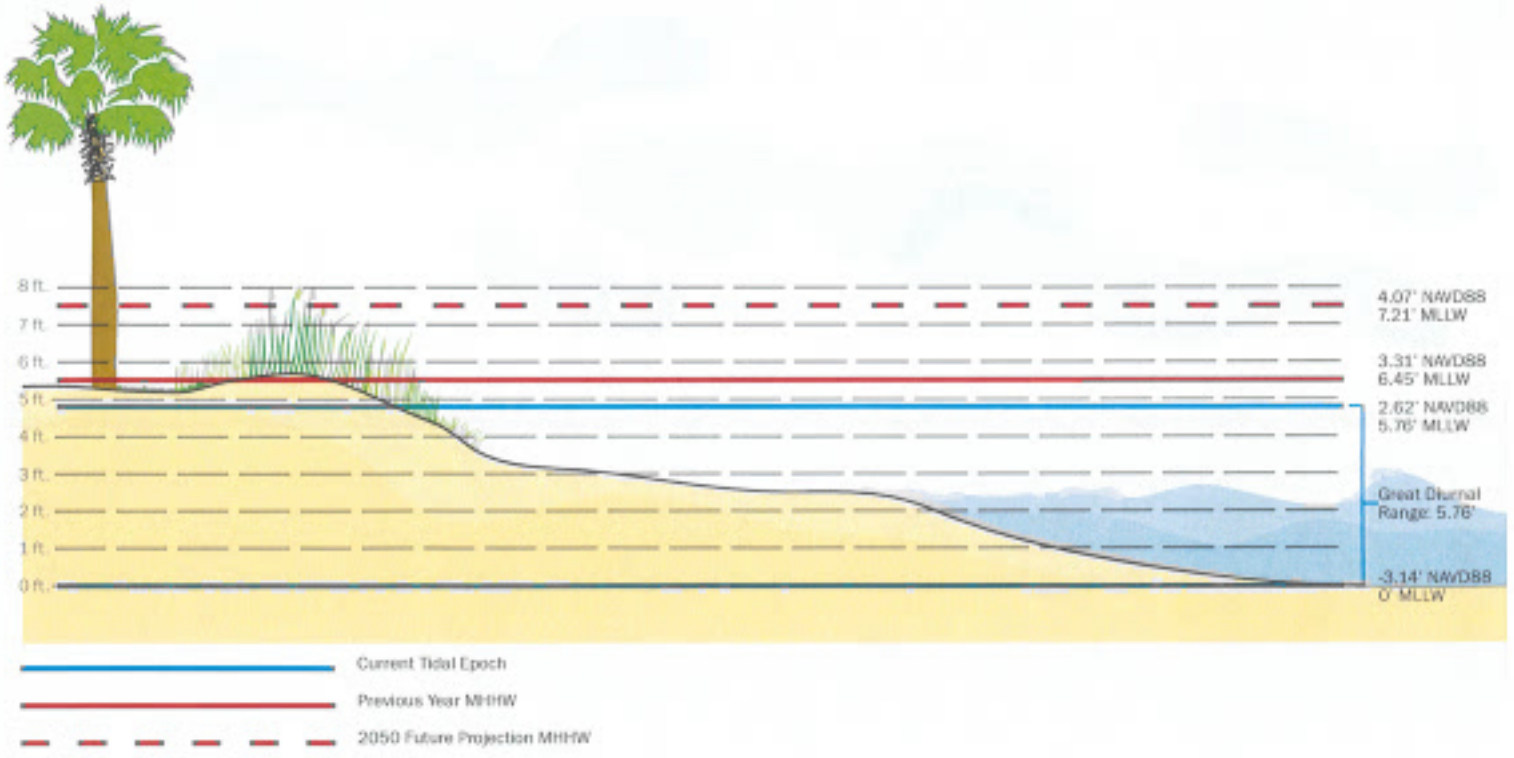



**Figure 2**
Historic and projected tidal datums based on the Charleston Harbor NOAA Station (Station 8665530).

# SEA LEVEL RISE

**A sea level rise analysis was performed to establish baseline tidal conditions and determine the target elevation that the city, planners, and engineers should use as guidance when developing flood mitigation solutions.**

### Baseline Tidal Conditions

The baseline tidal conditions for this analysis were established using observations from the Charleston Harbor NOAA Station (Station 8665530). This station has been collecting high-resolution tidal water level data for several decades over which increases in sea level can be observed (see Figure 3).

The baseline tidal elevation for this sea level rise analysis was based on statistical interpretations of the observed daily higher-high tides for 2023 (see Figure 4). This year represents an excellent baseline for quantifying future sea level rise because: 1) it is the most recent observation year, 2) the mean higher-high tide for the year aligns with long-term data trends, and 3) several extreme tidal events occurred during 2023 with the most extreme occurring outside of a hurricane or tropical storm event. To provide a conservative baseline for providing coastal protection, the 99.5% daily higher-high tide (5.97 ft NAVD 88) for the year 2023 was selected as the baseline tidal elevation for this analysis.

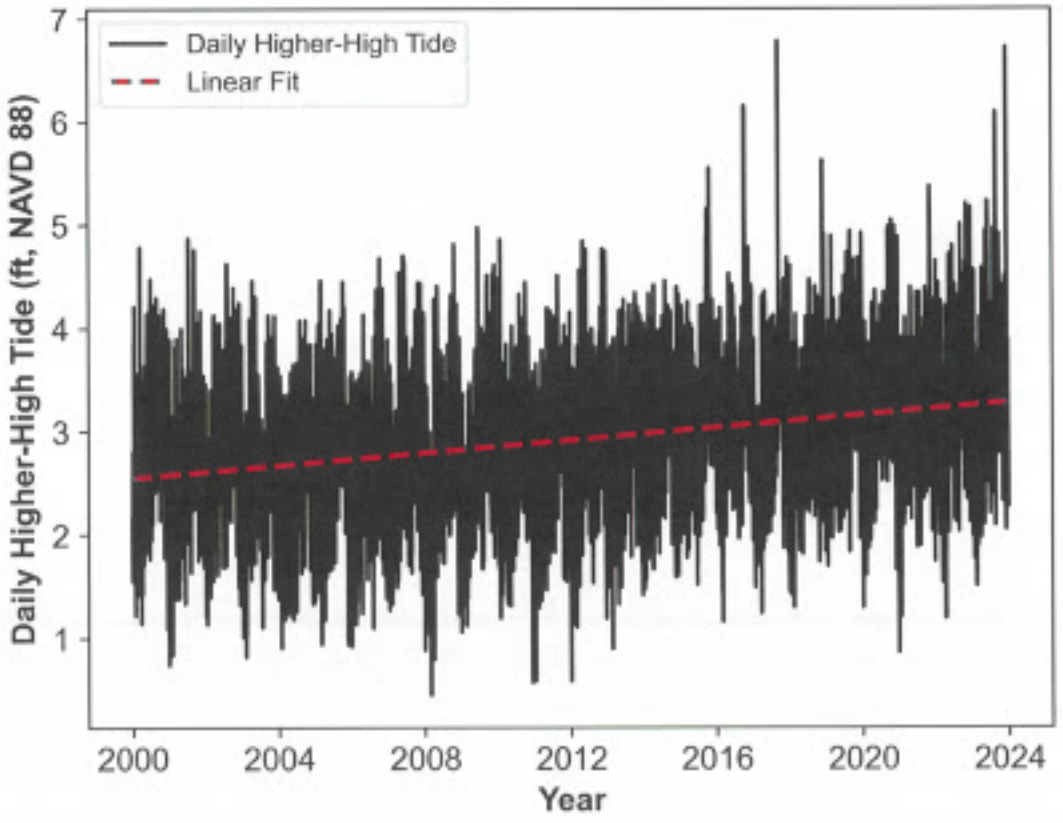



**Figure 3**
Daily higher-high tide from 2000-2023 for Charleston, SC (NOAA Station ID 8665530) along with a linear fit of the data.

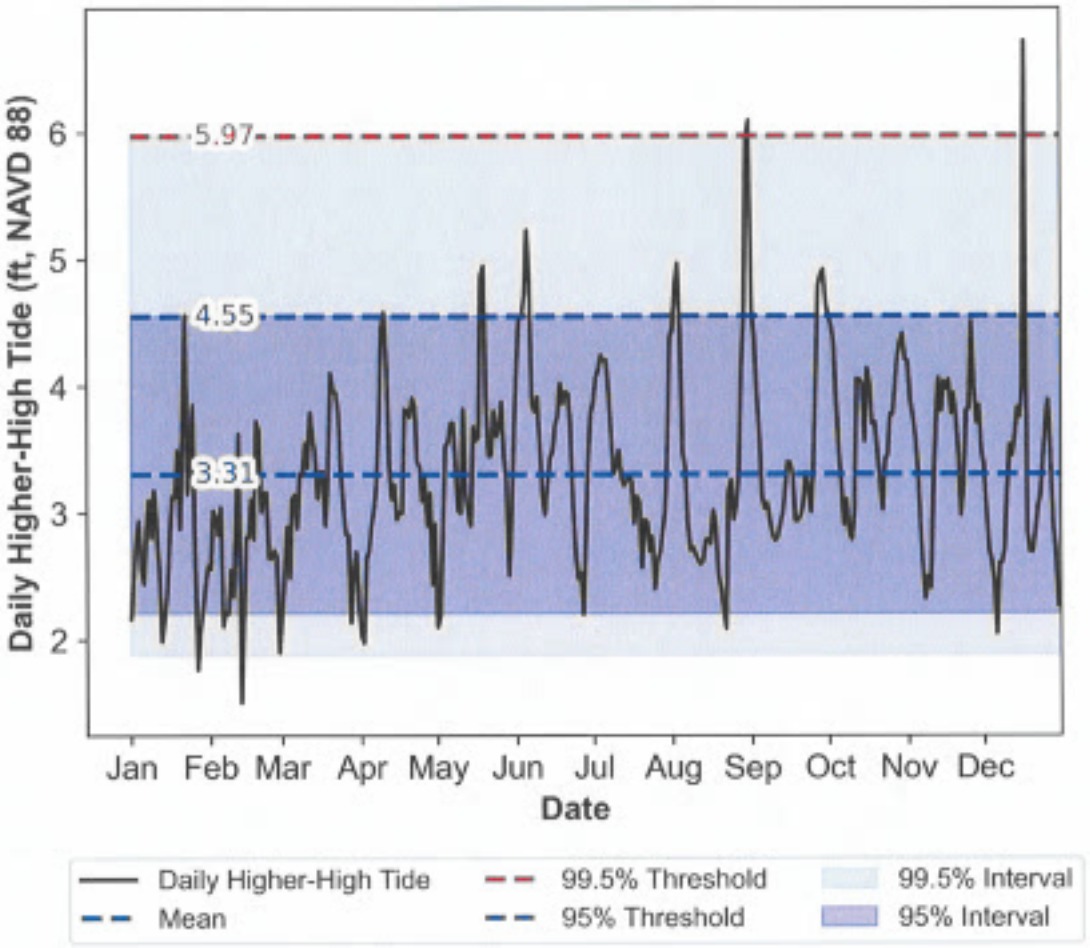



**Figure 4**
Daily higher-hide tide for Charleston, SC (NOAA Station ID 8665530) during 2023 along with quantile thresholds.

### Sea Level Rise Projections

Projections of future sea level rise have been established by the Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force. The projections and scenarios presented by this task force represent the most comprehensive and current (last updated 2022) information when investigating the impact of sea level rise along the U.S. coastline.

Overall, sea level rise projections presented by the task force represent the results of scenarios based on climate models which result in varying levels of risk and probability. For the purposes of this planning document, the intermediate projection for the year 2050 was selected as the sea level rise scenario to determine the local impact of future sea level rise.

For additional information regarding sea level rise scenarios please visit:
https://sealevel.nasa.gov/task-force-scenario-tool/?psmsl_id=234

### Vertical Land Subsidence

An additional hazard affecting coastal communities is vertical land subsidence, or the rate at which the surrounding landscape is sinking. It is hypothesized that the major contributors to this phenomenon include ground-water extraction and soil compaction in urban areas. Recent research has quantified these rates for the entirety of the U.S. eastern coastline based on vertical land motion data from 2007 to 2020 published by the United States Geological Survey. Analysis of the data points available within the municipal boundary for the City of Isle of Palms concluded that on average the landscape was sinking at a rate of approximately 0.15 inches/year.

For additional information regarding this research on vertical land subsidence please visit: https://doi.org/10.1093/pnasnexus/pgad426

### 2050 Sea Level Rise Mitigation Target

The previous datasets were used in the development of a sea level rise mitigation target for the City of Isle of Palms for the year 2050. Based on this analysis, the elevation target to mitigate/protect against future sea level rise is 7 feet NAVD88 (see Table 1; ~10 feet MLLW) which should provide protection for the vast majority of typical tides (excluding hurricanes and/or tropical storm events) experienced in the year 2050.

**Table 1**
Development of elevation target to mitigate future sea level rise

| Individual Components | Value |
|---|---|
| Current MHHW (2023; 99.5% Threshold) | 5.97 feet NAVD88 |
| Projected Sea Level Rise (Intermediate Scenario; Projected 2024 to 2050) | 0.763 feet |
| Vertical Land Subsidence (Average Observed; Projected 2024 to 2050) | 0.329 feet |
| **Sea Level Rise Target (2050)** | **7.061 feet NAVD88** |

## *Sea Level Rise Target (2050) is elevation 7' NAVD88*

# VULNERABILITY ANALYSIS

To assist planning efforts of potential mitigation projects, a vulnerability analysis was performed to identify impacted critical infrastructure and areas at-risk of tidal flooding.

This vulnerability analysis was performed using a 2D HEC-RAS model developed to simulate overland flow processes and the island's response to tidal-driven flooding. Several tidal boundary conditions were analyzed within this analysis representative of the tidal elevations for the years 2023, 2030, 2040, and 2050 (developed using the previously discussed methodology; see Table 2) to allow this analysis to identify which areas/infrastructure would be most immediately impacted.

Each tide cycle was developed based on an idealized tide cycle with a frequency of 12.5 hours wherein the peak and amplitude were determined using the MHHW (2.62 feet NAVD 88) and MLLW (-3.14 feet NAVD88) tidal values from the Charleston Harbor NOAA Station (Station 8665530) and shifted vertically to match the peak tide elevation for each target year.

**Table 2**
Development of additional elevation targets used to develop tide cycles for the vulnerability analysis.

| Target Year | Individual Components | Value |
|---|---|---|
| 2023 | Current MHHW (2023; 99.5% Threshold) | 5.97 feet NAVD88 |
| | Projected Sea Level Rise | N/A |
| | Vertical Land Subsidence | N/A |
| | **Sea Level Rise Target (2023)** | **5.97 feet NAVD88** |
| 2030 | Current MHHW (2023; 99.5% Threshold) | 5.97 feet NAVD88 |
| | Projected Sea Level Rise (Intermediate Scenario; Projected 2024 to 2030) | 0.153 feet |
| | Vertical Land Subsidence (Average Observed; Projected 2024 to 2030) | 0.076 feet |
| | **Sea Level Rise Target (2030)** | **6.199 feet NAVD88** |
| 2040 | Current MHHW (2023; 99.5% Threshold) | 5.97 feet NAVD88 |
| | Projected Sea Level Rise (Intermediate Scenario; Projected 2024 to 2040) | 0.442 feet |
| | Vertical Land Subsidence (Average Observed; Projected 2024 to 2030 | 0.202 feet |
| | **Sea Level Rise Target (2040)** | **6.614 feet NAVD88** |

Post-processing of the results from the vulnerability analysis allowed for maximum flood inundation boundaries to be developed for each tidal scenario. These flood inundation boundaries are useful tools for communicating flood risk at different timescales across the island.

However, it is important to note that due to model limitations inaccuracies in the simulated flood boundaries are possible. For example, the model does not account for recent projects which may mitigate tidal flow paths as well as stormwater networks which through tidal backflow may allow tides ingress further into the island. Therefore, these flood boundaries and results should be considered for planning purposes only. An example of this can be found below in Figure 5 which depicts the results of the vulnerability analysis for an area near the intersection of Palm Boulevard and 4th Avenue.

Please reference Appendix A for the results of this analysis across the entire island.

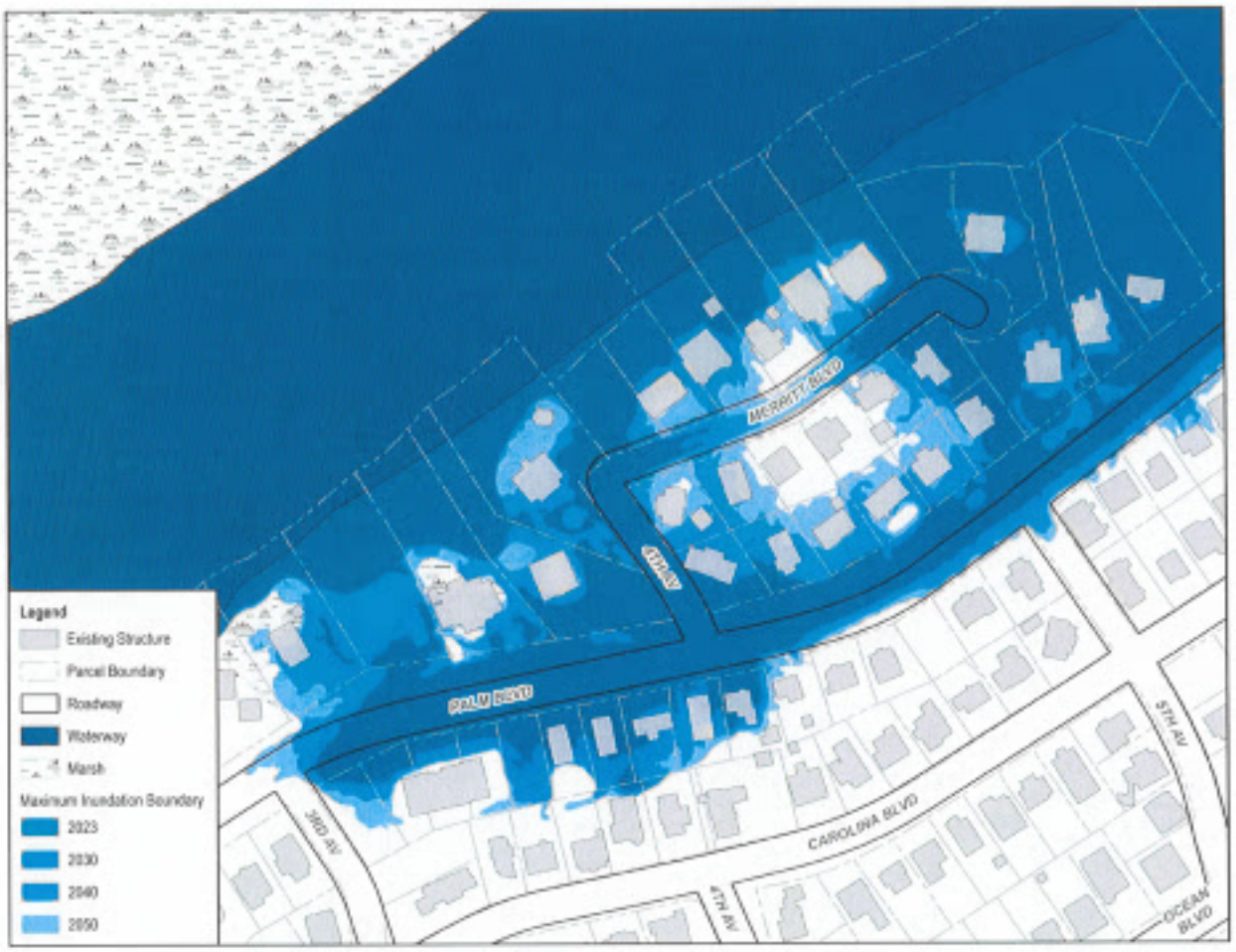



**Figure 5**
Example results from the vulnerability analysis near Palm Boulevard and 4th Avenue.

A summary of the impacts at each projection year observed in the vulnerability analysis can be found below in Table 3. Specifically, roadway and parcel (including appraised value and septic/sewer classifications) impact data are tabulated below

Overall, it can be interpreted from these results that the year 2040 is a critical year for the city, with the observed impacts substantially increasing from 2040 to 2050 at a rate greater than any other year-to-year comparison in this analysis.

**Table 3**
Results from the vulnerability analysis.

| Year | Parcels Impacted | Appraised Value of Impacted Parcels ($million) | Parcels Impacted on Septic | Roadways Impacted (miles) |
|---|---|---|---|---|
| **2023** | 1041 | 1415.28 | 235 | 3.37 |
| **2030** | 1221 | 1530.45 | 289 | 4.53 |
| **2040** | 1556 | 1791.70 | 410 | 6.95 |
| **2050** | 2011 | 2115.69 | 524 | 13.88 |

# ADAPTATION STRATEGIES

# ADAPTATION STRATEGIES OVERVIEW

## Policies

- A Elevated Tide and Emergency Operations Policies
- B Zoning Ordinance Updates for Redevelopment
- C Create a Design Tool for Redevelopment
- D Conduct Water Quality Assessment Plan

## Projects

- A Infrastructure Maintenance
- B Grey/ Rigid Infrastructure
- C Green Infrastructure
- D Perimeter Protections

## Programs

- A Incentivizing Private LID Stormwater Management
- B Purchasing or Conservation of Flood Prone Property
- C Educational Programs
- D Create a Demonstration Rain Garden

# POLICIES

## A Elevated Tide and Emergency Response Program

The City can adopt an operations policy to address storm surges and elevated seasonal tides as they happen more frequently. This policy should address:

- Advanced warning timeline strategy of when to inform the public and when to require public action as needed (evacuation, road closures, etc.)
- Timeline and implementation of barricades and signage for public safety
- Coordination with other agencies and municipalities
- Debris cleanup following a storm event

## B Zoning and Building Ordinance Updates for Redevelopment

As growth continues on Isle of Palms, it is imperative that the City Zoning Ordinance modify to require new development and redevelopment to meet the impacts of sea level rise and increased flooding.

Updates to the Zoning Ordinance in addition to what exists in the City Ordinance may include:

- On all new development and any redevelopment, an engineer must review and sign off on grading plan and drainage report to ensure compliance
- Development to prioritize routing runoff to adjacent drainage infrastructure (where applicable) within the right-of-way
- Increase volume/flow offset for stormwater
- Increase allowed fill on developed parcels that fall under the projected sea level rise plan elevation target
- Prohibiting new septic fields/tanks on sites where there is an available sewer tie-in or on parcels that are lower than elevation 7' NAVD88
- Increase setbacks on septic fields to the OCRM critical line and areas prone to flooding
- Limit/restrict new development in flood prone areas
- Maintain and strengthen marsh setbacks and add elevation considerations in setback requirements
- Increase tree canopy requirements to help better stabilize soil and slow the rate of runoff. Currently, the only required tree planting in the zoning ordinance is in the buffer yard requirements for commercial properties. This planting requirement should be expanded to required interior parcel tree planting for commercial and residential properties as well as required tree save minimums.
- Tree replacement for removal of historic trees currently requires half the DBH caliper inches of the removed tree. The replacement requirement can be increased up to the entire DBH in caliper inches to help restore a stabilizing root system and further deter the unnecessary removal of historic trees.
- Clarify the code to better define pervious paving. Sec. 5-4-13 (c) states that all newly installed hardscape elements be pervious, but does not define (or limit) what those materials are.
- Restrict the construction of bulkheads or revetments on the marsh side of the island. In February 2024, the City passed an emergency ordinance allowing property owners to erect protective bulkheads on beach front property between 100 and 914 Ocean Blvd. That allowance should not extend to the marsh fronting properties as bulkheads can cause long term erosion and degradation of the marsh ecosystem. Instead, fill or vegetated berms outside of the critical area should be considered to provide adequate tidal protection.

# PROJECTS

## A Grey/Rigid Infrastructure

Built infrastructure can help capture, store, and control storm and tidal water through improvements to the stormwater systems.

- **Upgrading and replacing pipes** to increase flow capacity and ensure positive drainage
- **Installing tide gates** on stormwater outfalls to prevent tidal backflow through stormwater networks.
- **Providing underground storage** to increase storage capacity during events.
- **Transitioning properties** to sewer will reduce risk of contamination during flood events.
- A **Dune Infiltration System** is a type of underground detention that relies on the naturally high infiltration capacity of dunes to store and treat storm water.

Check valves on marsh outfall

Improved drainage structure

Increase storm pipe size and structure

Dune infiltration system

Beach renourishment at Breach Inlet

Cleaned and reinforced existing ditch in the right-of-way

## B Infrastructure Maintenance

Maintenance and upkeep of existing systems will help mitigate flooding impacts by restoring existing systems.

- **Cleaning and upkeep** of public storm drains, pipes, ditches, and swales. This effort can come from the ongoing drainage master plan and public feedback of clogged utilities. This will require coordination with SCDOT if infrastructure lies within a right-of-way.
- **Continue beach renourishment** efforts the City has ongoing to add sand and restore dunes to bolster the resiliency of the beach

# PROJECTS

## C Green Infrastructure

Using low impact development projects, the City can mitigate increased flooding and sea level rise using more natural and less invasive practices. Many of these strategies also create a more planted and aesthetically interesting space.

- **Living shorelines** reinforce marsh and coastal shorelines by decreasing bank slope and using natural materials to not only help mitigate damage from flooding and erosion, but re-create and bolster a natural ecosystem. These living materials can range from native plants, oyster beds and shell bags, coir logs (biodegradable coconut fiber), rocks and any combination of those elements. (Note that riprap is prohibited as beach erosion control method per City zoning ordinance). Living shorelines are created at or below the critical line.
- **Marsh management** is one of the most critical aspects to combating seal level rise on Isle of Palms as the most impactful tidal flooding comes through the Intracoastal Waterway marsh. The City can prepare a study and plan that establishes concerns with sea level rise and increased flooding impacts on the marsh ecosystem and recommendations to monitor, protect, and restore the marsh as necessary. This study can provide site specific solutions and implementation strategies, which may include living shoreline strategies.
- **Creating bioswales and rain gardens** in the right-of-way and public space can utilize space that is either empty and/or prone to flooding to capture runoff. Both of these strategies will require native planting to slow the flow of runoff and stabilize from erosion. Low maintenance species should be selected.

Living Shorelines

Living Shorelines

Marsh Management

Right-Of-Way Bioswale

# PROJECTS

## D Perimeter Protection

As Isle of Palms is a barrier island, protecting its edges from flooding and sea level rise will be critical to its long term resiliency.

- **Raising Waterway Boulevard** to elevation 7' NAVD88 will provide a barrier for the interior of the island against tidal flooding from the Intracoastal Waterway, as most of flooding comes through the ICW.
- In addition to the ongoing dune restoration project on the south end of the island, further **dune/beach renourishment projects** can happen along the beach front. The placing and shaping of the new sand will help protect the beach from further erosion and serve as a physical barrier from the beach and inland areas.
- **Building inland berms** can provide flooding protection in site specific applications.


Waterway Boulevard

Berm on Pawley's Island

Dune renourishment efforts at Ocean Isle Beach, NC

# PROGRAMS

## A Purchasing Flood Prone Property

As grant funding becomes available, properties that continuously flood could be considered for land acquisition. Once acquired, they can be utilized as open green spaces that host flood mitigation projects.

## B Incentivizing Private LID Stormwater Systems

Property owners can help overall water management through the implementation of strategies on their properties. Using tax credits, water and utility rebates, group purchasing, and other incentives, the City can encourage property owners to install and maintain LID stormwater projects to manage on-site stormwater. These strategies can help alleviate the volume of stormwater the City's storm system captures during storm events and help stabilize the soil to reduce erosion. The City can create a points system that allows for greater benefits with more strategies a private homeowner achieves.

Examples of the LID strategies can include:

- Rain gardens
- Bioswales
- Replacing lawn with native planting
- Rain cisterns
- Increased tree canopy
- Green roof installation

Rain Gardens with Cistern

Bioswales

Replacing sod with native planting

Rain Cisterns

Tree canopy to stabilize soil

Green roof installation on Kiawah

# MOVING FORWARD

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# RESOURCES

# RESOURCES

**Sea Level Rise Viewer**
https://coast.noaa.gov/slr/

**Tidal Datums**
https://tidesandcurrents.noaa.gov/datum_options.html

**Charleston NOAA Tide Gauge**
https://tidesandcurrents.noaa.gov/waterlevels.html?id=8665530

**Sea Level Rise Projections**
https://sealevel.nasa.gov/task-force-scenario-tool/?psmsl_id=234

**Vertical Land Subsidence**
https://doi.org/10.1093/pnasnexus/pgad426

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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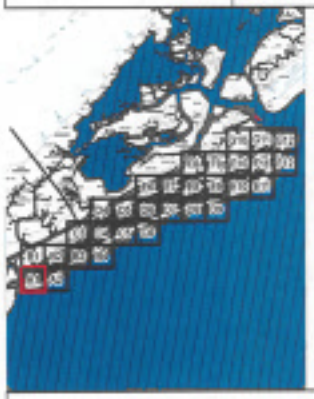

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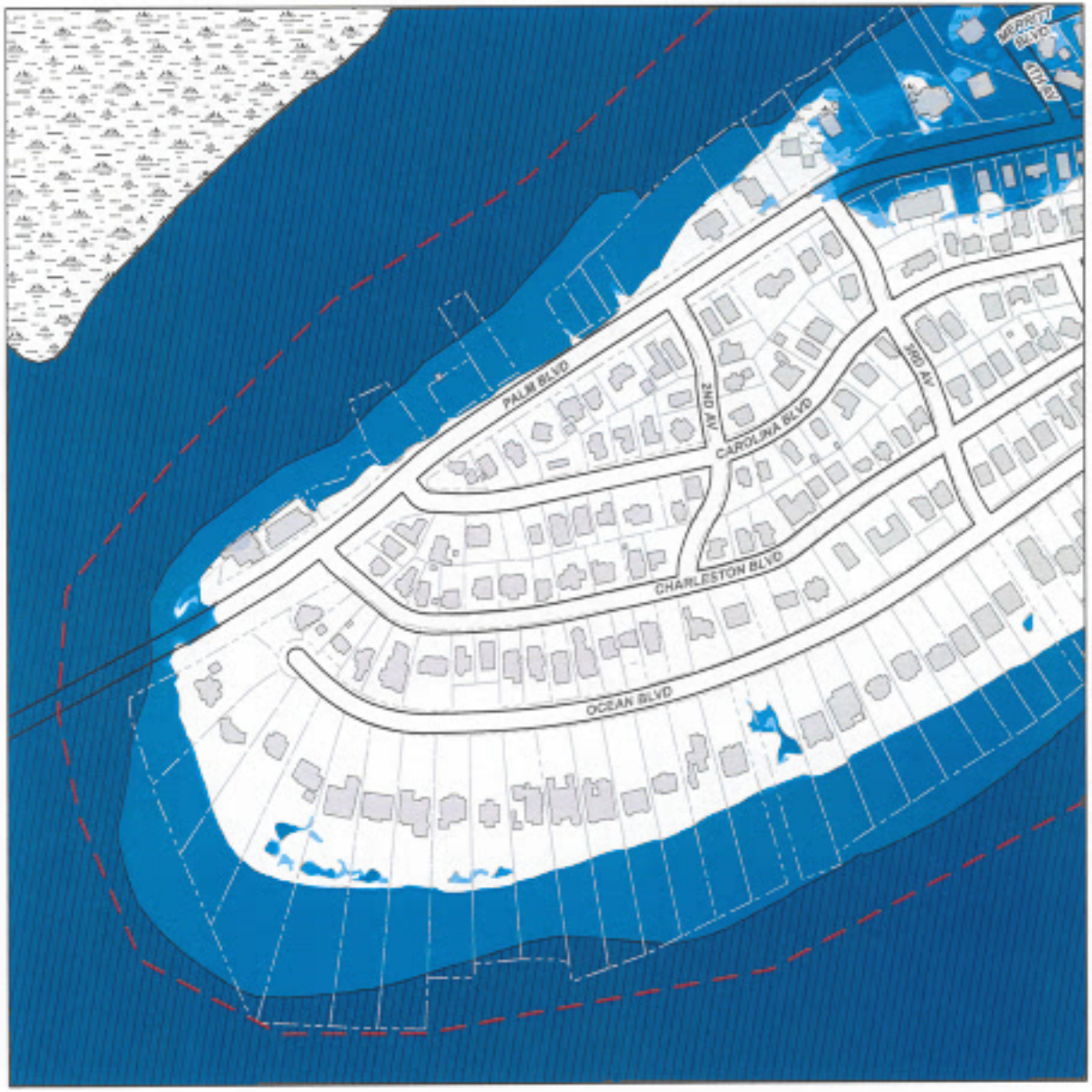
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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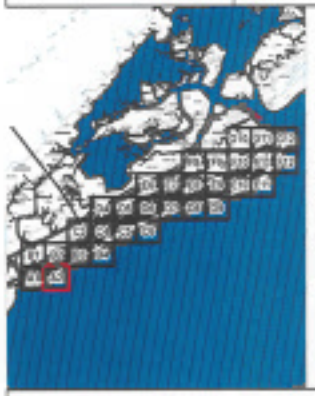
|---|---|---|



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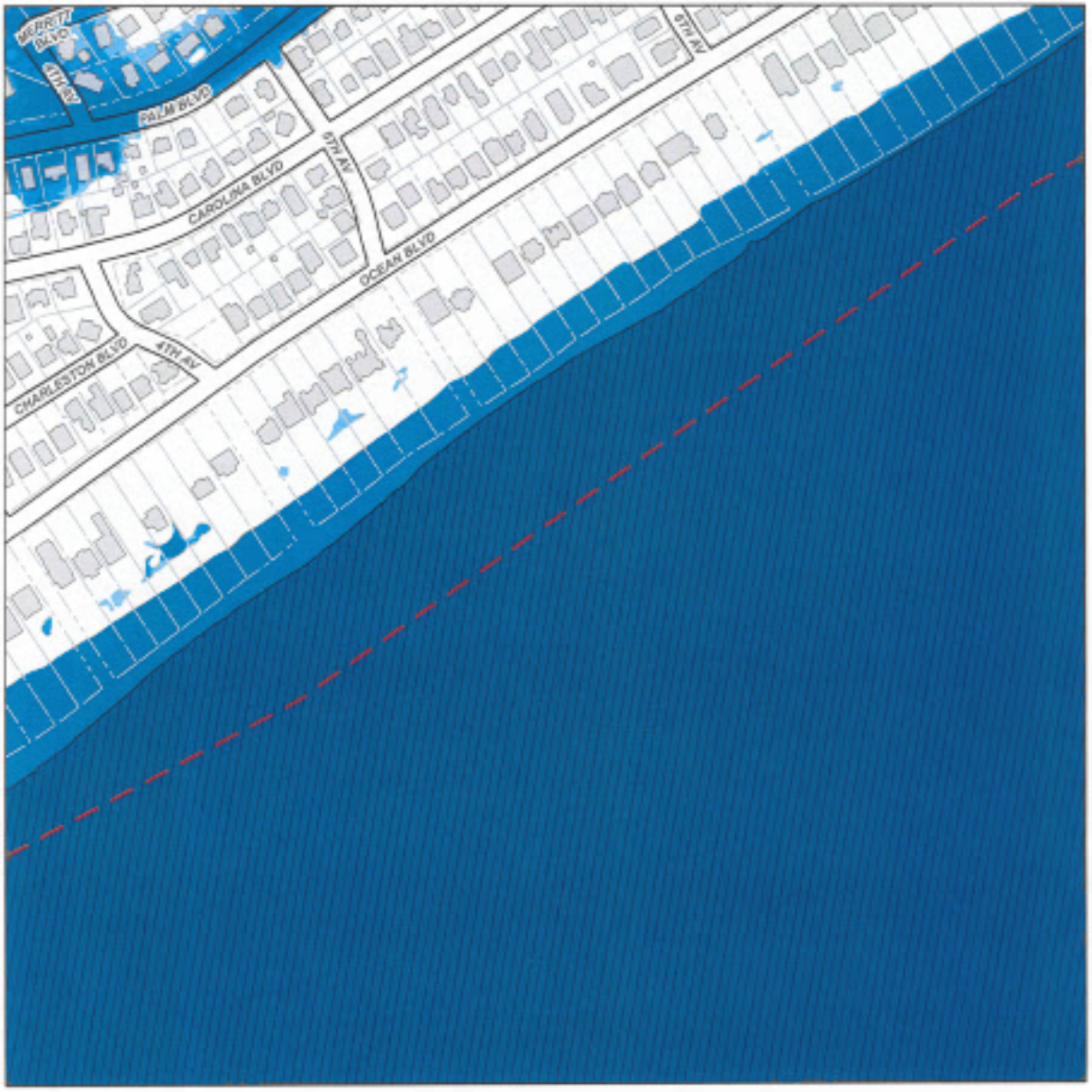
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

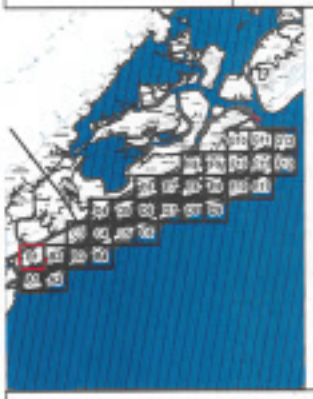
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector B1 | Page 3 of 30 |
|---|---|---|



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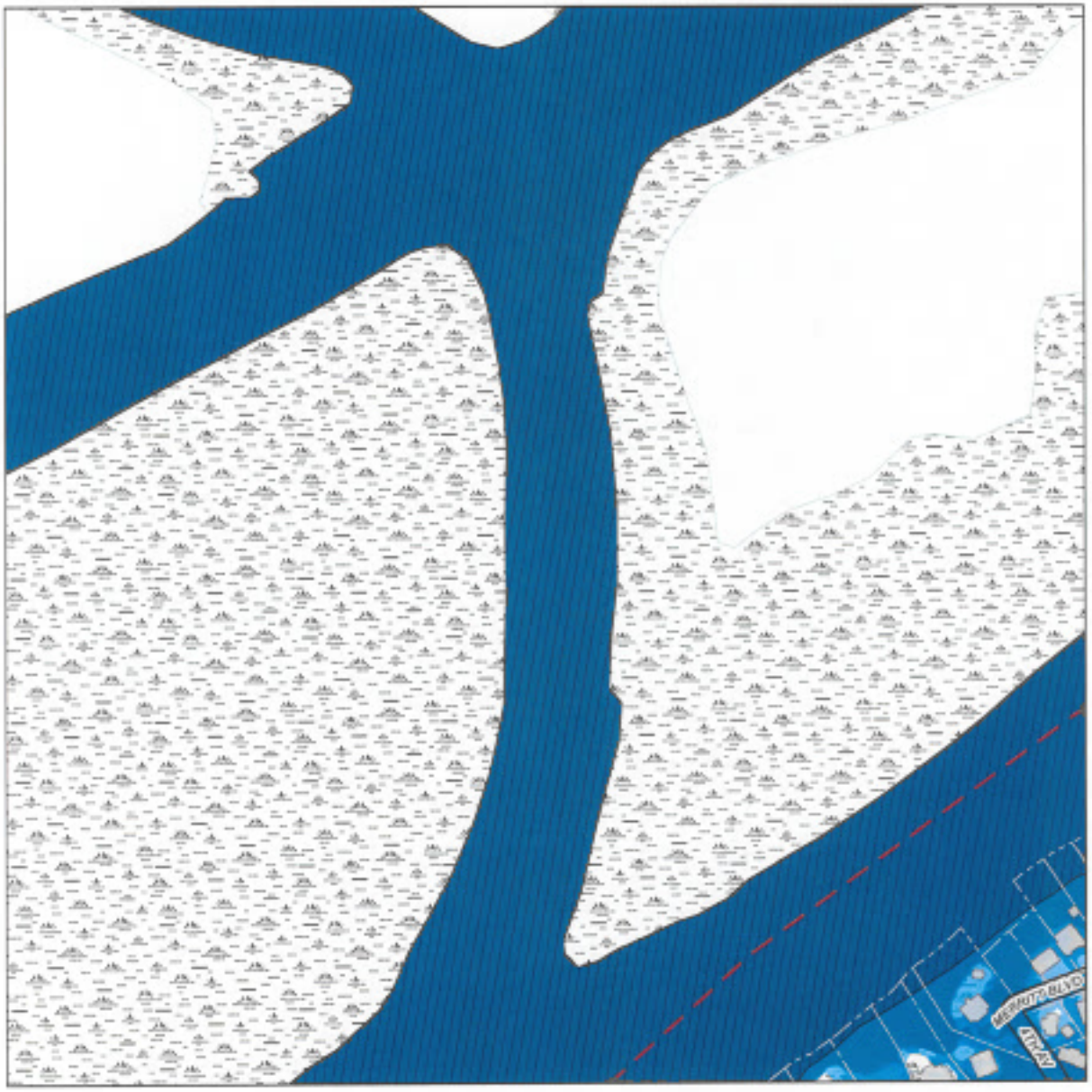
Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

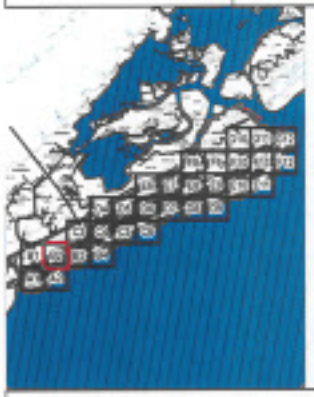
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector B2 | Page 4 of 30 |
|---|---|---|



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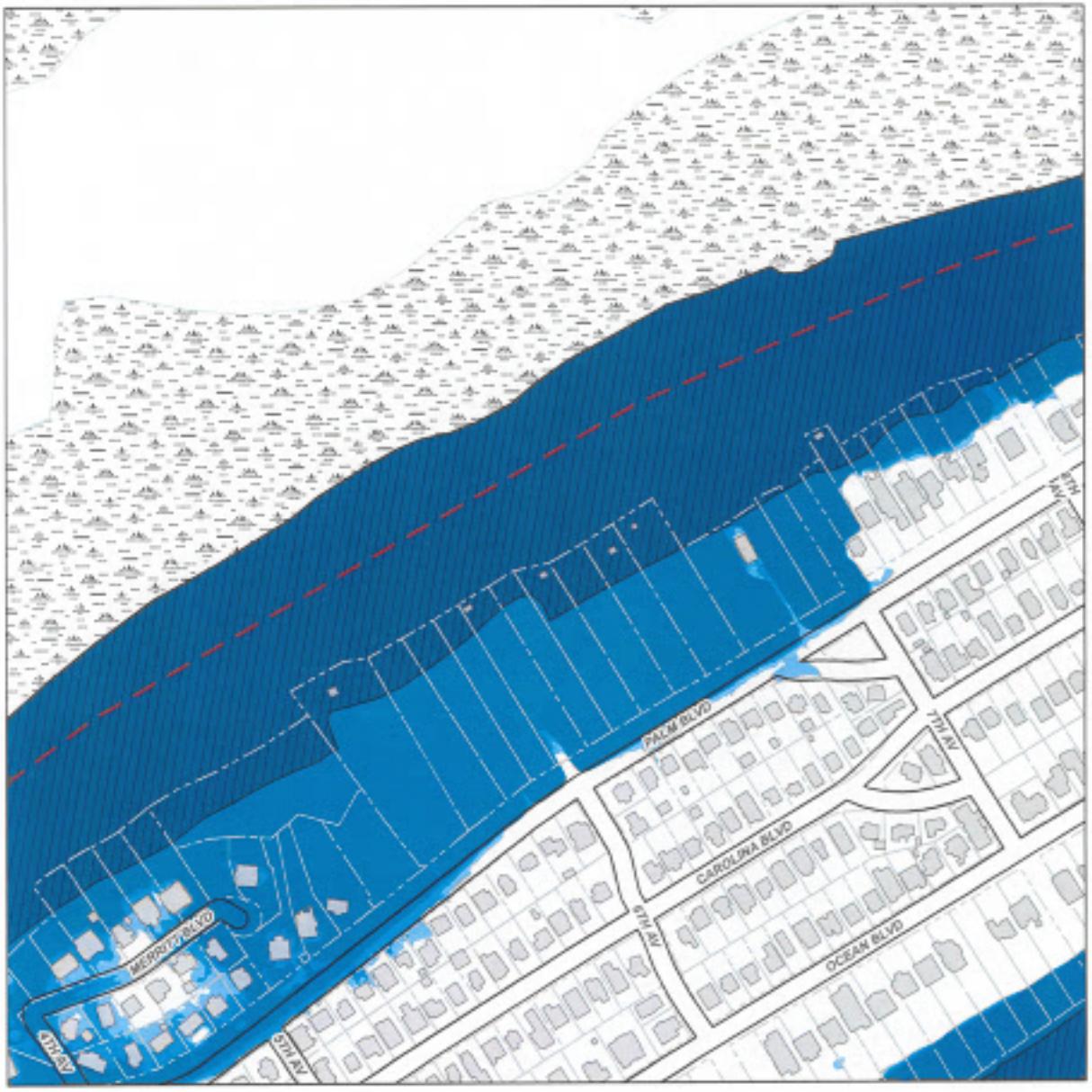
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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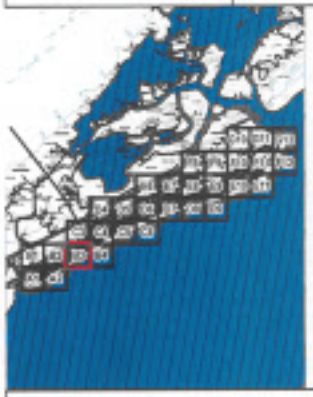
|---|---|---|



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- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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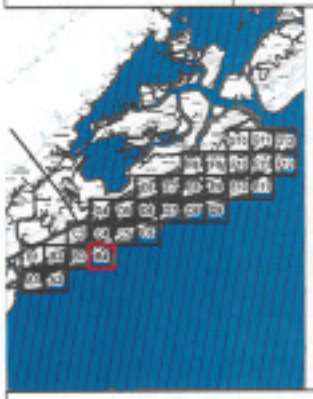
|---|---|---|



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- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

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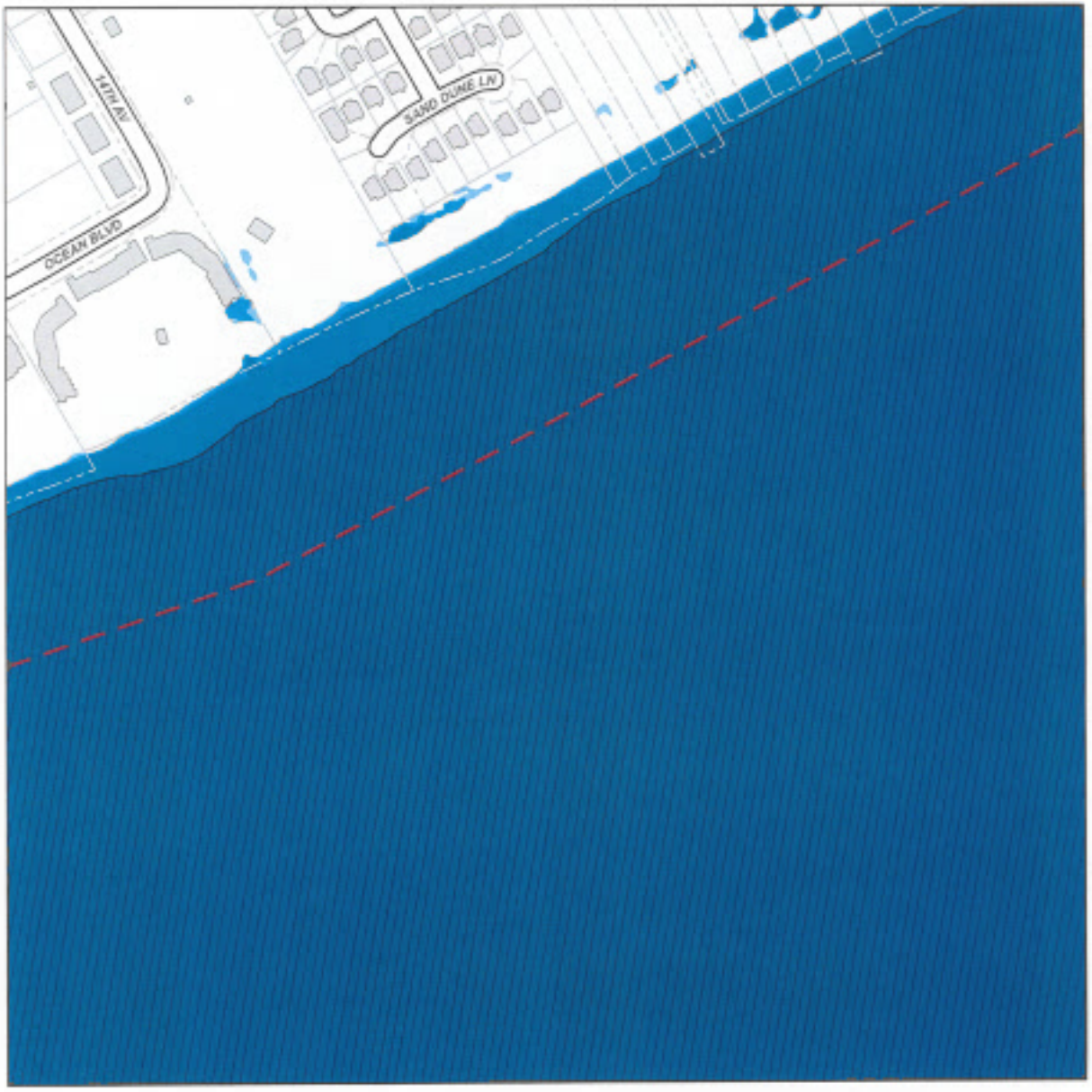

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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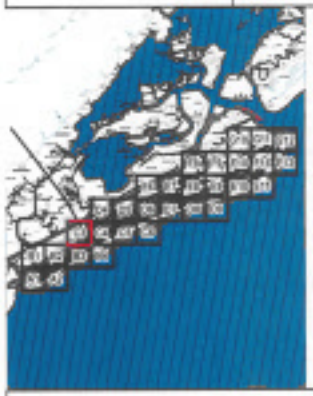

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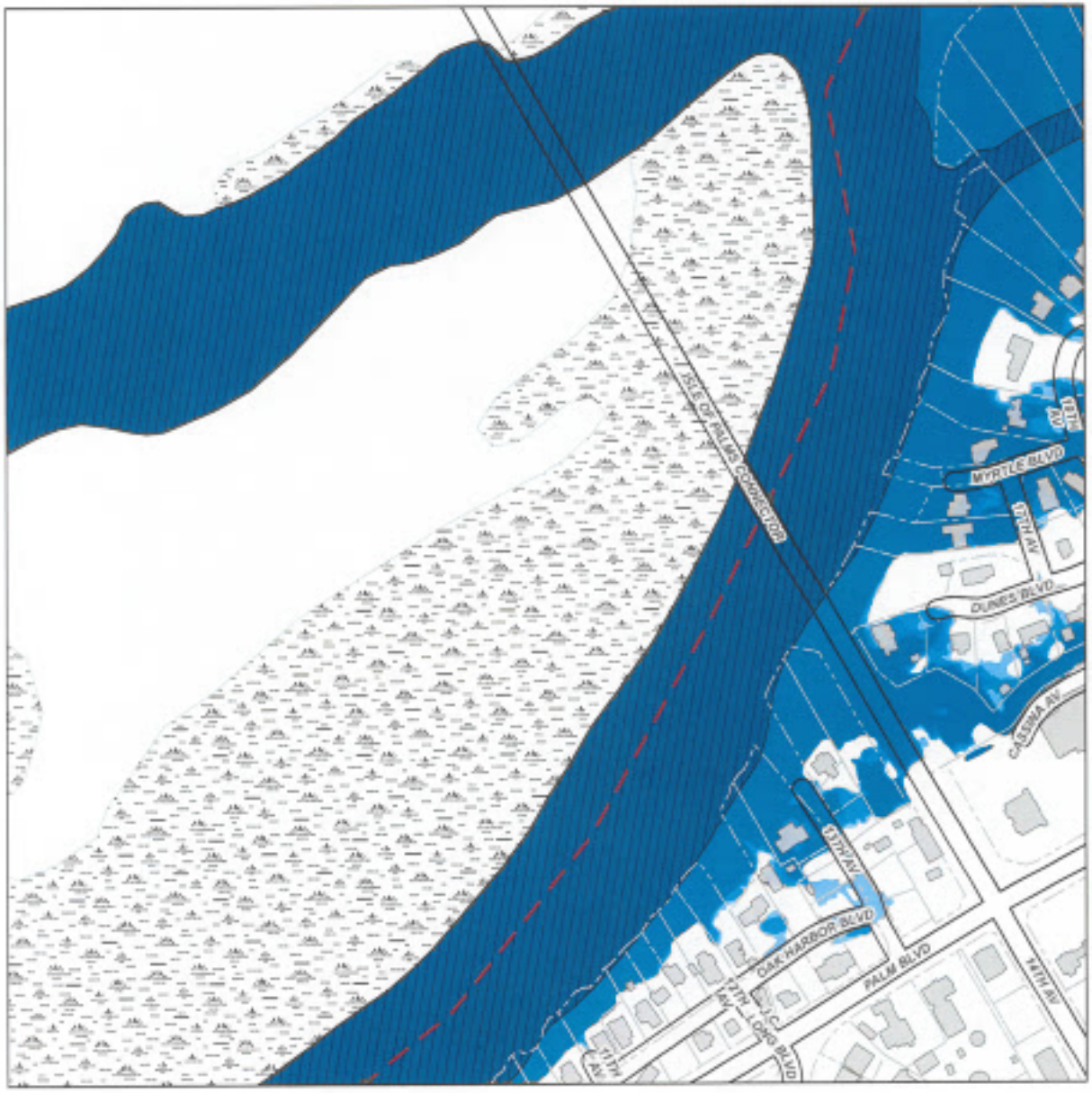
Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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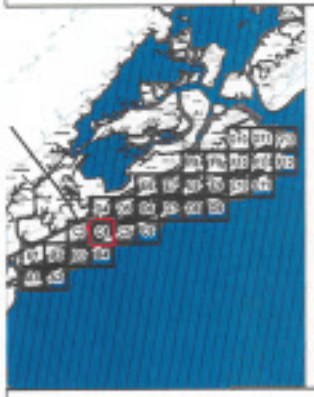
|---|---|---|



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- 2023
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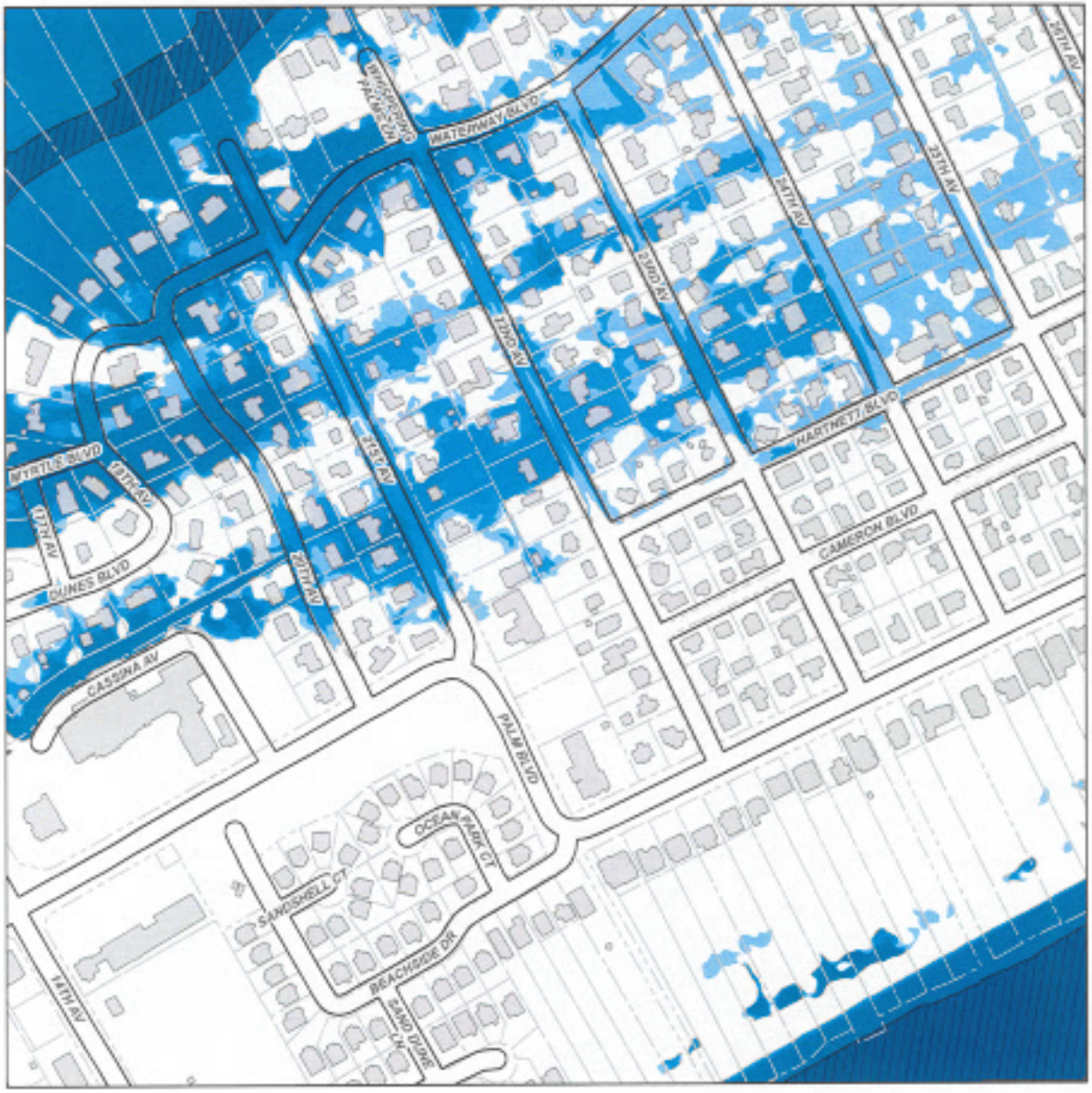
- 2050

N W E S

0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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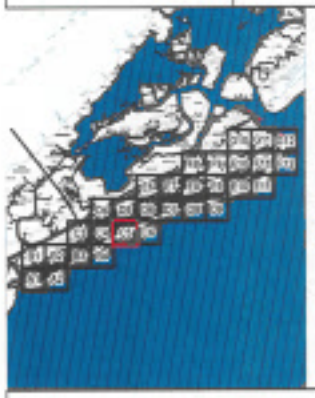
|---|---|---|



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- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

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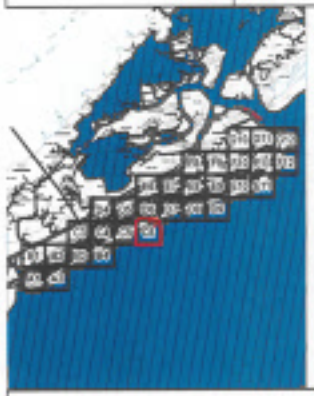
|---|---|---|



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- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D4 | Page 11 of 30 |
|---|---|---|

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- 2023
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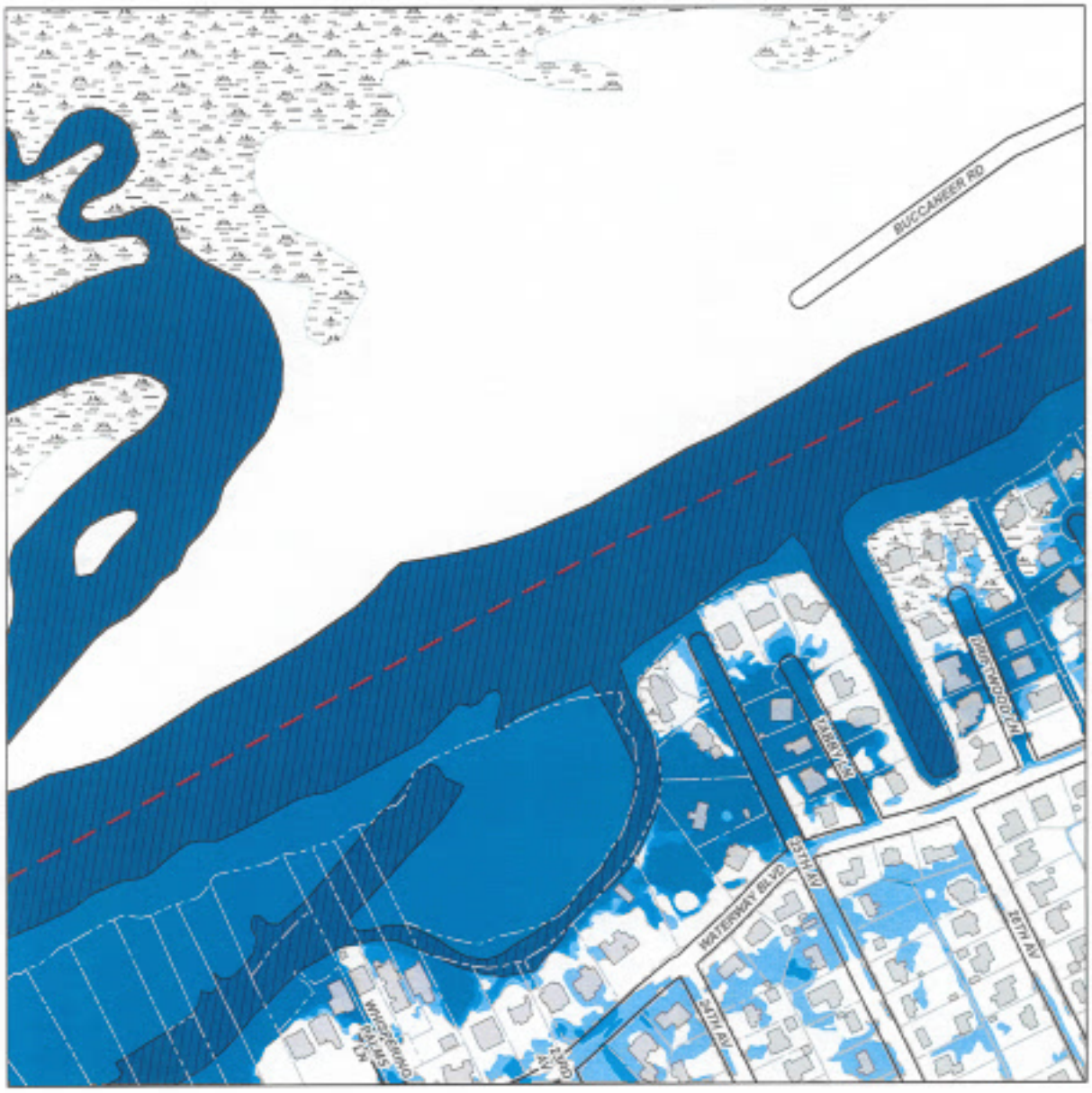
- 2040
- 2050

N W E S

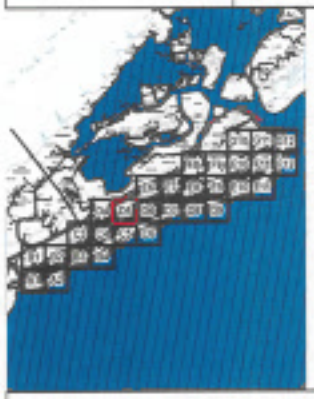
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D5 | Page 12 of 30 |
|---|---|---|



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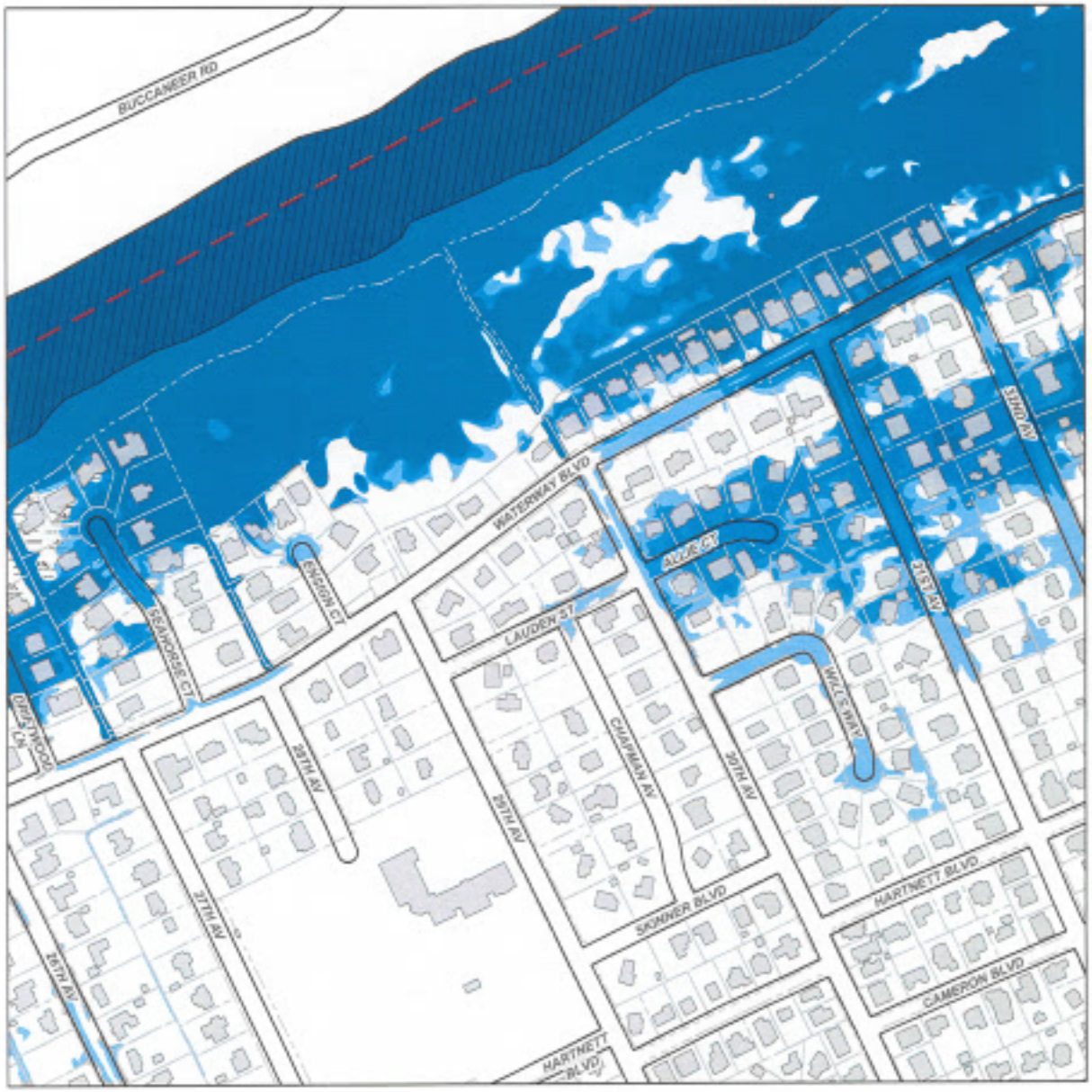
- 2023
- 2030
- 2040
- 2050

N W E S

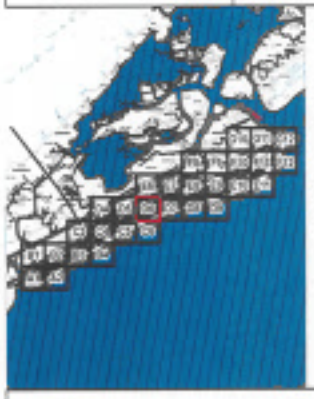
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D6 | Page 13 of 30 |
|---|---|---|



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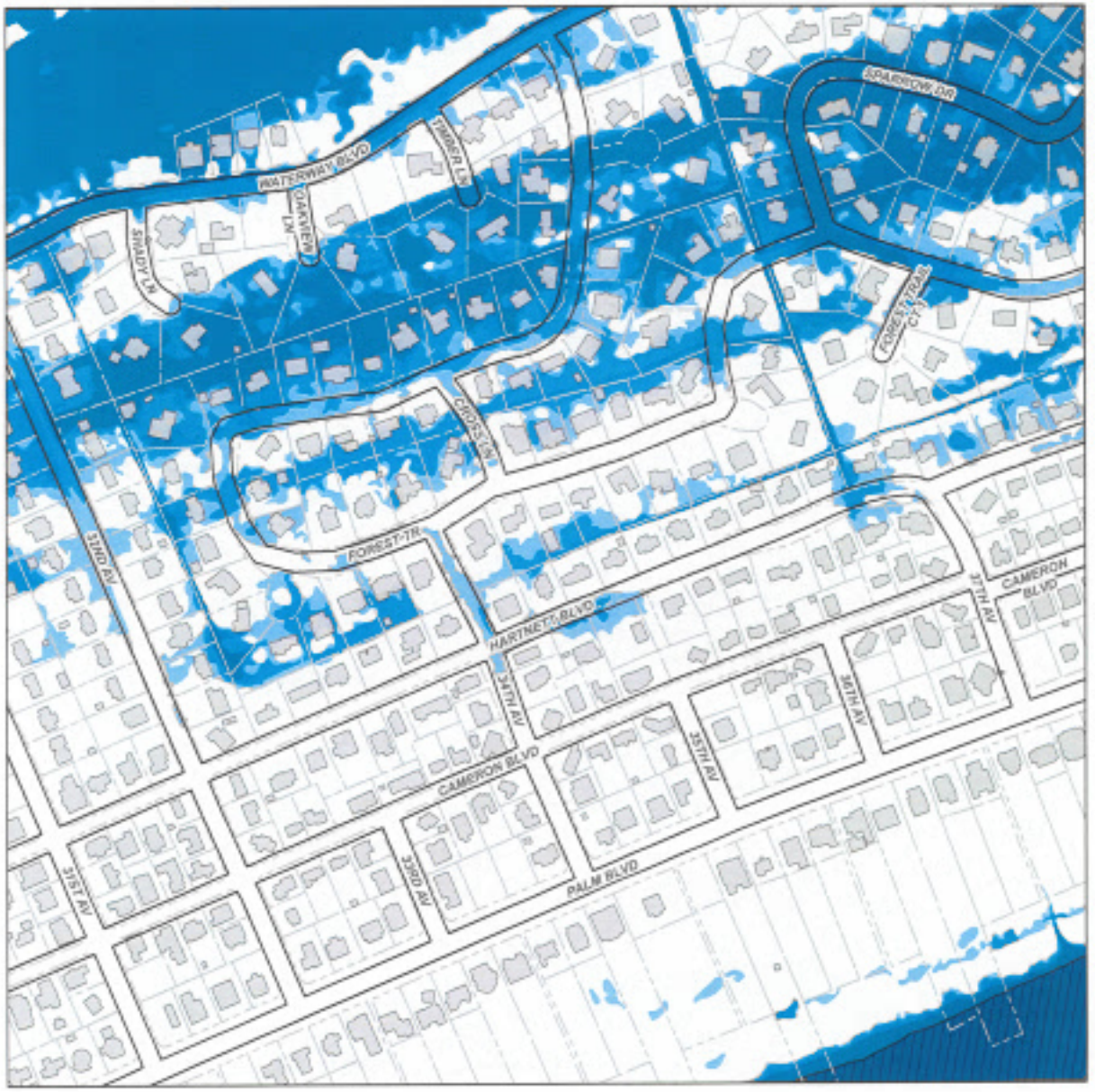
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

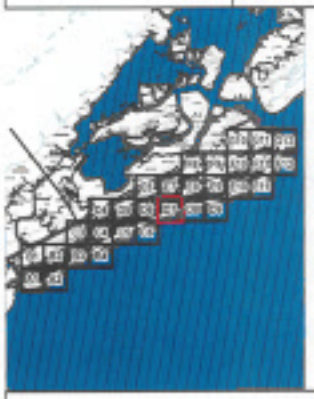
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D7 | Page 14 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
3. Existing structure and parcel boundary locations are approximate.
4. Parcels considered at-risk if inundation boundary intersects parcel boundary.
5. Flood boundaries and results of this analysis should be considered for planning purposes only. Inaccuracies are possible due to model limitations.
6. These results do not account for the impact of rainfall-driven flooding.

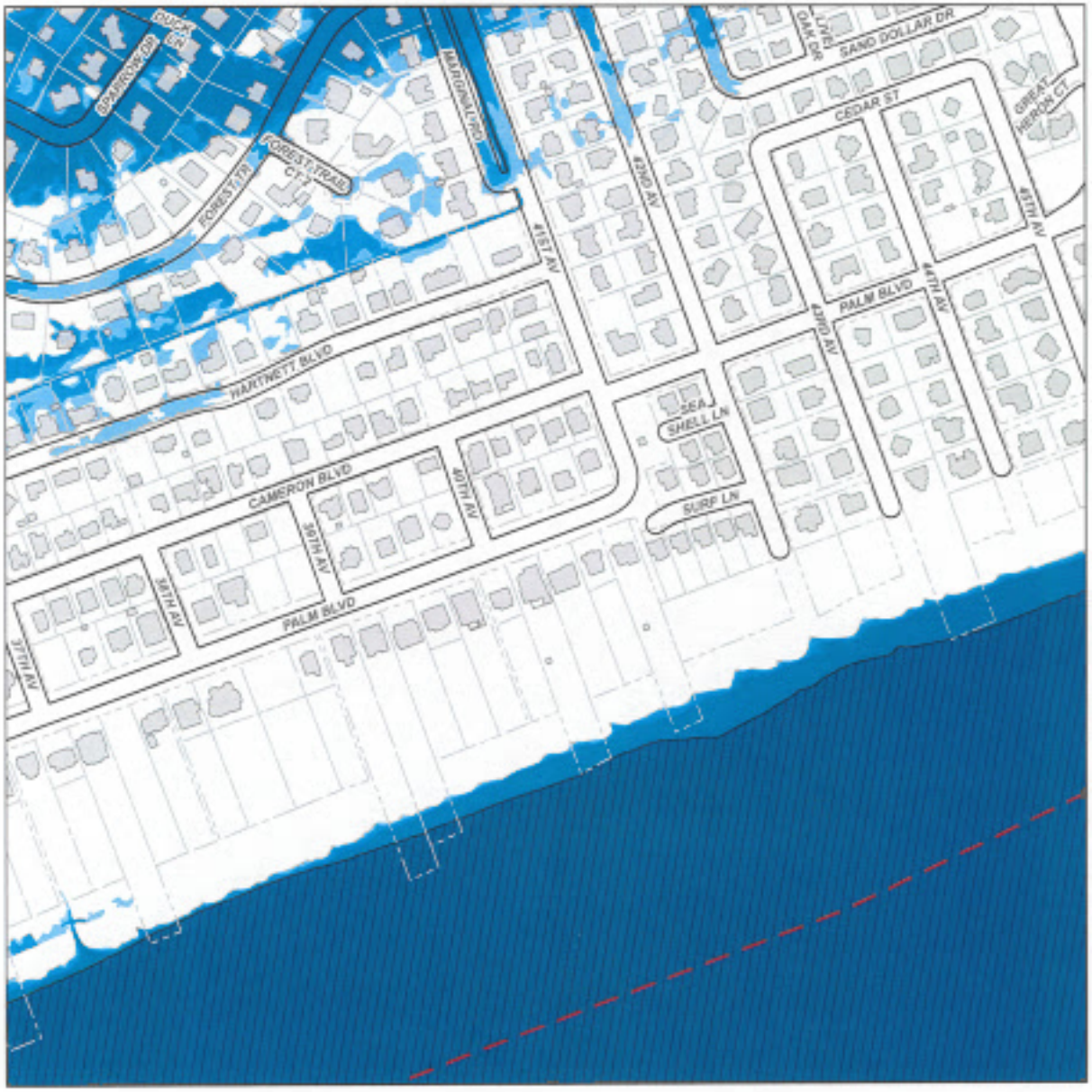
## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2060

N W E S

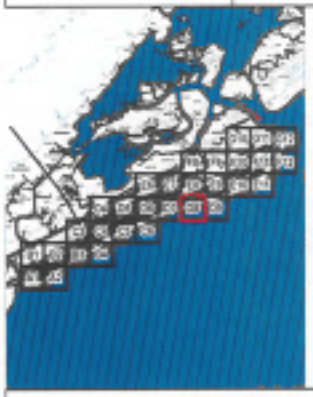
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D8 | Page 15 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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6. These results do not account for the impact of rainfall-driven flooding.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

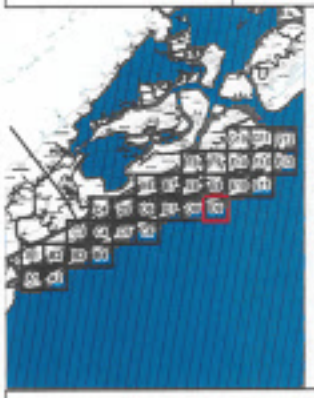
N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector D9 | Page 16 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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6. These results do not account for the impact of rainfall-driven flooding.

## Legend

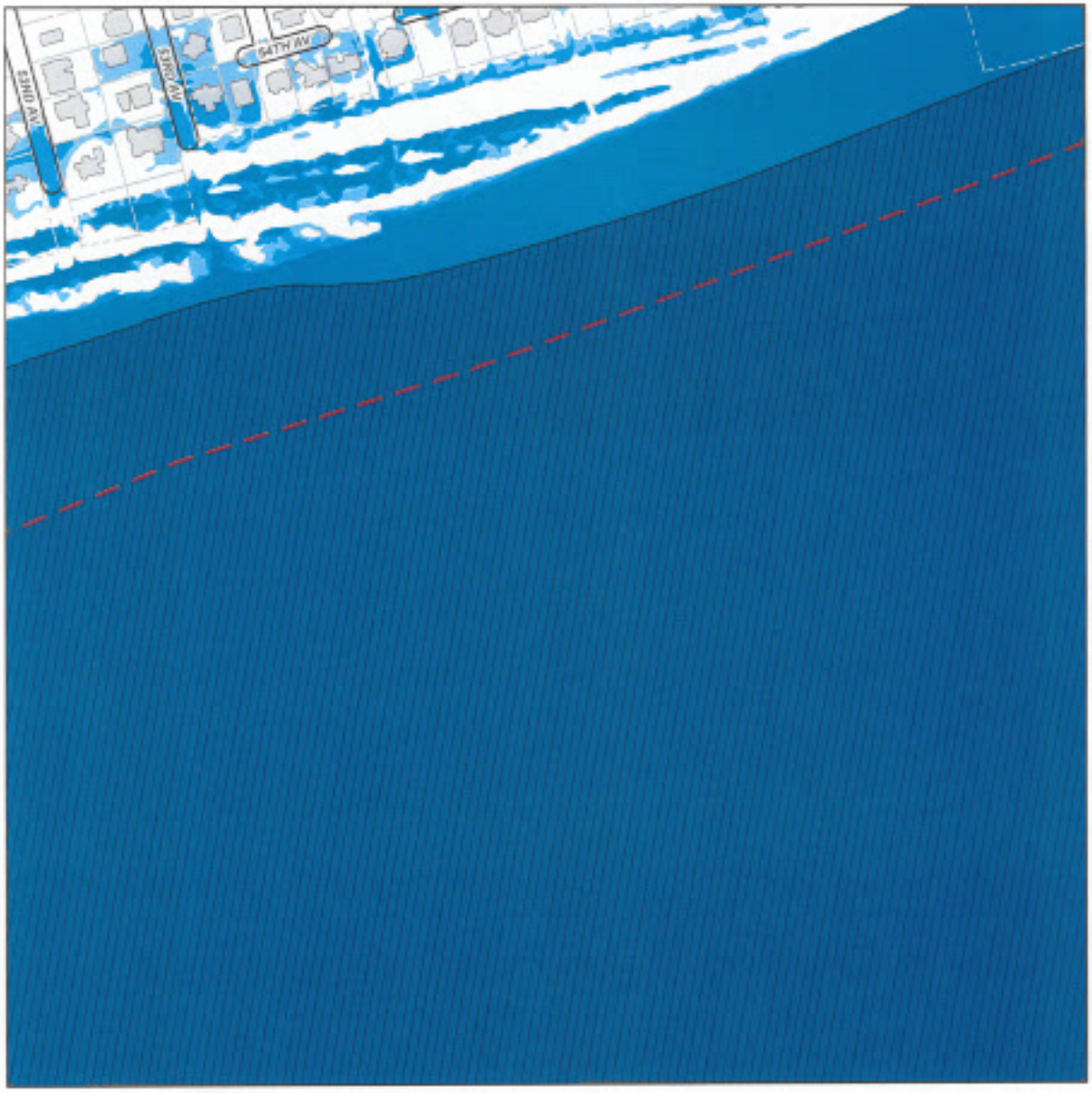
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E10 | Page 17 of 30 |
|---|---|---|

NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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6. These results do not account for the impact of rainfall-driven flooding.

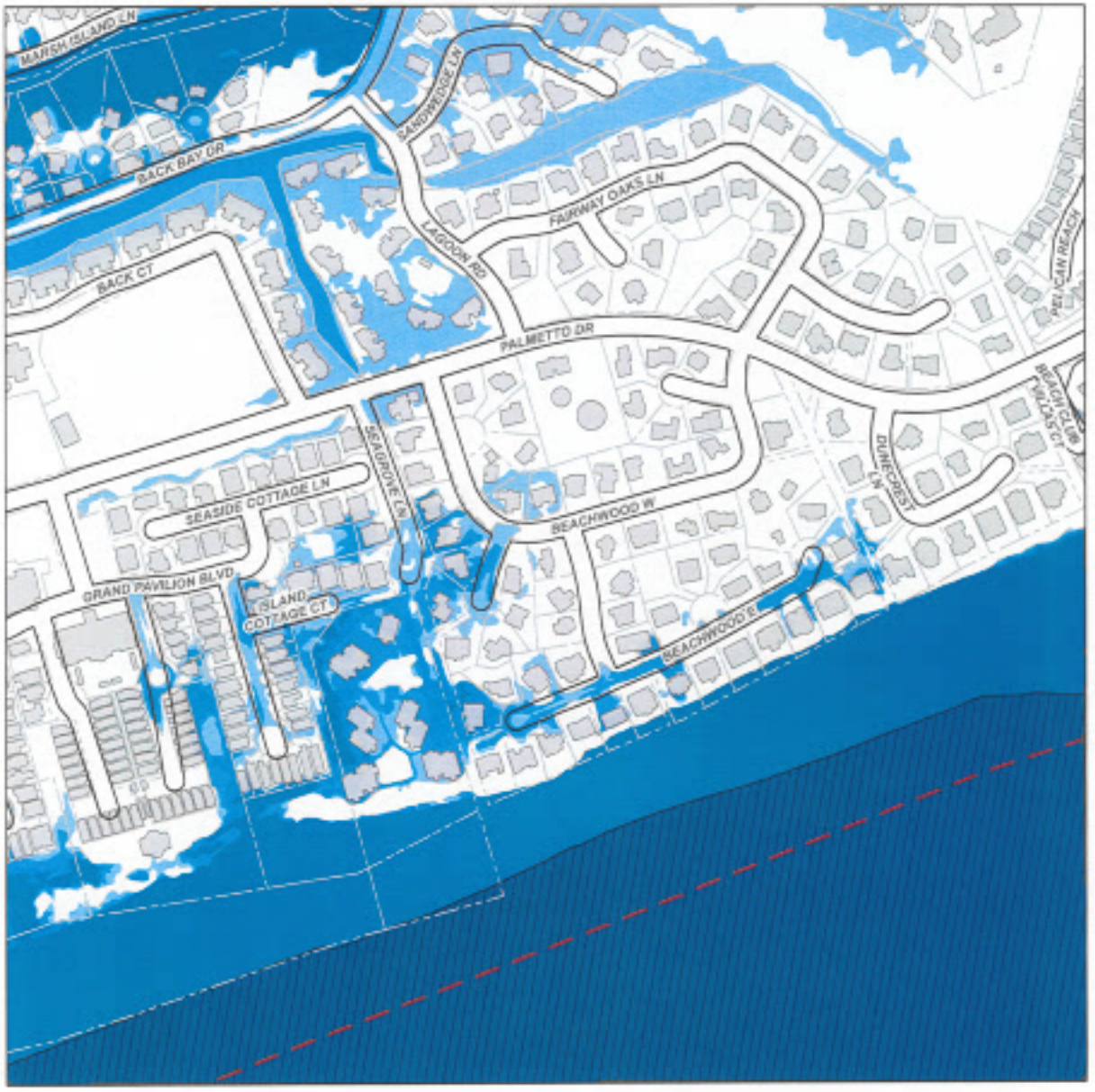
## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N
W E
S

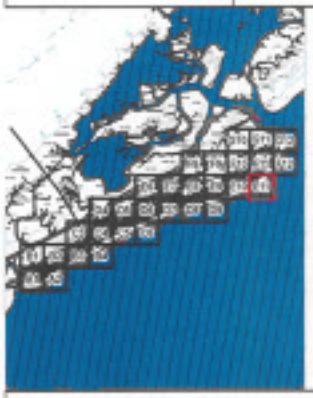
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E11 | Page 18 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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## Legend

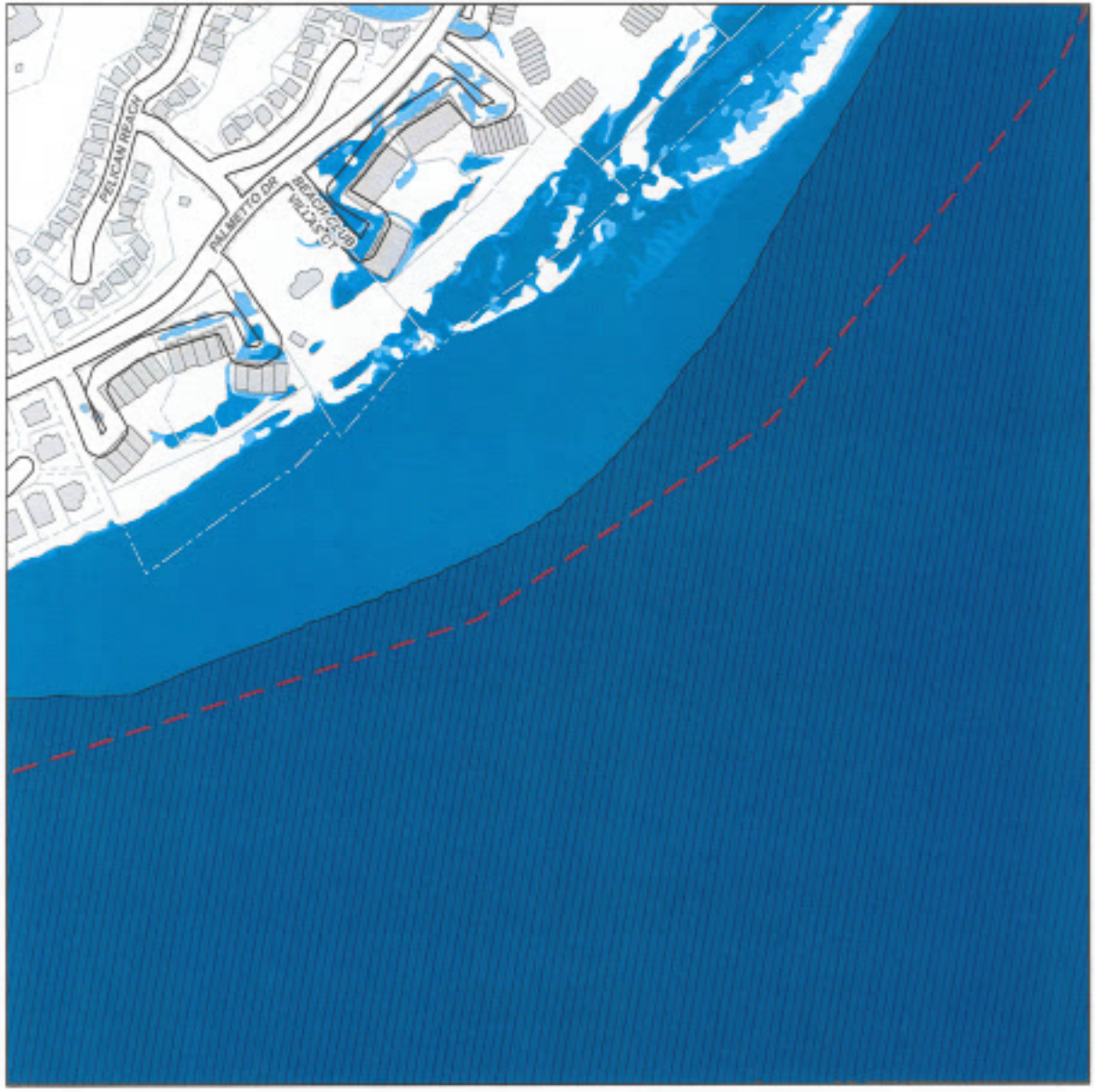
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N
W
E
S

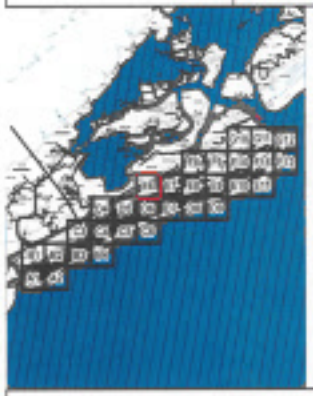
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E6 | Page 19 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
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## Legend

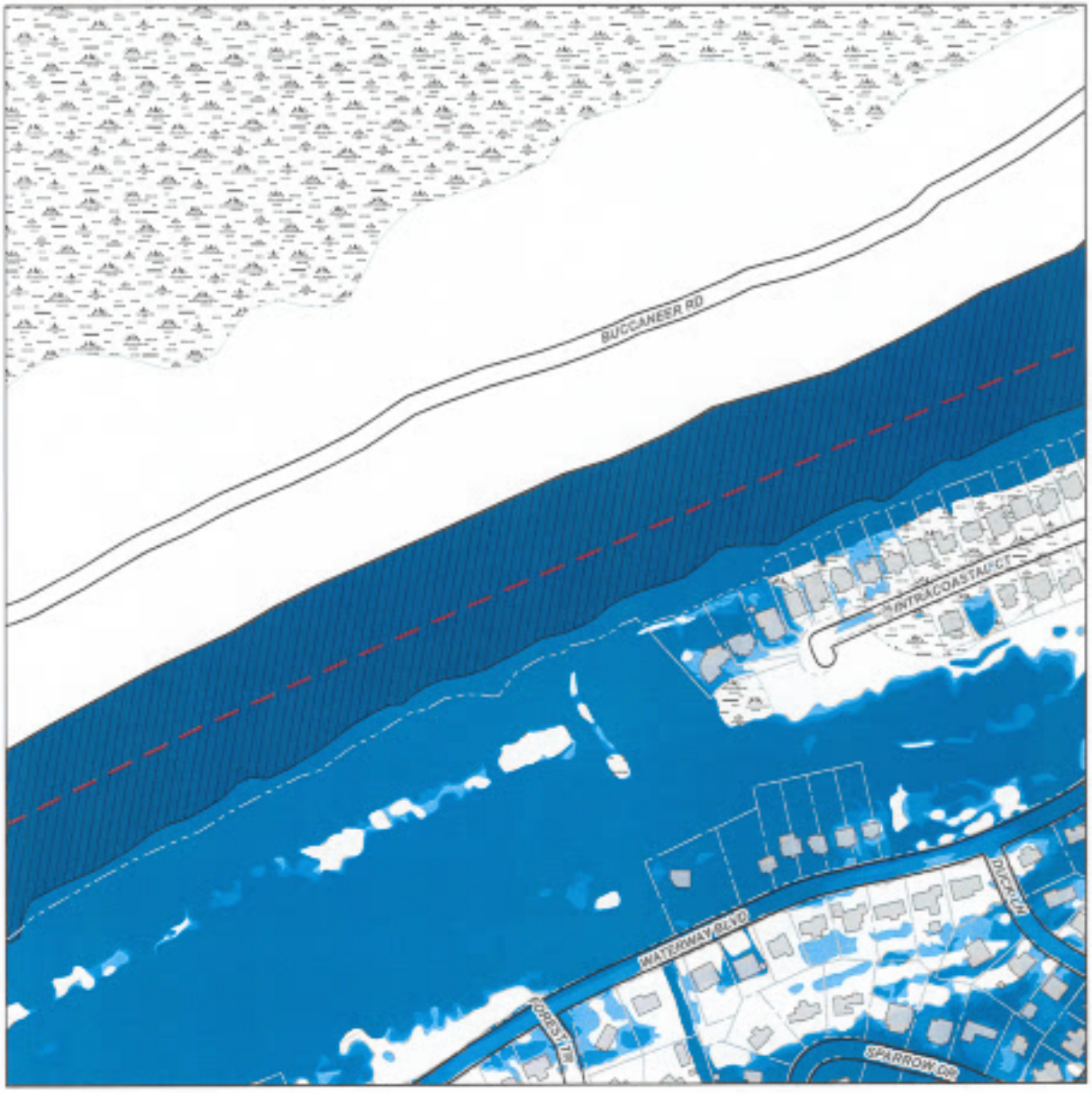
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

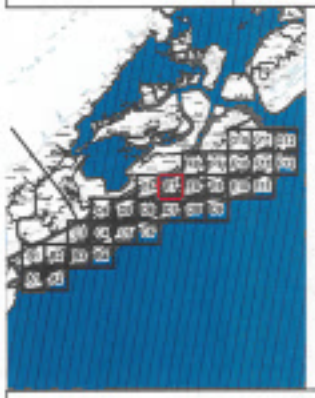
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E7 | Page 20 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
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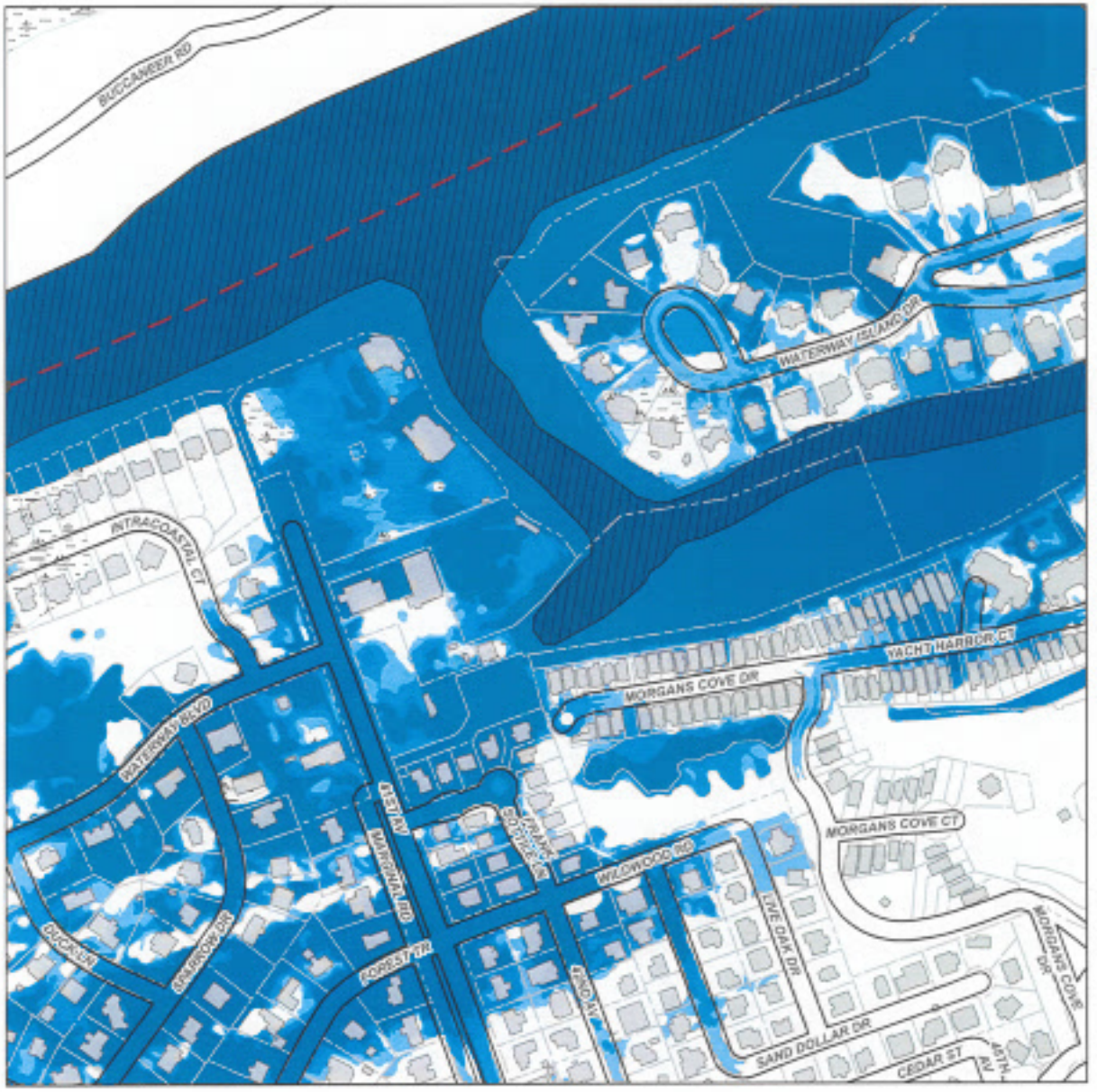
## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2060

N W E S

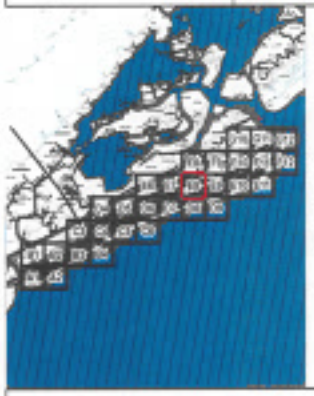
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E8 | Page 21 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
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## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector E9 | Page 22 of 30 |
|---|---|---|

NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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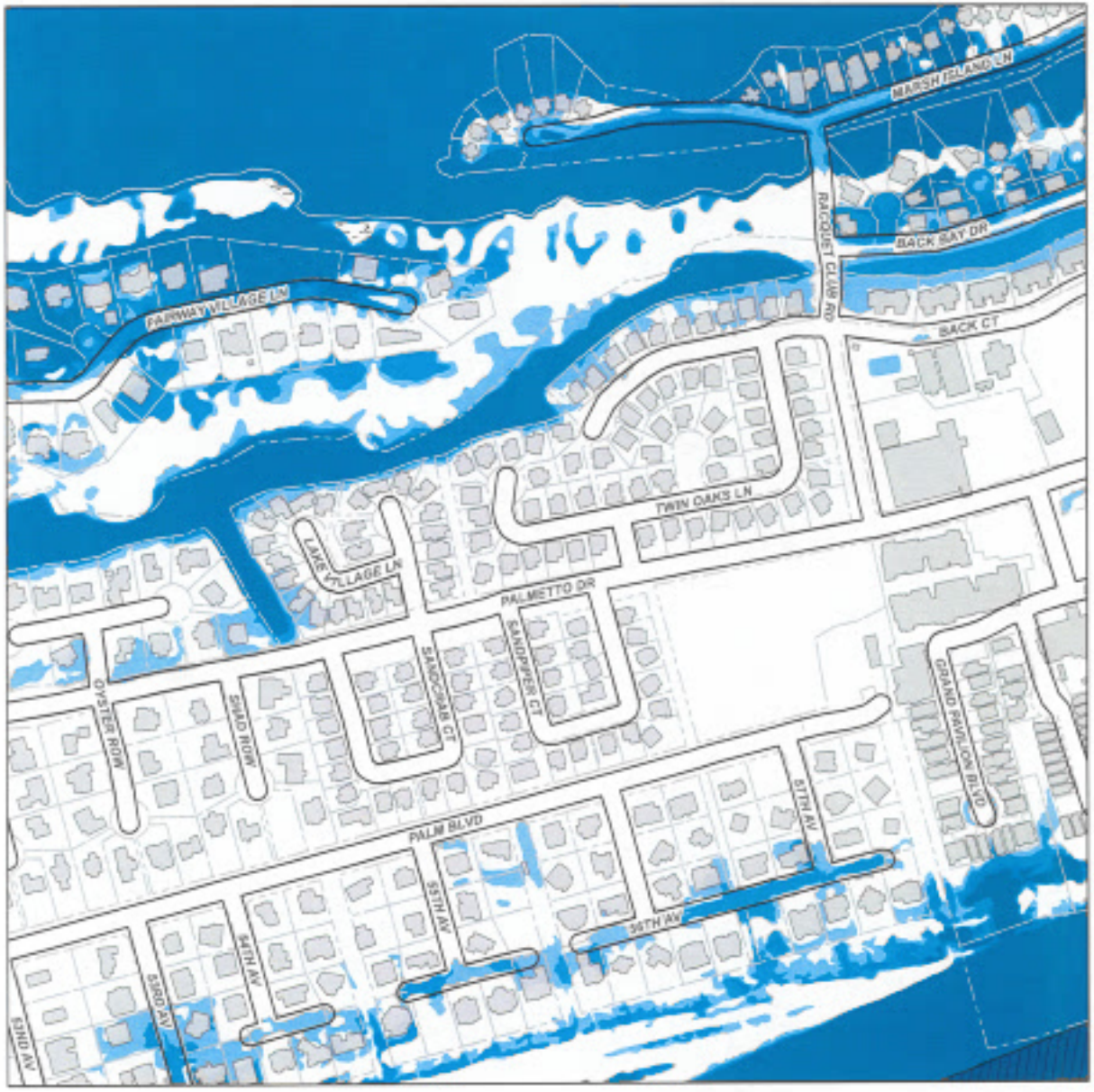
## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

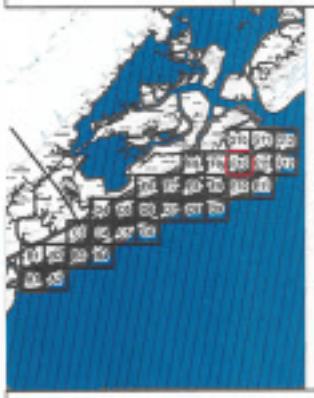
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector F10 | Page 23 of 30 |
|---|---|---|



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## Legend

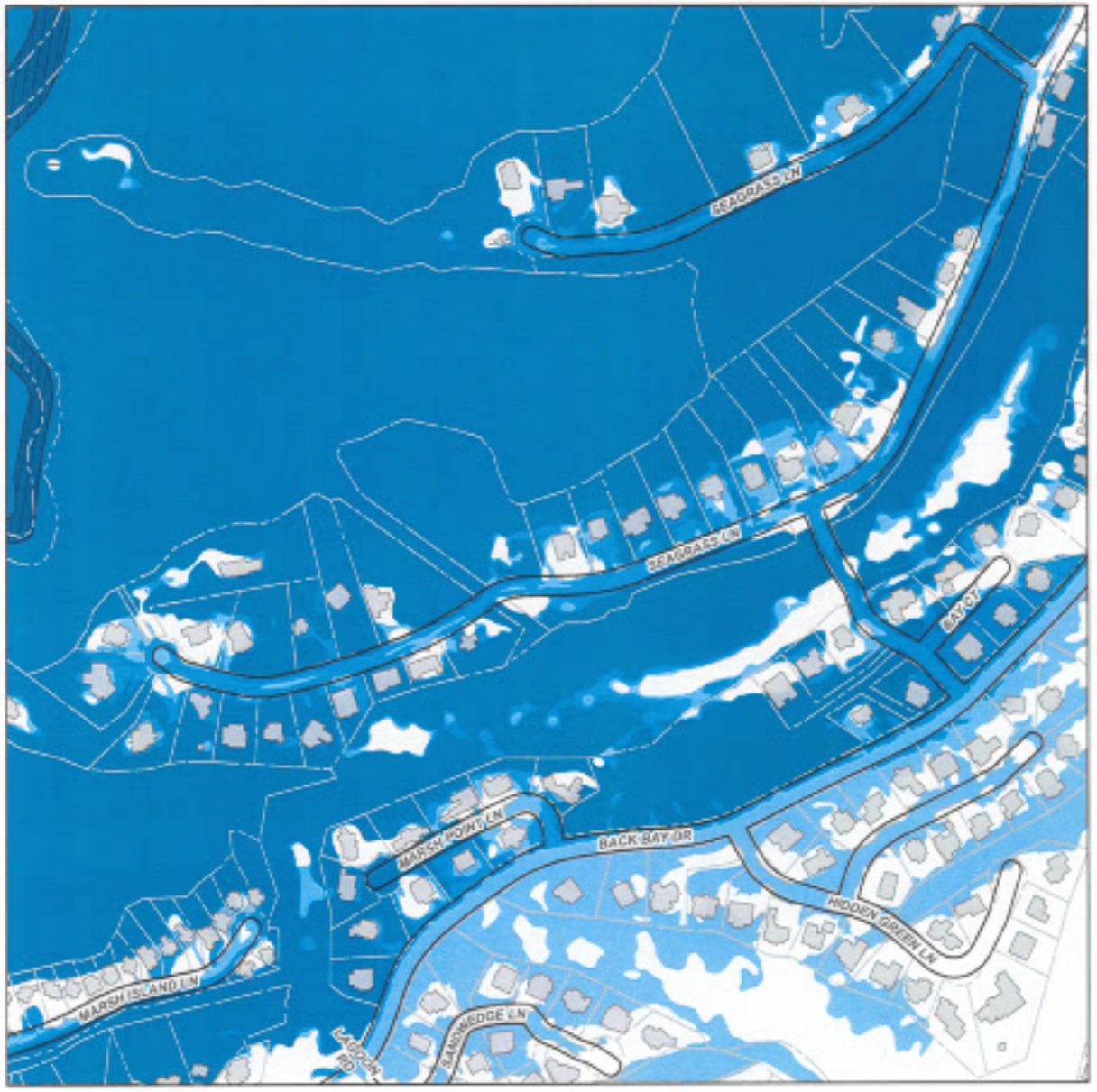
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

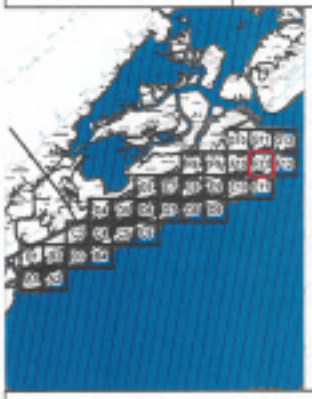
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector F11 | Page 24 of 30 |
|---|---|---|



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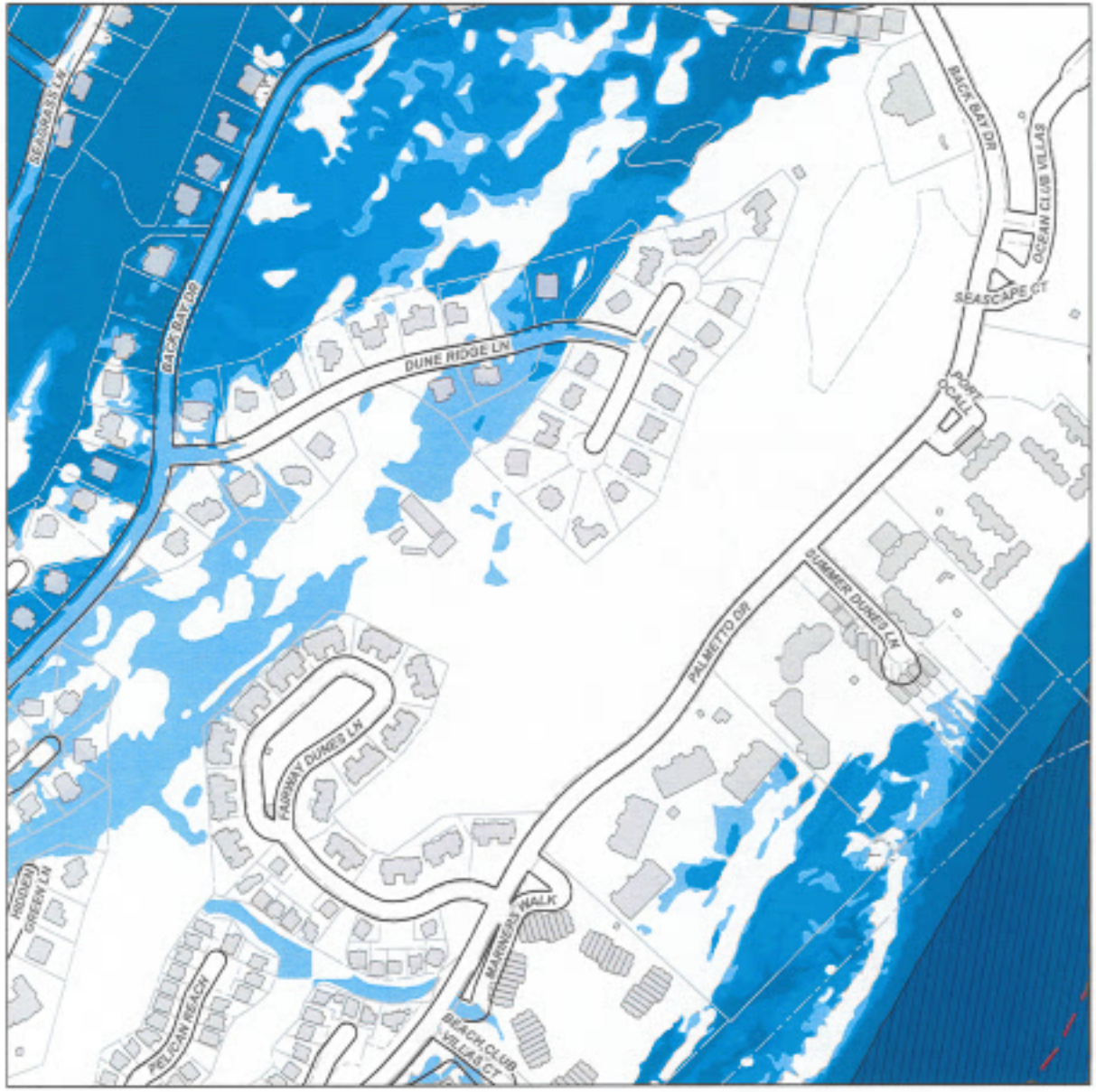
## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

N W E S

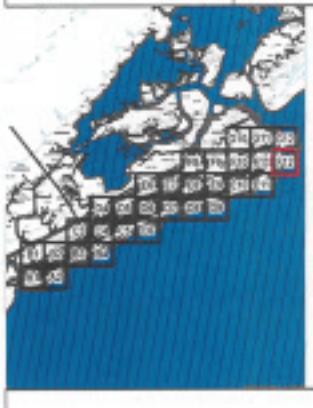
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector F12 | Page 25 of 30 |
|---|---|---|



NOTES:

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## Legend

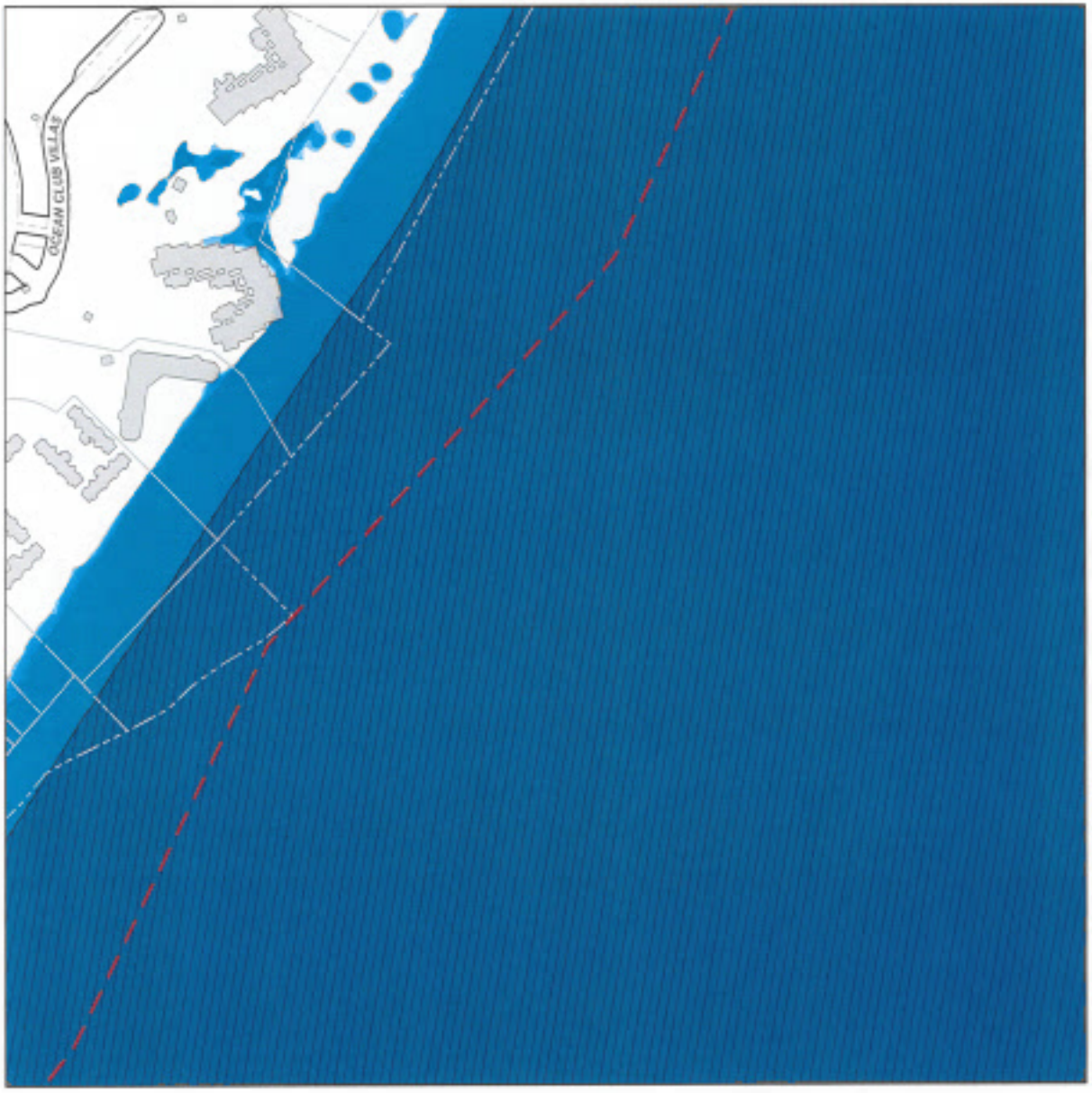
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

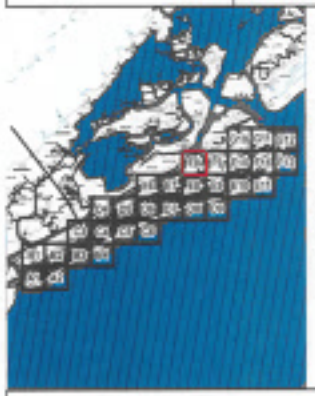
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector F8 | Page 26 of 30 |
|---|---|---|



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## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

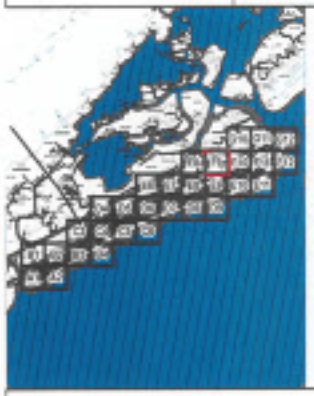
N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector F9 | Page 27 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

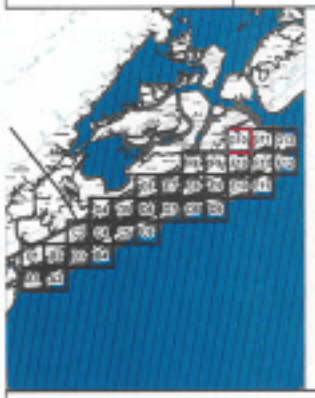
N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector G10 | Page 28 of 30 |
|---|---|---|



NOTES:

1. Flood inundation boundaries created using a 2D HEC-RAS model of the study area.
2. Tidal boundaries conditions were developed for each target year based on projected sea level rise and vertical land subsidence (following methodology discussed in the Sea Level Rise Adaptation Plan).
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## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary
- 2023
- 2030
- 2040
- 2050

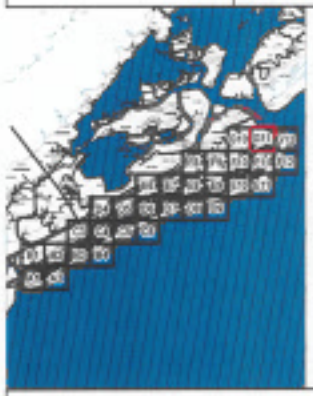
N W E S

0 250 500 1,000 Feet

City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector G11 | Page 29 of 30 |
|---|---|---|



NOTES:

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## Legend

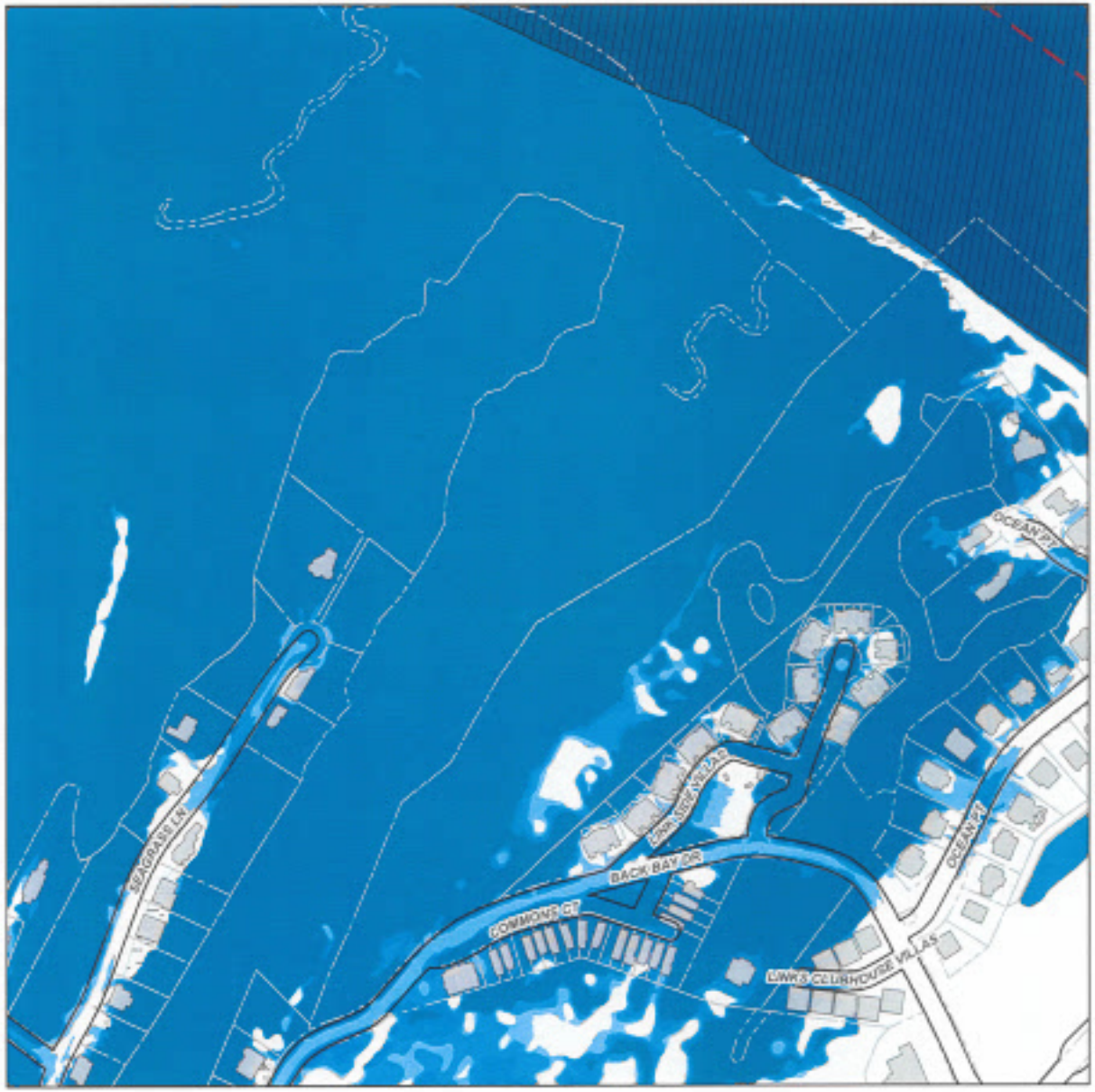
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N
W
E
S

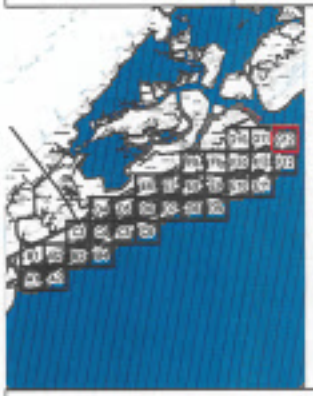
0 250 500 1,000 Feet



City of Isle of Palms, South Carolina
Sea Level Rise Adaptation Plan

Vulnerability Analysis

| Appendix A | Sector G12 | Page 30 of 30 |
|---|---|---|



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## Legend

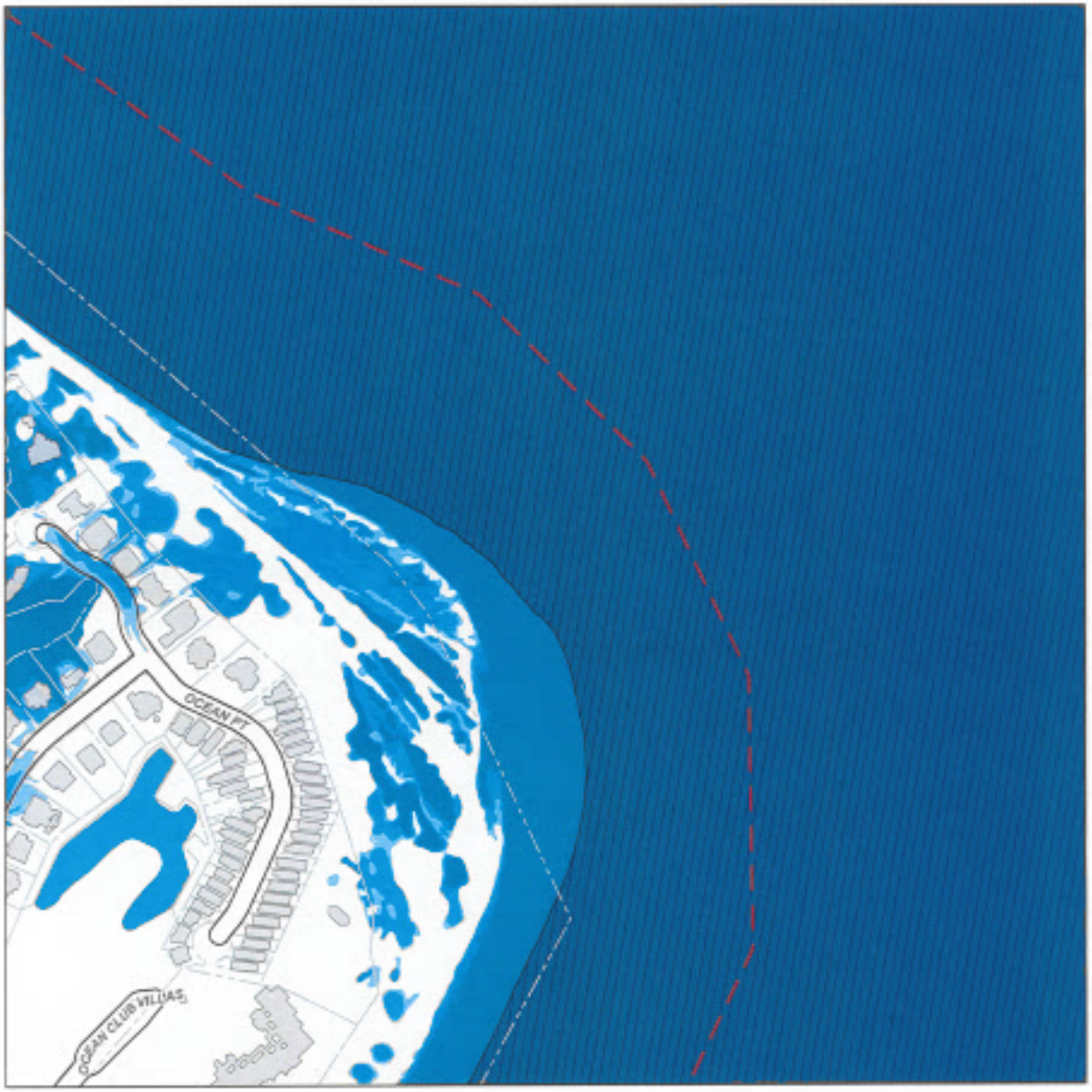
- Study Boundary
- Existing Structure
- Parcel Boundary
- Roadway
- Waterway
- Marsh

Maximum Inundation Boundary

- 2023
- 2030
- 2040
- 2050

N W E S

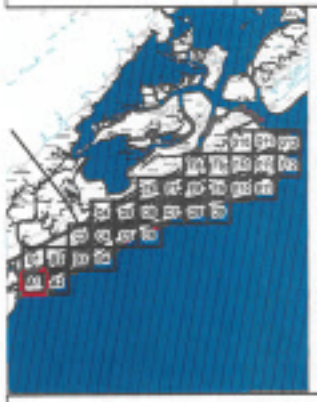
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector A1 | Page 1 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

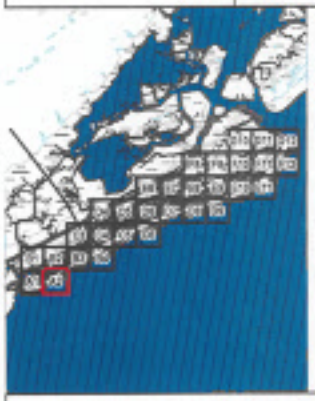
N
W E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector A2 | Page 2 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector B1 | Page 3 of 30 |
|---|---|---|

NOTES:

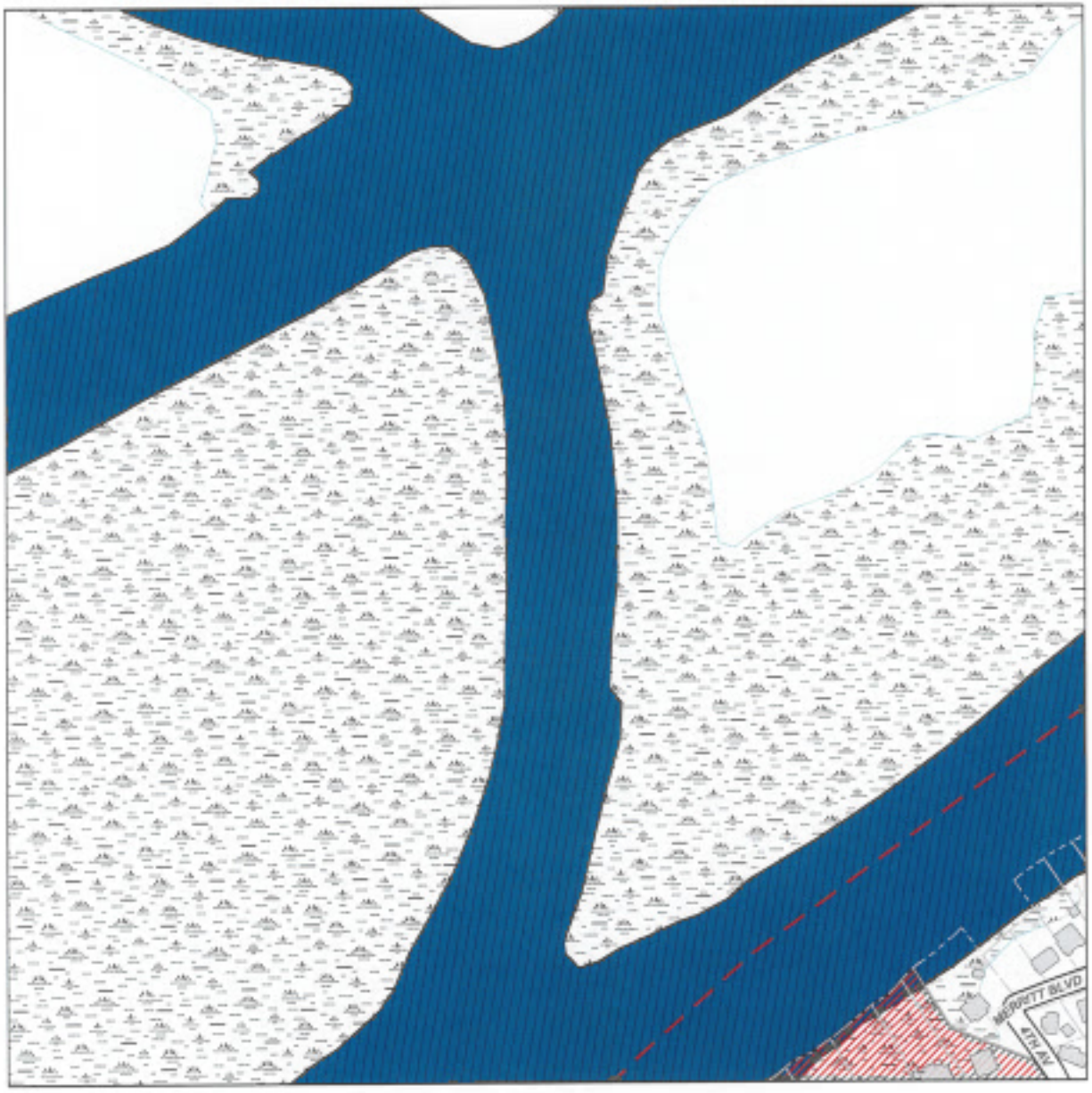
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

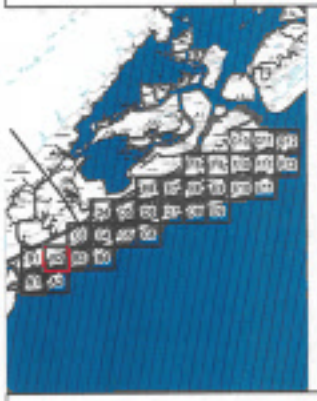
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector B2 | Page 4 of 30 |
|---|---|---|



NOTES:

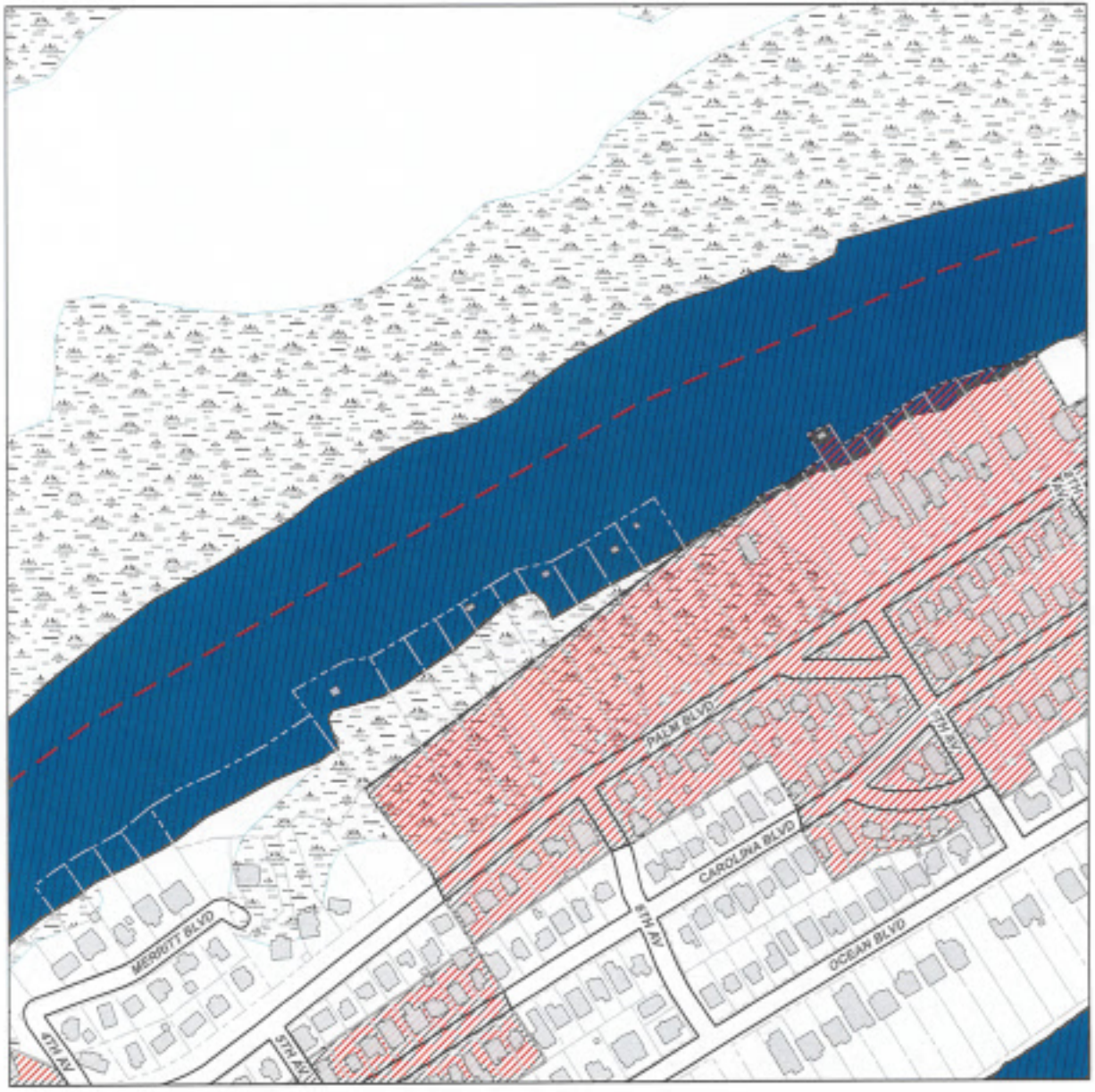
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector B3 | Page 5 of 30 |
|---|---|---|

NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

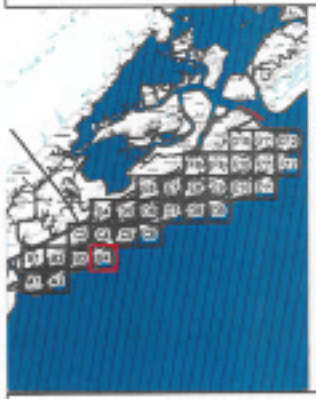
N
W E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector B4 | Page 6 of 30 |
|---|---|---|



NOTES

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

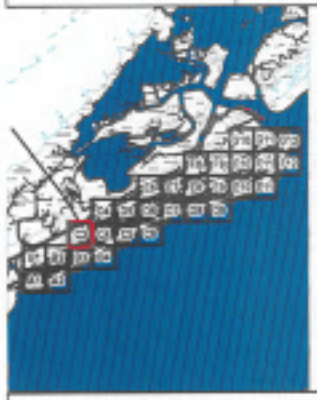
N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector C3 | Page 7 of 30 |
|---|---|---|



NOTES:

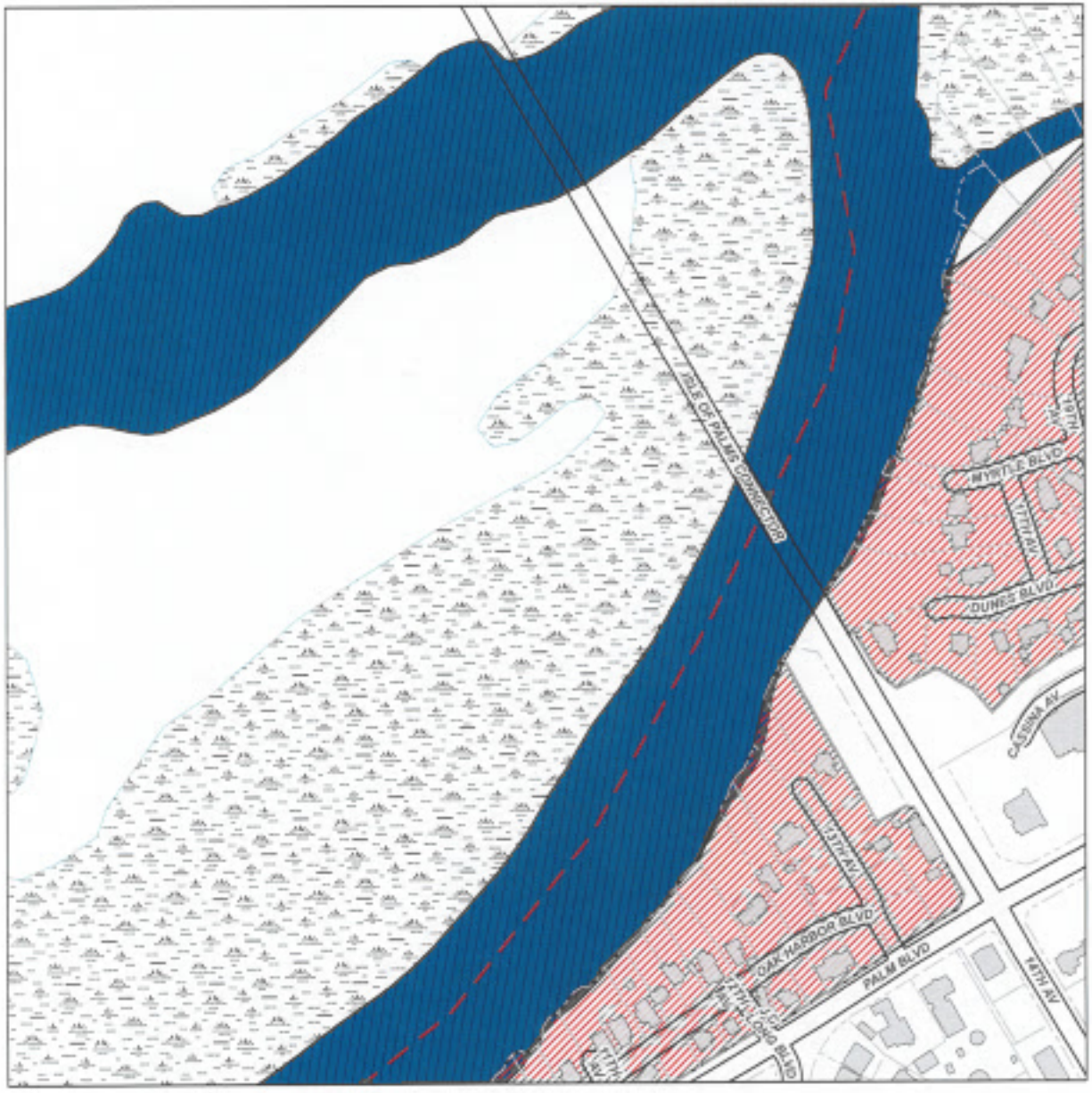
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

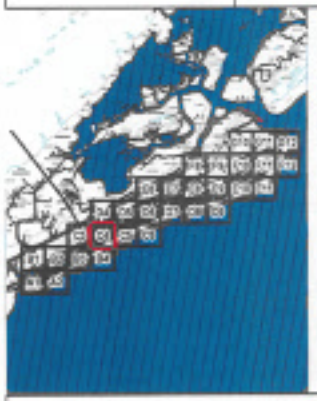
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector C4 | Page 8 of 30 |
|---|---|---|



NOTES:

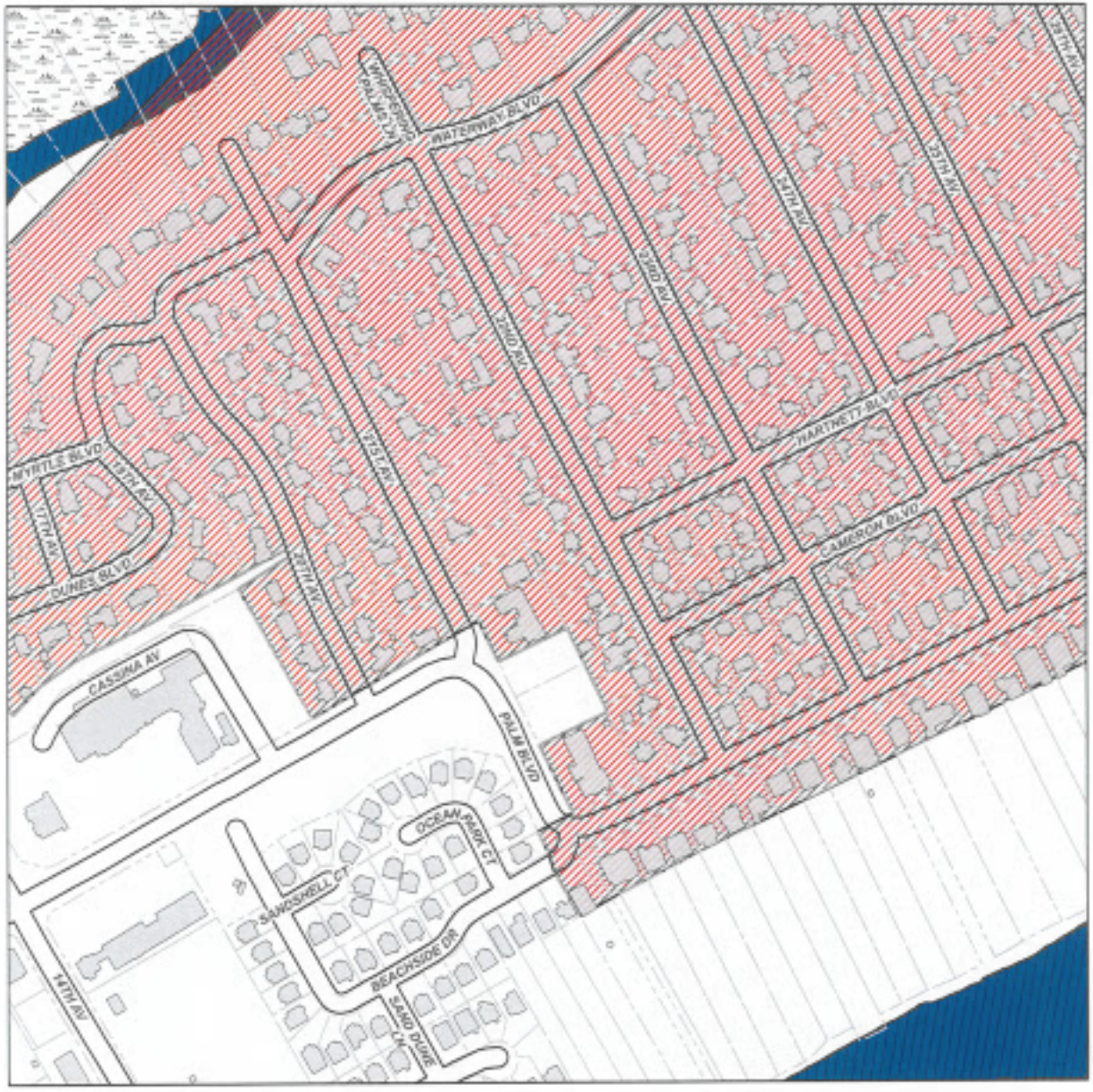
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

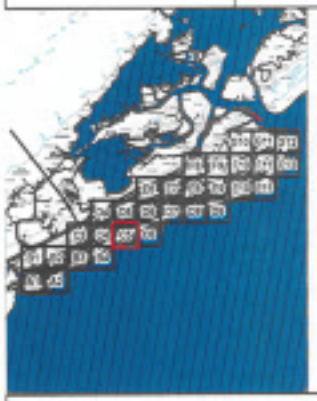
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector C5 | Page 9 of 30 |
|---|---|---|



NOTES:

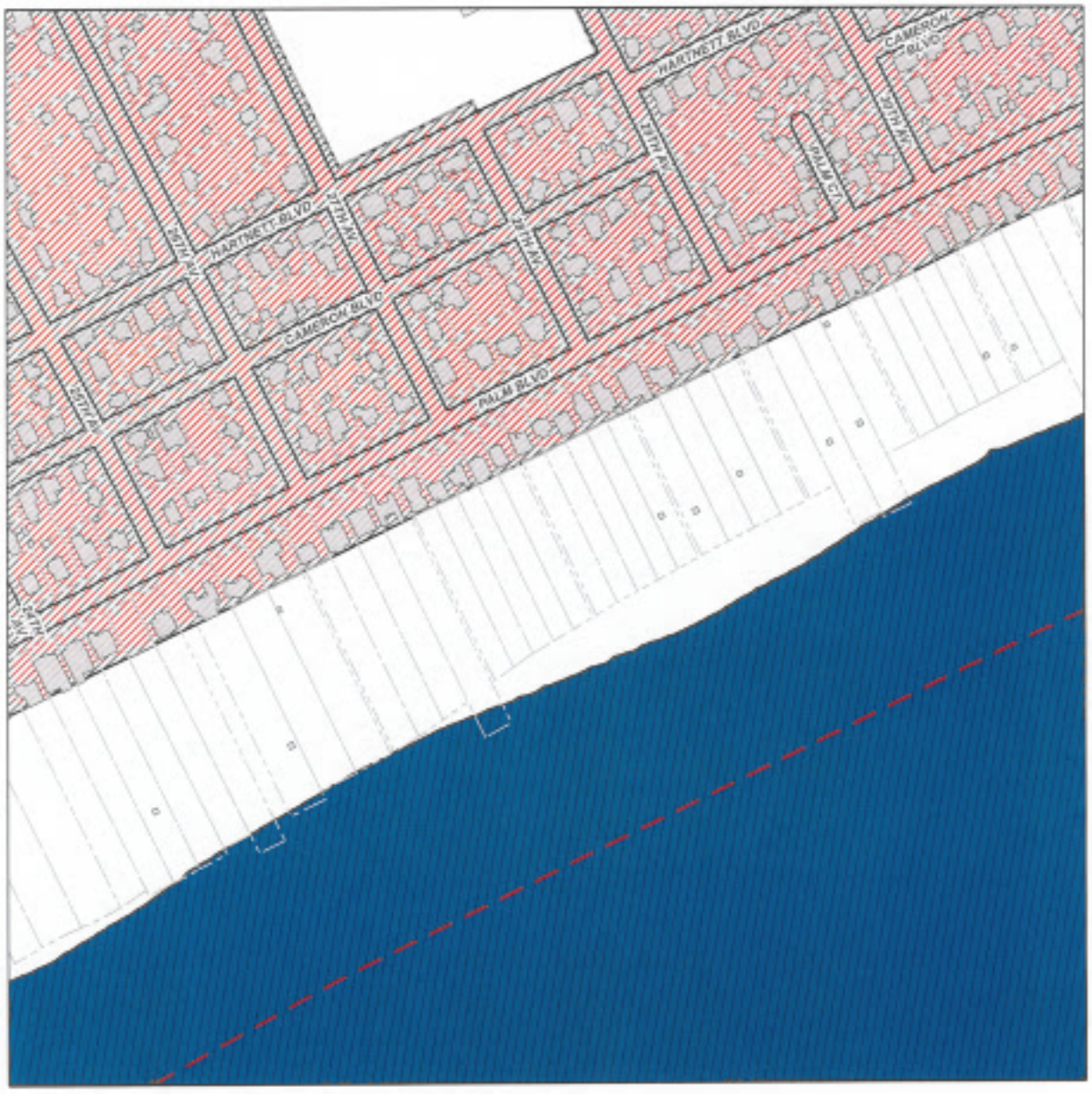
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

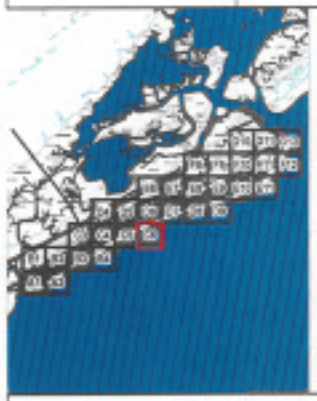
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector C6 | Page 10 of 30 |
|---|---|---|



NOTES:

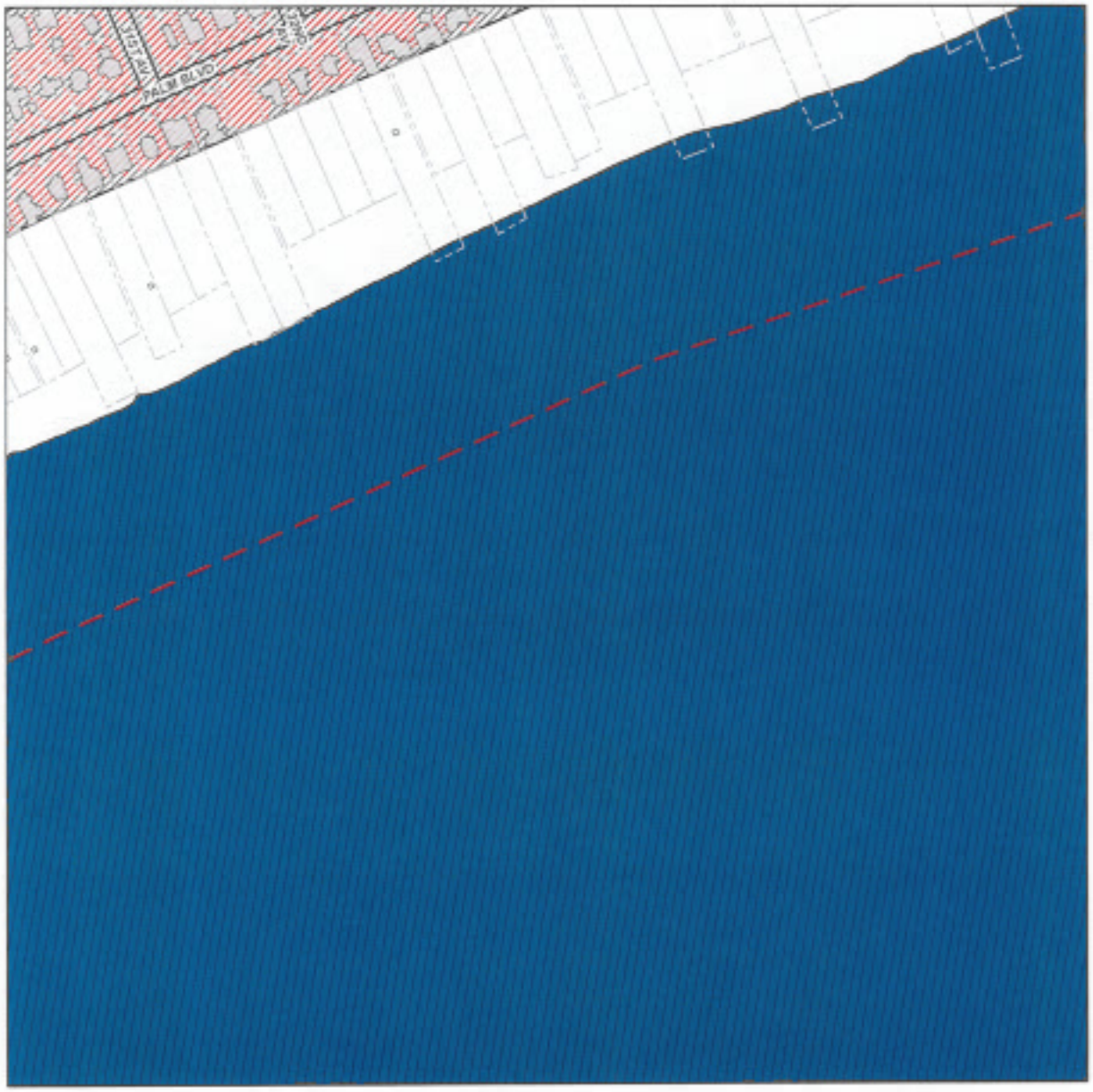
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

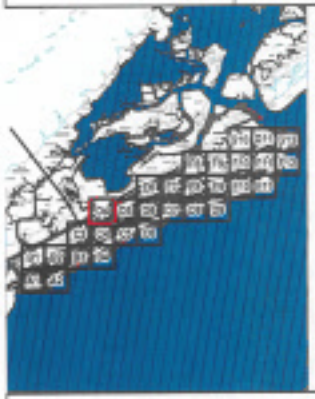
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D4 | Page 11 of 30 |
|---|---|---|



NOTES:

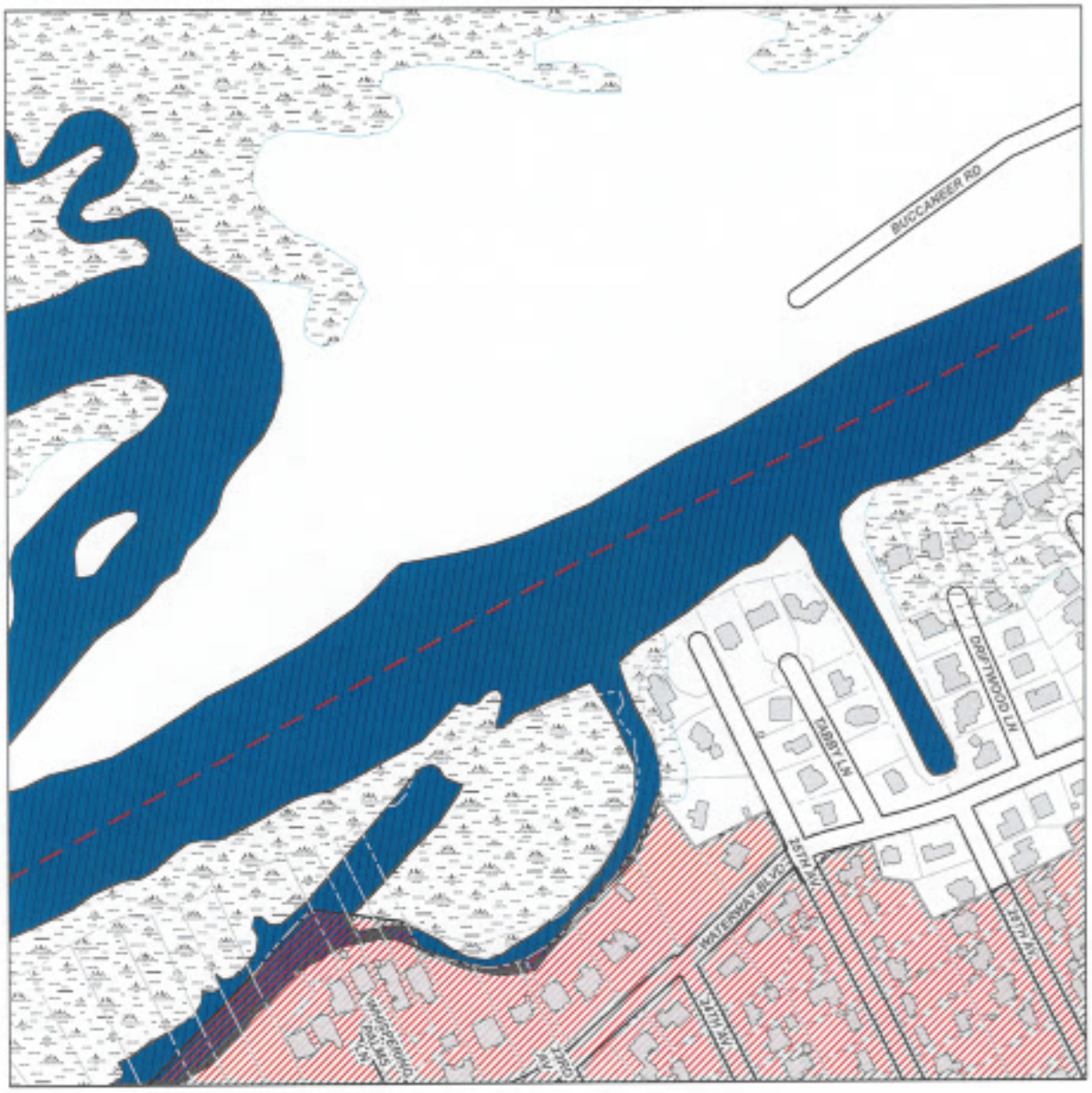
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

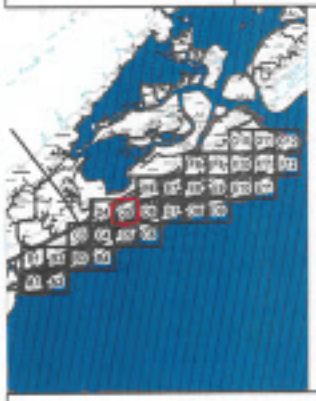
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D5 | Page 12 of 30 |
|---|---|---|



NOTES

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

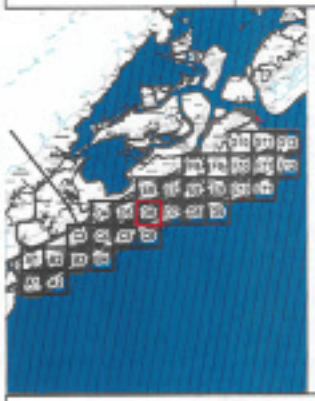
N W E S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D6 | Page 13 of 30 |
|---|---|---|



NOTES:

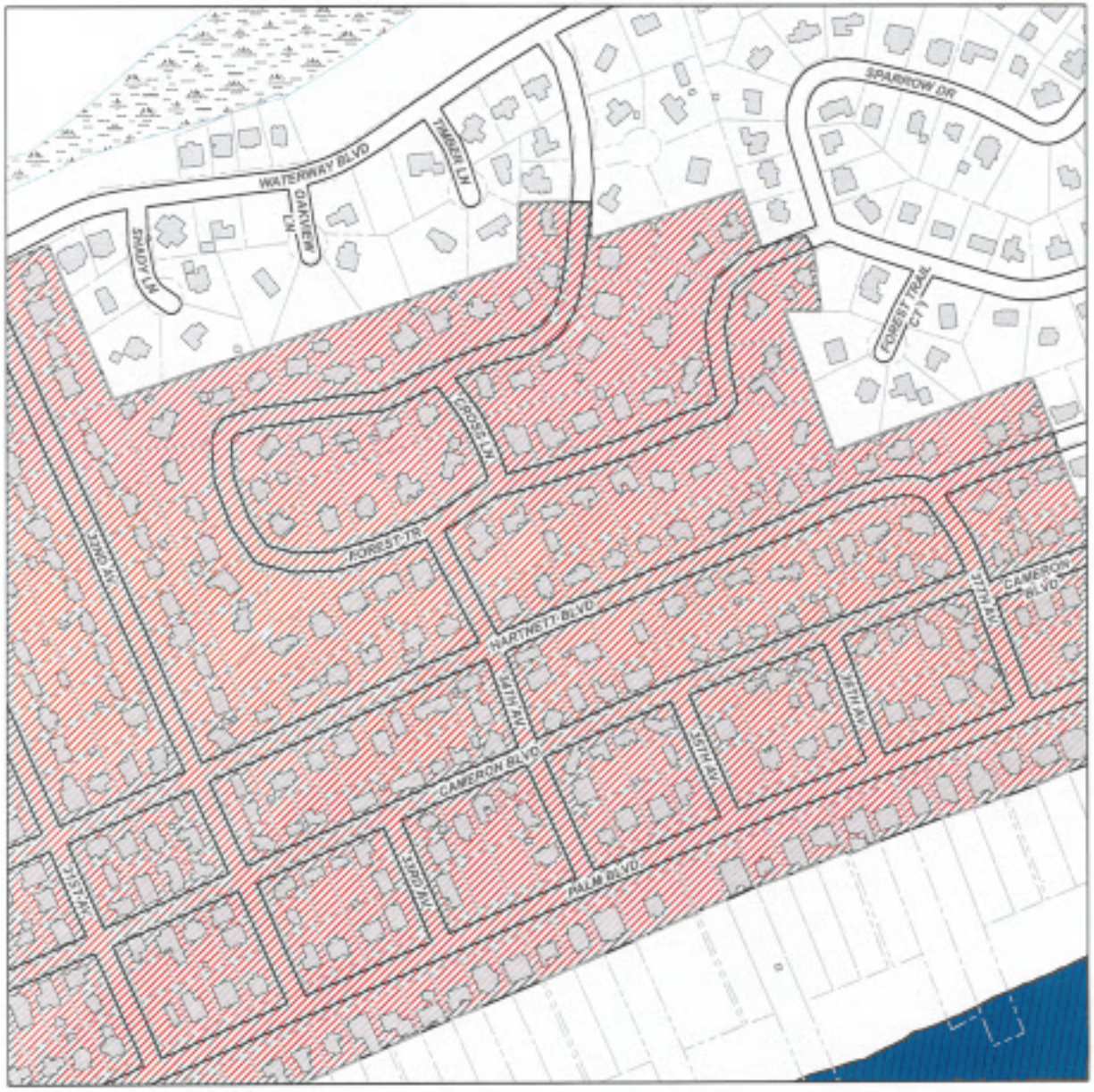
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

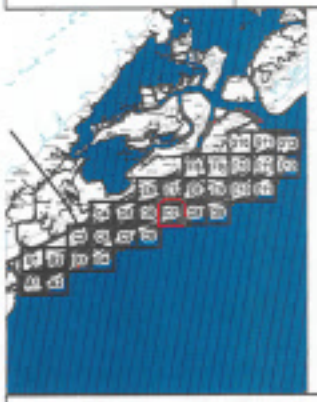
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D7 | Page 14 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

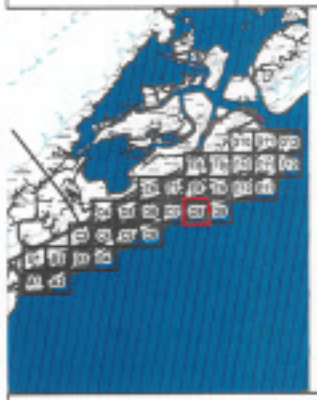
N W E S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

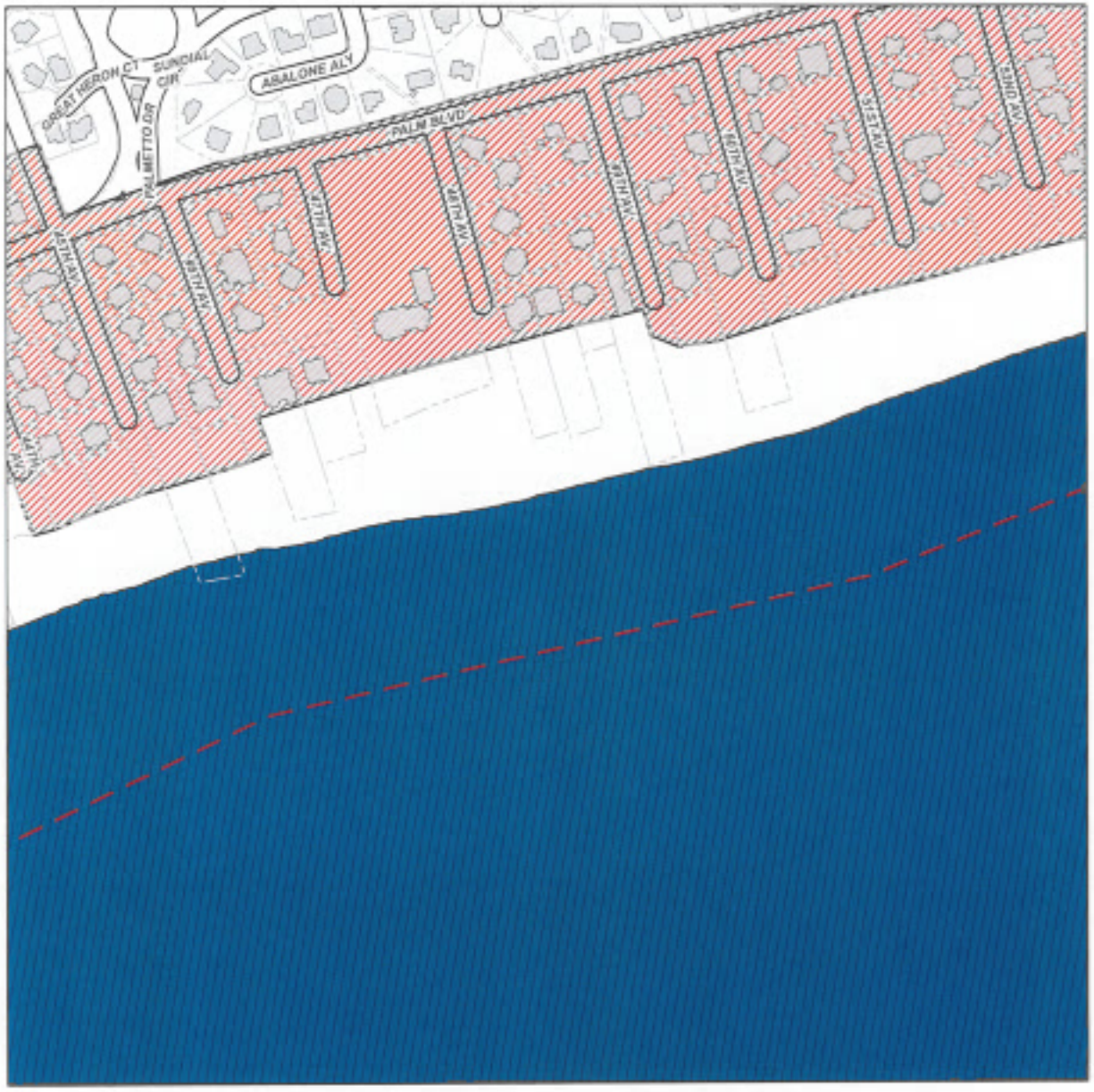
Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D8 | Page 15 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.




## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

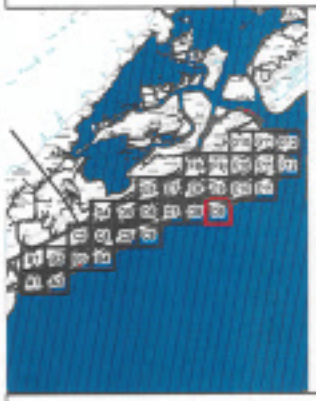
N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

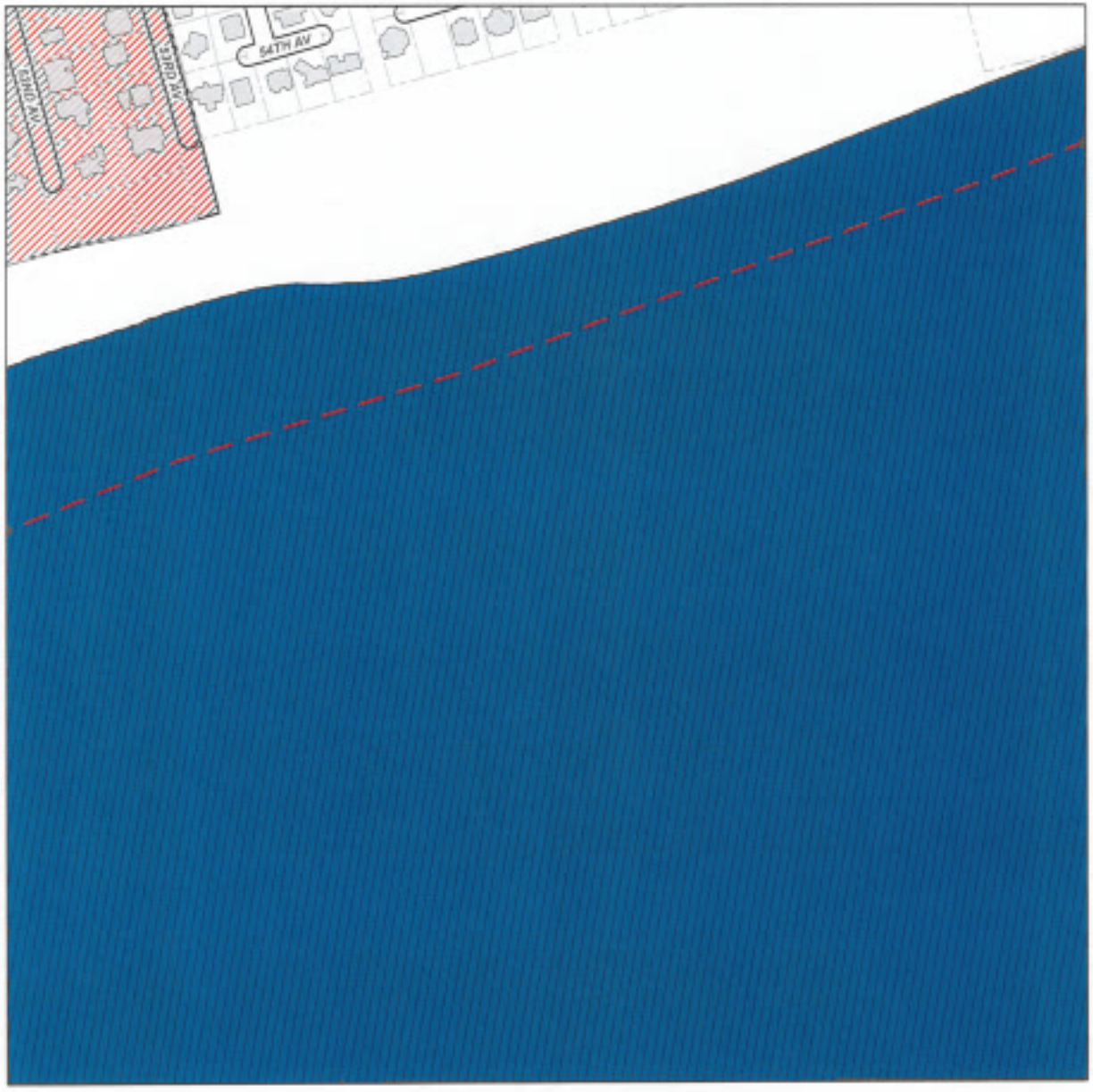
Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector D9 | Page 16 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.




## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

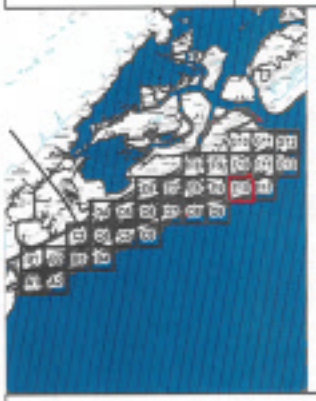
N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E10 | Page 17 of 30 |
|---|---|---|



NOTES:

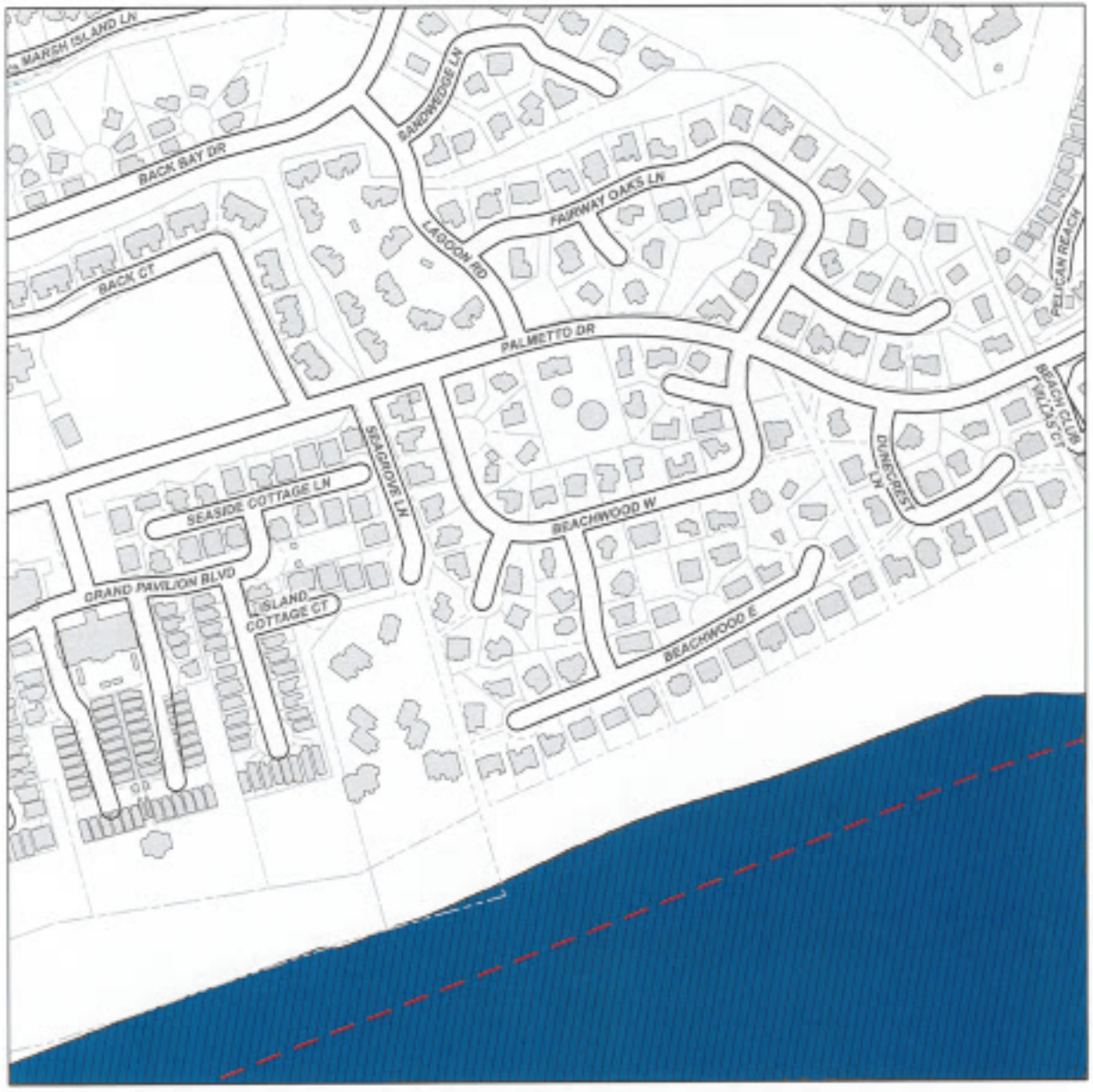
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2016 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

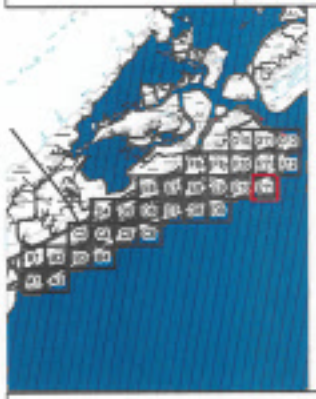
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E11 | Page 18 of 30 |
|---|---|---|



NOTES

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.


## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

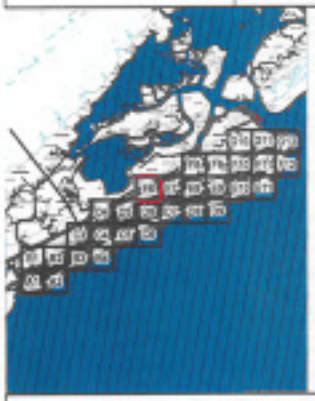
N W E S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E6 | Page 19 of 30 |
|---|---|---|



NOTES:

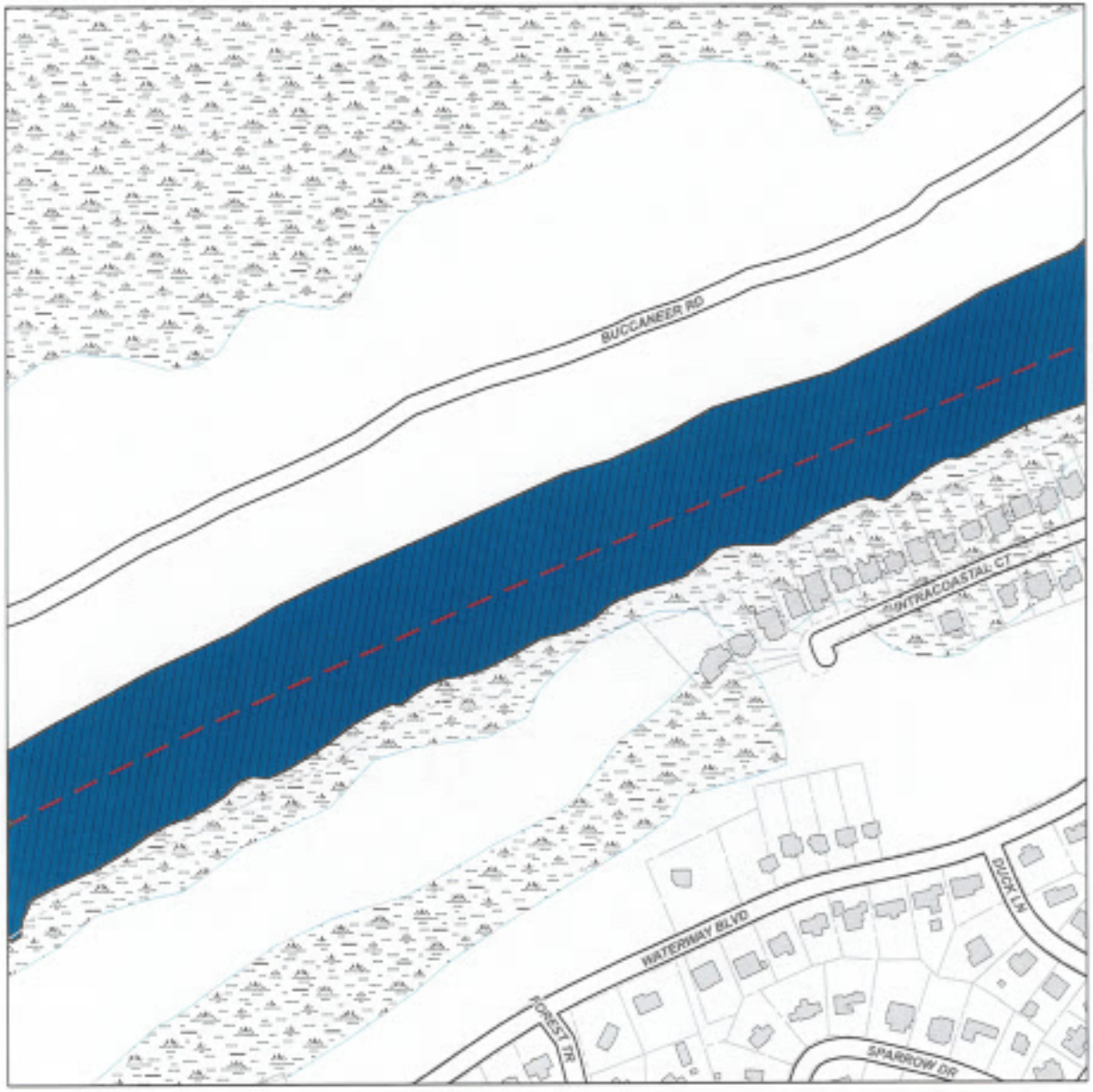
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E7 | Page 20 of 30 |
|---|---|---|

NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2016 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

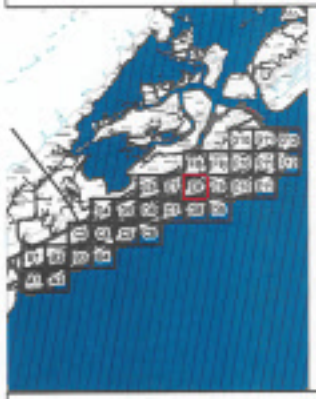
N, W, E, S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E8 | Page 21 of 30 |
|---|---|---|



NOTES

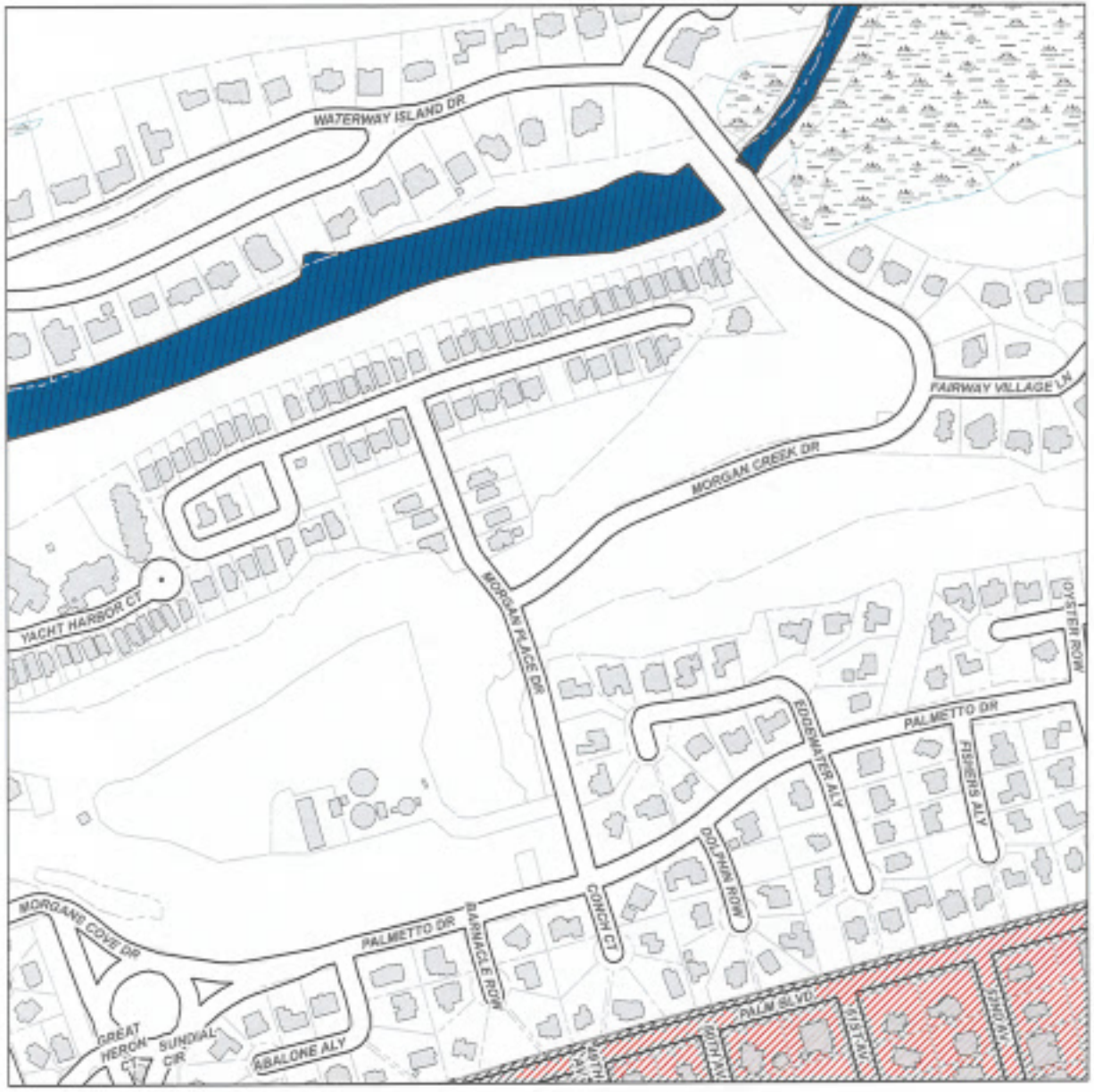
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

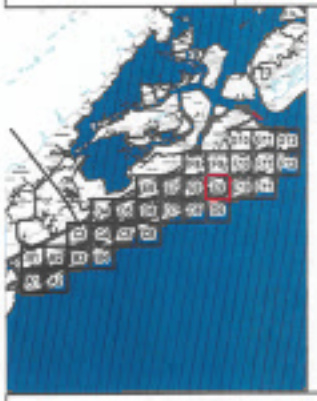
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector E9 | Page 22 of 30 |
|---|---|---|



NOTES:

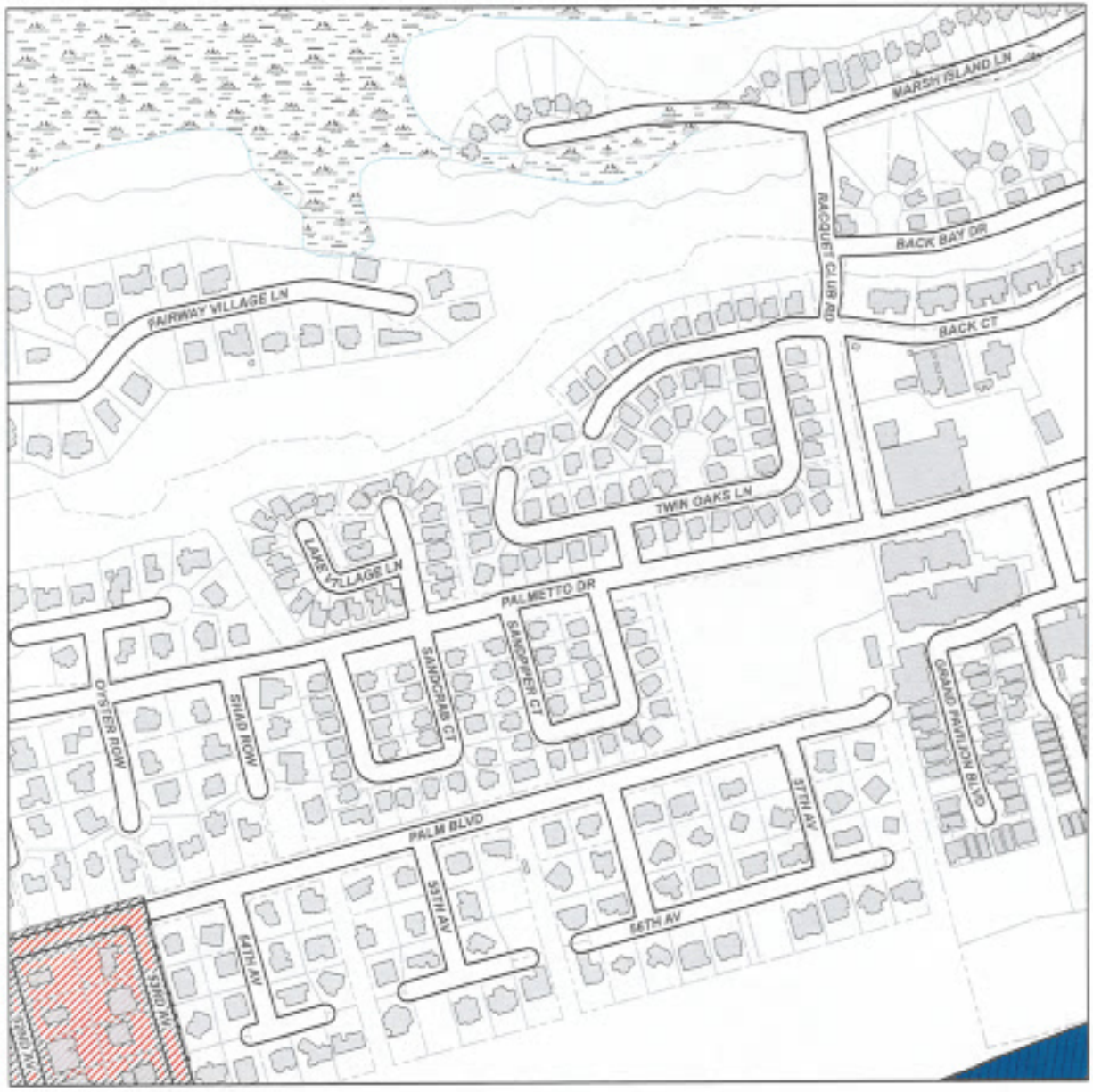
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2016 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

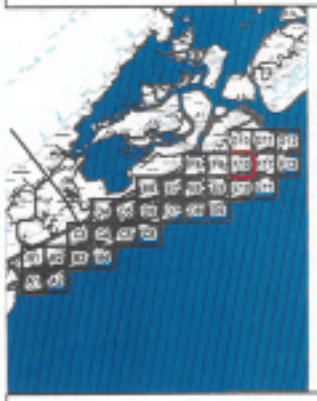
0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

| Appendix B | Sector F10 | Page 23 of 30 |
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2016 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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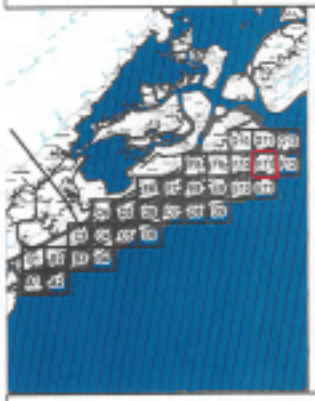
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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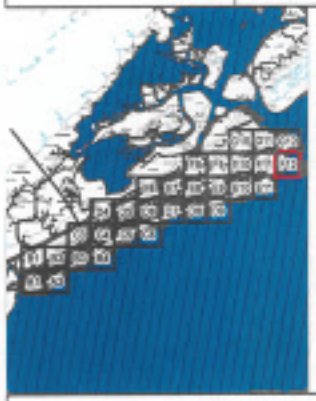
|---|---|---|



NOTES

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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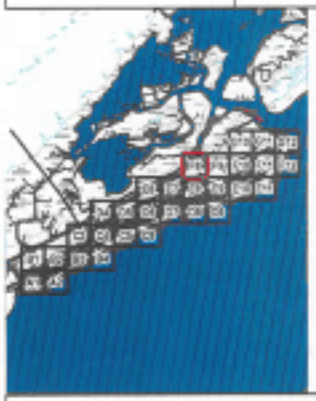
|---|---|---|



NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2016 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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|---|---|---|

NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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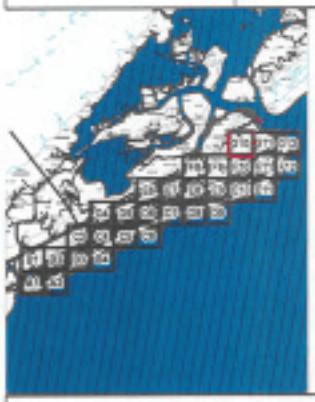
|---|---|---|



NOTES:

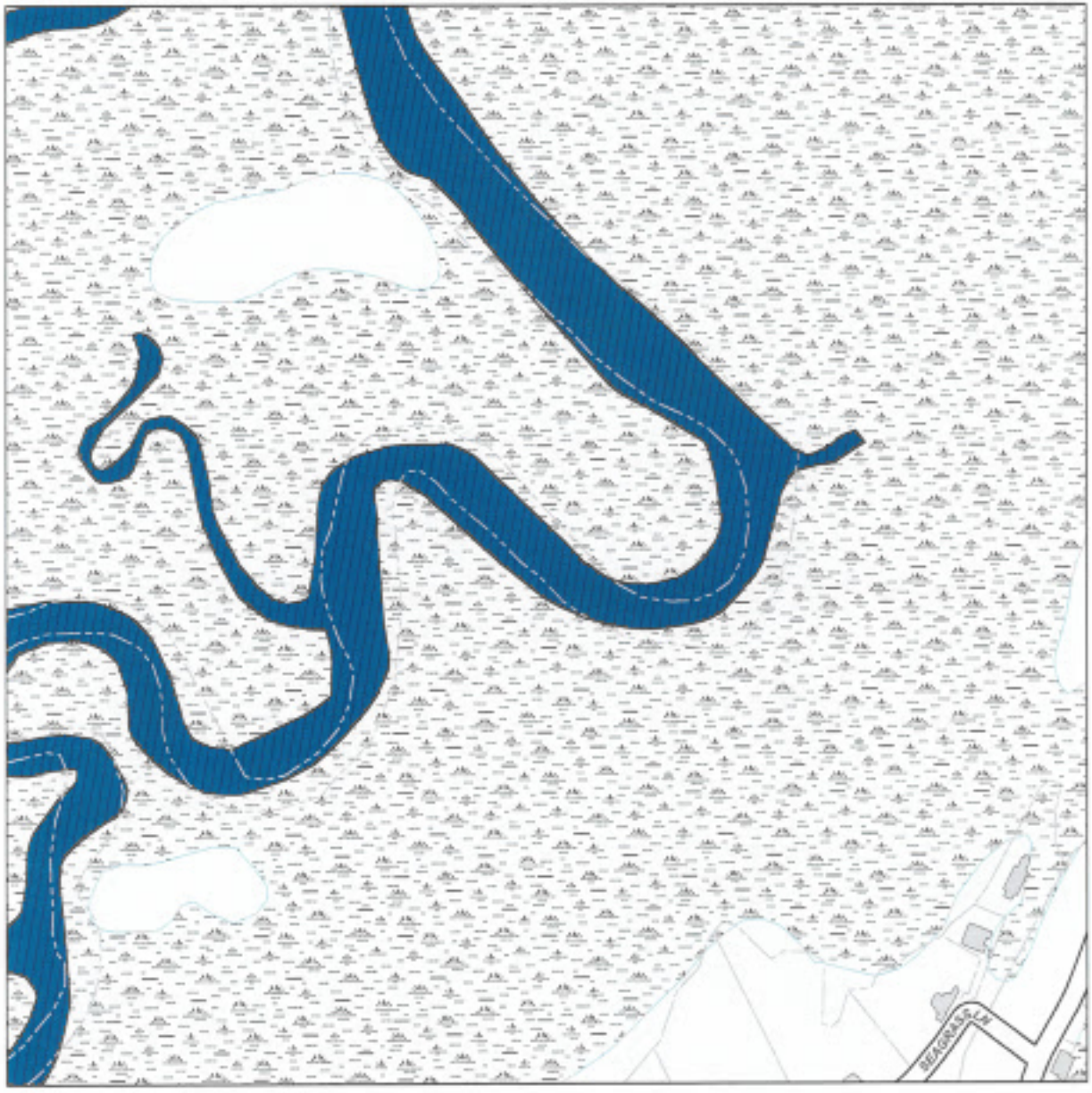
1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W E
S

0 250 500 1,000 Feet



**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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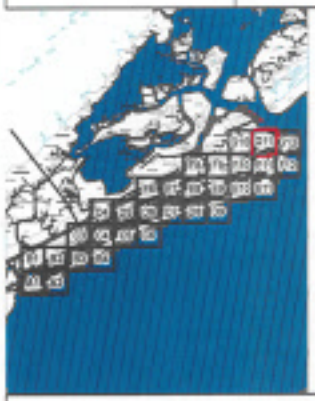

NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N W E S

0 250 500 1,000 Feet

**City of Isle of Palms, South Carolina**
**Sea Level Rise Adaptation Plan**

Vulnerability Analysis
Sewer Master Plan Supplementary Data

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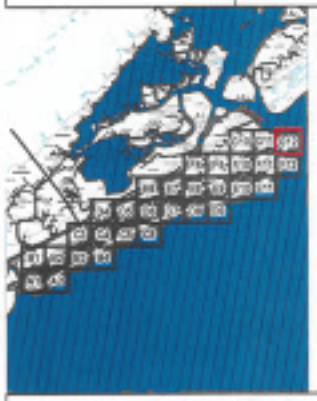

NOTES:

1. Existing structure and parcel boundary locations are approximate.
2. Septic service boundaries delineated based on 2018 Sewer Master Plan and may not account for recent improvements.

## Legend

- Study Boundary
- Existing Structure
- Parcel Boundary
- Areas on Septic
- Roadway
- Waterway
- Marsh

N
W
E
S

0 250 500 1,000 Feet