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Monroe County Roadway Vulnerability Study Final Report

Monroe County Roadway Vulnerability Analysis and Capital Plan
Monroe County, Florida

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Prepared for Monroe County



HR wood.

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Project Summary

Purpose and Need

Monroe County (County) is among the most vulnerable communities in the nation to rising sea levels, with a 120-mile archipelago of islands, most of which are at or near sea level, as well as ranking among highest areas in the country for impacts of tidal flooding. Being a coastal community exposes the population to the long-term Sea Level Rise (SLR) risks including public infrastructure and natural habitats within these highly vulnerable zones. Actively protecting infrastructure to ensure continuity of public services will lead to a competitive advantage across economic, built, and natural environments as climate change makes a progressively greater impact on the region.

Monroe County's (County) roadway system is vital for its access, evacuation, and mobilization within the Florida Keys. It provides a crucial contribution to economic development and growth as well as brings important social benefits. A well-maintained roadway system in the County invites tourism and serves its residents by providing access to employment, social activities, health, and education.

Project Description

The County maintains an estimated 311 miles of roads distributed among more than 2000 roadway segments throughout the County. As part of the County's Roadway Vulnerability Analysis and Capital project, the roadways maintained by the County will be evaluated to develop a long-term roads adaptation plan based on design criteria, SLR projections, adaptation methodology, policy/financing evaluation, and public/stakeholder outreach. The primary objective of the project is to analyze the impacts of current and projected levels of SLR on all County maintained roads and to develop an implementation plan and timeline to adapt roads for SLR. The results will be used to determine new policy considerations and design criteria for what acceptable levels of service should be.

Data Collection, GIS Data Sets, and Maps

LiDAR Data

The LiDAR data captured by Michael Baker International was assessed for accuracy, completion, and compatibility with GIS and cad programs used for the study analyses. The technical memorandum **Monroe County Mobile LiDAR Vertical Accuracy Assessment – Road Elevation Data and Finished Floor Elevations (FFE)** concluded that the road data conducted from June 25, 2019 to July 2, 2019 and the surveying of FFEs was conducted from September 9, 2019 to September 12, 2019, had an overall acceptable vertical accuracy to be used for the assessments to be conducted in the study. A detailed description of the analysis methods used to reach this conclusion can be found in **Appendix A**.

GIS Data and Maps

The foundation of the GIS database that was used throughout the project are the county-maintained roadway segments evaluated as part of the study. This base layer was created using

the list of roadway segments provide by the County in the RFQ, the County's Roadway Atlas and the County's GIS layer *Streets_PCI*.

The data initially collected laid a foundation of information for the analysis and concept development. Using GIS this database serves as storage of all existing data received from the County and the data that was collected as per the project scope. Additionally, the Data Collection Process included the collection of existing roadway conditions, utility locations, critical facilities, environmental resources, drainage structure locations, and the screening analysis process for the evaluation of the existing ground information, and the existing Mean Higher High Water (MHHW) elevations that were used to determine the criticality ranking of the roadway segments.

The **Appendix B - GIS Database Setup and Initial Elevation Analysis Technical Memorandum** further details the data setup and collection.

The entire GIS data package will be submitted as a separate deliverable package.

Site Assessment and Condition Survey

Data collection for the Site Assessment and Condition survey was performed between July 10 and July 18, 2019, with a total of 3,022 pavement sections analyzed. The average condition of the pavement network was determined to be a PCI range of 83, which falls within the Fair condition of the PCI rating scale. The full data set and analysis of the findings, and the remaining service life estimations are described in **Appendix C - Roadway Assessment and Condition Survey Technical Memorandum**.

Roadway and Stormwater Existing Data

The data collection process was broken down into two phases, the first phase was focused on cataloging, documenting, and organizing existing data received from the County, the second phase consisted of collecting and recording additional existing condition data to supplement the data sets provided by the county and have a comprehensive data base to be used for the analysis and recommendations for this study. The data organization and collection processes are outlined in detail in **Appendix D – Roadway and Stormdrain Data Collection Technical Memorandum**.

Environmental Assessments

An initial environmental desktop review focused on permitting, describes the development of a data base including a list of potential environmental constraints that could affect permitting and adaptation for the roadways. The tasks and methodologies are detailed in **Appendix E – Environmental Desktop Review (Ecological Permitting Constraints)**.

The environmental assessment for each one of the proposed project areas was conducted, and the **Monroe County Resiliency Conceptual Design Review – Wetlands, T&E Species, and Permitting Constraints Technical Memorandum** was developed. The Technical Memorandum outlines the evaluation of the proposed improvements and conceptual designs, and the environmental constraints to identify the project areas that may require additional permitting. A detailed evaluation of each of the project areas and can be found as an attachment to **Appendix L – Concept Design Technical Memorandum**.

Sea Level Rise and King Tide Projections

Appendix F - Sea Level Rise Projections for Monroe County provides the documentation and methodology used to reach the decision to base SLR projections on NOAA (2017). In general, for relatively short-term projections (2025 to 2045) the focus should be on the IPCC Median to NOAA 2017 Int-High scenarios.

Appendix G – King Tides and Wind Setup Technical Memorandum, explains in detail the tidal analysis and decisions to use the highest tidal range and normal wind setup levels, measure at the Naples tide gauge location.

Engineering Analysis

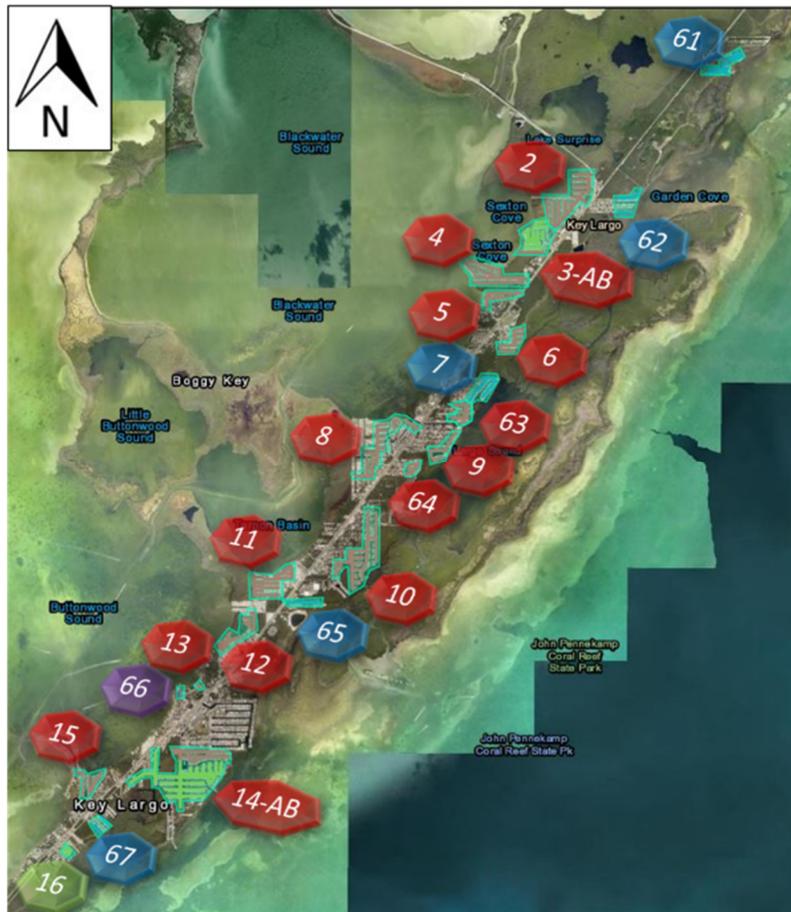
For the analysis process, the adopted interim standard methodology for adapting transportation infrastructure for SLR (annual average allowance of 7-days of tidal flooding per year) based on the SLR Pilot Projects was evaluated to determine if it was still applicable, considering the difference in time-period evaluation, latest available data, new approaches, and broader scope. It was found that in general, the existing roadside ground elevations are exceeded by stillwater levels, thus using the 7-day annual occurrence presents a problem for our desired project outcome of keeping the roadways dry and accessible with projected stillwater levels and relying on drainage improvements to mitigate KT. To meet the goal of dry and accessible roads, we did not base our design on a desired LOS, rather, sought to have roadways that will exceed the projected stillwater levels. LOS ultimately depends on the efficiency of the pump stations and how they will be used to address flooding during periods of KT, as accessibility should not be an issue with projected stillwater levels.

Project Area Identification, Design and Conceptual Plans

Project Area Identification

Through a 2-step assessment approach, we were able to tabulate a Vulnerability and Criticality score for each roadway segment included in the study. The most critical roadway segments were found to be located spread out throughout the entire study area (Upper, Middle, and Lower Keys). These critical roadway segments were used to initially define the specific locations in which the assessment to develop the future project areas were stipulated to begin. In lieu of establishing over 1000 projects that would only address one specific roadway at a time, it was recommended that a future adaptation project should address the entirety of critical impacted roadway limits within a specific location, thus each project area may contain roadway segments with several levels of criticality, Figure 1 shows project areas in the Upper Keys. The larger the area the more diverse the levels of criticality. This process resulted in the identification and selection of a total of 83 independent project areas that would address the critical roadways impacted by projected 2045 KT water levels. **Appendix J – Vulnerability Assessment and Inundation Mapping**, and **Appendix K – Prioritization of Roadway Segments Base on Vulnerability Assessment** technical memorandums outline in detail the processes and analysis for the vulnerability and criticality scoring used in the 2-step assessment for the roadway segments.

Figure 1: Project Areas - Upper Keys



Proposed Improvements Design

Appendix K - Concept Design and Technical Memorandum describes in detail how design decisions were reached as well as an overview analysis of the reference data and information used. The technical memorandum also includes all design assumptions and criteria used for the roadway and drainage improvements. All design decisions were based on the data collection, the analysis conducted in all previous tasks, and led to the development of general flood mitigation concepts for the 83 project area locations.

The design parameters used included minimum recommended elevations, listed in Table 1. To arrive at our recommended pavement elevation, the Design Year of the projects was first identified to be 2045, then the projected 2045 NOAA 2017 Int-High SLR and KT elevations were obtained from the SE FL Regional Climate Change Compact 2019 SLR Projections. The Tidal Datum elevation (ft) as it pertains to the Naples Gauge relative to 2000 MSL was calculated to be 0.6037-ft, it was then that the 2045 SLR projections were added to this stillwater level, to obtain elevations of 2.26-ft and 3.40-ft for 2045 SLR and 2045 KT, respectively. A

Table 1: Minimum Proposed Elevations

Design Scenario	Pavement Elevation (ft)
Improvements with drainage	2.26
Improvements without drainage	3.40

The difference in water elevation from the 2.26-ft to the 3.40-ft of projected 2045 KT is to be mitigated through the proposed drainage systems. In areas where drainage improvements are not feasible, the proposed minimum pavement elevation is to be 3.40-ft.

The LiDAR data was used to create Digital Terrain Model (DTM) files, these were used as reference in the design process to estimate the difference in elevation from the existing conditions to the proposed roadway elevations and visualize the tie-in and possible harmonization from the proposed improvements to the existing roadside features and/or terrain.

Another important design parameter was the available ROW. Through the design process, it was our goal to maintain all proposed improvements within the County roadway ROW, which was feasible in most cases. ROW survey and confirmation for special areas of concern was conducted, and the resulting files used as reference to accurately document any ROW encroachments. Projects in which proposed improvements required to go beyond the ROW have been documented in the Concept Design and Technical Memorandum, within the narrative for each individual project area, with the ROW encroachment listed for the roadway segment in which it is present.

With all parameters, design criteria and existing conditions considered, the proposed improvement alternative was chosen. The proposed alternative will recommend raising the roadway, providing a valley gutter where drainage structures are to be installed, as well as the incorporation of a pump/injection well system. In areas where the drainage alternative is not feasible, the road would be raised to meet KT elevations. There were three main typical sections developed for the project areas in the study that apply to most of the roadway segments in all project areas. Certain areas where none of these three typical sections were feasible, the area specific typical sections are described in the Concept Design Technical Memorandum.

Vulnerability and Road Adaptation Recommendations

This section outlines the comprehensive roads adaptation plan based on the results and guidance from previous project tasks. Based on this Adaptation Plan, a schedule on when corresponding adaptation improvements are required to be implemented has also been developed. The plan schedule is dynamic to accommodate updates based on actual information vs. projected information.

Analysis/Methodology

Although it is anticipated that all project areas will be impacted by 2045 projected KT water levels, not all project areas will become vulnerable at the same time. The adaptation plan was developed

through a thorough multi-step ranking and sorting analysis of the top critical 83 project areas within this study for which proposed concepts designs were completed. The initial prioritization process used to select these 83 areas was explained in detail in the **Concept Design Technical Memorandum**.

As part of the earlier project GIS tasks, the Sea Level Rise Viewer map was developed, this map contains layers for SLR and KT for 5-year intervals from 2025 to 2045, as well as for the years 2060 and 2100 for all project streets. This map displays and ranks the clearance between water levels and the existing roadway crown elevations among 6 different ranks. The visual analysis and initial sorting of the project areas was done based on the elevation ranks for both SLR and KT projections using this map. The project areas were assigned a general rank for SLR and KT for the years 2025, 2030 and 2035, based on the ranking from the map that corresponded to approximately 71% of the segments within that area. The ranking legend and a sample area of the map is seen in Figure 2. Some broad project areas were not being impacted consistently throughout its entire area at once, for example, half of the project area would be anticipated to be impacted in a specific year and the remaining half, 5 to 10 years afterwards. Hence, we recommended a 2-phase implementation approach for these Project Areas. This brought up the number of Project Areas considered in the adaptation plan to a total of 97.

Figure 2: MCRVS Sea Level Rise Viewer



After the 97 project areas were defined, the first step was to identify the those expected to be affected by the 2025 SLR water levels. As presented in Table 2, with color coding matching the *MCRVS Sea Level Rise Viewer*, most of the project areas fall within the yellow ranking, meaning

there will be partial flooding with at most 6-in of water throughout each of the project areas with stillwater levels over the current roadway elevations. Most of these areas also show over 6-in of flooding beginning with 2025 KT projections. This filtering phase yielded 49 project areas with these flooding characteristics. In addition, the Criticality Score for each of the 49 areas was calculated by adding up the individual scores of the project area roadway segments with a criticality score of 4 and above. After the scores were calculated, the areas were then sorted by their Average Criticality Score to arrange them from the highest to the lowest. In the results, project area No. 24-A (Tavernier Ocean Shores) was listed on top of the 2025 year of projected vulnerability based on the Average Criticality Score. The Project Area No. 24-A has a total length of 0.32 Miles (short project length), is densely populated (pushes to higher criticality scores) and is a low existing ground elevation area that anticipates impacts to approximately 50% of the project limits by 2025 King Tide water levels. Therefore, even though the project Area No. 24-A was listed on the top of the list, it does not represent the area that is anticipated to have the most flooding depth and does not contain the individual roadway segment that is currently being impacted/flooded the most.

After these 49 project areas were identified, sorted, and placed at the top of the adaptation plan for the 2025 year of projected vulnerability, the remaining 48 project areas were then sorted by year of projected vulnerability to identify when each one would need to be addressed. The next 10 project areas in the adaptation plan are ranked in orange (-0.5-ft to -1.0-ft below SL) for the projected 2030 KT, although better conditions are expected for the 2030 SLR stillwater levels (> 1-ft to 0.5-ft above SL) the KT impacts cement the need for improvements by the projected year of vulnerability, 2030. The following 10 project areas are ranked in orange for the projected 2035 KT and mostly ranked in yellow for the 2035 SLR stillwater level, again, the KT impacts determine the need for improvements by the projected year of vulnerability, 2035. Lastly, there are 28 remaining project areas, that overall do not have orange or red rankings until after 2035 for stillwater levels for SLR project nor KT projections, allowing for the implementations to be considered for years of vulnerability beyond 2035.

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Table 2: Adaptation Plan List

Adaptation Year	Project Area No.	Area	Key	Subdivision	Total Length (Feet)	Total Length (Miles)	SLR 2025	SLR2030	SLR 2035	KT 2025	KT 2030	KT 2035	Criticality Score (4 & 5)
2025 (49 areas)	24-A	Upper Keys	Key Largo	Tavernier Ocean Shores	1682	0.32	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	5.00
	42-A	Lower Keys	Summerland	Summerland Key Cove Amended / Summerland Key Cove 1St And 3Rd Additions / Summerland Estates Resubdivision No. 2	1119	0.21	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	5.00
	59-A	Lower Keys	Key West	Eaton Street / Palm Avenue	3938	0.75	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.99
	15	Upper Keys	Key Largo	Buccaneer Point / Pirates Cove 1St Addition	3945	0.75	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.90
	48	Lower Keys	Upper Sugarloaf	Sugarloaf / SR 939B	4512	0.85	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.89
	26	Middle Keys	Conch		2439	0.46	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.87
	4	Upper Keys	Key Largo	Stillwright Point No. 1 / Stillwright Point No. 2 / Paradise Point Cove	9207	1.74	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.86			
	30	Lower Keys	Big Pine	Doctor's Arm / Doctor's Arm 1st and 2nd Additions / Doctor's Arm 3rd Addition Sections A, B and C / JR Matthews Properties / Punta Brisa	16588	3.14	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	4.85
	2	Upper Keys	Key Largo	Lake Surprise Estates	12188	2.31	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.84
	36-A	Lower Keys	Little Torch	Coral Shores Estates Mobile Homes Sections 1 and 2 / State Road 4A / Ladies Acre Amended and 1st Addition / Mates Beach and Plats 2,3,4 and 6 / Winward Beach Estates	6704	1.27	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.80
	59-B	Lower Keys	Key West	Flagler Avenue	10450	1.98	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.79
	5	Upper Keys	Key Largo	Riviera Village Revised	1835	0.35	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	4.75
	37	Lower Keys	Little Torch	Jolly Roger Estates	16005	3.03	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.74
	8	Upper Keys	Key Largo	Cross Key Waterway Estates / Twin Lakes	10230	1.94	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.71
	49-A	Lower Keys	Lower Sugarloaf	Sugarloaf Shores Sections A, B, C, D / Sugarloaf Shores Sections D Extended / Sugarloaf Shores Section F Revised / Sugarloaf Shores Replat 1 & 2 / Orchid Park	3630	0.69	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.69
	52-A	Lower Keys	Big Coppitt Key	Gulfrest Park / Gulfrest Park No. 2 / Coppitt Extension / Coppitt Resub / Johnshonville / Similar Sound Section A	21737	4.12	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	4.69
	6	Upper Keys	Key Largo	Key Largo Mobile Homesites Plat No. 2 / Key Largo Mobile Homesites Plat No. 4	3700	0.70	> +1.0ft Above SL	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.68
	11	Upper Keys	Key Largo	Key Largo Trailer Village / Key Largo Trailer Park 1st Addition	7660	1.45	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.68
	10	Upper Keys	Key Largo	Winston Waterways Amended / Winston Waterways No. 2 / Winston Waterways No. 2 Amended / Largo Gardens	11934	2.26	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.67
39	Lower Keys	Ramrod	Breezeswept Beach Estates	24200	4.58	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	4.65	
18	Upper Keys	Key Largo	Sunrise Point Revision / Sunrise Point Addition Amended / Raes Cuda Canal	4665	0.88	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.63	

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Adaptation Year	Project Area No.	Area	Key	Subdivision	Total Length (Feet)	Total Length (Miles)	SLR 2025	SLR2030	SLR 2035	KT 2025	KT 2030	KT 2035	Criticality Score (4 & 5)
2025 (49 areas)	58	Lower Keys	Stock Island	Maloney / Sun Krest / Lincoln Gardens 1&2 / Balido 1&2 / Lincoln Manor Estates / Robyn / Sunshine / Shrimp Road	45542	8.63	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.63
	45-A	Lower Keys	Cudjoe	Cutthroat Harbor Estates / Cutthroat Harbor Estates 1st Addition / Cudjoe Ocean Shores	24513	4.64	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.62
	38	Lower Keys	Ramrod	Ramrod Shores 2Nd Addition / Ramrod Shores 3Rd Addition / Ramrod Shores Marina Section Revised	5113	0.97	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.58
	12	Upper Keys	Key Largo	Sunset Waterways / Key Largo Park Amended	5030	0.95	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.57
	51-A	Lower Keys	Saddle Bunch	Bay Point Trailer Park / Bay Point Trailer Park 1st Addition / Bay Point 1st Addition / Bay Point Amended Plat	2756	0.52	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.52
	29-A	Lower Keys	Big Pine	Eden Pines Colony / Eden Pines Colony 1st Addition / Eden Pines Colony 3rd Addition	16302	3.09	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.50
	9	Upper Keys	Key Largo	Largo Sound Park / Anglers Park Shores	2873	0.54	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	4.47
	56	Lower Keys	East Rockland	Rockland Hammock, Rockland Hammock Section 2	482	0.09	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	4.44
	54	Lower Keys	Geiger Key	Boca Chica Ocean Shores / Caribbean Park / Geiger Mobile Homes	10151	1.92	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.43
	28-A	Lower Keys	Big Pine	Key Deer Blvd / Port Pine Heights / Kyle-Dyer	14451	2.74	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.42
	35	Lower Keys	Big Pine	Sands / Big Pine Cove / Virgil'S Lowe	27902	5.28	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.42
	19	Upper Keys	Key Largo	Bay Haven Section 3	972	0.18	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.41
	14-A	Upper Keys	Key Largo	Key Largo Beach / Key Largo Ocean Shores / Harbor Shores / Thompson	7210	1.37	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	4.33
	31	Lower Keys	Big Pine	Tropical Bay, Tropical Bay 2nd Addition, Tropical Bay 3rd Addition	10934	2.07	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	4.28
	78	Lower Keys	Ramrod Key	Silver Shores Estates / Ramrod Shores 1st Addition / Ramrod Shores	12645	2.39	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	4.05
	76	Lower Keys	Little Torch Key		1425	0.27	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00			
	3-A	Upper Keys	Key Largo	Sexton Cove Estates	1318	0.25	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	13	Upper Keys	Key Largo	Buttonwood Shores	182	0.03	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	43-A	Lower Keys	Summerland	Summerland Beach 1st Addition / Summerland Beach 4Th Addition / Summerland Beach 6Th Addition	626	0.12	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	64	Upper Keys	Key Largo	South Creek Village	1925	0.36	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	< -1.0ft Below SL	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	17-A	Upper Keys	Key Largo	Bay Harbor Amended / Sunset Point	516	0.10	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	27-A	Middle Keys	Duck		1650	0.31	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	< -1.0ft Below SL	0.00
	21	Upper Keys	Key Largo	Dove Creek Estates	2101	0.40	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00
	41	Lower Keys	Summerland	Dobies	207	0.04	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00
	72	Lower Keys	Big Pine	Pine Heights / Pine Ridge	8295	1.57	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00
	33	Lower Keys	Big Pine	Watson Blvd / Key Deer Blvd / Wilder Rd	18638	3.53	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00
	73	Lower Keys	Big Pine	Kinercha	2670	0.51	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft	0.00
	63	Upper Keys	Key Largo	Oceana / Anglers Park	2735	0.52	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	< -1.0ft Below SL	0.00

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MONROE COUNTY ROADWAY VULNERABILITY STUDY FINAL REPORT

Adaptation Year	Project Area No.	Area	Key	Subdivision	Total Length (Feet)	Total Length (Miles)	SLR 2025	SLR2030	SLR 2035	KT 2025	KT 2030	KT 2035
2030 (10 Areas)	16	Upper Keys	Key Largo	Mandalay	1101	0.21	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	17-B	Upper Keys	Key Largo	Bay Harbor Amended / Sunset Point	1929	0.37	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	32	Lower Keys	Big Pine	Whispering Pines / Palm Villa	2088	0.40	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	3-B	Upper Keys	Key Largo	Sexton Cove Estates	5427	1.03	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	14-B	Upper Keys	Key Largo	Key Largo Beach / Key Largo Ocean Shores / Harbor Shores / Thompson	21459	4.06	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	23	Upper Keys	Key Largo	Bluewater Trailer Village Section 2 / Bluewater Trailer Village Section 4 / Harris Ocean Park Estates / Harris Ocean Park Estates 1st Addition / Palma Sola / Ocean Park Village	6648	1.26	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	36-B	Lower Keys	Little Torch	Coral Shores Estates Mobile Homes Sections 1 and 2 / State Road 4A / Ladies Acre Amended and 1st Addition / Mates Beach and Plats 2,3,4 and 6 / Winward Beach Estates	15145	2.87	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	52-B	Lower Keys	Big Coppitt Key	Gulfrest Park / Gulfrest Park No. 2 / Coppitt Extension / Coppitt Resub / Johnshonville / Similar Sound Section A	4344	0.82	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	50	Lower Keys	Saddle Bunch	Saddlebunch Shores	2000	0.38	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
	55	Lower Keys	East Rockland	Rockland Village	1920	0.36	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft	-0.5ft to -1.0ft
2035 (10 Areas)	24-B	Upper Keys	Key Largo	Tavernier Ocean Shores	1609	0.30	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	45-B	Lower Keys	Cudjoe	Cutthroat Harbor Estates / Cutthroat Harbor Estates 1st Addition / Cudjoe Ocean Shores	5929	1.12	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	49-B	Lower Keys	Lower Sugarloaf	Sugarloaf Shores Sections A, B, C, D / Sugarloaf Shores Sections D Extended / Sugarloaf Shores Section F Revised / Sugarloaf Shores Replat 1 & 2 / Orchid Park	31857	6.03	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	80	Lower Keys	Cudjoe Key	Cudjoe Ocean Shores Amd Sec 2A, Cutthroat Harbor Estates	4775	0.90	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	40	Lower Keys	Summerland	Summerland Yacht Harbor / Snug Harbor	3766	0.71	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	29-B	Lower Keys	Big Pine	Eden Pines Colony / Eden Pines Colony 1st Addition / Eden Pines Colony 3rd Addition	9981	1.89	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	28-B	Lower Keys	Big Pine	Key Deer Blvd / Port Pine Heights / Kyle-Dyer	15682	2.97	+0.5ft to 1.0ft	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	66	Upper Keys	Key Largo	Buttonwood Shores	355	0.07	+0.5ft to 1.0ft	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	22	Upper Keys	Key Largo	Hammer Point Park	5699	1.08	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft
	75	Lower Keys	No Name Key	Dolphin Estates / Dolphin Harbor Amended	8665	1.64	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to -1.0ft

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MONROE COUNTY ROADWAY VULNERABILITY STUDY FINAL REPORT

Adaptation Year	Project Area No.	Area	Key	Subdivision	Total Length (Feet)	Total Length (Miles)	SLR 2025	SLR2030	SLR 2035	KT 2025	KT 2030	KT 2035
BEYOND 2035 (28 Areas)	79	Lower Keys	Summerland Key	Summerland Beach Addition No 2	1695	0.32	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	25	Upper Keys	Key Largo	Tavernier Cove	180	0.03	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	34	Lower Keys	Big Pine	Tropical Key Colony / Pine Channel Estates Section 2 / Linda Loma / Linda Loma 1st Addition/ Cahill Pines & Palms	19143	3.63	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	7	Upper Keys	Key Largo	Largo Sound Village	3789	0.72	+0.5ft to 1.0ft	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	71	Lower Keys	Big Pine	Big Pine Shores / Koehns	10146	1.92	+0.5ft to 1.0ft	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	27-B	Middle Keys	Duck		29862	5.66	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	42-B	Lower Keys	Summerland	Summerland Key Cove Amended / Summerland Key Cove 1St And 3Rd Additions / Summerland Estates Resubdivision No. 2	7998	1.51	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	44	Lower Keys	Summerland	Summerland Beach 7Th Addition	358	0.07	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	46	Lower Keys	Cudjoe	Cudjoe Gardens / Cudjoe Gardens 8Th Addition	4890	0.93	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	47	Lower Keys	Upper Sugarloaf	Indian Mound Estates / Crane Blvd	6689	1.27	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	57	Lower Keys	Key Haven/Racoon Key	Key Haven / Key Haven Estates / Key Haven Amended / Key Haven 1St – 10Th Additions / Key Haven 5Th Addition Replat	21594	4.09	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	61	Upper Keys	Key Largo	Gulfstream Shores / Knowlson Colony / Knowlson Colony 1st Addition	4970	0.94	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	81	Lower Keys	Cudjoe Key		10200	1.93	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	1	Upper Keys		Card Sound Road	3880	0.73	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	43-B	Lower Keys	Summerland	Summerland Beach 1St Addition / Summerland Beach 4Th Addition / Summerland Beach 6Th Addition	1249	0.24	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	51-B	Lower Keys	Saddle Bunch	Bay Point Trailer Park / Bay Point Trailer Park 1St Addition / Bay Point 1St Addition / Bay Point Amended Plat	8692	1.65	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	53	Lower Keys	Big Coppitt Key	Porpoise Pointsection 2 / Boca Chica Rd	5855	1.11	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	60	Lower Keys	Key West	Atlantic Boulevard	1367	0.26	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	67	Upper Keys	Key Largo	Rock Harbor Estates	1090	0.21	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	68	Upper Keys	Key Largo	Tavernier Harbor Tavernier Park	730	0.14	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	69	Upper Keys	Key Largo	Tavernier / Camp Pleasant	875	0.17	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	74	Lower Keys	Big Pine	Big Pine Key Inc / Piney Point	9103	1.72	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	77	Lower Keys	Middle Torch Key	Dorns / Middle Torch Key Estate Amended	36935	7.00	> +1.0ft Above SL	> +1.0ft Above SL	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	20	Upper Keys	Key Largo	Seaside	970	0.18	> +1.0ft Above SL	> +1.0ft Above SL	> +1.0ft Above SL	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	62	Upper Keys	Key Largo	Key Largo City Garden Cove Plat 1 / Ocean Isle Estates	3165	0.60	> +1.0ft Above SL	> +1.0ft Above SL	> +1.0ft Above SL	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	65	Upper Keys	Key Largo	Hibiscus Park	700	0.13	> +1.0ft Above SL	> +1.0ft Above SL	> +1.0ft Above SL	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	70	Upper Keys	Key Largo	Sunny Haven / Tavernier Beach Amended / Largo Beach	3275	0.62	> +1.0ft Above SL	> +1.0ft Above SL	> +1.0ft Above SL	-0.5ft to 0.5ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft
	82	Lower Keys	Lower Sugarloaf		15010	2.84	> +1.0ft Above SL	+0.5ft to 1.0ft	+0.5ft to 1.0ft	+0.5ft to 1.0ft	-0.5ft to 0.5ft	-0.5ft to 0.5ft

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Results and Recommendations

The adaptation plan is capturing when would the project areas be impacted by the King Tide water levels in the time frame between 2025 to 2045. The list provides the engineering results based on the existing and projected data value sets; however, the County should have the flexibility to not specifically abide to the Adaptation Plan List ranking and be able to consider other influencing factors that were not captured by the engineering assessment such as funding opportunities and current roadway flooding impacts (documented historical flooding events). There are multiple project areas that have a high Average Criticality Score with a minor difference in the scoring between them. Ultimately the size of the project area does influence the final value of the Average Criticality Scoring, nonetheless, all the project areas identified are anticipated to be vulnerable to the projected SLR conditions.

Policy and Regulatory Requirements

Public and Stakeholder Involvement

Project Website

At the beginning of the project, a project website was created and published, KeysRoadsPlan.com is home to project information and has been updated throughout the life of the project. The website contains general information such as project description, information about the project team, flooding pictures submitted by Monroe County residents, and information about the public workshops held.

The website also gives public access to project maps that can be used by County residents and stakeholders, the maps include:

- Map of Existing Monroe County Roads Elevations
- Project Areas
- Criticality Evaluation Viewer

As of July of 2022, the conceptual plans for each one of the 83 projects have also been made available to the public on the project website.

Board of County Commissioners (BOCC) Presentations

During course of the study, the County staff and project teams presented to the Monroe County BOCC on several occasions, to give project updates, as well as explain methodologies used as the study progressed. The presentations and the topics covered:

- BOCC Briefing, November 18, 2020
 - Background on County's Resiliency and Climate Program
 - Introduction to SLR Roads Vulnerability Project
 - Project approach and status
 - Vulnerability and Criticality approach
 - Engineering concept design evaluation
 - Roads Program and Resiliency Policy Relations
- BOCC Special Meeting, June 21, 2021

- Monroe County Roadway Vulnerability Analysis and Capital Plan Update
 - Vulnerability and Criticality assessment
 - Defining the Project Areas
 - Roadway Conceptual Design
 - Project Examples
 - Next Steps
- BOCC Meeting, October 20, 2021
 - Monroe County Roadway Vulnerability Analysis and Capital Plan Update
 - Design Criteria and Sea Level Rise Projections used for the Analysis
 - Vulnerability and Criticality Assessment: Most Critical Locations
 - Defining Project Areas
 - Typical Design Approach
 - Project Examples: Conch Key
 - Adaptation Plan
- BOCC Meeting, June 15, 2022
 - Monroe County Roadway Vulnerability Analysis and Capital Plan Update
 - Concept Design
 - Neighborhood Areas
 - Adaptation Plan and Program Cost
 - Project Website
 - Policy and Implementation

Public Workshops

In addition to the project updates presented at the BOCC meetings, there were two Virtual Public Meetings held in February of 2022. The purpose of these meetings was to present the Study findings and recommendations and allow the public to ask openly ask questions in a forum specifically dedicated to them.

The Public Workshops were held on Tuesday February 17, 2022, and Wednesday February 23, 2022. The topics covered in the meeting were as follows:

- Climate Change and Seal Level Rise projections
 - County Resiliency Initiatives
 - SLR related planning efforts
 - Monroe County vulnerability
 - Monroe County proactive planning approach
- Project Scope overview
- Recommendations
- Adaptation Plan
- Policy and Implementation
- Open Public Discussion

APPENDIX A

**Technical Memorandum Monroe County Mobile LiDAR Vertical
Accuracy Assessment – Road Elevation Data and Finished Floor
Elevations (FFE)**

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APPENDIX B

**Technical Memorandum GIS Database Setup and Initial Elevation
Analysis**

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APPENDIX C

Technical Memorandum Roadway Assessment and Condition Survey

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APPENDIX D

Technical Memorandum Roadway and Stormdrain Data Collection

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APPENDIX E

**Technical Memorandum Environmental Desktop Review (Ecological
Permitting Constraints)**

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APPENDIX F

**Technical Memorandum Sea Level Rise Projections for Monroe
County**

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APPENDIX G

Technical Memorandum King Tides and Wind Setup

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APPENDIX H

**Technical Memorandum Storm Surge, Wind Waves, and Extreme
Events Analysis**

DRAFT



APPENDIX I

Technical Memorandum Wave Numerical Modeling

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APPENDIX J

**Technical Memorandum Vulnerability Assessment and Inundation
Mapping**

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APPENDIX K

**Technical Memorandum Prioritization of Roadway Segments Based
on Vulnerability Assessment**

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APPENDIX L

Technical Memorandum Concept Design (Includes Environmental & Permitting)

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