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ACRONYMS AND ABBREVIATIONS

BCR	benefit-to-cost ratio
C&SF	Central and Southern Florida
EQ	Environmental Quality
FWOP	Future Without Project
Int	Intermediate
NED	National Economic Development
OSE	Other Social Effects
RED	Regional Economic Development
SLR	sea level rise
USACE	U.S. Army Corps of Engineers
Zone AE	Special flood hazard area subject to flooding by the 1 percent annual change flood (100 year flood)
Zone AH	Special flood hazard area subject to shallow flooding or ponding by the 1 percent annual change flood (100 year flood)
Zone AO	Special flood hazard area subject to shallow flooding by the 1 percent annual change flood (100 year flood)

D.1 Introduction

This appendix provides a series of Tables of Effects (**Section D.2**) reflecting the performance of alternatives against federal objectives; guiding principles; the four accounts (National Economic Development [NED], Regional Economic Development [RED], Environmental Quality [EQ], and Other Social Effects [OSE]); the four formulation and evaluation criteria; and the study objectives. The federal objectives and guiding principles emphasize sustainable economic development, avoiding unwise use of floodplains, and protecting and restoring natural systems, including ecosystems. Additional guiding principles include public safety, social effects, and a watershed approach. Connections between these federal objectives and guiding principles link to study-specific planning objectives and relevant metrics. According to the U.S. Army Corps of Engineers' (USACE) January 5, 2021 Policy Directive, *Comprehensive Documentation of Benefits in Decision Documents*, a satisfactory array of metrics should be represented under all four accounts. Relationships among metrics become clearer through plan formulation iterations as the team advances toward the Recommended Plan. The USACE Comprehensive Benefit Evaluation Scoping (C-Best) Tool[1] was referenced to select benefits and their respective categories.

Also included in this appendix are the following technical memorandums, with referenced sections:

- **Sections D.3** and **D.4, National Economic Development Benefits Technical Memorandum, Nominal Results and Real Results**, respectively: Documents analysis to generate total benefits, net benefits, and benefit-to-cost ratio (BCR) using the NED economic analysis tool, based on total avoided equivalent annual damages and transportation travel time and operations savings. The Flood Damage Reduction Analysis (HEC-FDA) software modeling results, which generate the total avoided equivalent annual damages, are provided in **Annex D-1**.
- **Section D.5, National Economic Development Benefits Transportation Benefits Modeling Technical Memorandum, Part A**: Details analysis performed using the Southeast Florida Regional Planning Model to evaluate travel time savings across the final alternatives.
- **Section D.6, National Economic Development Benefits Transportation Benefits Modeling Technical Memorandum, Part B**: Documents analysis using time travel savings from the Southeast Florida Regional Planning Model results, reported in Section D.5, to assess travel time and operations costs savings.
- **Section D.7, Regional Economic Development Benefits Business Interruption Technical Memorandum**: Describes analysis generating Business Interruption and Direct Output Loss for the final alternatives via the HAZUS standardized risk assessment tool.
- **Section D.8, Regional Economic Development Benefits Temporary Displacement Technical Memorandum**: Details calculation of total temporary displacement for the final alternatives through the temporary displacement analysis tool.
- **Section D.9, Regional Economic Development Benefits IMPLAN Technical Memorandum**: Documents regional economic impact analysis related to temporary displacement days, cost savings, and benefits from construction and operations of the final alternatives using IMPLAN modeling.

[1] C-Best Tool: https://planning.erdc.dren.mil/toolbox/library/Misc/CompBenefitEvalScopingToolUserGuide_Oct2023.pdf

- **Section D.10, Environmental Quality and Other Social Effects Benefits Technical Memorandum**: Details analysis calculating flood values for septic tanks and cultural resource sites/buildings for the final alternatives using respective tools.
- **Section D.11, Life Safety Assessment Technical Memorandum**: Detailed qualitative assessment evaluating life safety risk.

D.2 Tables of Effects

Table D.2-1 through

Table D.2-7 provide a summary of the benefits results analyses for the NED, RED, EQ, and OSE accounts.

Table D.2-1. National Economic Development Benefits Results.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**															
Federal Objectives & Policy Requirements of the Region	**Maximize Sustainable Economic Development**															
Guiding Principles	**Sustainable Economic Development**															
P&G Accounts	**NED**															
Formulation & Evaluation Criteria	**Effectiveness**								**Efficiency**							
Metrics	**Total Avoided Equivalent Annual Damages, January 2025, Millions**			**Travel Time/Operations Savings NPV, Millions**	**Total Nominal Benefits (Real Benefits), Millions**				**Net Nominal Benefits (Net Real Benefits), Millions**				**Nominal BCR (Real BCR)**			
				2 year coastal, 25 year rainfall (0.033)												
Alternatives	**Low SLR**	**Int SLR**	**High SLR**	**Int SLR**	**Low SLR**	**Int SLR**	**Int SLR + Transportation Benefits**	**High SLR**	**Low SLR**	**Int SLR**	**Int SLR + Transportation Benefits**	**High SLR**	**Low SLR**	**Int SLR**	**Int SLR + Transportation Benefits**	**High SLR**
No Action Alternative (FWOP)	--	--	--	--	--	--		--	--	--		--	--	--		--
Alternative A	$33.6	$34.8	$66.7	$121.1	$1,815 ($879)	$1,847 ($892)	$2,195 ($1,046)	$2,611 ($1,184)	$447 (-$273)	$479 (-$261)	$827 (-$106)	$1,243 ($31)	1.33 (0.76)	1.35 (0.77)	1.60 (0.91)	1.91 (1.03)
Alternative B	$34.8	$37.1	$74.7	$111.0	$1,855 ($897)	$1,912 ($918)	$2,221 ($1,061)	$2,815 ($1,264)	-$421 (-$1,011)	-$364 (-$989)	-$54 (-$847)	$539 (-$644)	0.82 (0.47)	0.84 (0.48)	0.98 (0.56)	1.24 (0.66)
Alternative C	$36.5	$38.5	$78.4	$108.1	$1,965 ($951)	$2,014 ($970)	$2,314 ($1,109)	$2,973 ($1,337)	-$2,033 (-2,386)	-$1,984 (-$2,637)	-$1,684 (-$2,228)	-$1,025 (-$2,001)	0.49 (0.28)	0.50 (0.29)	0.58 (0.33)	0.74 (0.40)
Alternative RO (Recommended Plan)	$35.2	$31.8	$66.5	$248.8	$1,912 ($929)	$1,840 ($901)	$2,630 ($1,238)	$2,675 ($1,221)	$1,912)-$1,327)	$1,840 (-$1,354)	$2,630 (-$1,017)	$2,675 (-$1,035)	0.73 (0.41)	0.71 (0.40)	1.01 (0.55)	1.03 (0.54)

Notes: Dollar amounts are in millions, 2025 dollars. Nominal: values escalated to account for inflation; Real: values at the current price level.
NPV = net present value; NED = National Economic Development; BCR = benefit-to-cost ratio; Int = intermediate; SLR = sea level rise; FWOP = Future Without Project;; RO = Resilience Optimized

Table D.2-2. Regional Economic Development Benefits Results: Business Interruption and Temporary Displacement.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**
Federal Objectives & Policy Requirements of the Region	**Maximize Sustainable Economic Development**
Guiding Principles	**Sustainable Economic Development**
P&G Accounts	**RED**
Formulation & Evaluation Criteria	**Effectiveness**

Metrics	Business Interruption Annualized Direct Output Loss, 2025		Business Interruption Regional Economic Impacts Savings, High Sea Level Rise				Temporary Displacement, Annualized Value of Total Displacement Days						Temporary Displacement Regional Economic Impacts, Indirect and Induced Savings (Direct and Secondary Benefits)							
							2 year coastal, 25 year rainfall (0.033)		2 year coastal, 100 year rainfall (0.009)		100 year coastal, 100 year rainfall (0.002)		Total Job Losses (Full-time Equivalent)		Total Labor Income		Total Value Added		Total Output	
Alternatives	**Int SLR**	**High SLR**	**Total Jobs (Full-time Equivalent)**	**Total Labor Income**	**Total Value Added**	**Total Output**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**
No Action Alternative (FWOP)	$2.5	$5.7	--	--	--	--	$6.1	$8.4	$4.9	$6.6	$1.3	$2.4	--	--	--	--	--	--	--	--
Alternative A	$2.3	$3.5	40	$2.6	$3.0	$4.3	$5.3	$6.2	$4.2	$5.1	$1.2	$1.8	12	32	$0.7	$2.2	$1.5	$4.5	$2.1	$6.4
Alternative B	$2.1	$2.9	51	$3.3	$3.8	$5.4	$5.2	$5.9	$4.2	$4.8	$1.1	$1.7	13	38	$0.9	$2.5	$1.8	$5.2	$2.6	$7.5
Alternative C	$2.0	$3.0	51	$3.2	$3.8	$5.4	$5.1	$5.6	$4.0	$4.6	$1.1	$1.6	15	41	$1.0	$2.8	$2.1	$5.8	$3.0	$8.3
Alternative RO (Recommended Plan)	$2.2	$3.9	32	$2.1	$2.4	$3.3	$5.3	$6.1	$4.2	$5.1	$1.2	$1.9	32	40	$0.8	$2.2	$1.6	$4.5	$2.3	$6.5

Notes: Dollar amounts are in millions, 2025 dollars. RED = Regional Economic Development; Int = intermediate; SLR = sea level rise; FWOP = Future Without Project; RO = Resilience Optimized

Table D.2-3. Regional Economic Development Benefits Results: Construction and Operation Benefits.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**
Federal Objectives & Policy Requirements of the Region	**Maximize Sustainable Economic Development**
Guiding Principles	**Sustainable Economic Development**
P&G Accounts	**RED**
Formulation & Evaluation Criteria	**Effectiveness**

	Construction				Operations			
Metrics	**Total Jobs (Full-time Equivalent)**	**Total Labor Income**	**Total Value Added**	**Total Output**	**Direct Jobs (Full-time Equivalent)**	**Total Labor Income**	**Total Value Added**	**Total Output**
No Action Alternative (FWOP)	--	--	--	--	--	--	--	--
Alternative A	739	$50.7	$84.6	$143.3	14	$0.9	$1.7	$3.1
Alternative B	1,234	$84.7	$141.2	$239.0	26	$1.8	$3.1	$5.8
Alternative C	2,051	$140.7	$234.8	$397.5	54	$3.7	$6.5	$12.2
Alternative RO (Recommended Plan)	1,227	$93.4	$155.8	$263.8	11	$0.8	$1.4	$2.6

Table D.2-4. Regional Economic Development Benefits Results: National Flood Insurance Program Premium Cost Reductions.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**
Federal Objectives & Policy Requirements of the Region	**Maximize Sustainable Economic Development**
Guiding Principles	**Sustainable Economic Development**
P&G Accounts	**RED**
Formulation & Evaluation Criteria	**Effectiveness**

	2 Year Surge, 100 Year Rainfall Event (0.91% Probability)			
Metrics	**Number of Structures with Flood Values above FFE Zones AE, AO, AH**		**Estimated NFIP Premium Cost Reductions a/ Zones AE, AH, AO**	
Alternative	**Intermediate SLR**	**High SLR**	**Intermediate SLR**	**Hight SLR**
No Action Alternative (FWOP)	1,727	2,713	$0	$0
Alternative A	1,494	1,971	$48	$154
Alternative B	1,448	1,827	$58	$184
Alternative C	1,387	1,737	$70	$203
Alternative RO (Recommended Plan)	1,500	2,011	$47	$146

Notes for Tables D.2-3 and D.2-4: Dollar amounts are in millions, 2025 dollars. RED = Regional Economic Development; FWOP = Future Without Project; SLR = sea level rise; RO = Resilience Optimized

Table D.2-5. Environmental Quality Benefits Results: Septic Tank Flood Values.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**
Federal Objectives & Policy Requirements of the Region	**Protect and Restore the Functions of Natural Ecosystems**
Guiding Principles	**Healthy & Resilient Ecosystems**
P&G Accounts	**EQ**
Formulation & Evaluation Criteria	**Effectiveness**

Metrics	Threatened & Endangered Species Risk	Number of Septic Tanks with Flood Values (Int/High SLR)						Reduction in Risk to Sanitary Sewer Overflow Occurrences					
		2 year coastal, 25 year rainfall (0.033)		2 year coastal, 100 year rainfall (0.009)		100 year coastal, 100 year rainfall (0.002)		2 year coastal, 25 year rainfall (0.033)		2 year coastal, 100 year rainfall (0.009)		100 year coastal, 100 year rainfall (0.002)	
Alternatives		**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**
No Action Alternative (FWOP)	No Direct Effects	7,854	8,071	9,312	9,550	9,368	9,713	--	--	--	--	--	--
Alternative A	No Direct Effects	7,769	7,860	9,153	9,323	9,200	9,442	2%	2%	2%	3%	2%	5%
Alternative B	No Direct Effects	7,762	7,835	9,143	9,289	9,160	9,421	2%	2%	2%	3%	2%	5%
Alternative C	No Direct Effects	7,732	7,798	9,096	9,234	9,112	9,350	2%	2%	2%	4%	2%	6%
Alternative RO (Recommended Plan)	No Direct Effects	7,761	7,856	9,152	9,282	9,232	9,449	2%	2%	2%	3%	2%	5%

Notes: EQ = Environmental Quality; Int = intermediate; SLR = sea level rise; RO = Resilience Optimized

Table D.2-6. Environmental Quality Benefits Results: Septic Tank Flood Values.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**
Federal Objectives & Policy Requirements of the Region	**Protect and Restore the Functions of Natural Ecosystems**
Guiding Principles	**Sustainable Development**
P&G Accounts	**EQ**
Formulation & Evaluation Criteria	**Effectiveness**

Metrics	Avoided Capital Improvement Costs
Alternatives	**Costs avoided over the 50-year period of analysis (2035-2085)**
No Action Alternative (FWOP)	$0
Alternative A	$150
Alternative B	$200
Alternative C	$200
Alternative RO (Recommended Plan)	$200

Notes: Dollar amounts are in millions, 2025 dollars. EQ = Environmental Quality; RO = Resilience Optimized

Table D.2-7. Environmental Quality, Other Social Effects, and Watershed Approach Benefits Results.

Planning Objective	**Enhance C&SF Project water control structures' functionality and capacity to reduce flood damages and improve resiliency caused by inundation and changed conditions within the Study Area over the 50-year period of analysis of 2035–2085.**												
Federal Objectives & Policy Requirements of the Region	**Maximize Sustainable Economic Development**						**Protect and Restore the Functions of Natural Ecosystems**						
Guiding Principles	**Public Safety**						**Healthy and Resilient Ecosystems**						**Watershed Approach**
P&G Accounts	**OSE**						**OSE**						**OSE**
Formulation & Evaluation Criteria	**Completeness**						**Effectiveness**						**Acceptability**
	Critical Infrastructure (Number of Flooded Structures, Int/High SLR)						**Cultural Resources Sites with Flood Values (Int/High SLR)**						
	2 year coastal, 25 year rainfall (0.033)		**2 year coastal, 100 year rainfall (0.009)**		**100 year coastal, 100 year rainfall (0.002)**		**2 year coastal, 25 year rainfall (0.033)**		**2 year coastal, 100 year rainfall (0.009)**		**100 year coastal, 100 year rainfall (0.002)**		
Metrics	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Int SLR**	**High SLR**	**Maintains integrity across sub basins**
No Action Alternative	4	5	10	15	12	26	104	106	116	119	116	121	Diminished conditions in upstream watersheds.
Alternative A	4	4	8	13	11	19	105	106	116	118	116	118	Least engineering complexity to reduce flooding in upstream watersheds; minimal tradeoffs in downstream watersheds.
Alternative B	4	4	8	13	10	18	104	106	116	117	117	119	Moderate engineering complexity to reduce flooding in upstream watersheds; moderate tradeoffs in upstream and downstream watersheds.
Alternative C	4	4	8	13	9	16	102	103	113	115	113	117	Greatest engineering complexity to reduce flooding in upstream watersheds with enhanced drawdown potential; highest potential tradeoffs in upstream and downstream watersheds.
Alternative RO (Recommended Plan)	4	4	9	14	11	21	105	105	115	116	116	117	Moderate engineering complexity to reduce flooding in upstream watersheds; moderate tradeoffs in upstream and downstream watersheds.

Notes: OSE = Other Social Effects; Int = intermediate; SLR = sea level rise; RO = Resilience Optimized

D.3 National Economic Development Benefits Technical Memorandum, Nominal Results

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 9, 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins NED Analysis

1 Purpose:

This memo outlines the national economic development (NED) analysis, carried out as part of the South Florida Water Management District's (SFWMD) Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (203 Study). The analysis was carried out in compliance with applicable U.S. federal guidelines. These include the 1983 Principles and Guidelines (P&G) (42 U.S.C. 1962a-2), designed to guide the formulation and evaluation of major Federal water resources development agencies, including the U.S. Army Corps of Engineers (USACE) in accordance with section 103 of the Water Resources Planning Act; and the 2013 Principles, Requirements, and Guidelines (PR&G). All supporting guidance was also followed, including the Principles and Requirements for Federal Investments in Water Resources issued by the Council on Environmental Quality and approved by the Water Resources Council, the Interagency Guidelines for implementing the Principles and Requirements, and the Corps of Engineers Agency Specific Procedures to Implement the Principles, Requirements, and Guidelines.

This Section 203 Study focuses on enhancing the resiliency of the water control structures and adjacent primary canals in Broward Basins Reach A, a reach of the ongoing USACE C&SF Section 216 Study. Broward Basins Reach A is referred to herein as the Section 203 Study Area (or Study Area).

2 Summary of Results:

The final array of alternatives that were included in the economic analysis include three alternatives (denoted as A, B, and C), as well as an enhanced version of Alternative C that includes nonstructural measures for residual flood risk management. The three alternatives include increasingly complex infrastructure investments, including primary structure modifications, primary C&SF Project canal improvements, and storage and nature-based projects, and therefore each show increasing costs. Alternative A includes the least number of features and a lower cost, Alternative B adds complexity and project features, and Alternative C includes the most projects and is therefore expected to be most expensive. The enhanced version of Alternative C builds on Alternative C to evaluate whether additional risk management measures, including nonstructural features, could enhance overall benefits and provide a cost-effective flood risk management approach. Project alternatives allow for an assessment of which drainage areas are improved most by the additional cost and complexity. Results for the three alternatives and the enhanced version of Alternative C are summarized below in **Table 1**.

The best projects for each drainage area are carried forward into the Recommended Plan (RP) though the development of a fourth alternative – Alternative Resilience Optimization (RO). Economic analysis of the RP / Alternative RO is also added to this memo, as summarized in **Table 1**.

Sensitivity analysis was carried out on the RP / Alternative RO by applying updated joint probabilities for future rainfall conditions developed by the University of Central Florida. These results are summarized in **Table 1** and explained in more detail at the end of this memo.

Total costs and benefits of the project alternatives were evaluated in current dollars on a net present value basis, accounting for the expected impacts of inflation. Costs were estimated to include both design and capital construction costs over an 8-year period from 2027 to 2034, and operations and maintenance (O&M) and repair, replacement and rehabilitation (RR&R) costs over the 50-year evaluation period starting in 2035. Flood damage reduction estimates for structures, roadways, and vehicles in the Study Area are included as project benefits, based on HEC-FDA modeling results. Uncertainty around future flooding scenarios is represented in the HEC-FDA results through a low, intermediate, and high sea level rise scenario for the 2085 future condition. Transportation benefits are also included in the analysis for the intermediate sea level rise scenario only. In alignment with the nominal federal discount rate, all costs and benefits are entered into the model in 2025 dollars and adjusted for expected price escalation over time. BCA results are evaluated in net present value terms for a base year 2035, the estimated first year of project operation. This analysis conforms to the methodologies set forth in the USACE Principles and Guidelines and other federal guidelines regarding benefit cost analysis. Individual assumptions and approaches are discussed in more detail in the sections that follow.

Analysis results for Alternative A, Alternative B, Alternative C, and Alternative C enhanced are summarized in **Table 1**. Alternative A is found to have a benefit to cost ratio over 1, indicating cost effectiveness, under all sea level rise scenarios. Alternative B is only cost effective under the intermediate and high sea level rise scenarios. Alternative C and Alternative C enhanced are not cost effective under any of the sea level rise scenarios. The RP / Alternative RO is estimated to be cost effective under the high sea level rise scenario and the intermediate sea level rise scenario, when transportation benefits are included.

Table 1. Summary of NED Analysis for Final Array of Alternatives--Net Present Value Results (net present value, in millions)

		Sea Level Rise Scenario			
Alternative	**Benefit-Cost Calculation**	**Low SLR**	**Intermediate SLR**	**Intermediate SLR (including Transportation Benefits[a/])**	**High SLR**
Alternative A	Total Benefits	$1,815	$1,847	$2,195	$2,611
	Total Costs	$1,368	$1,368	$1,368	$1,368
	BCR	1.33	1.35	1.60	1.91
	Net Benefits	$447	$479	$827	$1,243
Alternative B	Total Benefits	$1,855	$1,912	$2,221	$2,815
	Total Costs	$2,276	$2,276	$2,276	$2,276
	BCR	0.82	0.84	0.98	1.24
	Net Benefits	-$421	-$364	-$54	$539
Alternative C	Total Benefits	$1,965	$2,014	$2,314	$2,973
	Total Costs	$3,998	$3,998	$3,998	$3,998
	BCR	0.49	0.50	0.58	0.74
	Net Benefits	-$2,033	-$1,984	-$1,684	-$1,025
Alternative C, Enhanced	Total Benefits	$2,770	$2,827	$3,127	$3,928
	Total Costs	$3,998	$3,998	$3,998	$3,998
	BCR	0.69	0.71	0.78	0.98
	Net Benefits	-$1,228	-$1,171	-$871	-$70
RP / Alternative RO	Total Benefits	$1,912	$1,840	$2,630	$2,675
	Total Costs	$2,606	$2,606	$2,606	$2,606
	BCR	0.73	0.71	1.01	1.03
	Net Benefits	-$693	-$765	$25	$69
Sensitivity Analysis—Joint Probabilities for Future Rainfall Conditions					
RP / Alternative RO Sensitivity	Total Benefits	$4,398	$3,269	$4,059	$4,173
	Total Costs	$2,606	$2,606	$2,606	$2,606
	BCR	1.69	1.25	1.56	1.60
	Net Benefits	$1,793	$663	$1,454	$1,567

a/ Transportation benefits included in the Tentatively Selected Plan (TSP) Sensitivity Analysis are from the TSP Alternative and were not modeled for the updated joint probabilities for future rainfall conditions.

Notes: SLR = sea level rise; BCR = benefit-to-cost ratio; RO = Resilience Optimized

3 Economic Analysis

This analysis evaluates the costs and benefits of the alternative plans, Alternative A, Alternative B, and Alternative C, and enhanced Alternative C, for resiliency improvements to the existing infrastructure of the C&SF Project. These are defined as the final array of project alternatives, in addition to the RP/Alternative RO. The project timeline includes an 8-year design and construction period from 2027 to 2034 and a 50-year period of analysis from the beginning of 2035 to the beginning of 2085. In keeping with the nominal federal discount rate, costs and benefits are all considered in current or nominal dollars and escalated as appropriate. The net present value of the stream of future costs and benefits is calculated using a 3.25% discount rate, the federal discount rate for use by federal agencies in the formulation and evaluation of plans for water and related land resources for the 2026 fiscal year (October 1, 2025, through September 30, 2026), as required by the Water Resources Planning Act of 1965 and the Water Resources Development Act of 1974 and announced in the USACE Guidance Memorandum 26-01 (USACE 2025).

3.1 Final Array of Alternatives

The final array of alternatives includes Alternative A, Alternative B, and Alternative C, as well as an enhanced version of Alternative C. Alternatives A, B, and C increase in complexity and number of projects included. Alternative C adds additional risk management measures, including nonstructural features, assuming elevation and dry floodproofing are implemented for residential and non-residential buildings. Assumptions around the costs and benefits used to evaluate the final array of alternatives are described in the following sections. The RP/Alternative RO, based on the best projects for each drainage area, was also analyzed, with results presented along with the final array of alternatives.

3.1.1 Costs

3.1.1.1 Capital Costs

Project capital costs are based on rough order of magnitude (ROM) construction cost estimates completed for each of the project alternatives by water resource engineers on the J-Tech team. These costs are summarized below in **Table 2**. Capital costs are estimated to take place over an 8-year period from 2027 to 2034, with construction costs assumed to be spread evenly over the 6-year period from 2029 to 2034. The alternatives range in cost from less infrastructure-intensive to more infrastructure-intensive. Construction costs are escalated according to the USACE Civil Works Construction Cost Index System (CWCCIS; USACE 2024). Although the three construction elements most closely related to the C&SF Flood Resiliency Project include channels and canals; levees and floodwalls; and floodway control and diversion structures, the composite CWCCIS index is used to estimate construction cost increases over time. The index uses an increase of 2.6 percent for all future years.

Table 2. Construction Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
Flood Risk Management Improvements to Coastal Structures and Non-coastal Structure S37B:					
G56 Improvements	$9,600	$77,100	$288,200	$288,200	$78,300
G57 Improvements	$45,700	$67,300	$141,600	$141,600	$133,400
S37B Improvements	$0	$42,300	$0	$0	$46,000
S37A Improvements	$292,500	$298,500	$292,500	$292,500	$190,800
S36 Improvements	$28,700	$153,000	$177,000	$177,000	$149,700
S33 Improvements	$151,900	$163,000	$198,100	$198,100	$161,000
G54 Improvements	$8,300	$51,400	$224,700	$224,700	$170,600
S13 Improvements	$197,800	$257,700	$303,600	$303,600	$225,800
Other Flood Risk Management Improvements:					
G-08 Canal	$0	$36,900	$36,900	$36,900	$7,300
C-14 Canal (in C-14 West Watershed)	$0	$5,700	$5,700	$5,700	$5,000
C-14 Canal (in C-14 East Watershed) -From DS side of S37B to 300' US of S37A	$0	$0	$48,000	$48,000	$0
C-14 Canal (in C-14 East Watershed) -From 300' DS of S37A to End of Canal Excavation	$0	$0	$19,400	$19,400	$0
C-13 Canal (in C-13 West Watershed)	$0	$0	$18,700	$18,700	$0
C-13 Canal (in C-13 East Watershed) -From End of S36 Project to NW 21st Ave	$0	$0	$4,000	$4,000	$0
C-13 Canal (in C-13 East Watershed) -From NW 21st Ave to End of Canal Excavation	$0	$0	$7,400	$7,400	$0
C-12 Canal (in C-12 West Watershed)	$0	$0	$3,200	$3,200	$0
G-15 Canal	$0	$0	$63,200	$63,200	$0
C-11 Canal (in C-11 West and East Watersheds)	$0	$37,300	$37,300	$37,300	$21,000
Stormwater storage improvements					
Stormwater Storage Capacity Improvement No. 1 (Markham Park)	$0	$36,000	$36,000	$36,000	$0
Stormwater Storage Capacity Improvement No. 2 (Hillsboro Watershed)	$0	$0	$133,400	$133,400	$0
Upstream Nonstructural Costs (elevation and dry floodproofing)	$0	$0	$0	$145,500	$0
Downstream Canal Stage Monitoring Stations (6 New Stations)	$0	$0	$0	$0	$5,900

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
FPL Electrical Infrastructure Upgrades	$0	$0	$0	$0	$25,000
Total Construction Costs	**$734,500**	**$1,226,100**	**$2,038,900**	**$2,184,400**	**$1,219,900**

Notes: RO = Resilience Optimized; RP = Recommended Plan

Real estate costs were also considered under capital costs. Cost to acquire necessary rights-of-way, as well as temporary and permanent easements, were estimated for each project alternative, as summarized in **Table 3**. Real estate costs are assumed to all take place in 2028. It is assumed that real estate costs escalate over time at the same rate as inflation.

Table 3. Real Estate Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO[a/]
SFWMD's Cost to Acquire Additional Canal Right-of-Way:	$4,300	$3,100	$123,800	$123,800	See Appendix F for Real Estate Costs
SFWMD's Cost to Acquire Permanent Access Easements:	$20,100	$20,100	$20,100	$20,100	
SFWMD's Cost to Acquire Temporary Construction Easements:	$1,000	$1,500	$1,400	$1,400	
Total Real Estate Costs	**$25,400**	**$24,700**	**$145,400**	**$145,400**	**$338,800**

a/ Only total Recommended Plan real estate costs have been updated according to 04/09/26 updated cost estimates
Notes: RO = Resilience Optimized; RP = Recommended Plan

Preconstruction engineering and design (PED), engineering during construction (EDC), and construction management (CM), are estimated as 10 percent, 5 percent, and 8.5 percent of the total construction costs respectively, not including nonstructural elements.

Table 4 summarizes total capital costs of the project alternatives including construction, construction management, design, and real estate costs. Preconstruction engineering and design (PED), engineering during construction (EDC), and construction management (CM), are estimated as 10 percent, 5 percent, and 8.5 percent of the total construction costs respectively, not including nonstructural elements.

Table 4. Total Capital Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
Construction Costs	$734,500	$1,226,100	$2,038,900	$2,184,400	$1,219,900
Engineering (PED, EDC)	$110,200	$183,900	$305,800	$305,800	$179,200
Construction Management	$62,400	$104,200	$173,300	$173,300	$101,600
Real Estate Costs	$25,400	$24,700	$145,400	$145,400	$338,800
Total Capital Costs	**$932,600**	**$1,538,900**	**$2,663,400**	**$2,808,900**	**$1,839,500**

Notes: RO = Resilience Optimized; RP = Recommended Plan

3.1.1.2 Operations and Maintenance, Repair, Replacement, and Rehabilitation Costs

Annual operations and maintenance costs were estimated for the future without project (FWOP) and all project alternatives based on 2010 O&M costs. Costs were escalated to 2025 dollars (Q1) using the GDP Implicit Price Deflator quarterly data (US Bureau of Economic Analysis 2025). Annual O&M costs are included in the analysis for the 50-year analysis period, assuming that operations begin in 2035. It is assumed that O&M costs will increase over the analysis period at the same rate as inflation. After the RP / Alternative RO was selected, annual O&M costs were refined based on SFWMD's actual historical O&M costs from 2015 through 2025, and adjusted based on the improvements by canal reach. O&M costs are summarized in **Table 5 and Table 6**.

Table 5. Annual Operations and Maintenance Costs — Alternatives A, B, and C (1000s, rounded to the nearest 100)

	FWOP	Alternative A	Alternative B	Alternative C	Alternative C Enhanced
O&M Costs (2025 Q1 dollars)[a/]	$1,600	$2,900	$3,900	$6,000	$6,000
Net O&M Costs (2025 Q1 dollars)	n/a	$1,300	$2,300	$4,400	$4,400

a/ O&M estimates for the FWOP and Alternatives A, B, C, and C Enhanced are based on a level 4 (ROM) O&M cost estimate generated using the SFWMD cost estimating tool.

Notes: FWOP = future without project; O&M = operations and maintenance

Table 6. Annual Operations and Maintenance Costs — Alternative RO (1000s, rounded to the nearest 100)

	FWOP	RP/Alternative RO
O&M Costs (2025 Q1 dollars)[a/]	$300	$1,200
Net O&M Costs (2025 Q1 dollars)	n/a	$900

a/ O&M estimate for the Recommended Plan is based on a level 3 O&M cost estimate generated using historical SFWMD O&M between 2015-2025.

Notes: FWOP = future without project; O&M = operations and maintenance; RO = Resilience Optimized; RP = Recommended Plan

Repair, replacement and rehabilitation (RR&R) costs were estimated by spillway structure for each of the project alternatives. RR&R costs are assumed to take place approximately halfway through the 50-year

analysis period, in 2060. Although they are likely to be spread out over a multi-year period, for this analysis they are assumed to take place in 2060. RR&R costs are summarized in **Table 7**. RR&R cost estimates include the same PED, EDC, and CM assumptions used in the construction costs (10 percent, 5 percent, and 8.5 percent, respectively).

Table 7. Repair, Replacement, and Rehabilitation Costs (1000s 2025 dollars, rounded to the nearest 100)

	FWOP	Alternative A	Alternative B	Alternative C	Alternative C Enhanced	RP/Alternative RO
RR&R Costs	$36,400	$56,200	$71,100	$118,700	$118,700	$69,800
Net RR&R Costs	n/a	$19,800	$34,700	$82,300	$82,300	$33,300

Notes: FWOP = future without project; RO = Resilience Optimized; RP = Recommended Plan; RR&R = repair, replacement, and rehabilitation

3.1.2 Benefits

The main NED benefits of the project are reduced flood damages within the Study Area. Reduced damages to structures, roadways, and vehicles were modeled using HEC-FDA software and integrated into the NED analysis. Transportation benefits in the form of travel time savings and vehicle operating cost savings were modeled in a dedicated transportation analysis and integrated into the NED analysis for the intermediate sea level rise scenario only.

3.1.2.1 Flood Damage Reduction Benefits

Flood damage reduction benefits were estimated using HEC-FDA software. Refer to the HEC-FDA Technical Memo in **Annex D-1** for detail on how that analysis was carried out. Expected annual damages avoided were calculated for 2035, the start of project operations, and for 2085, the end of the analysis period, for a low, intermediate, and high sea level rise scenario. Structure damage estimates were refined to ensure compliance with 33 U.S.C. § 2318 (Floodplain Management) by excluding structures constructed after 1991 that are not compliant with the effective FEMA Base Flood Elevation. This resulted in 491 structures being omitted from the damage calculations. Structure and road damages were originally estimated in HEC-FDA in January 2021 dollars. Vehicle damages were originally estimated in January 2024 dollars. All values are converted to 2025 Q1 dollars using the GDP Implicit Price Deflator quarterly data (U.S. Bureau of Economic Analysis 2025) for entry into the model. Expected annual damages are interpolated for the years between 2035 and 2085 using a straight-line interpolation. It is assumed that the value of avoided flood damages escalates over time at the same rate as overall inflation over the analysis period.

Table 8 summarizes expected annual avoided damages for 2035 and 2085 for all project alternatives, across the low, intermediate, and high sea level rise future conditions.

Table 8. HEC-FDA Estimates of Expected Annual Damages Avoided—Final Array (1000s real 2025 dollars, rounded to the nearest 100)

Alternative	Damage Category	2035	2085 Low SLR	2085 Intermediate SLR	2085 High SLR
Alternative A	Structures	$27,600	$26,300	$27,200	$51,900
Alternative A	Road Base	$6,100	$5,500	$6,000	$11,300
Alternative A	Vehicles	$1,700	$1,800	$1,600	$3,500
Alternative B	Structures	$27,900	$27,300	$29,000	$57,100
Alternative B	Road Base	$6,100	$5,700	$6,400	$13,500
Alternative B	Vehicles	$1,700	$1,800	$1,700	$4,100
Alternative C	Structures	$29,900	$28,600	$30,000	$60,800
Alternative C	Road Base	$6,500	$6,000	$6,700	$13,500
Alternative C	Vehicles	$1,800	$1,900	$1,800	$4,100
Alternative C, Enhanced	Structures	$45,300	$43,800	$45,500	$82,200
Alternative C, Enhanced	Road Base	$6,500	$6,000	$6,700	$13,500
Alternative C, Enhanced	Vehicles	$1,800	$1,900	$1,800	$4,100
RP/Alternative RO	Structures	$29,600	$27,300	$24,500	$51,300
RP/Alternative RO	Road Base	$6,400	$6,000	$5,800	$11,800
RP/Alternative RO	Vehicles	$1,700	$1,900	$1,500	$3,400

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

3.1.2.2 Transportation Benefits

Transportation benefits were estimated based on a dedicated traffic analysis and results integrated into the NED analysis. Refer to the Transportation Benefits Technical Memo in **Section D.5** for a detailed summary of that analysis. Transportation benefits were estimated based on travel time savings and vehicle operations cost savings associated with avoided flooding and evacuation of the Study Area. Estimates of transportation benefits were modeled based on expected flooding under future conditions in 2035 and 2085 under the intermediate sea level rise scenario. Results were interpolated for the intermediate years on a linear basis to arrive at benefits estimates for each year of the analysis period from 2035 to 2085 in real 2025 dollars. The Transportation Benefits Technical Memo in **Section D.6** provides more details on the modeled results and interpolation of benefits estimates. It is assumed that these benefits escalate over time at the same rate as inflation over the analysis period.

Note that transportation benefits were estimated only for the intermediate sea level rise future condition.

3.1.3 Results

The net present value of the future stream of costs and benefits of the project is calculated using a 3.25% discount rate, set forth in the Federal Register for use by federal agencies in the formulation and evaluation of plans for water and related land resources for the 2025 fiscal year (through September 30, 2025), and announced in the USACE Economic Guidance Memorandum 26-01 (USACE 2025).

The net present value of project benefits are summarized in **Table 9** for each alternative, sea level rise scenario and benefit category. Note that transportation benefits were only modeled for the intermediate sea level rise scenario. Transportation benefits were not calculated for the RP/Alternative RO.

Table 9. Summary of Project Benefits—Final Array (millions, net present value)

		Sea Level Rise Scenario		
Alternative	**Benefit Category**	**Low SLR**	**Intermediate SLR (including Transportation Benefits)**	**High SLR**
Alternative A	Structures/Contents	$1,422	$1,444	$2,038
	Roads	$305	$318	$444
	Vehicles	$88	$85	$130
	Transportation		$348	
	Total Benefits	**$1,815**	**$2,195**	**$2,611**
Alternative B	Structures/Contents	$1,453	$1,494	$2,169
	Roads	$312	$329	$501
	Vehicles	$90	$89	$145
	Transportation		$310	
	Total Benefits	**$1,855**	**$2,221**	**$2,815**
Alternative C	Structures/Contents	$1,542	$1,576	$2,315
	Roads	$328	$347	$510
	Vehicles	$94	$92	$147
	Transportation		$300	
	Total Benefits	**$1,965**	**$2,314**	**$2,973**
Alternative C, Enhanced	Structures/Contents	$2,348	$2,388	$3,271
	Roads	$328	$347	$510
	Vehicles	$94	$92	$147
	Transportation		$300	
	Total Benefits	**$2,770**	**$3,127**	**$3,928**
RP/Alternative RO	Structures/Contents	$1,503	$1,435	$2,080
	Roads	$326	$321	$465
	Vehicles	$93	$84	$130
	Transportation		$790	
	Total Benefits	**$1,922**	**$2,630**	**$2,675**

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Dividing the net present value of project benefits by the net present value of project costs yields the benefit-to-cost ratio (BCR), which determines cost effectiveness of the project alternative. Subtracting the net present value of costs from the net present value of benefits yields the project alternative's net benefits.

NED analysis results show that Alternative A is estimated to be cost effective under all sea level rise scenarios. Alternative A has the greatest net benefit among project alternatives. Alternative B is cost effective only under the intermediate and high sea level rise scenarios. Alternatives C and Alternative C enhanced are not cost effective under any of the sea level rise scenarios. The RP/Alternative RO has a BCR over 1 under the intermediate and high sea level rise scenarios.

Table 10 summarizes results of the NED analysis. Note that transportation benefits were only estimated for the intermediate sea level rise scenario.

Table 10. Summary of NED Analysis Net Present Value Results—Final Array (net present value, in millions)

		Sea Level Rise Scenario			
Alternative	**Benefit-Cost Calculation**	**Low SLR**	**Intermediate SLR**	**Intermediate SLR (including Transportation Benefits)**	**High SLR**
Alternative A	Total Benefits	$1,815	$1,847	$2,195	$2,611
	Total Costs	$1,368	$1,368	$1,368	$1,368
	BCR	1.33	1.35	1.60	1.91
	Net Benefits	$447	$479	$827	$1,243
Alternative B	Total Benefits	$1,855	$1,912	$2,221	$2,815
	Total Costs	$2,276	$2,276	$2,276	$2,276
	BCR	0.82	0.84	0.98	1.24
	Net Benefits	-$421	-$364	-$54	$539
Alternative C	Total Benefits	$1,965	$2,014	$2,314	$2,973
	Total Costs	$3,998	$3,998	$3,998	$3,998
	BCR	0.49	0.50	0.58	0.74
	Net Benefits	-$2,033	-$1,984	-$1,684	-$1,025
Alternative C, Enhanced	Total Benefits	$2,770	$2,827	$3,127	$3,928
	Total Costs	$3,998	$3,998	$3,998	$3,998
	BCR	0.69	0.71	0.78	0.98
	Net Benefits	-$1,228	-$1,171	-$871	-$70
RP/Alternative RO	Total Benefits	$1,912	$1,840	$2,630	$2,675
	Total Costs	$2,606	$2,606	$2,606	$2,606
	BCR	0.73	0.71	1.01	1.03
	Net Benefits	-$693	-$765	$25	$69

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

3.2 Sensitivity Analysis

Sensitivity analysis was carried out on the RP/Alternative RO by applying updated joint probabilities for future rainfall conditions developed by the University of Central Florida. These results are summarized in **Table 11**, **Table 12**, and **Table 13**.

The sensitivity analysis is based on a set of recurrence intervals that incorporate projected future changes in rainfall and associated uncertainties using the Coupled Model Intercomparison Project Phased 6 (CMIP6) downscaled results. These recurrence intervals were estimated by University of Central Florida and reflect improved physics, higher resolution, and comprehensive projections of future

climate conditions along with uncertainties. The sensitivity runs for the RP/Alternative RO scenarios are presented here but were carried out for all project alternatives. Refer to the HEC-FDA Technical Memo in **Annex D-1** for more information on the HEC-FDA modeling.

These sensitivity runs incorporating joint probabilities for future rainfall conditions demonstrate increased levels of benefits for the RP/Alternative RO across the categories of structures, roads, and vehicles. For all sea level rise scenarios, the sensitivity analysis shows a BCR well above 1.

Table 11. HEC-FDA Estimates of Expected Annual Damages Avoided—Final Array (1000s real 2025 dollars, rounded to the nearest 100)

Alternative	Damage Category	2035	2085 Low SLR	2085 Intermediate SLR	2085 High SLR
RP/Alternative RO Sensitivity	Structures	$76,500	$72,900	$28,600	$55,600
	Road Base	$7,500	$7,000	$4,300	$12,400
	Vehicles	$1,400	$1,400	$1,500	$4,000

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Table 12. Summary of Project Benefits—Final Array (millions, 2025 dollars)

		Sea Level Rise Scenario		
Alternative	Benefit Category	Low SLR	Intermediate SLR (including Transportation benefits)	High SLR
RP/Alternative RO Sensitivity	Structures/Contents	$3,941	$2,876	$3,524
	Roads	$384	$319	$514
	Vehicles	$73	$74	$134
	Transportation	N/A	N/A	N/A
	Total Benefits	**$4,398**	**$3,269**	**$4,173**

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Table 13. Summary of NED Analysis for RP / Alternative RO--Net Present Value Results (net present value, in millions)

		Sea Level Rise Scenario			
Alternative	Benefit-Cost Calculation	Low SLR	Intermediate SLR	Intermediate SLR (including Transportation benefits[a/])	High SLR
RP/Alternative RO Sensitivity	Total Benefits	$4,398	$3,269	$4,059	$4,173
	Total Costs	$2,606	$2,606	$2,606	$2,606
	BCR	1.69	1.25	1.56	1.60
	Net Benefits	$1,793	$663	$1,454	$1,567

a/ Transportation benefits included in the TSP Sensitivity Analysis are from the TSP Alternative and were not modeled for the updated joint probabilities for future rainfall conditions.

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

References

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D.4 National Economic Development Benefits Technical Memorandum, Real Results

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 9, 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins NED Analysis

1 Purpose:

This memo outlines the national economic development (NED) analysis, carried out as part of the South Florida Water Management District's (SFWMD) Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (203 Study). The analysis was carried out in compliance with applicable U.S. federal guidelines. These include the 1983 Principles and Guidelines (P&G) (42 U.S.C. 1962a-2), designed to guide the formulation and evaluation of major Federal water resources development agencies, including the U.S. Army Corps of Engineers (USACE) in accordance with section 103 of the Water Resources Planning Act; and the 2013 Principles, Requirements, and Guidelines (PR&G). All supporting guidance was also followed, including the Principles and Requirements for Federal Investments in Water Resources issued by the Council on Environmental Quality and approved by the Water Resources Council, the Interagency Guidelines for implementing the Principles and Requirements, and the Corps of Engineers Agency Specific Procedures to Implement the Principles, Requirements, and Guidelines.

This Section 203 Study focuses on enhancing the resiliency of the water control structures and adjacent primary canals in Broward Basins Reach A, a reach of the ongoing USACE C&SF Section 216 Study. Broward Basins Reach A is referred to herein as the Section 203 Study Area (or Study Area).

2 Summary of Results:

The final array of alternatives that were included in the economic analysis include three alternatives (denoted as A, B, and C), as well as an enhanced version of Alternative C that includes nonstructural measures for residual flood risk management. The three alternatives include increasingly complex infrastructure investments, including primary structure modifications, primary C&SF Project canal improvements, and storage and nature-based projects, and therefore each show increasing costs. Alternative A includes the least number of features and a lower cost, Alternative B adds complexity and project features, and Alternative C includes the most projects and is therefore expected to be most expensive. The enhanced version of Alternative C builds on Alternative C to evaluate whether additional risk management measures, including nonstructural features, could enhance overall benefits and provide a cost-effective flood risk management approach. Project alternatives allow for an assessment of which drainage areas are improved most by the additional cost and complexity. Results for the three alternatives and the enhanced version of Alternative C are summarized below in **Table 1**.

The best projects for each drainage area are carried forward into the recommended plan (RP), though the development of a fourth alternative – Resilience Optimization Alternative (Alternative RO). Economic analysis of the RP / Alternative RO is also added to this memo, as summarized in **Table 1**.

Sensitivity analysis was carried out on the RP/Alternative RO by applying updated joint probabilities for future rainfall conditions developed by the University of Central Florida. These results are summarized in **Table 1** and explained in more detail at the end of this memo.

Total costs and benefits of the project alternatives were evaluated in real 2025 dollars on a net present value basis. Costs were estimated to include both design and capital construction costs over an 8-year period from 2027 to 2034, and operations and maintenance (O&M) and repair, replacement and rehabilitation (RR&R) costs over the 50-year evaluation period starting in 2035. Flood damage reduction estimates for structures, roadways, and vehicles in the Study Area are included as project benefits, based on HEC-FDA modeling results. Uncertainty around future flooding scenarios is represented in the HEC-FDA results through a low, intermediate, and high sea level rise scenario for the 2085 future condition. Transportation benefits are also included in the analysis for the intermediate sea level rise scenario only. All costs and benefits are in real 2025 dollars and account only for real expected price escalation over time (i.e. price escalation over and above inflation). BCA results are evaluated in net present value terms for a base year 2035, the estimated first year of project operation. This analysis conforms to the methodologies set forth in the USACE Principles and Guidelines and other federal guidelines regarding benefit cost analysis. Individual assumptions and approaches are discussed in more detail in the sections that follow.

Analysis results for Alternative A, Alternative B, Alternative C, Alternative C enhanced, and RP/Alternative RO are summarized in **Table 1**. Alternative A is found to have a benefit to cost ratio over 1, indicating cost effectiveness, under the high sea level rise scenario. Based on the federal objective of maximizing net NED benefits, Alternative A shows the strongest results. The other alternatives have BCRs below 1 across all the future sea level rise scenarios. These results account only for real price escalation over time.

Table 1. Summary of NED Analysis for Final Array of Alternatives--Net Present Value Results (real 2025 dollars shown in net present value, in millions)

		Sea Level Rise Scenario			
Alternative	**Benefit-Cost Calculation**	**Low SLR**	**Intermediate SLR**	**Intermediate SLR (including Transportation benefits[a/])**	**High SLR**
Alternative A	Total Benefits	$879	$892	$1,046	$1,184
	Total Costs	$1,152	$1,152	$1,152	$1,152
	BCR	0.76	0.77	0.91	1.03
	Net Benefits	-$273	-$261	-$106	$31
Alternative B	Total Benefits	$897	$918	$1,061	$1,264
	Total Costs	$1,908	$1,908	$1,908	$1,908
	BCR	0.47	0.48	0.56	0.66
	Net Benefits	-$1,011	-$989	-$847	-$644
Alternative C	Total Benefits	$951	$970	$1,109	$1,337
	Total Costs	$3,338	$3,338	$3,338	$3,338
	BCR	0.28	0.29	0.33	0.40
	Net Benefits	-$2,386	-$2,367	-$2,228	-$2,001
Alternative C Enhanced	Total Benefits	$1,340	$1,361	$1,500	$1,782
	Total Costs	$3,338	$3,338	$3,338	$3,338
	BCR	0.40	0.41	0.45	0.53
	Net Benefits	-$1,998	-$1,976	-$1,837	-$1,555
RP/Alternative RO	Total Benefits	$929	$901	$1,238	$1,221
	Total Costs	$2,256	$2,256	$2,256	$2,256
	BCR	0.41	0.40	0.55	0.54
	Net Benefits	-$1,327	-$1,354	-$1,017	-$1,035
Sensitivity Analysis—Joint Probabilities for Future Rainfall Conditions					
RP/Alternative RO Sensitivity	Total Benefits	$2,129	$1,698	$2,035	$2,044
	Total Costs	$2,256	$2,256	$2,256	$2,256
	BCR	0.94	0.75	0.90	0.91
	Net Benefits	-$127	-$558	-$221	-$212

a/ Transportation benefits included in the Tentatively Selected Plan (TSP) Sensitivity Analysis are from the TSP Alternative and were not modeled for the updated joint probabilities for future rainfall conditions.

Notes: SLR = sea level rise; BCR = benefit-to-cost ratio; RO = Resilience Optimized

3 Economic Analysis

This analysis evaluates the costs and benefits of the alternative plans, Alternative A, Alternative B, and Alternative C, and an enhanced version of Alternative C, for resiliency improvements to the existing infrastructure of the C&SF Project. These are defined as the final array of project alternatives, in addition to the RP/Alternative RO. The project timeline includes a 8-year design and construction period from 2027 to 2034 and a 50-year period of analysis from 2035 to 2085. Costs and benefits are all considered in 2025 Q1 dollars, and escalated if necessary to be kept in real dollars. The net present value of the stream of future costs and benefits is calculated using a 3.25% discount rate, the discount rate determined for use by federal agencies in the formulation and evaluation of plans for water and related land resources for the 2026 fiscal year (October 1, 2025 through September 30, 2026), as required by the Water Resources Planning Act of 1965 and the Water Resources Development Act of 1974 and announced in the USACE Economic Guidance Memorandum 26-01 (USACE 2025).

3.1 Final Array of Alternatives

The final array of alternatives includes Alternative A, Alternative B, and Alternative C, as well as an enhanced version of Alternative C. Alternatives A, B, and C increase in complexity and number of projects included. Alternative C adds additional risk management measures, including nonstructural features, assuming elevation and dry floodproofing are implemented for residential and non-residential buildings. Assumptions around the costs and benefits used to evaluate the final array of alternatives are described in the following sections. The RP/Alternative RO, based on the best projects for each drainage area, was also analyzed, with results presented along with the final array of alternatives.

3.1.1 Costs

3.1.1.1 Capital Costs

Project capital costs are based on rough order of magnitude (ROM) construction cost estimates completed for each of the project alternatives by water resource engineers on the J-Tech team. These costs are summarized below in **Table 2**. Capital costs are estimated to take place over an 8-year period from 2027 to 2034, with construction costs assumed to be spread evenly over the 6-year period from 2029 to 2034. The alternatives range in cost from less infrastructure-intensive to more infrastructure-intensive. Construction costs are escalated according to the USACE Civil Works Construction Cost Index System (CWCCIS; USACE 2024), less the expected amount of inflation according to the 10-year historical average of annual GDP Implicit Price Deflator, to account for the expected real escalation of construction costs above and beyond inflation. Although the three construction elements most closely related to the C&SF Flood Resiliency Project include channels and canals; levees and floodwalls; and floodway control and diversion structures, the composite CWCCIS index is used to estimate construction cost increases over time. The index uses an increase of 2.6% for all future years, while expected annual inflation is 2.43%, resulting in an expected real cost escalation of 0.17%.

Table 2. Construction Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
Flood Risk Management Improvements to Coastal Structures and Non-coastal Structure S37B:					
G56 Improvements	$9,600	$77,100	$288,200	$288,200	$78,300
G57 Improvements	$45,700	$67,300	$141,600	$141,600	$133,400
S37B Improvements	$0	$42,300	$0	$0	$46,000
S37A Improvements	$292,500	$298,500	$292,500	$292,500	$190,800
S36 Improvements	$28,700	$153,000	$177,000	$177,000	$149,700
S33 Improvements	$151,900	$163,000	$198,100	$198,100	$161,000
G54 Improvements	$8,300	$51,400	$224,700	$224,700	$170,600
S13 Improvements	$197,800	$257,700	$303,600	$303,600	$225,800
Other Flood Risk Management Improvements:					
G-08 Canal	$0	$36,900	$36,900	$36,900	$7,300
C-14 Canal (in C-14 West Watershed)	$0	$5,700	$5,700	$5,700	$5,000
C-14 Canal (in C-14 East Watershed) -From DS side of S37B to 300' US of S37A	$0	$0	$48,000	$48,000	$0
C-14 Canal (in C-14 East Watershed) -From 300' DS of S37A to End of Canal Excav.	$0	$0	$19,400	$19,400	$0
C-13 Canal (in C-13 West Watershed)	$0	$0	$18,700	$18,700	$0
C-13 Canal (in C-13 East Watershed) -From End of S36 Project to NW 21st Ave	$0	$0	$4,000	$4,000	$0
C-13 Canal (in C-13 East Watershed) -From NW 21st Ave to End of Canal Excav.	$0	$0	$7,400	$7,400	$0
C-12 Canal (in C-12 West Watershed)	$0	$0	$3,200	$3,200	$0
G-15 Canal	$0	$0	$63,200	$63,200	$0
C-11 Canal (in C-11 West and East Watersheds)	$0	$37,300	$37,300	$37,300	$21,000
Stormwater storage improvements					
Stormwater Storage Capacity Improvement No. 1 (Markham Park)	$0	$36,000	$36,000	$36,000	$0
Stormwater Storage Capacity Improvement No. 2 (Hillsboro Watershed)	$0	$0	$133,400	$133,400	$0
Upstream Nonstructural Costs (elevation and dry floodproofing)	$0	$0	$0	$145,500	$0
Downstream Canal Stage Monitoring Stations (6 New Stations)	$0	$0	$0	$0	$5,900

FPL Electrical Infrastructure Upgrades					$25,000
Total Construction Costs	**$734,500**	**$1,226,100**	**$2,038,900**	**$2,184,400**	**$1,219,900**

Notes: RO = Resilience Optimized; RP = Recommended Plan

Real estate costs were also considered under capital costs. Cost to acquire necessary rights-of-way, as well as temporary and permanent easements were estimated for each project alternative, as summarized in **Table 3**. Real estate costs are assumed to all take place in 2028. It is assumed that real estate costs escalate over time at the same rate as inflation, therefore real cost escalation is zero.

Table 3. Real Estate Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C Enhanced	RP/Alternative RO[a/]
SFWMD's Cost to Acquire Additional Canal Right-of-Way:	$4,300	$3,100	$123,800	$123,800	See Appendix F for Real Estate Costs
SFWMD's Cost to Acquire Permanent Access Easements:	$20,100	$20,100	$20,100	$20,100	
SFWMD's Cost to Acquire Temporary Construction Easements:	$1,000	$1,500	$1,400	$1,400	
Total Real Estate Costs	**$25,400**	**$24,700**	**$145,400**	**$145,400**	**$338,800**

a/ Only total Recommended Plan real estate costs have been updated according to 04/09/26 updated cost estimates

Notes: RO = Resilience Optimized; RP = Recommended Plan

Table 4 summarizes total capital costs of the project alternatives including construction, construction management, design, and real estate costs. Preconstruction engineering and design (PED), engineering during construction (EDC), and construction management (CM), are estimated as 10%, 5%, and 8.5% of the total construction costs respectively, (not including nonstructural elements).

Table 4. Total Capital Costs—Final Array (1000s 2025 dollars, rounded to the nearest 100)

Cost Element	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
Construction Costs	$734,500	$1,226,100	$2,038,900	$2,184,400	$1,219,900
Engineering (PED, EDC)	$110,200	$183,900	$305,800	$305,800	$179,200
Construction Management	$62,400	$104,200	$173,300	$173,300	$101,600
Real Estate Costs	$25,400	$24,700	$145,400	$145,400	$338,800
Total Capital Costs	**$932,600**	**$1,538,900**	**$2,663,400**	**$2,808,900**	**$1,839,500**

Notes: RO = Resilience Optimized; RP = Recommended Plan

3.1.1.2 Operations and Maintenance, Repair, Replacement, and Rehabilitation Costs

Annual operations and maintenance costs were estimated for the future without project (FWOP) and all project alternatives based on 2010 O&M costs. Costs were escalated to 2025 dollars (Q1) using the GDP Implicit Price Deflator quarterly data (U.S. Bureau of Economic Analysis 2025). Annual O&M costs are included in the analysis for the 50-year analysis period, assuming that operations begin in 2035. It is assumed that O&M costs will increase over the analysis period at the same rate as inflation, therefore real cost escalation is zero. After the RP/Alternative RO was selected, annual O&M costs were refined based on SFWMD's actual historical O&M costs from 2015 through 2025, and adjusted based on the improvements by canal reach. O&M costs are summarized in **Table 5** and **Table 6**.

Table 5. Annual Operations and Maintenance Costs—Final Array (1000s, rounded to the nearest 100)

	FWOP	Alternative A	Alternative B	Alternative C	Alternative C Enhanced
O&M Costs (2025 Q1 dollars)[a/]	$1,600	$2,900	$3,900	$6,000	$6,000
Net O&M Costs (2025 Q1 dollars)	n/a	$1,300	$2,300	$4,400	$4,400

a/ O&M estimates for the FWOP and Alternatives A, B, C, and C Enhanced are based on a level 4 (ROM) O&M cost estimate generated using the SFWMD cost estimating tool.
Notes: FWOP = future without project; O&M = operations and maintenance

Table 6. Annual Operations and Maintenance Costs—Final Array (1000s, rounded to the nearest 100)

	FWOP	RP/Alternative RO
O&M Costs (2025 Q1 dollars)[a/]	$300	$1,200
Net O&M Costs (2025 Q1 dollars)	n/a	$900

a/ O&M estimate for the Recommended Plan is based on a level 3 O&M cost estimate generated using historical SFWMD O&M between 2015-2025.
Notes: FWOP = future without project; O&M = operations and maintenance; RO = Resilience Optimized; RP = Recommended Plan

Repair, replacement and rehabilitation (RR&R) costs were estimated by spillway structure for each of the project alternatives. RR&R costs are assumed to take place approximately halfway through the 50-year analysis period, in 2060. Although they are likely to be spread out over a multi-year period, for this analysis they are assumed to take place in 2060. RR&R costs are summarized in **Table 7**. RR&R costs are escalated in the same way as capital costs, based on the USACE CWCCIS (USACE 2024), less the expected amount of inflation according to the 10-year historical average of annual GDP Implicit Price Deflator, to account for the expected real escalation of construction costs above and beyond inflation. RR&R cost estimates include the same PED, EDC, and CM assumptions used in the construction costs (10%, 5%, and 8.5%, respectively).

Table 7. Repair, Replacement, and Rehabilitation Costs (1000s 2025 dollars, rounded to the nearest 100)

	FWOP	Alternative A	Alternative B	Alternative C	Alternative C, Enhanced	RP/Alternative RO
RR&R Costs	$36,400	$56,200	$71,100	$118,700	$118,700	$69,800
Net RR&R Costs		$19,800	$34,700	$82,300	$82,300	$33,300

Notes: FWOP = future without project; RO = Resilience Optimized; RP = Recommended Plan; RR&R = repair, replacement, and rehabilitation

3.1.2 Benefits

The main NED benefits of the project are reduced flood damages within the Study Area. Reduced damages to structures, roadways, and vehicles were modeled using HEC-FDA software and integrated into the NED analysis. Transportation benefits in the form of travel time savings and vehicle operating cost savings were modeled in a dedicated transportation analysis and integrated into the NED analysis for the intermediate sea level rise scenario only.

3.1.2.1 Flood Damage Reduction Benefits

Flood damage reduction benefits were estimated using HEC-FDA software. Refer to the HEC-FDA Technical Memo in **Annex D-1** for detail on how that analysis was carried out. Expected annual damages avoided were calculated for 2035, the start of project operations, and for 2085, the end of the analysis period, for a low, intermediate, and high sea level rise scenario. Structure damage estimates were refined to ensure compliance with 33 U.S.C. § 2318 (Floodplain Management) by excluding structures constructed after 1991 that are not compliant with the effective FEMA Base Flood Elevation. This resulted in 491 structures being omitted from the damage calculations. Structure and road damages were originally estimated in HEC-FDA in January 2021 dollars. Vehicle damages were originally estimated in January 2024 dollars. All values are converted to 2025 Q1 dollars using the GDP Implicit Price Deflator quarterly data (U.S. Bureau of Economic Analysis 2025) for entry into the model. Expected annual damages are interpolated for the years between 2035 and 2085 using a straight-line interpolation. It is assumed that the value of avoided flood damages escalates over time at the same rate as overall inflation over the analysis period, therefore real cost escalation is zero.

Table 8 summarizes expected annual avoided damages for 2035 and 2085 for all project alternatives, across the low, intermediate, and high sea level rise future conditions.

Table 8. HEC-FDA Estimates of Expected Annual Damages Avoided—Final Array (1000s real 2025 dollars, rounded to the nearest 100)

Alternative	Damage Category	2035	2085 Low SLR	2085 Intermediate SLR	2085 High SLR
Alternative A	Structures	$27,600	$26,300	$27,200	$51,900
Alternative A	Road Base	$6,100	$5,500	$6,000	$11,300
Alternative A	Vehicles	$1,700	$1,800	$1,600	$3,500
Alternative B	Structures	$27,900	$27,300	$29,000	$57,100
Alternative B	Road Base	$6,100	$5,700	$6,400	$13,500

Alternative B	Vehicles	$1,700	$1,800	$1,700	$4,100
Alternative C	Structures	$29,900	$28,600	$30,000	$60,800
Alternative C	Road Base	$6,500	$6,000	$6,700	$13,500
Alternative C	Vehicles	$1,800	$1,900	$1,800	$4,100
Alternative C, Enhanced	Structures	$45,300	$43,800	$45,500	$82,200
Alternative C, Enhanced	Road Base	$6,500	$6,000	$6,700	$13,500
Alternative C, Enhanced	Vehicles	$1,800	$1,900	$1,800	$4,100
RP/Alternative RO	Structures	$29,600	$27,300	$24,500	$51,300
RP/Alternative RO	Road Base	$6,400	$6,000	$5,800	$11,800
RP/Alternative RO	Vehicles	$1,700	$1,900	$1,500	$3,400

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

3.1.2.2 Transportation Benefits

Transportation benefits were estimated based on a dedicated traffic analysis and results integrated into the NED analysis. Refer to the Transportation Benefits Technical Memo in **Section D.5** for a detailed summary of that analysis. Transportation benefits were estimated based on travel time savings and vehicle operations cost savings associated with avoided flooding and evacuation of the study area. Estimates of transportation benefits were modeled based on expected flooding under future conditions in 2035 and 2085 under the intermediate sea level rise scenario. Results were interpolated for the intermediate years on a linear basis to arrive at benefits estimates for each year of the analysis period from 2035 to 2085 in real 2025 dollars. The Transportation Benefits Technical Memo in **Section D.6** provides more details on the modeled results and interpolation of benefits estimates. It is assumed that these benefits escalate over time at the same rate as inflation over the analysis period.

Note that transportation benefits were estimated only for the intermediate sea level rise future condition.

3.1.3 Results

The net present value of the future stream of costs and benefits of the project is calculated using a 3.25% discount rate, set forth in the Federal Register for use by Federal agencies in the formulation and evaluation of plans for water and related land resources for the 2025 fiscal year (through September 30, 2025), and announced in the USACE Economic Guidance Memorandum 26-01 (USACE 2025).

The net present value of project benefits are summarized in **Table 9** for each alternative, sea level rise scenario and benefit category. Note that transportation benefits were only modeled for the intermediate sea level rise scenario.

Table 9. Summary of Project Benefits—Final Array (millions, 2025 dollars)

		Sea Level Rise Scenario		
Alternative	**Benefit Category**	**Low SLR**	**Intermediate SLR (including Transportation benefits)**	**High SLR**
Alternative A	Structures/Contents	$688	$696	$923
	Roads	$148	$153	$201
	Vehicles	$43	$42	$59
	Transportation		$155	
	Total Benefits	**$879**	**$1,046**	**$1,184**
Alternative B	Structures/Contents	$701	$717	$975
	Roads	$151	$158	$223
	Vehicles	$44	$44	$66
	Transportation		$142	
	Total Benefits	**$897**	**$1,061**	**$1,264**
Alternative C	Structures/Contents	$746	$758	$1,041
	Roads	$159	$166	$229
	Vehicles	$46	$45	$67
	Transportation		$139	
	Total Benefits	**$951**	**$1,109**	**$1,337**
Alternative C, Enhanced	Structures/Contents	$1,134	$1,150	$1,487
	Roads	$159	$166	$229
	Vehicles	$46	$45	$67
	Transportation		$139	
	Total Benefits	**$1,340**	**$1,500**	**$1,782**
RP/Alternative RO	Structures/Contents	$729	$703	$949
	Roads	$158	$156	$211
	Vehicles	$45	$42	$60
	Transportation		$337	
	Total Benefits	**$933**	**$1,238**	**$1,221**

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Dividing the net present value of project benefits by the net present value of project costs yields the benefit-to-cost ratio (BCR), which determines cost effectiveness of the project alternative. Subtracting the net present value of costs from the net present value of benefits yields the project alternative's net benefits.

NED analysis results show that Alternative A is estimated to be cost effective under the high sea level rise scenarios. Alternative A has the greatest net benefit among project alternatives. All other project alternatives have a BCR below 1 for all sea level rise scenarios.

Table 10 summarizes results of the NED analysis. Note that transportation benefits were only estimated for the intermediate sea level rise scenario.

Table 10. Summary of NED Analysis Net Present Value Results—Final Array (real 2025 dollars shown in net present value, in millions)

		Sea Level Rise Scenario			
Alternative	**Benefit-Cost Calculation**	**Low SLR**	**Intermediate SLR**	**Intermediate SLR (including Transportation benefits)**	**High SLR**
Alternative A	Total Benefits	$879	$892	$1,046	$1,184
	Total Costs	$1,152	$1,152	$1,152	$1,152
	BCR	0.76	0.77	0.91	1.03
	Net Benefits	-$273	-$261	-$106	$31
Alternative B	Total Benefits	$897	$918	$1,061	$1,264
	Total Costs	$1,908	$1,908	$1,908	$1,908
	BCR	0.47	0.48	0.56	0.66
	Net Benefits	-$1,011	-$989	-$847	-$644
Alternative C	Total Benefits	$951	$970	$1,109	$1,337
	Total Costs	$3,338	$3,338	$3,338	$3,338
	BCR	0.28	0.29	0.33	0.40
	Net Benefits	-$2,386	-$2,367	-$2,228	-$2,001
Alternative C, Enhanced	Total Benefits	$1,340	$1,361	$1,500	$1,782
	Total Costs	$3,338	$3,338	$3,338	$3,338
	BCR	0.40	0.41	0.45	0.53
	Net Benefits	-$1,998	-$1,976	-$1,837	-$1,555
RP/Alternative RO	Total Benefits	$929	$901	$1,238	$1,221
	Total Costs	$2,256	$2,256	$2,256	$2,256
	BCR	0.41	0.40	0.55	0.54
	Net Benefits	-$1,327	-$1,354	-$1,017	-$1,035

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

3.2 Sensitivity Analysis

Sensitivity analysis was carried out on the RP/Alternative RO by applying updated joint probabilities for future rainfall conditions developed by the University of Central Florida. These results are summarized in **Table 10**, **Table 11**, and **Table 12.**

The sensitivity analysis is based on a set of recurrence intervals that incorporate projected future changes in rainfall and associated uncertainties using the Coupled Model Intercomparison Project Phased 6 (CMIP6) downscaled results. These recurrence intervals were estimated by University of Central Florida and reflect improved physics, higher resolution, and comprehensive projections of future climate conditions along with uncertainties. The sensitivity runs for the RP/Alternative RO scenarios are presented here but were carried out for all project alternatives. Refer to the HEC-FDA Technical Memo in Annex D-1 for more information on the HEC-FDA modeling.

These sensitivity runs incorporating joint probabilities for future rainfall conditions demonstrate increased levels of benefits for the RP/Alternative RO across the categories of structures, roads, and vehicles. For the low and high sea level rise scenarios, the sensitivity analysis shows a BCR above 0.9.

Table 11. HEC-FDA Estimates of Expected Annual Damages Avoided—Final Array (1000s real 2025 dollars, rounded to the nearest 100)

Alternative	Damage Category	2035	2085 Low SLR	2085 Intermediate SLR	2085 High SLR
RP/Alternative RO Sensitivity	Structures	$76,500	$72,900	$28,600	$55,600
	Road Base	$7,500	$7,000	$4,300	$12,400
	Vehicles	$1,400	$1,400	$1,500	$4,000

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Table 12. Summary of Project Benefits—Final Array (millions, 2025 dollars)

		Sea Level Rise Scenario		
Alternative	**Benefit Category**	**Low SLR**	**Intermediate SLR (including Transportation benefits)**	**High SLR**
RP/Alternative RO Sensitivity	Structures/Contents	$1,907	$1,500	$1,748
	Roads	$186	$161	$236
	Vehicles	$36	$36	$60
	Transportation			
	Total Benefits	**$2,129**	**$1,698**	**$2,044**

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

Table 13. Summary of NED Analysis for RP/Alternative RO--Net Present Value Results (real 2025 dollars shown in net present value, in millions)

		Sea Level Rise Scenario			
Alternative	**Benefit-Cost Calculation**	**Low SLR**	**Intermediate SLR**	**Intermediate SLR (including Transportation benefits[a/])**	**High SLR**
RP/Alternative RO Sensitivity	Total Benefits	$2,129	$1,698	$2,035	$2,044
	Total Costs	$2,256	$2,256	$2,256	$2,256
	BCR	0.94	0.75	0.90	0.91
	Net Benefits	-$127	-$558	-$221	-$212

a/ Transportation benefits included in the TSP Sensitivity Analysis are from the TSP Alternative and were not modeled for the updated joint probabilities for future rainfall conditions.

Notes: RO = Resilience Optimized; RP = Recommended Plan; SLR = sea level rise

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D.5 National Economic Development Benefits Transportation Benefits Modeling Technical Memorandum, Part A

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins, Transportation Benefits Modeling Approach

1 Introduction and Purpose

This analysis quantifies the impacts of roadway flooding on travel performance and associated road-user costs. Impacts are measured as changes in Vehicle-Hours Traveled (VHT)—representing additional delay—and Vehicle-Miles Traveled (VMT)—representing additional travel distance—due to flood-related roadway closures.

The methodology integrates hydrologic and topographic data with the Southeast Florida Regional Planning Model (SERPM), a Florida Department of Transportation (FDOT)-approved travel demand model, to simulate network performance under multiple sea level rise (SLR) and storm event scenarios.

2 Regulatory and Modeling Framework

2.1 Federal Requirements

Under 23 CFR § 450.324, Metropolitan Planning Organizations (MPOs) serving urbanized areas with populations over 200,000 are required to update their metropolitan transportation plans using validated, regionally coordinated data (e.g., for travel, land use, population, employment, and congestion). The plans must also include current and projected transportation demand of persons and goods—requirements that logically necessitate robust, validated travel demand modeling. These ensure credible forecasts, coordinated investment planning, and compliance with environmental justice and congestion management requirements.

2.2 Model Selection

SERPM was selected as the analytical tool. It is maintained by the Regional Transportation Technical Advisory Committee – Modeling Subcommittee (RTTAC-MS) under the Southeast Florida Transportation Council (SEFTC), comprising modeling staff from FDOT Districts 4 and 6, the Broward MPO, Miami-Dade Transportation Planning Organization, and Palm Beach Transportation Planning Agency. This study employed SERPM[1] version 8.543, which at the time represented the most current and reliable release of the model.[2]

[1] SERPM 8.543 (October 2024) as maintained under SEFTC/RTTAC-MS; CT-RAMP with five time-period assignments. FDOT Blob Storage

[2] Although SERPM version 9 was issued shortly thereafter, it was subsequently recalled due to identified issues and was therefore not considered suitable for use.

2.3 Geographic Scope

The SERPM coverage area encompasses Miami-Dade, Broward, and Palm Beach Counties, as illustrated in the regional coverage map in **Exhibit** 1. The exhibit further depicts the SERPM highway network, which extends throughout all three counties.

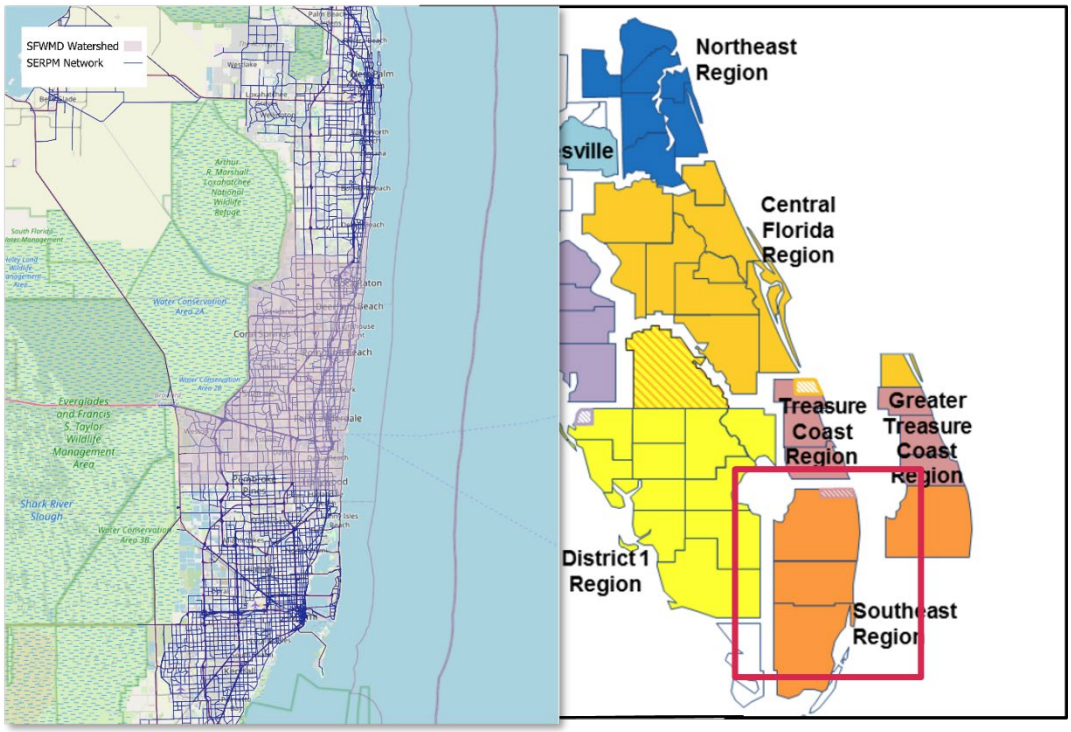


Exhibit 1: SERPM Model Geographic Scope

3 SERPM Model Overview

SERPM is an integrated passenger–freight (multi-modal) activity-based travel demand model with iterative feedback to ensure that network speeds and travel times used in trip-making decisions are consistent with the final assignment results. SERPM is implemented in Citilabs (acquired by Bentley Systems) – Cube®. The model sequence, which is depicted in **Exhibit 2**, includes:

a. Input Data

- Land Use and Other Zonal Data: Provides spatial socioeconomic information (population, employment, land use patterns) for generating trips.
- Transportation Networks: Describes the roadway and transit networks, including capacities, speeds, and connectivity.

b. Freight and External Trips

- Truck, Port, EE/EI Trip Generation: Produces trip totals for freight (truck and port-related) and external trips (EE = External–External, EI = External–Internal) based on land use and network data.
- Transportation Level of Service (Skims): Generates travel time and cost matrices for all modes and purposes, used as input for trip distribution and mode choice.

- Truck, Port, EE/EI Trip Distribution: Allocates freight and external trips between origin and destination zones using the skim data.
- Truck and External Vehicle Trips: Resulting trip tables for freight and external vehicles, which will later be assigned to the network.

c. Passenger Trips

- *Synthetic Population*: A modeled representation of the regional population, including households and individuals with socio-economic attributes.
- *CT-RAMP*: The activity-based passenger travel model (Coordinated Travel – Regional Activity Modeling Platform), which:
  - Generates daily activity patterns.
  - Produces household, person, tour, and trip files.
- *Visitor Model*: Generates trips from tourists and non-resident visitors, producing tour and trip files.

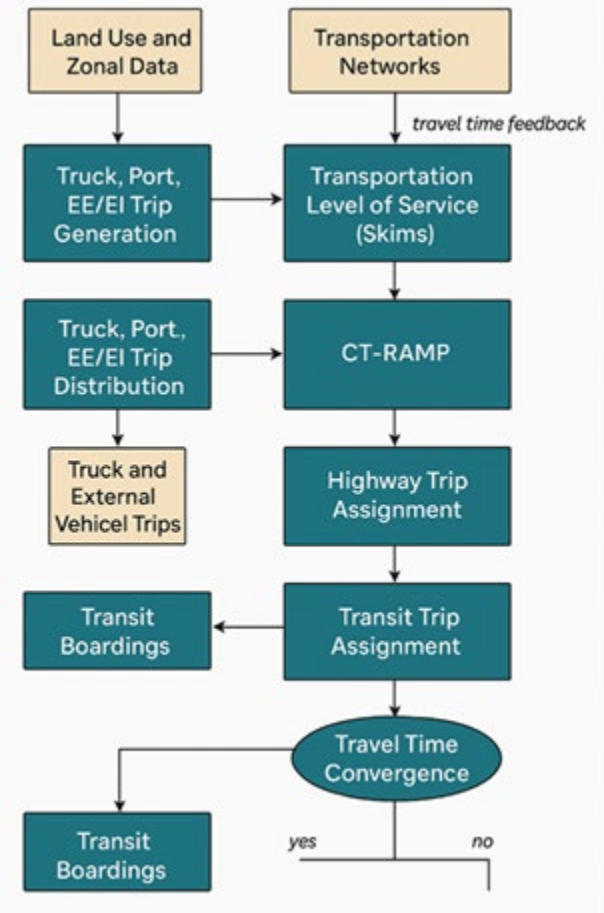


Exhibit 2: SERPM Summary Flow Chart

d. Network Assignment

- *Highway Trip Assignment*: Assigns truck, external, CT-RAMP-generated, and visitor trips to the highway network, resulting in highway volumes and speeds.
- *Transit Trip Assignment*: Assigns passenger transit trips to the transit network, producing Transit Boardings.

e. Feedback Loop

After the highway trip assignment, Travel Time Convergence is checked:

- *Yes* → Model run ends with final assignments.
- *No* → Updated travel times feed back into the Transportation Level of Service (Skims) step, and the process iterates until convergence is reached.

3.1 SERPM Outputs

SERPM 8 generates time-of-day travel demand and traffic assignments across five distinct time periods: **AM peak** (6:00–9:00 AM), **Midday** (9:00 AM–3:00 PM), **PM peak** (3:00–7:00 PM), **Evening** (7:00 PM–10:00 PM)**,** and **Night** (10:00 PM–6:00 AM). These periods represent the temporal distribution of daily travel activity and are used to allocate trips from the activity-based model into appropriately time-stamped demand matrices.

Each time period is assigned a unique set of skims and highway assignments to reflect congestion and travel conditions specific to that interval. To produce daily metrics—such as total vehicle miles traveled (VMT) and vehicle hours traveled (VHT)—the model aggregates the results across all five periods, ensuring that outputs account for diurnal variation in network performance and travel patterns.

3.2 SERPM Highway Network Characteristics

The SERPM highway network classifies all roadway links using **the Facility Type Class 1 (FTC1)** system, which provides a broad categorization of facilities consistent with standard roadway hierarchies. FTC1 identifies links as freeways, principal arterials, minor arterials, collectors, or local roads, and this classification is used in reporting, network summaries, and post-processing of model outputs such as vehicle miles traveled (VMT) and vehicle hours traveled (VHT). These categories provide an interpretable framework for understanding travel patterns and system performance at a regional scale.

In addition to FTC1, the model also employs a **Facility Type Class 2 (FTC2)** coding, which is a more detailed classification used internally during traffic assignment. FTC2 sub-divides the broad FTC1 categories to assign facility-specific capacities, volume–delay function parameters, and adjustments for features such as managed lanes, toll roads, ramps, and auxiliary lanes.

In practice, FTC1 supports communication and summary-level analysis, while FTC2 provides the operational detail necessary for accurate highway assignment and network performance modeling**.** **Exhibit 3** summarizes the differences between this facility-type attributes.

Exhibit 3: Roadway Classification - Facility Types in SERPM

FTC1 (General Category)	FTC2 Subcategories (Detailed)	Use in SERPM
Freeway	Freeway - General Purpose, Managed/Toll Lanes, Ramps, Expressways	Broad reporting category; FTC2 used for assignment with lane, toll, and auxiliary lane adjustments
Principal Arterial	Principal Arterial - Divided, Undivided, Toll Arterials	FTC2 distinguishes major urban vs rural arterials and toll variations; used in capacity lookup
Minor Arterial	Minor Arterial - Divided, Undivided	FTC2 provides finer-grained arterial coding for speeds and capacity
Collector	Major Collector, Minor Collector	FTC2 refines collector coding for suburban vs rural conditions
Local	Local Street (Urban or Rural)	No major FTC2 subdivisions; mostly input for connectivity

Notes: FTC1 = Facility Type Class 1; FTC2 = Facility Type Class 2; SERPM = Southeast Regional Planning Model

4 Highway Network Enhancement

The SERPM base network lacks elevation attributes for roadway links, making it inherently flat. Without correcting for this limitation, flood-depth calculations would have been inaccurate.

4.1 Elevation Data Source and Accuracy

Elevation information was retrieved from the Florida Geographic Data Library (FGDL). The two-foot contour polygon-based dataset was sourced by the Florida Division of Emergency Management, collected by LiDAR, and created by CH2M Hill in 2008, with a reported vertical accuracy of at least two feet.

4.2 SERPM Network Adaptation

Using ArcGIS, elevation data was clipped to an area extending slightly beyond the Broward County boundary to reduce file size (**Exhibit 4**). The clipped elevation dataset was then spatially joined to the unloaded SERPM future network—defined as the network containing all projects in the County's 2045 Long Range Transportation Plan (LRTP)—using the Spatial Join function.

Through this process, each network polyline was assigned the average elevation value of all intersecting contour polygons. The elevation-enhanced network (**Exhibit 5**) was then stored for subsequent use in flood-depth calculations.

Exhibit 4: Broward County Terrain

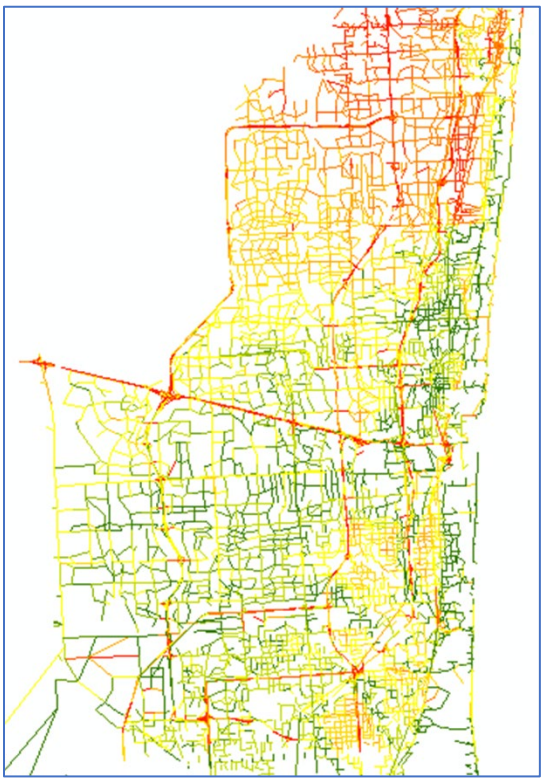


Exhibit 5: SERPM Network with Elevation

4.3 Flood Depth Calculation and Network Conditioning

Flood inundation layers for a 25-year storm under Intermediate and High SLR projections were overlaid on the elevation-enhanced network. Flood depth was calculated as:

- *Flood Depth = Inundation Surface Elevation – Roadway Crest Elevation*
- *Links with depth > 0.5 ft were closed (capacity/speed set to zero)*

5 Alternatives Analyzed

Along with the 25-year flood, we modeled two SLR scenarios: intermediate conditions for 2035 and 2085, and high conditions for 2085. The analysis included a Future Without Project (FWOP) alternative and three build alternatives (A, B, and C). Alternative RO was subsequently analyzed for 25-year flood, intermediate SLR scenario only. These scenarios/alternatives are summarized in **Exhibit 6.** SERPM results are discussed in **Section 6** of this Technical Memo for Alternatives A, B, and C. SERPM results for Alternative RO are discussed in **Section 9**.

For this project, SERPM 2045 trip tables were locked (and reused across all scenarios and alternatives) and the model was run **assignment-only** with closures. The convergence criterion is set for 200 iterations with a relative gap of 0.0001.

Exhibit 6: Scenario Matrix (Year/SLR × Alternative)

Year / SLR	FWOP	Alternative A	Alternative B	Alternative C	Alternative RO
2035 iSLR	✓	✓	✓	✓	✓
2085 iSLR	✓	✓	✓	✓	✓
2085 hSLR	✓	✓	✓	✓	n/a

Notes: FWOP = future without project; hSLR = high sea level rise; iSLR = intermediate sea level rise; RO = Resilience Optimized

6 Roadway Network Flood Impact Assessment

The analysis quantified flood impacts on the roadway network by testing the PM peak traffic period, which represents the heaviest travel demand, in combination with the most severe four-hour flood. This condition is expected to yield the greatest transportation impacts—and thus the most pronounced potential benefits of the build alternatives. If substantial effects are not observed under this condition, other periods can be reasonably assumed to exhibit minimal impacts.

Model reliability is directly dependent on input accuracy; results are only as sound as the underlying data. Accordingly, flood profiles were reviewed to confirm content, identify the worst-case condition, and ensure consistency across scenarios. For each alternative, SFWMD provided 24-hour flood files in four-hour intervals (six files per alternative). These files were statistically analyzed to determine the four-hour period with the greatest flooding. Supporting data, statistical interval-level and daily analyses, and the identification of the most severe four-hour flood are included in **Appendix A**.

6.1 Conversion from PM Peak to Daily Estimates

Although the SERPM analyses were conducted for the weekday PM peak period, the resulting Vehicle-Miles Traveled (VMT) and Vehicle-Hours Traveled (VHT) values were scaled to represent daily totals. This was accomplished by applying the ratio of PM peak VMT/VHT to daily VMT/VHT observed under non-flooded baseline conditions.

By applying this proportional factor, the analysis accounts for less congested periods of the day and ensures that results represent daily exposure to flood conditions rather than an isolated peak period. This approach yields more conservative daily delay and distance estimates while retaining the PM peak as the bounding case for congestion effects.

6.2 Analysis Considerations

Key considerations are highlighted below to provide context for interpreting the modeling results and understanding the scope of the analysis.

- **Artificial Links**: The SERPM network includes *centroid connectors* and artificial links to represent access where smaller roads are not explicitly coded. In low-lying areas with canals and water bodies, these connectors may abstractly connect zones in ways that do not fully capture local flooding conditions. This abstraction, however, is consistent with FDOT and MPO practice for regional models and is not expected to materially bias systemwide outcomes. Nevertheless, at the neighborhood scale, trips maintained in the model may not always be feasible in reality.

- **Peak Period Focus**: The modeling of the weekday PM peak as a conservative upper-bound scenario is intended to represent the maximum plausible exposure of commuter traffic to flood-related closures; results should be interpreted as an upper bookend, not an expected average. Flood events occurring at off-peak times or weekends would likely coincide with reduced demand and, therefore, lower total delay. The proportional impacts of flooding, however, would remain directionally similar. The present analysis provides *an upper-bound* estimate of delay costs. Sensitivity runs at reduced demand levels could be performed in future refinements to illustrate differences between bounding and expected outcomes. It is noteworthy that this sensitivity is only needed if study decisions hinge on these outputs; otherwise, the reported values should be interpreted as stress-test scenario.

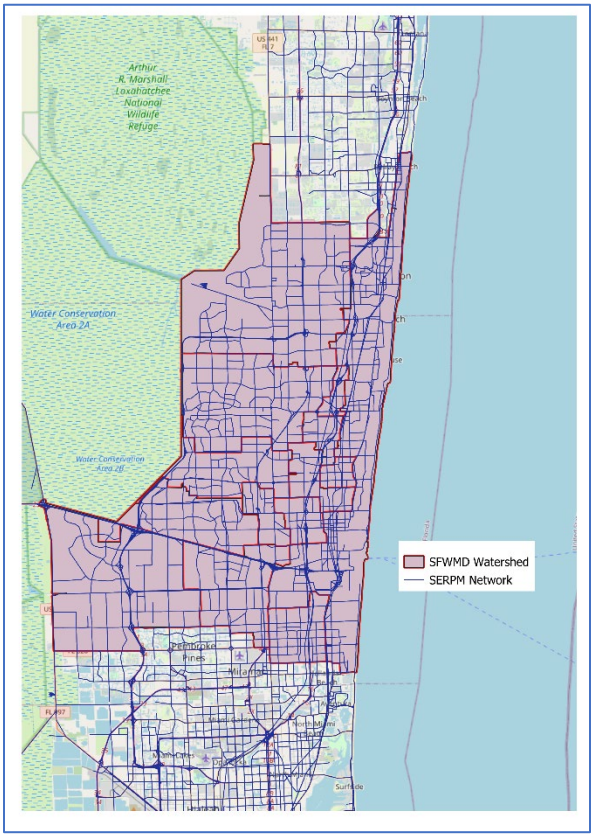
- **Use of Peak Flood Depth**: Road closures were applied for a 24-hour window based on peak inundation exceeding 0.5 feet. In practice, some segments may exceed this threshold for shorter periods. The assumption of a fixed closure window provides a *conservative bounding estimate of maximum travel disruption*. Future refinements could incorporate time-varying closures based on flood hydrographs. As with the peak period focus, this additional more detailed analysis might only be needed if the study decisions are mainly based on these outputs; otherwise, the reported values should be interpreted as a worst-case plausible scenario. Moreover, under extreme closures, fixed-demand assignment can produce penalty hours that exceed physically realizable daily travel. Such outputs are used **only** as an upper-bound stress signal; planning decisions should consider the bracketed mid-case.

- **SERPM Modeling Assumptions and Boundaries**: Models are, by definition, simplified representations of reality. They are designed to capture the most essential features of complex systems while necessarily abstracting from certain details. As such, trade-offs are unavoidable: some aspects of reality must be generalized, omitted, or approximated to make the analysis tractable and consistent. These inherent simplifications do not diminish the value of the modeling results; they provide a structured framework for evaluating scenarios in a transparent and replicable manner.

  The conventions used here—network abstractions consistent with regional practice, a weekday PM peak assignment as a bounding stress test, expansion to daily totals via baseline PM-to-daily ratios, and a conservative closure rule—are transparent choices that emphasize upper-bound disruption and results should be interpreted as such. If critical decisions are sensitive to these assumptions, outcomes can be bracketed using reduced-demand scenarios and time-varying or duration-based closure rules to demonstrate the likely range—always within the capabilities and flexibility of SERPM.

6.3 SERPM Results

Although the model was run for the full region—capturing trips to and from Miami-Dade and Palm Beach Counties that interact with Broward County traffic—results are reported for the watershed polygon provided by SFWMD and depicted in **Exhibit 7**.



Reporting at the full-region scale would dilute meaningful differences in VMT and VHT because aggregation and rounding across a large, congested network can mask small changes.

Accordingly, **Exhibits 8–10** summarize the FWOP condition and the three alternatives for each SLR scenario—2035 iSLR (**Exhibit 8**), 2085 iSLR (**Exhibit 9**), and 2085 hSLR **(Exhibit 10**)—and report results for the watershed area only.

Exhibit 7: Study Watersheds

Exhibit 7: 2035 – Intermediate SLR

Scenario	Truck VMT	Truck VHT	Auto VMT	Auto VHT
FWOP	3,648,000	353,000	51,041,000	8,022,000
Alternative A	3,622,000	212,000	50,612,000	4,410,000
Alternative B	3,629,000	209,000	50,532,000	4,362,000
Alternative C	3,626,000	209,000	50,545,000	4,352,000

Notes: FWOP = future without project; VHT = vehicle hours traveled; VMT = vehicle miles traveled

Exhibit 8: 2085 – Intermediate SLR

Scenario	Truck VMT	Truck VHT	Auto VMT	Auto VHT
FWOP	3,630,000	1,182,000	51,031,000	29,759,000
Alternative A	3,586,000	855,000	49,868,000	21,744,000
Alternative B	3,611,000	939,000	50,401,000	24,159,000

Alternative C	3,597,000	958,000	49,858,000	24,840,000

Note: FWOP = future without project; VHT = vehicle hours traveled; VMT = vehicle miles traveled

Exhibit 9: 2085 – High SLR

Scenario	Truck VMT	Truck VHT	Auto VMT	Auto VHT
FWOP	3,464,000	336,021,000	48,123,000	*Modeled Vehicle-Hours (fixed-demand stress test)*[3]
Alternative A	3,461,000	85,295,000	48,093,000	
Alternative B	3,475,000	86,031,000	48,160,000	
Alternative C	3,475,000	86,031,000	48,160,000	

Notes: FWOP = future without project; VHT = vehicle hours traveled; VMT = vehicle miles traveled

7 Evaluation of Flood Inputs and Reasonableness of SERPM Results

The reliability of any modeling exercise depends first and foremost on the accuracy and representativeness of its input data. In the case of SERPM, flooding is not a variable predicted by the model itself, but rather *an exogenous input that shapes the supply conditions* under which the model operates.

This section does not evaluate the quality or appropriateness of the flood data; instead, it analyzes and summarizes the statistical characteristics of the inputs and examines how these trends are reflected in the model results. Patterns in the input assumptions propagate through the model, influencing performance measures such as vehicle miles traveled (VMT), vehicle hours traveled (VHT), and facility-specific impacts. Linking the analysis of SERPM outputs with a review of flood inputs ensures that observed results are interpreted within the proper context.

The objective of this section is to verify whether observed hydrologic changes—quantified in both absolute terms and probability distributions—are consistent with and predictive of changes in VMT and VHT under varying SLR and storm scenarios.

7.1 Flood Depth Trends

The progression from *2035 iSLR → 2085 iSLR* (different years, but same SLR) represents a moderate hydrologic intensification (~10% depth increase), while the leap from *2085 iSLR → 2085 hSLR* (same year, different SLR) is substantially larger (>26%), indicating that system performance in later scenarios will be disproportionately sensitive to the assumed SLR trajectory.

The flood depth increments reported below (e.g., +0.61 ft, +1.73 ft) are based on the mean (**μ**) of the Gaussian distributions, representing the *expected average flood depth*. They do not reflect maximum values, which would yield larger changes but are less directly comparable to system-wide average performance metrics such as VMT and VHT.

[3] Values reflect a fixed-demand assignment under 24-hr closures. They represent an **upper-bound penalty** under infeasible conditions and are not an operational forecast.

Exhibit 11 summarizes the flood depth trend analyses—stepwise escalation between time horizons and SLR severity levels—and reveals consistent behavior across the FWOP and all build alternatives. The graphical representations of these trends are included in **Appendix B.**

Exhibit 11: Flood Depth Trend Analysis

Future Without Project

- *2035→2085 iSLR:* *+0.61 ft* *(10.1%)*
- *2085 iSLR→2085 hSLR:* *+1.75 ft* *(27.3%)*

Alternative A

- *2035→2085 iSLR:* *+0.61 ft* *(10.2%)*
- *2085 iSLR→2085 hSLR:* *+1.73 ft* *(26.5%)*

Alternative B

- *2035→2085 iSLR:* *+0.61 ft* *(10.2%)*
- *2085 iSLR→2085 hSLR:* *+1.74 ft* *(26.6%)*

Alternative C

- *2035→2085 iSLR:* *+0.61 ft* *(10.4%)*
- *2085 iSLR→2085 hSLR:* *+1.75 ft* *(26.9%)*

Notes: iSLR = intermediate sea level rise; hSLR = high sea level rise

Exhibit 10: Impact of Time and SLR Scenarios on Average Flood Depths

Alternative	2035 iSLR (ft)	2085 iSLR (ft)	2085 hSLR (ft)	2035 iSLR→ 2085 iSLR (%)	2085 iSLR→ 2085 hSLR (%)
FWOP	5.9	6.5	8.3	10.1	27.3
Alternative A	5.9	6.6	8.3	10.2	26.5
Alternative B	5.9	6.5	8.3	10.2	26.6
Alternative C	5.9	6.5	8.3	10.4	26.9

Notes: FWOP = future without project; iSLR = intermediate sea level rise; hSLR = high sea level rise

7.2 Flood Depth Distributions

A Gaussian curve, also referred to as a *normal distribution* or *bell curve*, is a statistical representation of how values are distributed around a central average. It is characterized by a single peak at the mean and a symmetrical shape, where values closer to the mean occur more frequently, and values farther from the mean occur less frequently.

In the context of this study, these curves were applied to represent the distribution of flood depths. By examining shifts in the mean of these distributions across scenarios, the analysis identifies whether average conditions under each alternative meaningfully differ from one another.

Future Without Project

- *Mean **μ** rises from ~5.9 ft in 2035 iSLR to ~8.2 ft in 2085 hSLR.*
- *Standard deviation **σ** remains stable (~0.48–0.49 ft).*

Alternative A

- *Mean **μ** increases from ~5.92 ft in 2035 iSLR to ~8.25 ft in 2085 hSLR.*
- *Standard deviation **σ** remains stable at ~0.48–0.49 ft.*

Alternative B

- *Mean **μ** increases from ~5.9 ft in 2035 iSLR to ~8.24 ft in 2085 hSLR.*
- *Standard deviation **σ** remains stable at ~0.48–0.49 ft.*

Alternative C

- *Mean **μ** increases from ~5.87 ft in 2035 iSLR to ~8.24 ft in 2085 hSLR.*
- *Standard deviation **σ** remains stable at ~0.48–0.49 ft.*

The stability of **σ** indicates that the range of day-to-day variability is unchanged; the upward shift of the mean (***μ)*** with hSLR signals a systematic baseline rise in flood depth. This behavior suggests that flood events will not only remain frequent but will, on average, occur at significantly higher depths—amplifying travel disruption risks even under "typical" flood days. These results are also graphically depicted in **Appendix B**.

8 Quantitative Correlation of Flood Hazard with SERPM VMT/VHT Results

This section demonstrates how incremental increases in flood hazard—expressed as depth and/or probability and provided externally to SERPM—translate into modeled network performance in terms of Vehicle-Miles Traveled (VMT) and Vehicle-Hours Traveled (VHT) across analysis years, SLR/storm scenarios, and build alternatives.

Performance changes are expected to be nonlinear: small additional inundations can disable critical links or nodes, lengthen detours, and reduce effective speeds, which elevates VHT and, under severe conditions, can reduce VMT due to suppressed trips or shorter feasible paths.

Because hazard inputs are essentially consistent across alternatives within a given scenario, observed differences in VMT/VHT primarily reflect differences in network design and operations (capacity, connectivity, and routing options). The exhibits that follow link trends in network exposure to changes in VMT/VHT to support a reasonableness assessment of model outcomes given the supplied flood assumptions.

8.1 Overview of Findings

Comparing flood depth changes to modeled performance metrics reveals a strong qualitative correlation.

- **2035 iSLR (~0.6 ft increase)**: Build alternatives reduce Auto VHT by ~45–47% vs. FWOP (base). Impacts are moderate because the network still has convenient rerouting routes with available capacity.

- **2085 iSLR (~0.6 ft increase)**: Auto VHT increases sharply under more severe closures; build alternatives still trims delay when compared with FWOP (Alt A ≈–27%, Alt B ≈–19%, Alt C ≈–16.5%). This indicates growing sensitivity as the system approaches saturation.

- **2085 hSLR (~1.73–1.75 ft increase)**: FWOP Auto VHT grows to orders of magnitude higher; build alternatives still reduce delay ≈73–74%, showing material adaptation benefits even under extreme conditions.

Across scenarios, the direction of change in Auto VMT and Auto VHT tracks the intensity and spatial reach of flooding, but the magnitude is distinctly ***nonlinear***. When closures are limited and viable relievers exist, flows can reroute with modest delay.

As flooding encroaches on mid-tier relievers and collectors, detours lengthen and speeds fall, compounding delay even when the additional inundation appears small. This context frames the scenario comparisons below (**Exhibit 12**) and explains why a given depth increment has very different network effects in 2035 iSLR, 2085 iSLR, and 2085 hSLR.

Exhibit 11: Flood Depth vs. Performance — Scenario Summary

Scenario	Δ Flood vs prior (%)	FWOP Auto VHT	Δ VHT vs prior FWOP (%)	Build VHT vs. FWOP (Alternatives A/B/C)	Network state
2035iSLR	—	8,022,000	—	Alt A -45.0% Alt B -45.6% Alt C -45.7%	Capacity remains available
2085iSLR	10.2–11.9	29,759,000	271%	Alt A -26.9% Alt B -18.8% Alt C -16.5%	Strained capacity / approaching saturation
2085hSLR	27.7–25.8	N/A	N/A	Alt A -73.7% Alt B -73.4% Alt C -73.4%	Network failure (stress test)

Notes: Δ = delta/change; FWOP – future without project; VHT = vehicle hours traveled; iSLR = intermediate sea level rise; hSLR = high sea level rise

8.2 Observed Proportionality and Scenario Sensitivity

While the proportionality between flood depth and VHT/VMT degradation is generally strong, the sensitivity is ***nonlinear***—small depth increases in already-constrained networks yield disproportionately large delay impacts. When road closure (water level on road ≥ 0.5 ft) is modest and redundancy exists, a small depth increase causes limited delay.

Under more severe road closures, the same depth increase forces widespread detours onto slower facilities, compounding congestion and producing outsized VHT growth. With large depth jumps (e.g., 2085 hSLR), closures are extensive; some trips are suppressed altogether (VMT can decrease) while delays surge (in order of magnitude) as the network approaches gridlock.

Deviations among Alternatives A–C in performance metrics under similar hydrologic conditions are minimal, suggesting that while their intrinsic differences may influence localized resilience, they do not materially alter flood exposure at the macro scale across the roadway network.

8.3 Alignment in Model Results

This subsection evaluates face validity by comparing the spatial and temporal progression of flood inputs with corresponding SERPM outcomes. The objective is to verify that changes in Auto VMT/VHT align with the geographic extent and intensity of inundation, the availability of detour routes, and the exposure of specific facility types. In essence, the analysis tests whether the input patterns plausibly generate the modeled results.

8.3.1 Vulnerability to Flood of Different Roadway Types

The SERPM highway network classifies all roadway links using the **Facility Type Class 1 (FTC1)** system, which provides a broad categorization of facilities consistent with standard roadway hierarchies. FTC1 identifies links as freeways, principal arterials, minor arterials, collectors, or local roads, and this classification is used in reporting, network summaries, and post-processing of model outputs. These categories (described in **Exhibit 13**) provide an interpretable framework for understanding flooding risk and system performance at a regional scale as shown in **Exhibit 14**.

Exhibit 12: SERPM Model Facility Type 1 (FTC 1) Dictionary

FTC 1	Facility type	Access / operating characteristics	Role in detours
10	Freeway	Fully access-controlled, high speed	Even low exposure is consequential; ramp/segment closures spill traffic to slower classes.
20	Uninterrupted roadway	Long signal spacing / divided	Parallel reliever to freeways; closures push traffic to 40/60.
40	Higher-speed interrupted facility	Signalized arterial	Flooding moves demand to collectors/locals; delays propagate.
60	Lower-speed & collector facility	Collectors/locals	Primary detour class; high exposure explains nonlinear VHT.
70	Ramps	Freeway ramps	Localized but critical; closures sever movements and reduce usable mainline capacity.
80	HOV/Managed lanes	Co-located with freeways	Exposure reduces effective capacity when closed.
90	Toll roads	Limited-access tolled	Often resilient corridors that absorb detours when open.

Notes: FTC1 = Facility Type Class 1; SERPM = Southeast Regional Planning Model

When flooding affects freeways and uninterrupted roadways, displaced demand shifts to interrupted facilities and collectors, where side friction and signal control dominate, amplifying delay. Exposure of ramps constrains access, and exposure of managed/toll lanes reduces redundancy that would otherwise absorb rerouted flows.

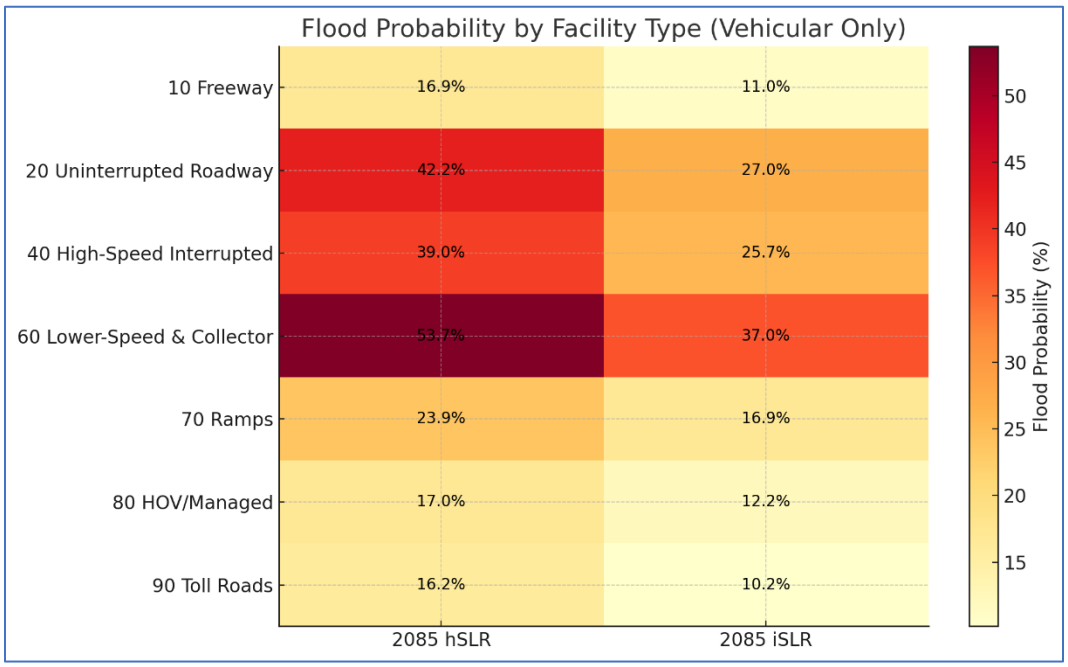


Exhibit 13: Flood Probability by Facility Type — iSLR vs. hSLR

8.3.2 Hazard Progression – Spatial Verification

Exhibit 15 maps the flooded roadway links within the watershed in Broward County for 2085 iSLR (top row) and 2085 hSLR (bottom row), shown side-by-side across FWOP and the three build alternatives (columns). Links are color-ramped by retained water depth (ft.); red segments indicate higher depths—i.e., links that would exceed the SERPM closure threshold and be removed from the network—while green segments remain passable.

The pattern is clear: under 2085 iSLR, flooding is concentrated along the coast and tidal channels, with inland grids largely intact; under 2085 hSLR, inundation spreads westward and along key arterials, severing many more coastal, near-coastal, and mid-tier reliever/collector links. Visual differences among alternatives are modest compared with the scenario step itself, reinforcing that performance changes are driven primarily by the hazard intensity and spatial reach (iSLR → hSLR), not by materially different exposure across alternatives.

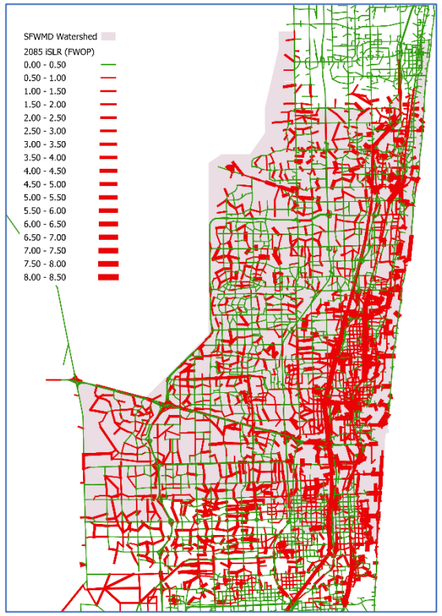
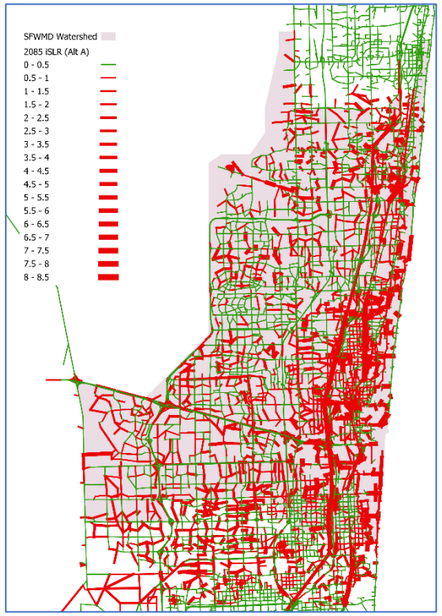
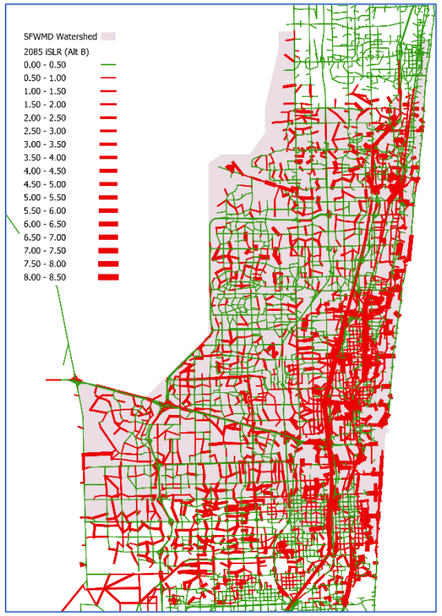
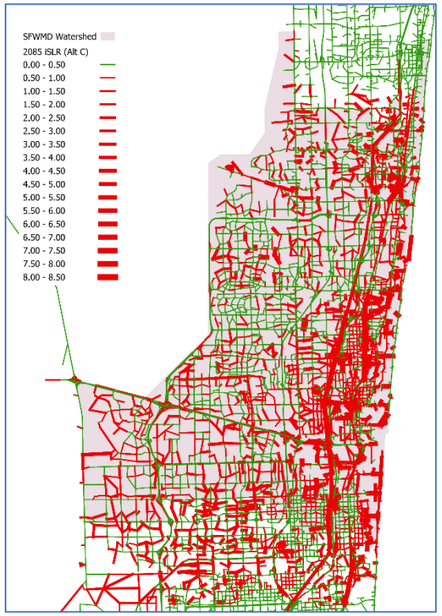
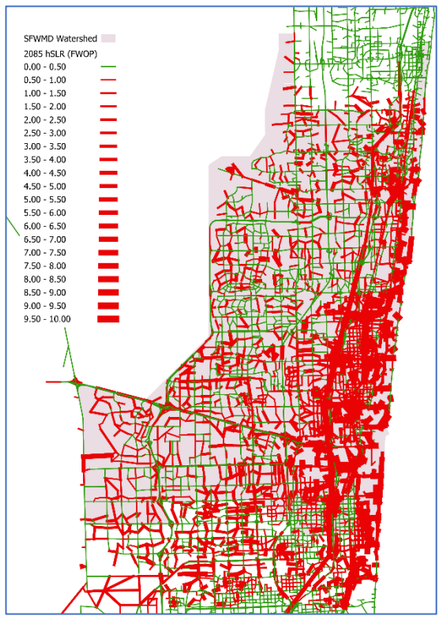
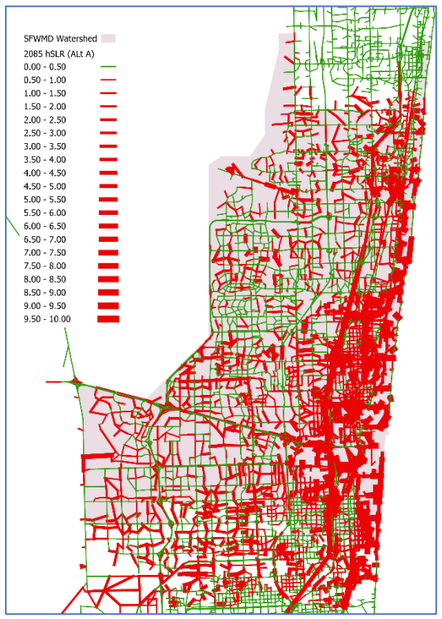
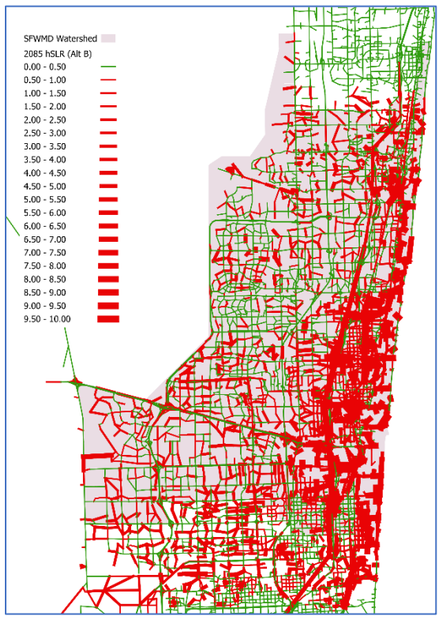
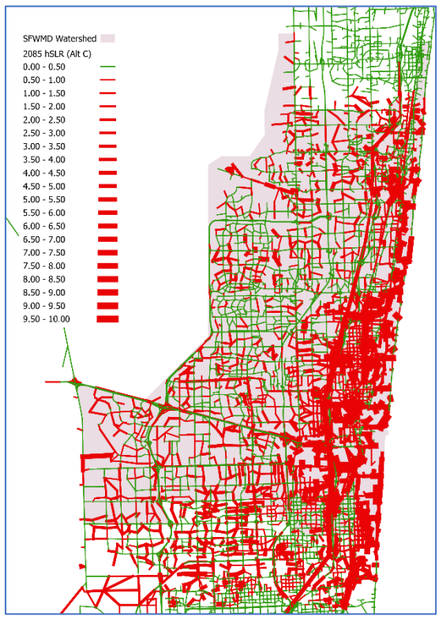
2085 iSLR (Intermedia Sea Level Rise)				
2085 hSLR (High Sea Level Rise)				

Exhibit 14: Spatial Progression of Flood by SLR and Alternatives

9 Alternative Resilience Optimized (RO)

An optimization exercise was completed following the comprehensive benefits review of Alternatives A, B, and C whereby a new optimized Alternative was created, Alternative Resilience Optimized (RO). Alternative RO is comprised of effective features from Alternatives A, B, and C. Modeling was repeated for Alternative RO to evaluate VHT and VMT in the 25-year storm under Intermediate SLR projections. Alternative RO was not evaluated under the High SLR 2085 scenario, as prior testing of the other alternatives showed widespread network system impacts that limited meaningful comparison at that flood level. The results of the tested scenarios are provided in **Exhibits 16-17** below. The statistical analysis of Alternative RO flood profile is included in Appendix C.

Exhibit 16: 2035 – Intermediate SLR

Scenario	Truck VMT	Truck VHT	Auto VMT	Auto VHT
FWOP	3,648,000	353,000	51,041,000	8,022,000
Alternative RO	992,000	96,000	15,127,000	1,987,000

Notes: FWOP = future without project; RO = Resilience Optimized; VHT = vehicle hours traveled; VMT = vehicle miles traveled

Exhibit 17: 2085 – Intermediate SLR

Scenario	Truck VMT	Truck VHT	Auto VMT	Auto VHT
FWOP	3,630,000	1,182,000	51,031,000	29,759,000
Alternative RO	985,000	311,000	15,036,000	7,129,000

Notes: FWOP = future without project; RO = Resilience Optimized; VHT = vehicle hours traveled; VMT = vehicle miles traveled

10 Conclusions and Methodological Recommendations

This study deliberately adopted a conservative, stress-test framing: weekday PM peak assignment, a fixed 24-hour closure window based on peak inundation, and baseline PM-to-daily expansion factors. This approach was appropriate for an initial trial, given the limited understanding of the flood files at project start and the need to establish an upper bound on disruption.

That said, several methodological refinements could materially improve reliability and reproducibility while preserving the stress-test intent. Key improvements include: (i) shifting from a single-period PM run with baseline expansion to multi-period assignments with time-varying closures, and (ii) bracketing results with both an upper-bound and a mid-case scaling rather than relying on a single daily number. These refinements would help control unrealistic VHT inflation under near-failure conditions and align the workflow more closely with the model's capabilities.

Even with such methodological enhancements, the qualitative conclusions of this report remain unchanged: as sea-level rise severity and event intensity increase, closures compound nonlinearly, and well-targeted projects (the tested alternatives) continue to deliver substantial relative delay reductions under stress. The refinements serve primarily to make the magnitude estimates more defensible and the analysis more transparent.

APPENDIX A: Statistical Analysis of SERPM Flood Input Data (Alternatives A, B, C)

1) Future Without Project – 2035 Intermediate Sea Level Rise

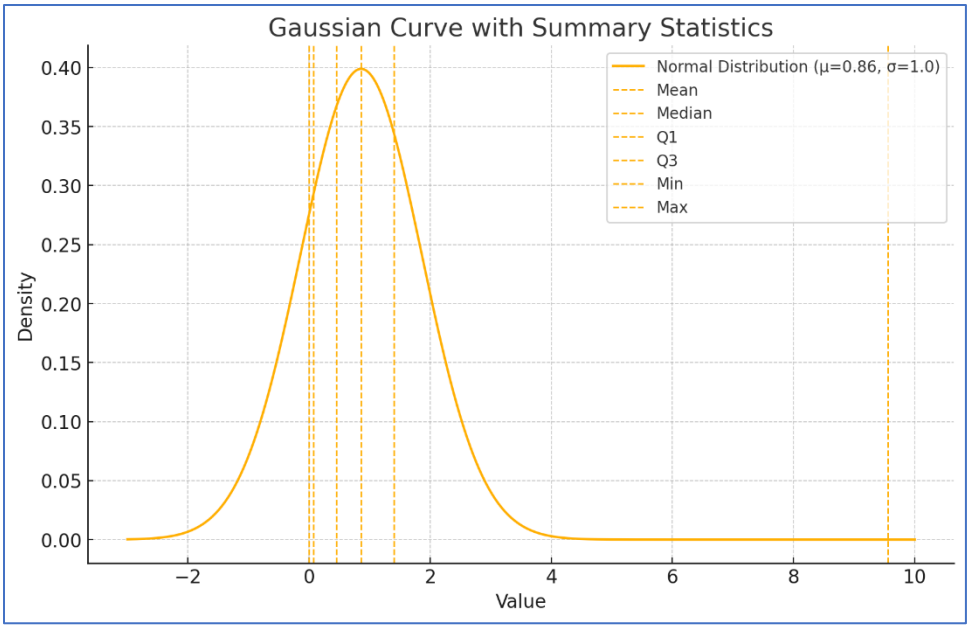
Flood Data in Four-Hour Periods

12_ECB_2S25R35i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	495,295	0.66	0.92	0.0001	0.04	0.19	1.07	7.62
100	516,951	0.65	0.81	0.0001	0.06	0.22	1.10	6.74
104	522,127	0.68	0.82	0.0001	0.06	0.25	1.16	6.84
108	720,145	0.92	1.00	0.0001	0.24	0.54	1.36	9.14
112	591,550	0.98	1.05	0.0001	0.11	0.58	1.65	9.56
116	574,919	0.97	1.04	0.0001	0.07	0.59	1.69	9.41
120	564,573	1.06	1.17	0.0001	0.08	0.66	1.80	9.52

Notes: 2S25R35i = 2-year coastal, 25-year rainfall, 2035 condition, intermediate sea level rise; ECB = existing conditions baseline

Daily Flood Data

Statistic	Without Zeros
Count	3,985,560
Mean	0.86
Std Deviation	1.00
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.45
Q3 (75%)	1.40
Max Value	9.56



Future Without Project – 2035 Intermediate Sea Level Rise

2) Future Without Project – 2085 Intermediate Sea Level Rise

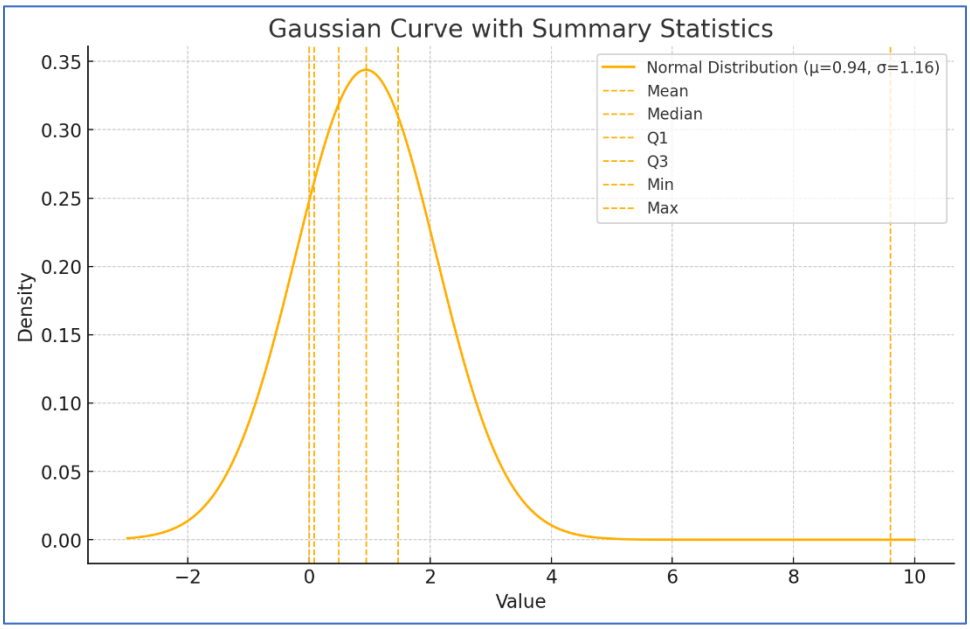
Flood Data in Four-Hour Periods

13_FWOPi_2S25R85i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	503,434	0.76	1.14	0.0001	0.04	0.24	1.16	6.84
100	523,034	0.75	1.00	0.0001	0.06	0.25	1.19	7.13
104	527,000	0.77	0.97	0.0001	0.06	0.29	1.25	7.71
108	728,602	1.00	1.18	0.0001	0.24	0.56	1.42	9.24
112	610,070	1.05	1.20	0.0001	0.11	0.61	1.70	9.59
116	586,098	1.04	1.15	0.0001	0.08	0.63	1.76	9.44
120	583,514	1.15	1.33	0.0001	0.08	0.70	1.85	9.54

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, intermediate sea level rise; FWOPi = future without project, intermediate sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,061,752
Mean	0.94
Std Deviation	1.16
Min Value	0.00
Q1 (25%)	0.08
Median (50%)	0.49
Q3 (75%)	1.47
Max Value	9.59



Future Without Project ***– 2085 Intermediate Sea Level Rise***

3) Future Without Project – 2085 High Sea Level Rise

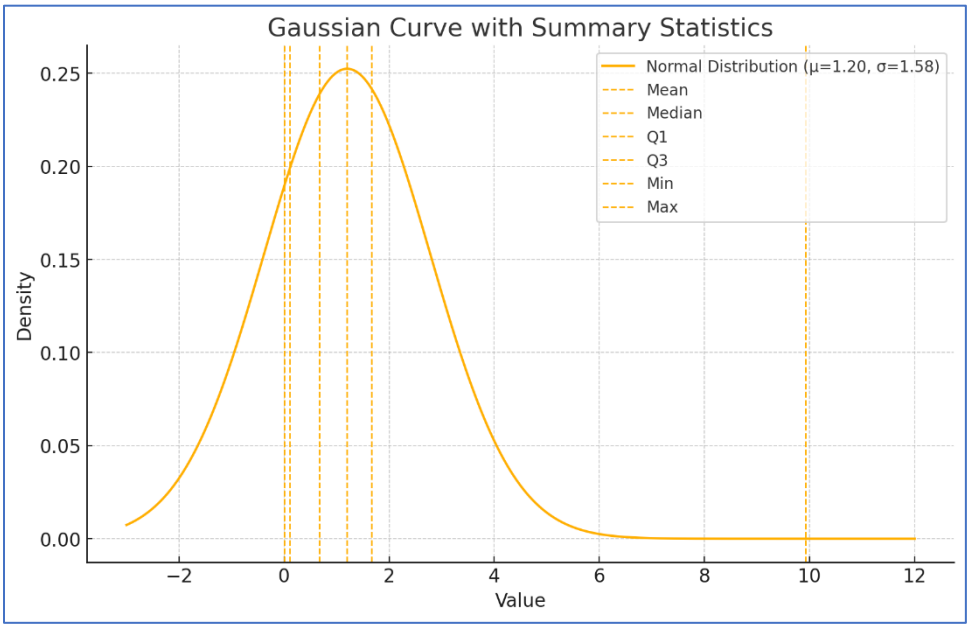
Flood Data in Four-Hour Periods

14_FWOPh_2S25R85h -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	540,554	1.05	1.64	0.0001	0.04	0.47	1.36	9.27
100	562,112	1.02	1.49	0.0001	0.07	0.47	1.38	8.49
104	563,856	1.02	1.45	0.0001	0.07	0.47	1.42	8.24
108	758,141	1.24	1.60	0.0001	0.27	0.67	1.66	9.86
112	655,945	1.30	1.58	0.0001	0.15	0.83	1.84	9.92
116	630,594	1.27	1.50	0.0001	0.13	0.83	1.85	9.57
120	635,161	1.40	1.72	0.0001	0.13	0.93	1.98	9.65

Notes: 2S25R85h = 2-year coastal, 25-year rainfall, 2085 condition, high sea level rise; FWOPh = future without project, high sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,346,363
Mean	1.20
Std Deviation	1.58
Min Value	0.00
Q1 (25%)	0.11
Median (50%)	0.67
Q3 (75%)	1.66
Max Value	9.92



Future Without Project – 2085 High Sea Level Rise

4) Alternative A – 2035 Intermediate Sea Level Rise

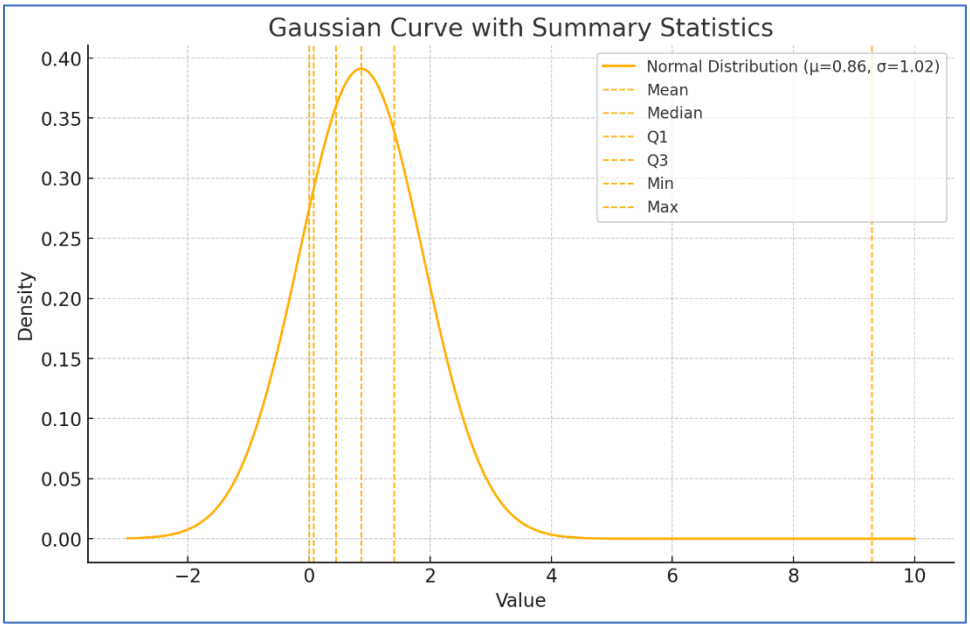
Flood Data in Four-Hour Periods

15_ECWP_AlternativeA_2S25R35i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	494,709	0.66	0.93	0.0001	0.04	0.17	1.06	6.63
100	513,037	0.66	0.84	0.0001	0.05	0.21	1.10	7.67
104	517,347	0.68	0.85	0.0001	0.05	0.24	1.16	6.88
108	716,290	0.92	1.02	0.0001	0.23	0.53	1.35	9.04
112	587,369	0.97	1.08	0.0001	0.10	0.56	1.63	9.29
116	559,864	0.98	1.07	0.0001	0.07	0.61	1.70	9.17
120	559,809	1.06	1.19	0.0001	0.06	0.64	1.79	9.27

Notes: 2S25R35i = 2-year coastal, 25-year rainfall, 2035 condition, intermediate sea level rise; ECWP = existing conditions with project

Daily Flood Data

Statistic	Without Zeros
Count	3,948,425
Mean	0.86
Std Deviation	1.02
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.44
Q3 (75%)	1.40
Max Value	9.29



Alternative A – 2035 Intermediate Sea Level Rise

5) Alternative A – 2085 Intermediate Sea Level Rise

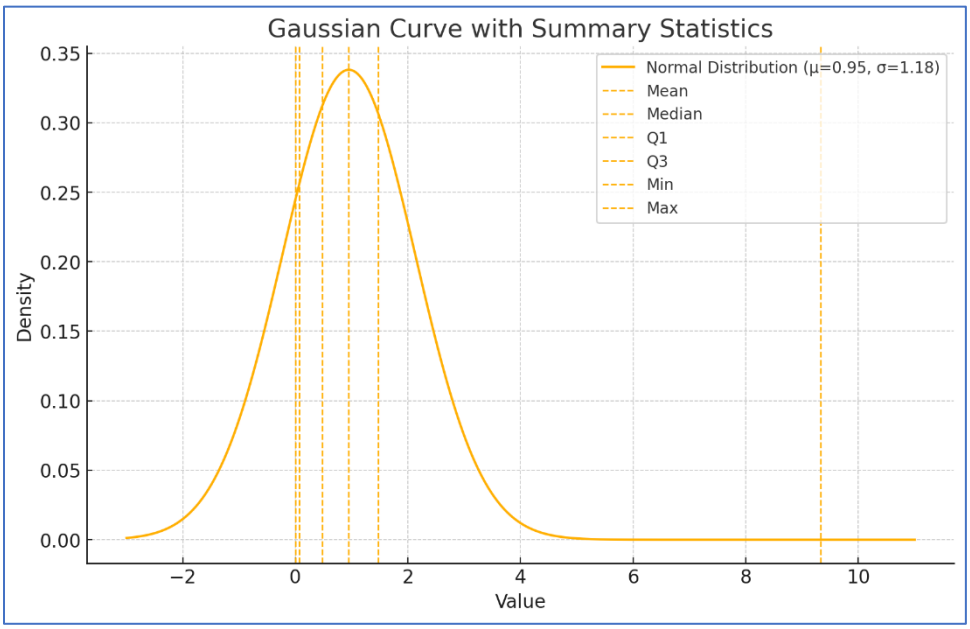
Flood Data in Four-Hour Periods

16_FWPi_AlternativeA_2S25R85i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	502,783	0.77	1.16	0.0001	0.04	0.23	1.16	6.84
100	519,180	0.75	1.02	0.0001	0.05	0.24	1.19	7.71
104	522,309	0.77	1.00	0.0001	0.05	0.27	1.26	6.88
108	725,967	1.00	1.19	0.0001	0.24	0.55	1.40	9.12
112	600,284	1.06	1.22	0.0001	0.11	0.61	1.70	9.33
116	578,040	1.05	1.18	0.0001	0.07	0.62	1.75	9.20
120	574,821	1.15	1.36	0.0001	0.07	0.69	1.84	9.32

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, intermediate sea level rise; FWPi = future with project, intermediate sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,023,384
Mean	0.95
Std Deviation	1.18
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.48
Q3 (75%)	1.47
Max Value	9.33



Alternative A – 2085 Intermediate Sea Level Rise

6) Alternative A – 2085 High Sea Level RIse

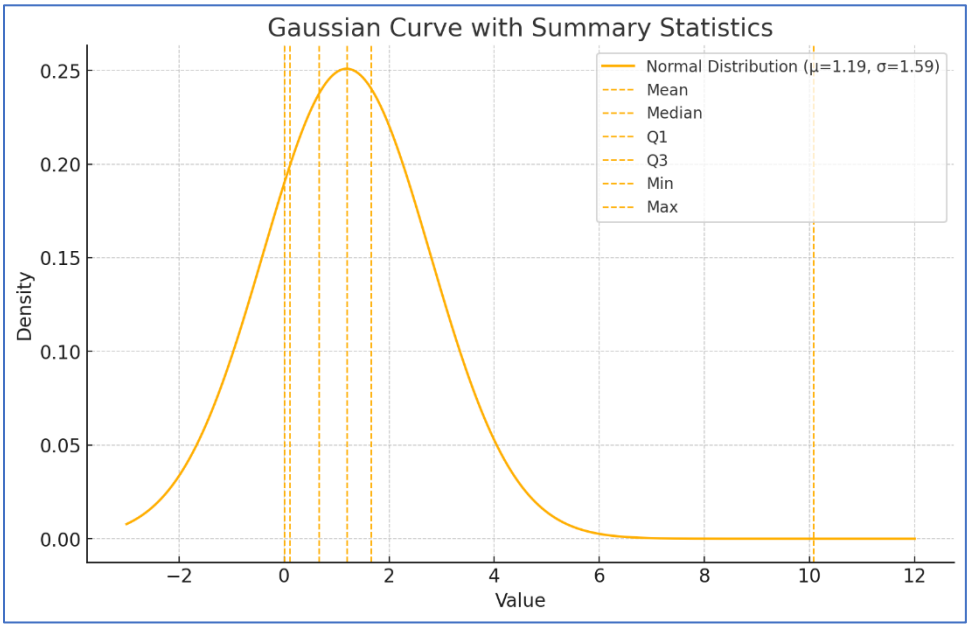
Flood Data in Four-Hour Periods

17_FWPh_AlternativeA_2S25R85h -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	539,355	1.05	1.65	0.0001	0.04	0.45	1.36	9.27
100	558,071	1.02	1.50	0.0001	0.06	0.45	1.38	8.55
104	558,990	1.01	1.46	0.0001	0.06	0.46	1.42	8.29
108	751,720	1.23	1.61	0.0001	0.27	0.65	1.65	9.91
112	645,765	1.30	1.59	0.0001	0.15	0.83	1.83	10.07
116	621,501	1.27	1.50	0.0001	0.12	0.82	1.85	9.66
120	625,381	1.40	1.73	0.0001	0.12	0.93	1.97	9.79

Notes: 2S25R85h = 2-year coastal, 25-year rainfall, 2085 condition, high sea level rise; FWPh = future with project, high sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,300,783
Mean	1.19
Std Deviation	1.59
Min Value	0.00
Q1 (25%)	0.11
Median (50%)	0.66
Q3 (75%)	1.65
Max Value	10.07



Alternative A – 2085 High Sea Level Rise

7) Alternative B – 2035 Intermediate Sea Level Rise

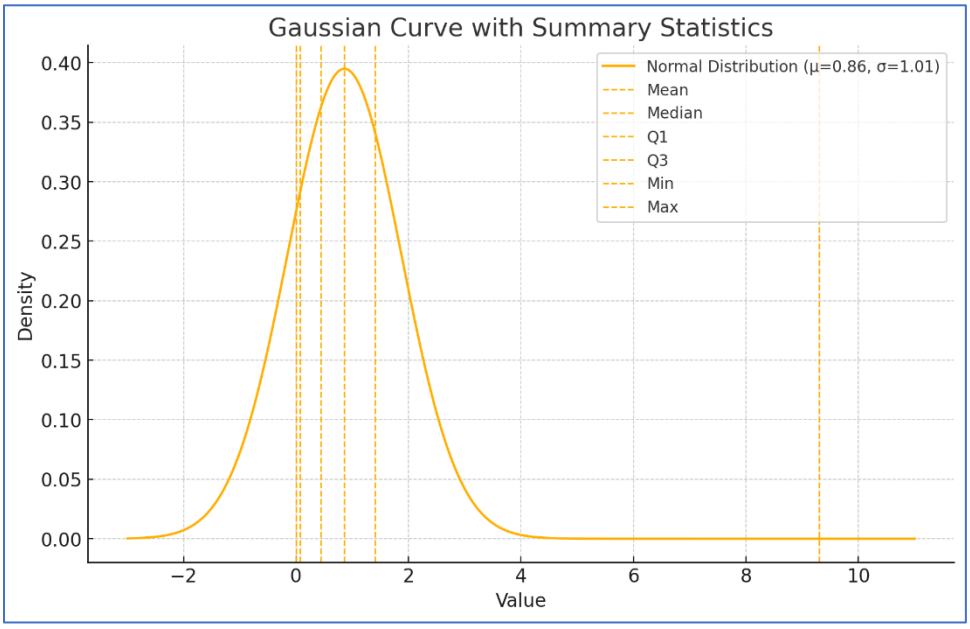
Flood Data in Four-Hour Periods

18_ECWP_AlternativeB_2S25R35i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	494,682	0.66	0.93	0.0001	0.04	0.17	1.06	6.98
100	512,991	0.66	0.83	0.0001	0.05	0.20	1.10	6.58
104	517,296	0.68	0.84	0.0001	0.05	0.24	1.16	6.67
108	715,928	0.92	1.01	0.0001	0.23	0.53	1.34	9.04
112	583,603	0.98	1.07	0.0001	0.10	0.57	1.64	9.30
116	562,991	0.97	1.06	0.0001	0.07	0.59	1.69	9.17
120	559,307	1.05	1.18	0.0001	0.06	0.64	1.79	9.28

Notes: 2S25R35i = 2-year coastal, 25-year rainfall, 2035 condition, intermediate sea level rise; ECWP = existing conditions with project

Daily Flood Data

Statistic	Without Zeros
Count	3,946,798
Mean	0.86
Std Deviation	1.01
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.44
Q3 (75%)	1.40
Max Value	9.30



Alternative B – 2035 Intermediate Sea Level Rise

8) Alternative B – 2085 Intermediate Sea Level Rise

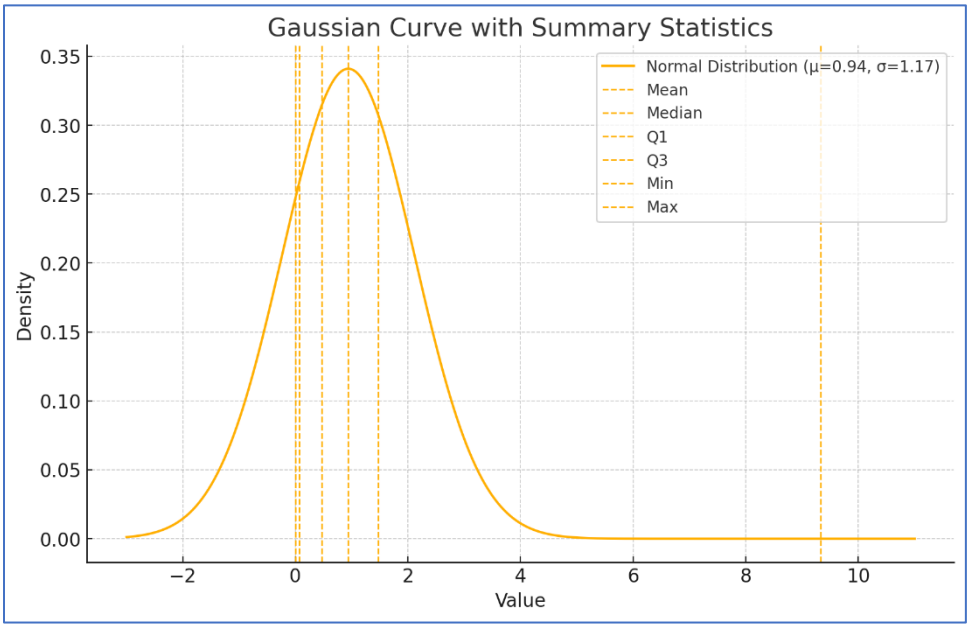
Flood Data in Four-Hour Periods

19_FWPi_AlternativeB_2S25R85i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	502,808	0.76	1.15	0.0001	0.04	0.22	1.16	6.84
100	519,193	0.75	1.02	0.0001	0.05	0.24	1.19	6.99
104	522,250	0.77	0.99	0.0001	0.05	0.27	1.26	6.73
108	725,476	0.99	1.19	0.0001	0.24	0.55	1.40	9.12
112	602,651	1.05	1.22	0.0001	0.10	0.59	1.69	9.33
116	573,896	1.05	1.17	0.0001	0.07	0.63	1.76	9.21
120	574,023	1.15	1.35	0.0001	0.07	0.69	1.84	9.32

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, intermediate sea level rise; FWPi = future with project, intermediate sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,020,297
Mean	0.94
Std Deviation	1.17
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.47
Q3 (75%)	1.47
Max Value	9.33



Alternative B ***– 2085 Intermediate Sea Level Rise***

9) Alternative B – 2085 High Sea Level Rise

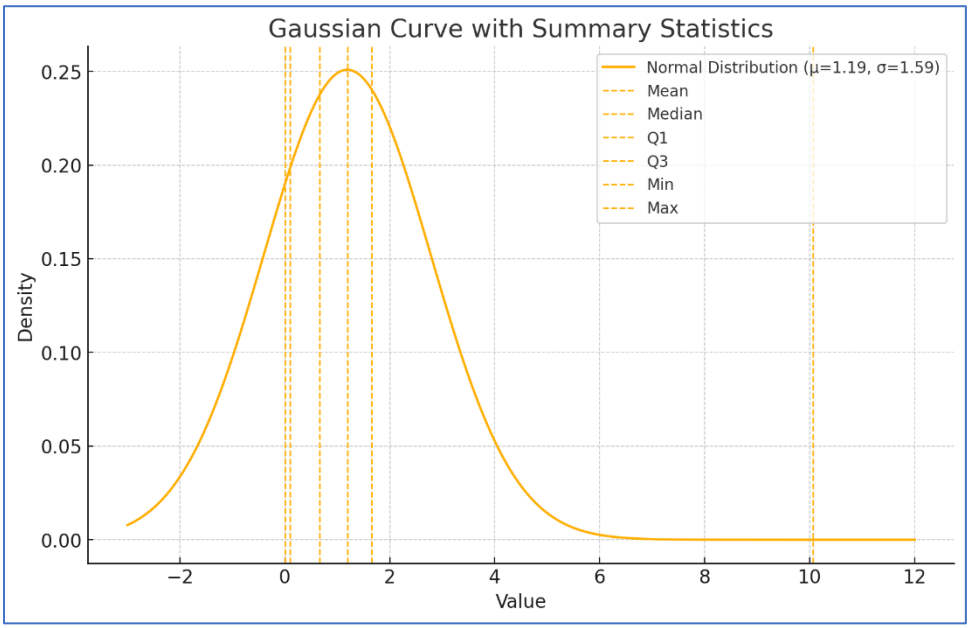
Flood Data in Four-Hour Periods

20_FWPh_AlternativeB_2S25R85h -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	539,800	1.05	1.65	0.0001	0.04	0.45	1.36	9.27
100	558,342	1.02	1.50	0.0001	0.06	0.45	1.38	8.55
104	559,263	1.01	1.46	0.0001	0.06	0.46	1.41	8.29
108	752,227	1.23	1.61	0.0001	0.26	0.65	1.65	9.91
112	644,032	1.30	1.58	0.0001	0.14	0.83	1.83	10.06
116	619,799	1.26	1.50	0.0001	0.11	0.82	1.85	9.66
120	623,714	1.40	1.72	0.0001	0.11	0.93	1.97	9.78

Notes: 2S25R85h = 2-year coastal, 25-year rainfall, 2085 condition, high sea level rise; FWPh = future with project, high sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,297,177
Mean	1.19
Std Deviation	1.59
Min Value	0.00
Q1 (25%)	0.10
Median (50%)	0.66
Q3 (75%)	1.65
Max Value	10.06



Alternative B ***– 2085 High Sea Level Rise***

10) Alternative C – 2035 Intermediate Sea Level Rise

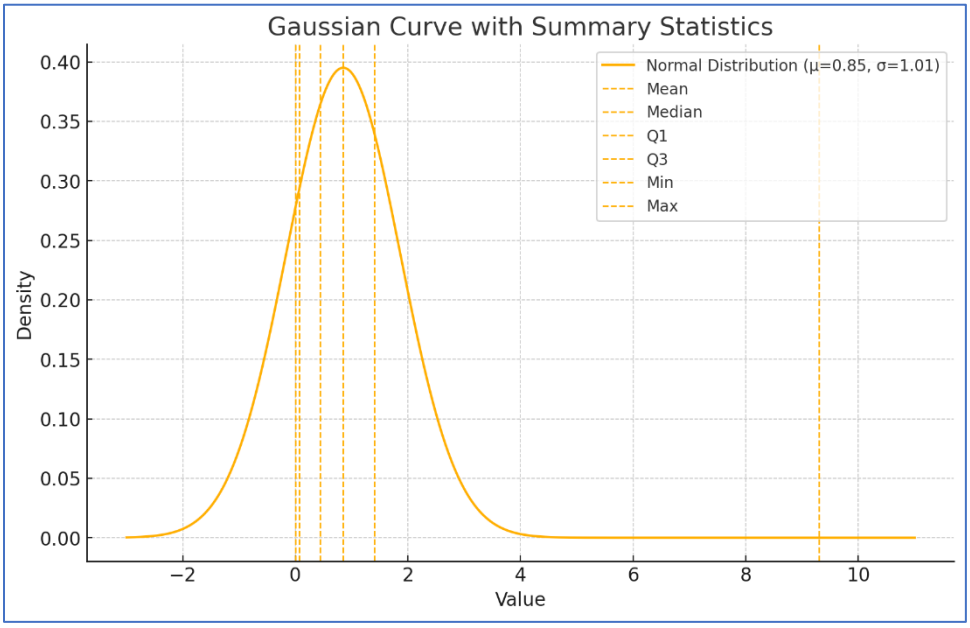
Flood Data in Four-Hour Periods

21_ECWP_AlternativeC_2S25R35i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	494,812	0.66	0.93	0.0001	0.04	0.18	1.06	6.50
100	513,104	0.66	0.83	0.0001	0.05	0.21	1.09	6.58
104	517,368	0.68	0.83	0.0001	0.05	0.24	1.15	6.67
108	715,772	0.92	1.01	0.0001	0.23	0.53	1.34	9.04
112	589,628	0.96	1.06	0.0001	0.09	0.56	1.63	9.30
116	565,990	0.97	1.06	0.0001	0.06	0.59	1.68	9.17
120	562,389	1.05	1.18	0.0001	0.06	0.64	1.78	9.28

Notes: 2S25R35i = 2-year coastal, 25-year rainfall, 2035 condition, intermediate sea level rise; ECWP = existing conditions with project

Daily Flood Data

Statistic	Without Zeros
Count	3,959,063
Mean	0.85
Std Deviation	1.01
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.44
Q3 (75%)	1.40
Max Value	9.30



Alternative C – 2035 Intermediate Sea Level Rise

Alternative C – 2085 Intermediate Sea Level Rise

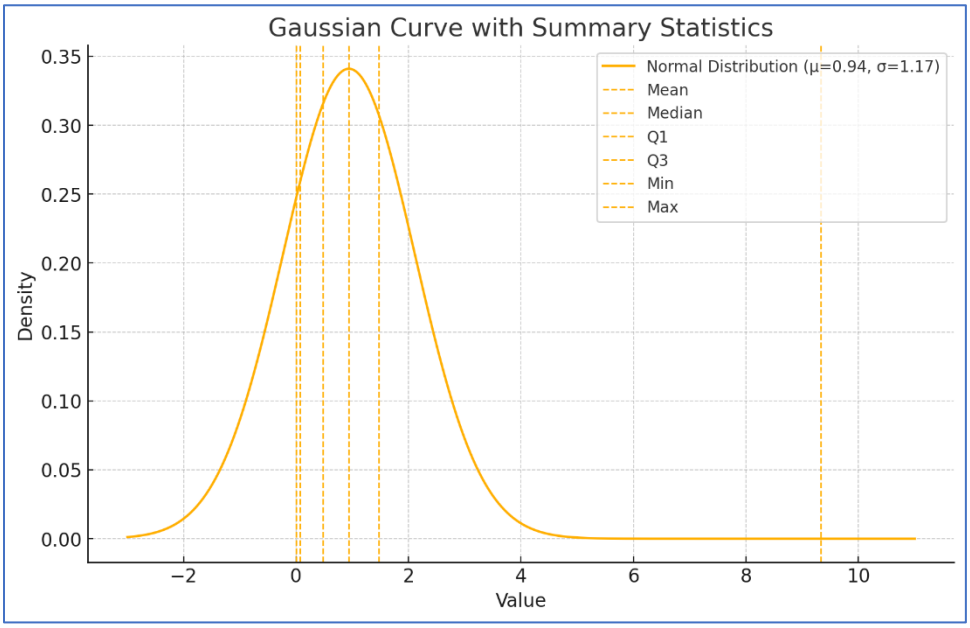
Flood Data in Four-Hour Periods

22_FWPi_AlternativeC_2S25R85i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	503,028	0.76	1.15	0.0001	0.04	0.22	1.15	6.84
100	519,397	0.75	1.01	0.0001	0.05	0.24	1.18	6.63
104	522,337	0.77	0.99	0.0001	0.05	0.28	1.25	7.37
108	725,166	0.99	1.19	0.0001	0.24	0.55	1.40	9.12
112	599,035	1.05	1.21	0.0001	0.10	0.61	1.68	9.33
116	576,230	1.04	1.16	0.0001	0.07	0.63	1.74	9.20
120	576,493	1.14	1.34	0.0001	0.07	0.69	1.82	9.32

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, intermediate sea level rise; FWPi = future with project, intermediate sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,021,686
Mean	0.94
Std Deviation	1.17
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.48
Q3 (75%)	1.47
Max Value	9.33



Alternative C – 2085 Intermediate Sea Level Rise

Alternative C – 2085 High Sea Level RIse

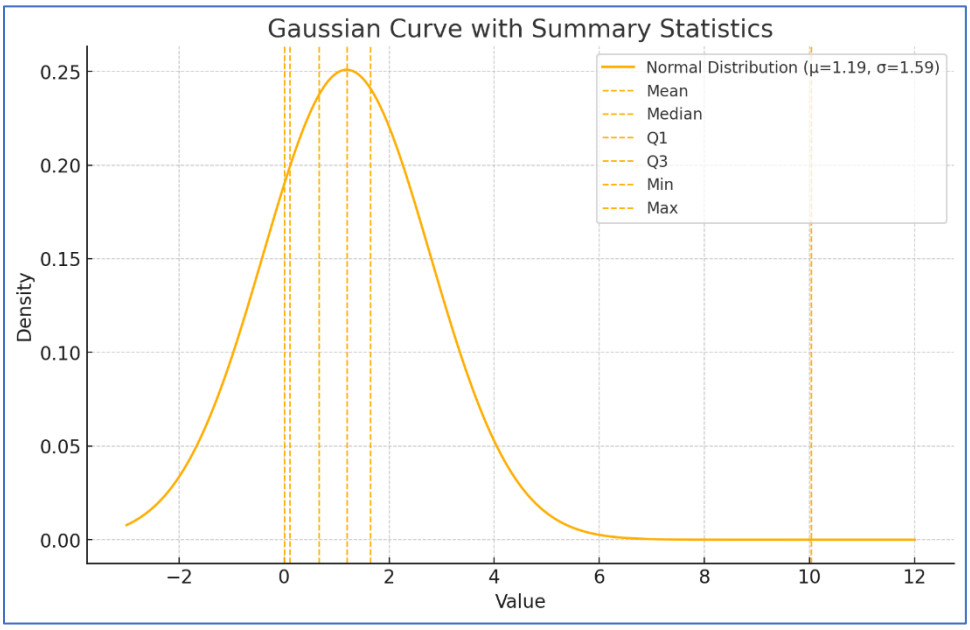
Flood Data in Four-Hour Periods

23_FWPh_AlternativeC_2S25R85h -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	540,271	1.05	1.65	0.0001	0.04	0.45	1.35	9.27
100	558,745	1.02	1.50	0.0001	0.06	0.45	1.37	8.58
104	559,596	1.01	1.46	0.0001	0.06	0.45	1.41	8.30
108	751,647	1.23	1.61	0.0001	0.26	0.65	1.64	9.93
112	642,117	1.30	1.58	0.0001	0.15	0.84	1.82	10.03
116	614,226	1.27	1.50	0.0001	0.12	0.85	1.85	9.64
120	624,139	1.39	1.72	0.0001	0.11	0.93	1.95	9.75

Notes: 2S25R85h = 2-year coastal, 25-year rainfall, 2085 condition, high sea level rise; FWPh = future with project, high sea level rise

Daily Flood Data

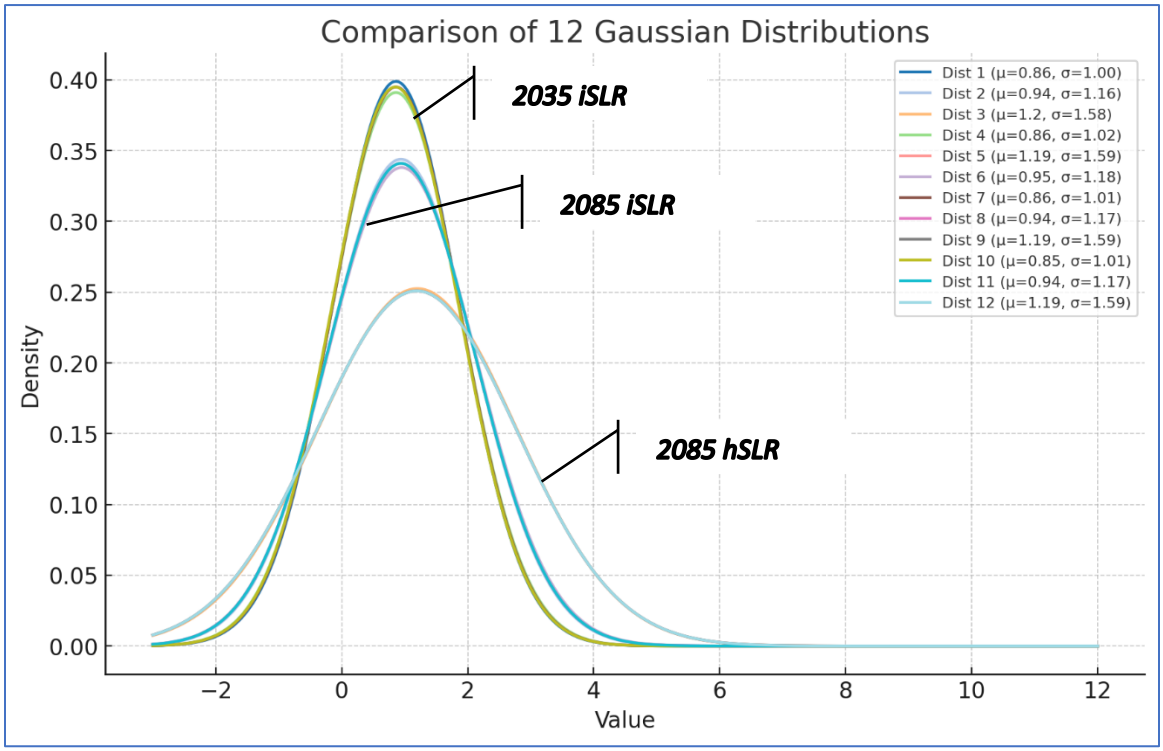
Statistic	Without Zeros
Count	4,290,741
Mean	1.19
Std Deviation	1.59
Min Value	0.00
Q1 (25%)	0.11
Median (50%)	0.66
Q3 (75%)	1.64
Max Value	10.03



Alternative C – 2085 High Sea Level Rise

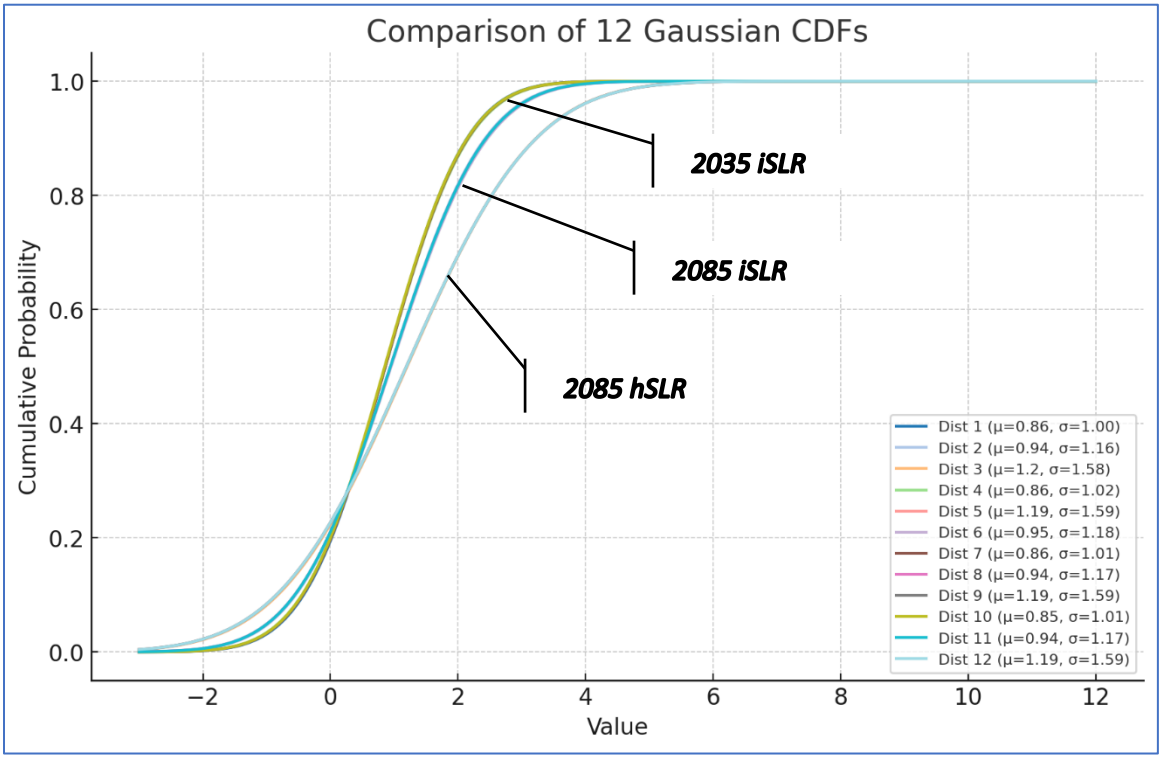
ID	Scenario	Mean	StdDev	Min	Q1	Median	Q3	Max
1	FWOP – 2035 iSLR	0.86	1.00	0	0.07	0.45	1.40	9.56
2	FWOP – 2085 iSLR	0.94	1.16	0	0.08	0.49	1.47	9.59
3	FWOP – 2085 hSLR	1.20	1.58	0	0.11	0.67	1.66	9.92
4	Alternative A – 2035 iSLR	0.86	1.02	0	0.07	0.44	1.40	9.29
5	Alternative A – 2085 iSLR	0.95	1.18	0	0.07	0.48	1.47	9.33
6	Alternative A – 2085 hSLR	1.19	1.59	0	0.11	0.66	1.65	10.07
7	Alternative B – 2035 iSLR	0.86	1.01	0	0.07	0.44	1.40	9.30
8	Alternative B – 2085 iSLR	0.94	1.17	0	0.07	0.47	1.47	9.33
9	Alternative B – 2085 hSLR	1.19	1.59	0	0.10	0.66	1.65	10.06
10	Alternative C – 2035 iSLR	0.85	1.01	0	0.07	0.44	1.40	9.30
11	Alternative C – 2085 iSLR	0.94	1.17	0	0.07	0.48	1.47	9.33
12	Alternative C – 2085 hSLR	1.19	1.59	0	0.11	0.66	1.64	10.03

Notes: iSLR = intermediate sea level rise; hSLR = high sea level rise



The floods are grouped into three distinct Gauss profiles:

- **2035 iSLR (IDs 1, 4, 7, 10)**: Narrow, centered around μ ≈ 0.86
- **2085 iSLR (IDs 2, 6, 8, 11)**: Slightly wider, centered around μ ≈ 0.94
- **2085 hSLR (IDs 3, 5, 9, 12)**: Widest, centered around μ ≈ 1.19



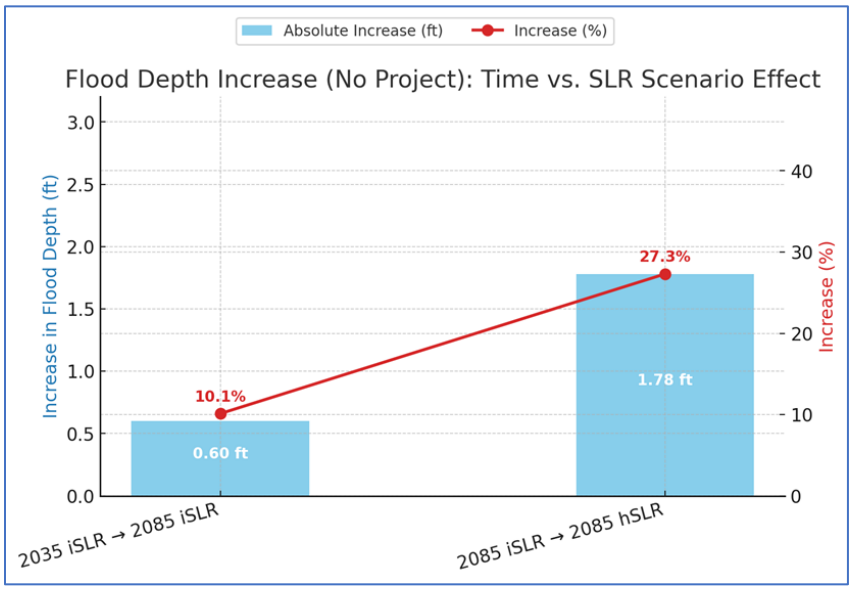
The comparison of the 12 Gaussian CDFs shows the following:

- **2035 iSLR (IDs 1, 4, 7, 10)**: The curve rises steeply → probability mass is tightly clustered near the mean.
- **2085 iSLR (IDs 2, 6, 8, 11)**: Smoother slope → more spread around the mean.
- **2085 hSLR (IDs 3, 5, 9, 12)**: Widest slope → values are most dispersed, with probability accumulating more gradually.

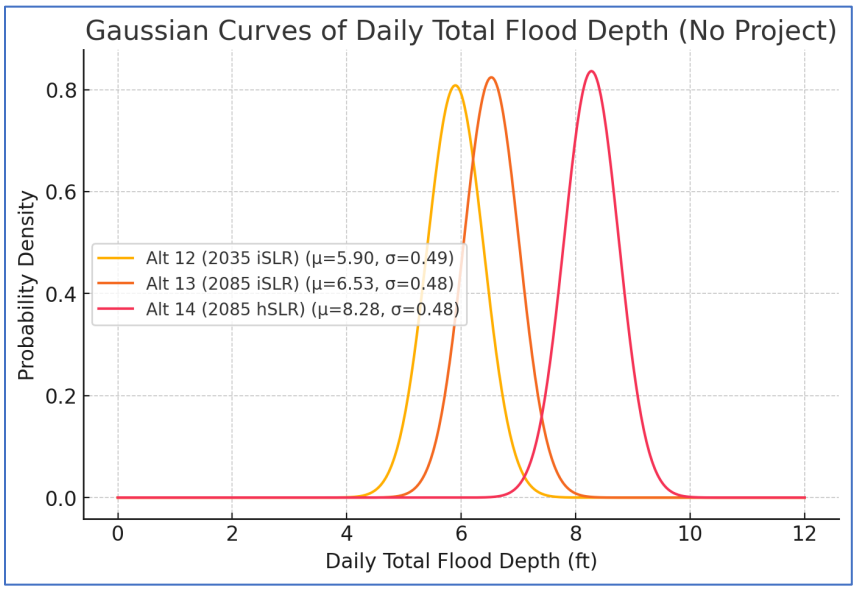
This confirms that as the mean increases, variance also increases, leading to a slower climb in the CDF.

APPENDIX B: Scenarios Flood Trends and Distribution Analysis

1. No Project Flood Trends and Distribution

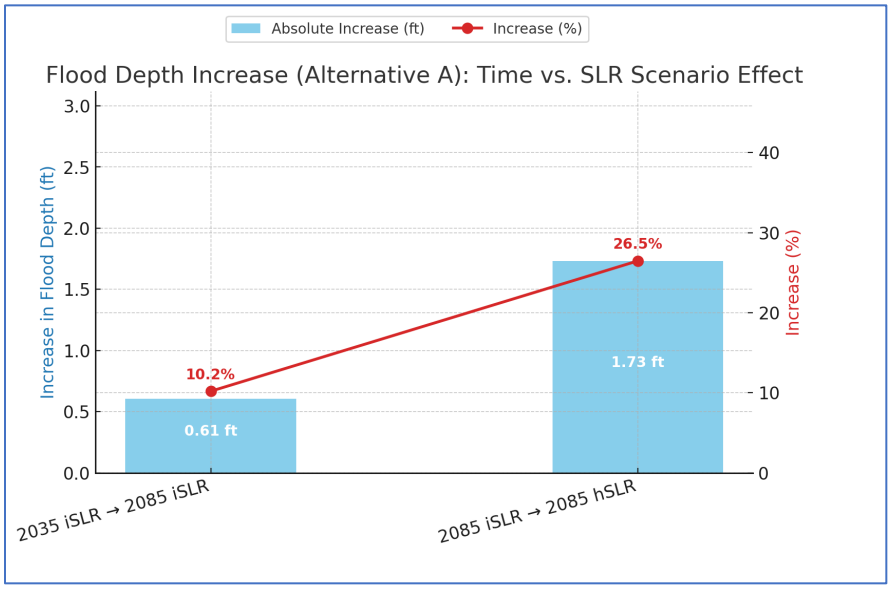


Trend1: No Project Time (2035-2085) vs. SLR (i-h) Effect on Flood Depth

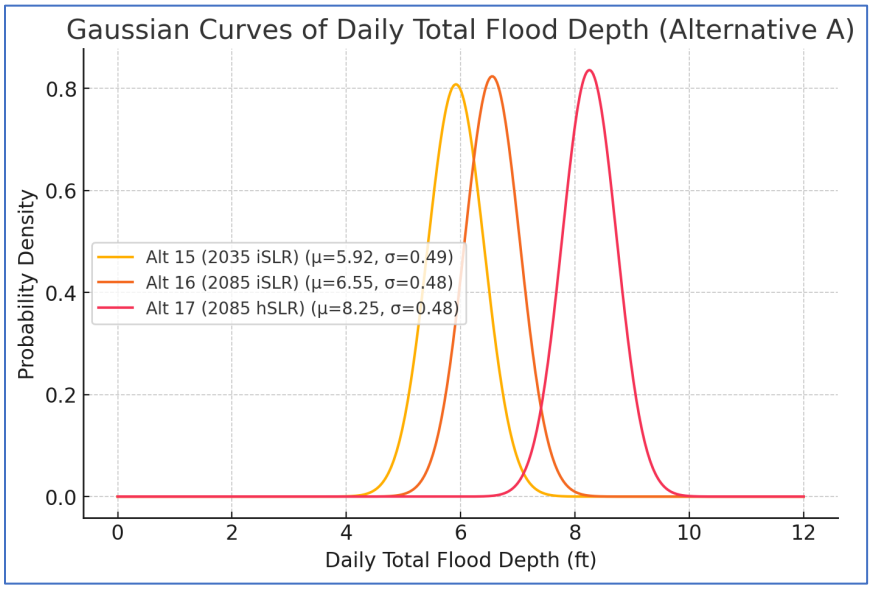


Distribution 1: No Project Daily Flood Depth Gaussian Curves

2. Build Alternative A Flood Trends and Distribution

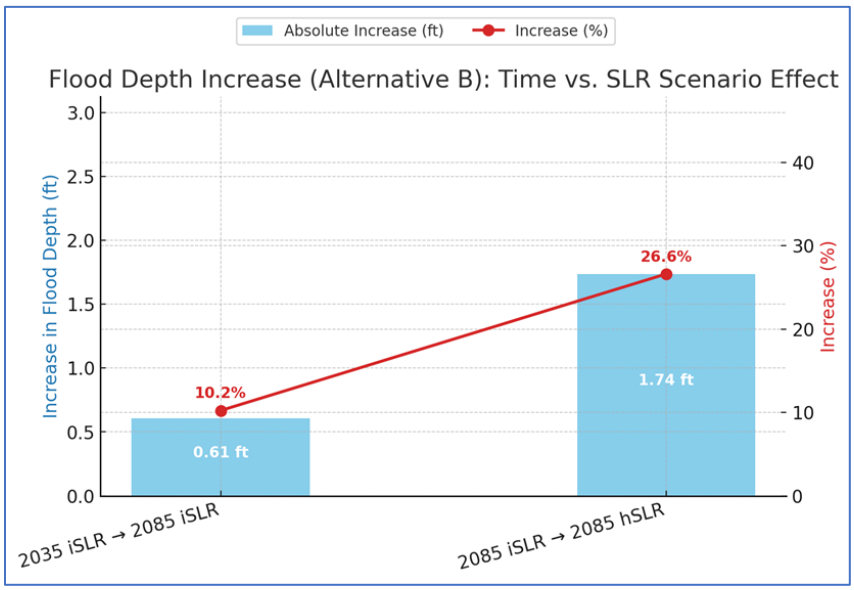


Trend 2: Alternative A (2035-2085) vs. SLR (i-h) Effect on Flood Depth

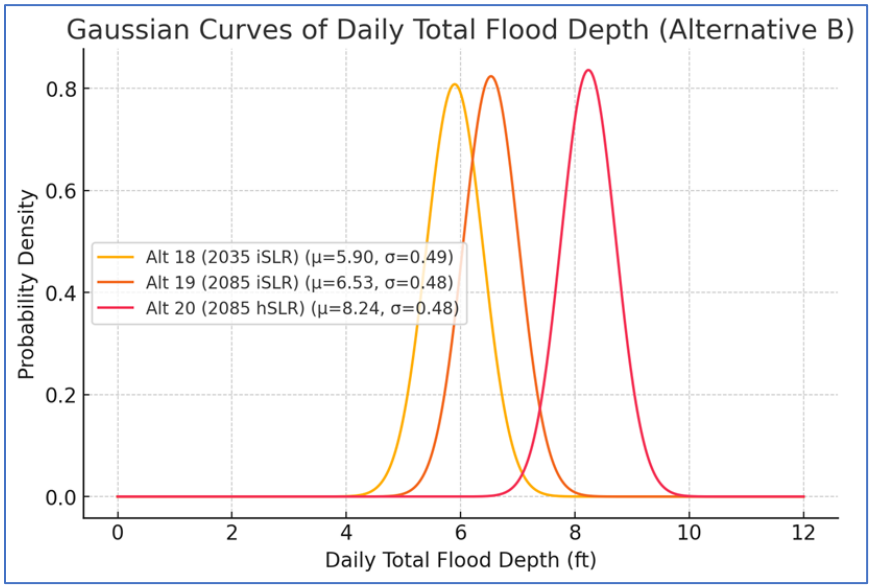


Distribution 2: Alternative A Daily Flood Depth Gaussian Curves

3. Build Alternative B Flood Trends and Distribution

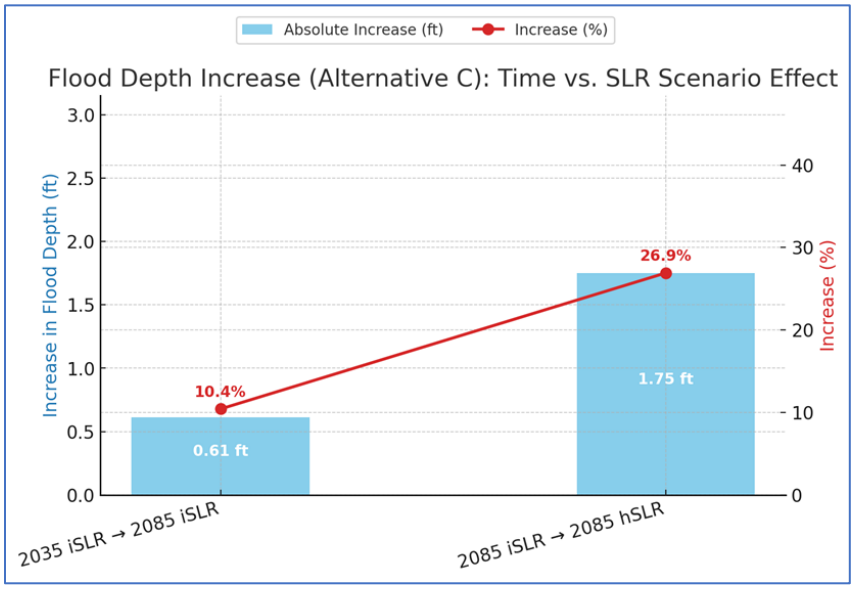


Trend 3: Alternative B (2035-2085) vs. SLR (i-h) Effect on Flood Depth

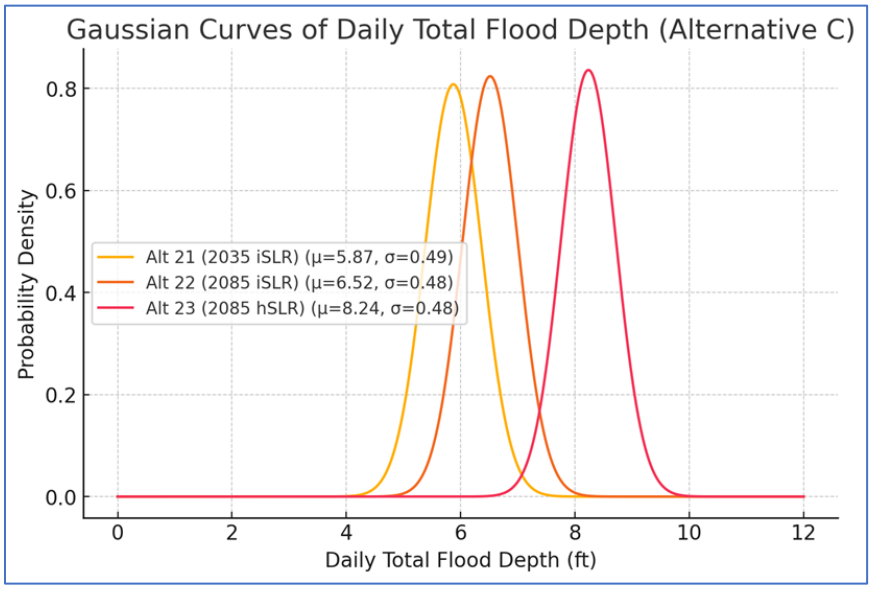


Distribution 3: Alternative B Daily Flood Depth Gaussian Curves

4. Build Alternative C Flood Trends and Distribution



Trend 4: Alternative C (2035-2085) vs. SLR (i-h) Effect on Flood Depth



Distribution 4: Alternative C Daily Flood Depth Gaussian Curves

APPENDIX C: Statistical Analysis of SERPM Flood Input Data (Alternative RO)

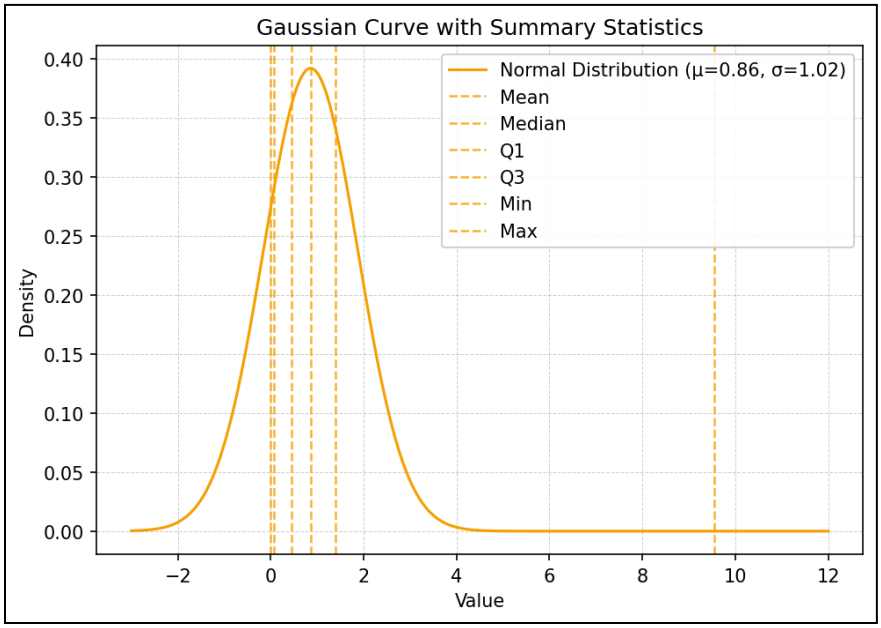
Alternative RO – 2035 Intermediate SLR

AlternativeRO_2S25R35i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	494,775	0.66	0.94	0.0001	0.04	0.17	1.06	6.51
100	514,849	0.66	0.84	0.0001	0.05	0.20	1.09	7.98
104	519,590	0.68	0.84	0.0001	0.05	0.24	1.15	6.68
108	586,489	0.98	1.07	0.0001	0.10	0.57	1.63	9.54
112	586,489	0.98	1.07	0.0001	0.10	0.57	1.63	9.54
116	566,772	0.97	1.06	0.0001	0.07	0.59	1.68	9.39
120	563,295	1.05	1.19	0.0001	0.07	0.64	1.78	9.51

Notes: 2S25R35i = 2-year coastal, 25-year rainfall, 2035 condition, intermediate sea level rise; RO = Resilience Optimized; SLR = sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	3,962,732
Mean	0.86
Std Deviation	1.02
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.44
Q3 (75%)	1.39
Max Value	9.54



Alternative RO – 2035 Intermediate Sea Level Rise

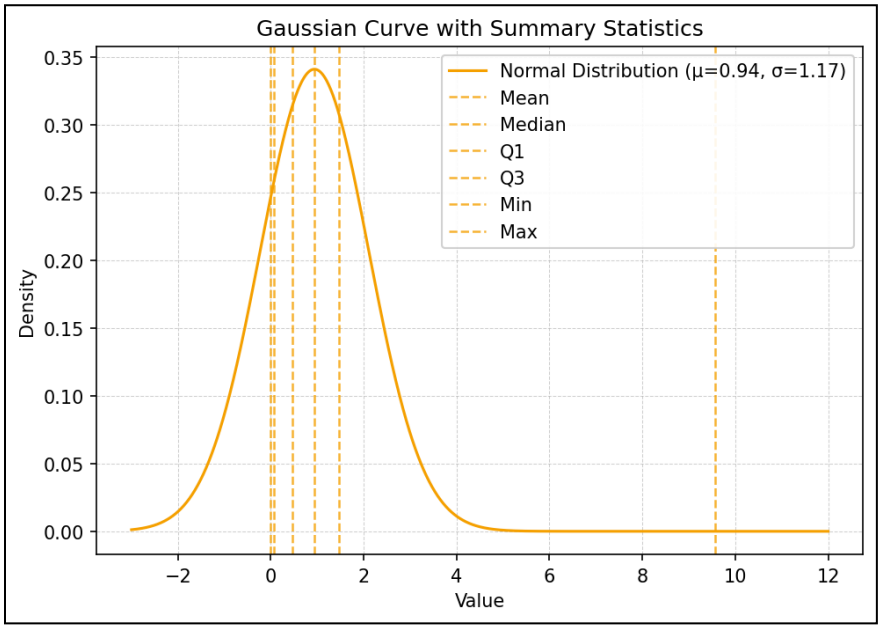
Alternative RO – 2085 Intermediate SLR

AlternativeRO_2S25R85i -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	502,958	0.76	1.15	0.0001	0.04	0.22	1.15	7.43
100	520,989	0.75	1.01	0.0001	0.05	0.24	1.18	6.64
104	524,517	0.77	0.99	0.0001	0.06	0.27	1.24	7.52
108	726,398	0.99	1.19	0.0001	0.24	0.55	1.39	9.16
112	602,315	1.05	1.21	0.0001	0.11	0.60	1.68	9.58
116	580,831	1.04	1.16	0.0001	0.07	0.62	1.74	9.43
120	581,590	1.14	1.34	0.0001	0.07	0.67	1.82	9.51

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, intermediate sea level rise; RO = Resilience Optimized; SLR = sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,039,598
Mean	0.94
Std Deviation	1.17
Min Value	0.00
Q1 (25%)	0.07
Median (50%)	0.47
Q3 (75%)	1.46
Max Value	9.58



Alternative RO – 2085 Intermediate Sea Level Rise

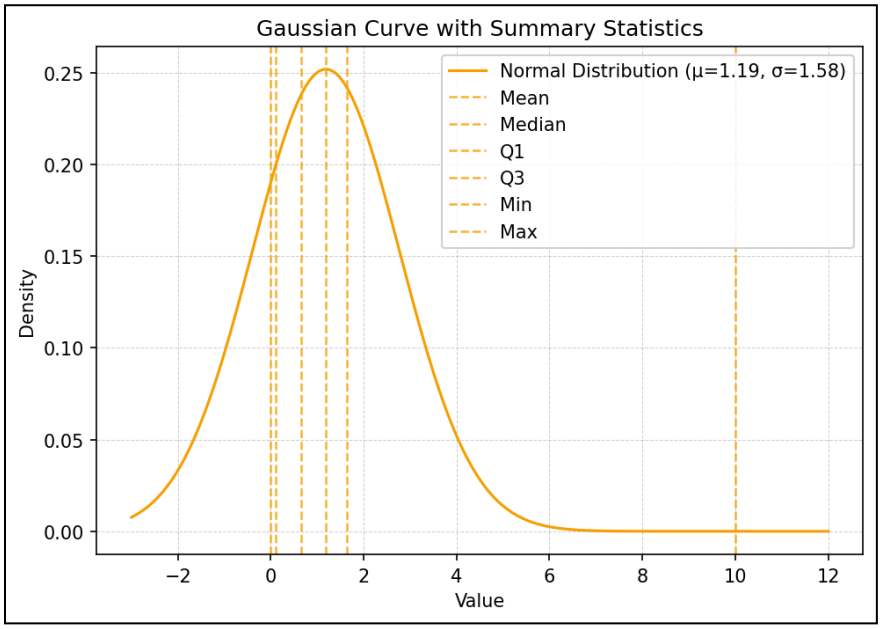
Alternative RO – 2085 High Sea Level Rise

AlternativeRO_2S25R85h -- Statistics Excluding Zeros								
File ID	Count	Mean	Std	Min	Q1	Median	Q3	Max
096	540,573	1.05	1.65	0.0001	0.04	0.45	1.35	9.27
100	560,166	1.01	1.50	0.0001	0.06	0.45	1.37	8.54
104	561,537	1.01	1.45	0.0001	0.07	0.45	1.41	8.29
108	753,068	1.23	1.61	0.0001	0.26	0.65	1.64	9.90
112	646,353	1.29	1.58	0.0001	0.15	0.83	1.82	10.00
116	625,373	1.25	1.50	0.0001	0.11	0.81	1.83	9.60
120	626,370	1.39	1.72	0.0001	0.12	0.93	1.96	9.70

Notes: 2S25R85i = 2-year coastal, 25-year rainfall, 2085 condition, high sea level rise; RO = Resilience Optimized; SLR = sea level rise

Daily Flood Data

Statistic	Without Zeros
Count	4,313,440
Mean	1.19
Std Deviation	1.58
Min Value	0.00
Q1 (25%)	0.11
Median (50%)	0.66
Q3 (75%)	1.64
Max Value	10.00



Alternative RO – 2085 High Sea Level Rise

D.6 National Economic Development Benefits Transportation Benefits Modeling Technical Memorandum, Part B

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins, Transportation Benefits

1 Introduction:

This memo outlines the transportation benefits analysis, carried out as part of the South Florida Water Management District's (SFWMD) Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (203 Study).

This Section 203 Study focuses on enhancing the resiliency of the water control structures and adjacent primary canals in Broward Basins Reach A, a reach of the ongoing U.S. Army Corps of Engineers (USACE) C&SF Section 216 Study. Broward Basins Reach A is referred to herein as the Section 203 Study Area (or Study Area).

This analysis estimates the impact on travel times and vehicle operations that flooding of the transportation network in the analysis area would have on the transportation system. This analysis is derived from the results of the transportation analysis that is included in Section D.05. The benefits of three proposed build options, Alternatives A, B, and C, in addition to Alternative RO (the Recommended Plan), were compared to the future without project (FWOP) option to estimate the benefits of the proposed build options.

2 Methodology/Assumptions

The Transportation Benefits analysis used the USDOT's Benefit-Cost Analysis Guidance for Discretionary Grant Programs (May 2025) to set the analysis framework and guide calculation inputs. The assumptions and inputs used in the benefits calculations utilized standard inputs and values from USDOT's BCA guidance. The overall methodology includes the following steps:

- Define existing and future conditions under both FWOP and "future with project" scenarios.
- The FWOP and with project scenarios incorporated a return interval that was applied to the transportation benefits because the exact timing of the next flood event in the study area is unknown. For this analysis, it was assumed a flood return period would be 25 years. Taking sea level rise into consideration, the annual probability of the event occurrence was 3.3 percent.
- Estimate benefits through 50 years of operations beyond the completion of work (from 2035 to 2084).
- Input USDOT-recommended monetized values for travel time savings and operating costs.
- Input USDOT estimates for occupancy rates in passenger and commercial vehicles.
- Use dollar values in 2025 dollars and in instances where values are expressed in historical dollar years, using the Bureau of Labor Statistics (BLS) Consumer Price Index (CPI) to adjust the values.
- Discount future benefits and costs with real discount rates of 3 percent consistent with USACE guidance.

The Southeast Florida Regional Planning Model (SERPM) was used to generate vehicle miles travelled and vehicle hours travelled under different storm events. The Federal Government requires Metropolitan Planning Organization (MPOs) serving urbanized areas with populations greater than 200,000 people to have a robust, validated, and regionally coordinated travel demand models to support long-range transportation planning processes. The SERPM travel demand model is maintained by the Regional Transportation Technical Advisory Committee-Modeling Subcommittee (RTTAC-MS) that is comprised of modeling experts from various agencies including Broward County, Miami-Dade Transportation Planning Organization, Florida Department of Transportation, and other government agencies. The USACE frequently uses outputs from MPO-approved travel demand models (like SERPM) during their participation in National Environmental Policy Act processes and alternative evaluations.

The approach followed to estimate flood impact in transportation included the following assumptions:

- Utilized the approved SERPM travel demand model future network (2045).
- Added roadway elevation data by intersecting network with slope shapefile.
- Calculated flood depths by intersecting roadway elevations with flood shapefile.
- Run SERPM under the FWOP scenario and closing roadways where flood depth exceeded 0.5 feet.
- Run SERPM with project (Build Scenario) closing roadways where flood depth exceeded 0.5 feet.
- The model was run for a 24-hour period. Results were not annualized.

Section D.4 presents a comprehensive summary of the methodology, an expanded description of the SERPM model, and a statistical evaluation of input networks and flood datasets to corroborate the modeling results.

The following storm scenarios were modeled against the transportation network to estimate the impact on flooding under the build alternatives:

- Future Without Project Conditions, 2035 and 2085
- Alternative A, 2035 and 2085
- Alternative B, 2035 and 2085
- Alternative C, 2035 and 2085
- Alternative RO / RP, 2035 and 2085

The travel demand model was run assuming a 25-year rain event, a 2-foot surge, and intermediate sea level rise. The transportation benefits analysis was limited to the intermediate sea level rise scenario as the road network was heavily flooded under the high sea level rise scenario which made many roads impassable, leading to unreliable vehicle hours travelled results.

Figure 1 presents part of the geographic area covered by SERPM. The network used in the alternatives evaluation includes known and planned improvements through 2045. It was assumed that a roadway with more than 0.5 feet of flooding was considered impassable.

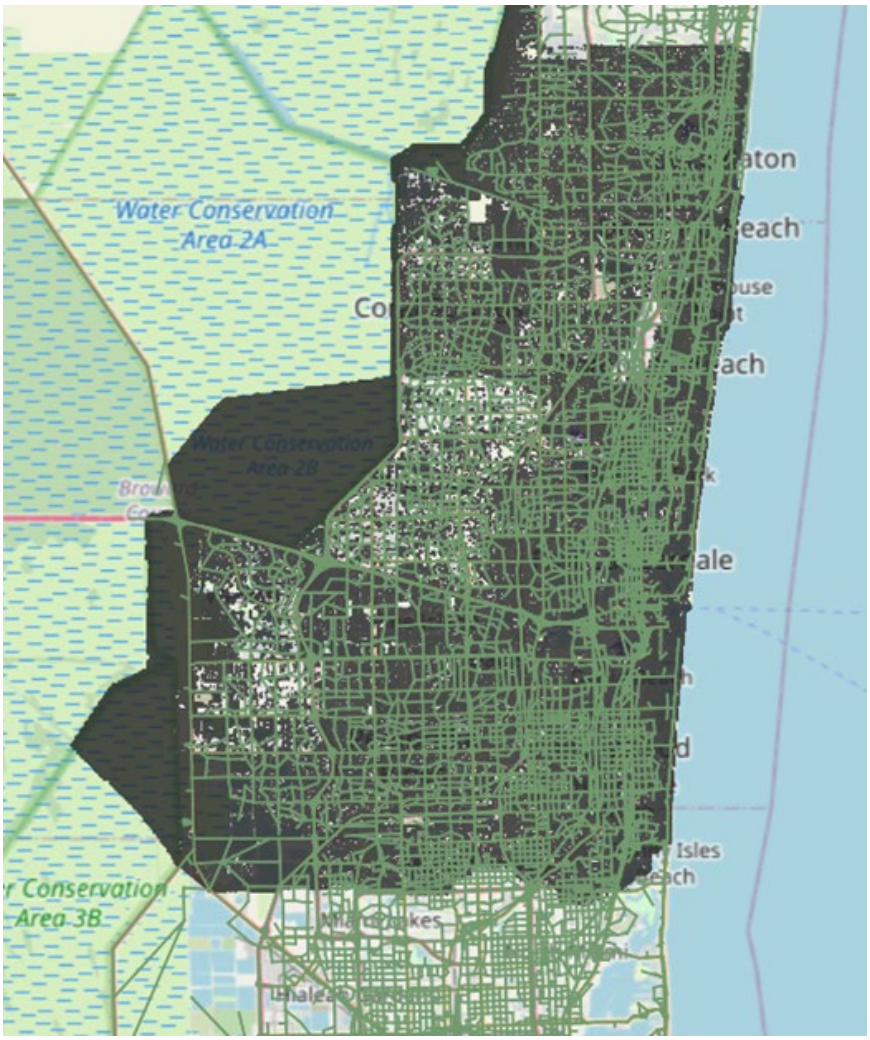


Figure 1. SERPM Travel Demand Model Network

3 Project Benefits

3.1 Travel Time Savings

For the Transportation Benefits analysis, the model was used to provide daily vehicle hours traveled (VHT) results from the 2035 and 2085 model years using the model's ultimate horizon (2045). To estimate the VHT in each of the years of the analysis between the endpoints, the data was interpolated. The 2045 model network inputs include the existing roadway network and all planned future improvements classified as "Cost Feasible" in South Florida's counties Long Range Transportation Plans (LRTPs). The VHT results are shown in Table 1.

Table 1. Vehicle Hours Travelled by Alternative

Alternative	2035	2085
Future Without Project	8,375,000	30,941,000
Alternative A	4,622,000	22,599,000
Alternative B	4,571,000	25,098,000
Alternative C	4,561,000	25,798,000
Alternative RO	2,083,000	7,440,000

Notes: RO = Resilience Optimized

The value of travel time savings was calculated in accordance with U.S. DOT guidance. The guidance suggests $21.10 per person-hour (2023 dollars) for all purpose local travel (auto), which assumes that 88.2 percent of local travel by surface modes (or trips) are personal while the remaining 11.8 percent are business. Value of travel time savings for trucks is assumed to be $35.70 (2023 dollars) per person-hour. Hourly rates were adjusted to 2025 dollars. The average occupancy was assumed to be 1.52 for autos and 1.0 for trucks and trucks were assumed to represent 7.0 percent of the total traffic.

The estimated vehicle hours traveled summarized in **Table 1** are adjusted based on type of vehicle and number of passengers. The VHT for private vehicles (i.e., cars) are estimated based on the following formula:

- Car VHTs = Total VHT * 93.0 percent car traffic * 1.52passenger per vehicle

The VHT for commercial vehicles (i.e., trucks) are estimated based on the following formula:

- Truck VHTs = Total VHT * 7.0 percent truck traffic * 1 passenger per vehicle

The adjusted total VHT are the sum of Car VHTs and Truck VHTs, which are computed for both No Build and Future With Project conditions. The annual VTTS are determined for the same period for Future With Project (i.e., under each of the three alternatives) and Future Without Project conditions based on the following formulas:

- Car VTTs = Total VHT * Value of Time for Private Vehicle Travel-All-Purposes
- Truck VTTs = Total VHT * Value of Time for Commercial Vehicle Travel-Truck Drivers

The analysis assumed a storm event annual probability of 3.3 percent. Because the timing of the event is unknown, the VHT in each year was adjusted by applying the annual probability of the storm event occurring. The present value of travel time savings over the 50-year analysis period for each of the alternatives when compared to the FWOP alternative are summarized in Table 2.

Table 2. Value of Travel Time Savings (VTTS) Benefits

Alternative	NPV Travel Time Savings (2025$)
Alternative A	$121,078,000
Alternative B	$110,968,000
Alternative C	$108,117,000
Alternative RO	$248,847,000

Notes: NPV = Net Present Value; RO = Resilience Optimized

3.2 Vehicle Operating Cost Savings

The project will result in savings in vehicle operating costs when compared to the no-build scenario due to better flow of traffic because fewer roads are closed due to flooding. The value of vehicle operating cost savings was calculated in accordance with U.S. DOT guidance which suggests vehicle operating costs of $0.56 per mile and $1.27 per mile for autos and truck, respectively. These costs are in 2023 dollars and are adjusted to 2025 dollars in the analysis. The per-mile vehicle operating cost estimates were multiplied by the difference between the annualized VMT under the FWOP alternative and the annualized VMT under the build alternative. Table 3 presents the VMT for each alternative.

Table 3. Vehicle Miles Travelled by Alternative

Alternative	2035	2085
Future Without Project	54,689,000	54,661,000
Alternative A	54,234,000	53,454,000
Alternative B	54,161,000	54,012,000
Alternative C	54,171,000	53,455,000
Alternative RO	16,119,000	16,021,000

Notes: RO = Resilience Optimized

The annual vehicle operating cost savings are determined for the same period for FWOP and Future With Project conditions based on the following formulas:

- Car VOCS = Total VMT * Vehicle Operating Costs
- Truck VOCS = Total VMT * Vehicle Operating Costs

VOCS is determined as the difference between FWOP and Future With Project conditions.

The analysis assumed a storm event annual probability of 3.3 percent. Because the timing of the event is unknown, the VHT in each year was adjusted by applying the annual probability of the storm event occurring. The present value of vehicle operating cost savings over the 50-year analysis period when compared to the FWOP alternative are summarized in Table 4.

Table 4. Vehicle Operating Cost Savings

Alternative	NPV Vehicle Operating Cost Savings (2025$)
Alternative A	$314,000
Alternative B	$245,000
Alternative C	$331,000
Alternative RO	$16,436,000

Notes: NPV = Net Present Value; RO = Resilience Optimized

3.3 Summary

The results of the Transportation Benefits analysis for the project alternatives are summarized in Table 5. The NPV calculation takes projected benefits over the study period and discounts these benefits at the 3 percent discount rate, which reduces the value of future benefits by the time value of money (discount rate). This discount rate was applicable at the time of the analysis in October 2025. Benefits that begin in 2035 are discounted over the 50-years of operation.

Table 5. Summary of Total Project Benefits, 2025 Dollars

Alternative	NPV Travel Time Savings	NPV Vehicle Operating Cost Savings	NPV Total Benefits
Alternative A	$121,078,000	$314,000	$121,392,000
Alternative B	$110,968,000	$245,000	$111,213,000
Alternative C	$108,117,000	$331,000	$108,448,000
Alternative RO	$248,847,000	$16,436,000	$265,283,000

Notes: NPV = Net Present Value; RO = Resilience Optimized

D.7 Regional Economic Development Benefits Business Interruption Technical Memorandum

Business Interruption Analysis FINAL Technical Report

Assessment of Business Interruption for the South Florida Water Management District

Submitted to:
South Florida Water Management District
David Griffin
Resiliency Project Manager
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Written by:
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1902 Reston Metro Plaza
Reston, VA 20190
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1 Introduction

This report presents the findings of a business interruption analysis for the South Florida Water Management District (SFWMD), as part of the Section 203 Comprehensive Benefits Analysis. The research team estimated the financial impacts of business interruptions caused by flooding by calculating Direct Output Loss in a Future Without Project (FWOP) condition, as well as three resiliency alternatives. The Direct Output Loss metric used to underpin this analysis refers to the reduction in sales and production value due to disruption to a non-residential building's use and is calculated based on HAZUS Flood Technical Manual methodologies. The analysis shows how losses could be avoided by implementing various levels of flood protection.

1.1 Location

The Study Area consists of the eastern portion of Broward County and a small portion of southern Palm Beach County. The Study Area is inland and does not border the Atlantic Ocean. Broward and Palm Beach Counties are two of the most populated counties in Florida, boasting diverse economies with high employment rates in transportation and utilities; professional and business services; education and health services; and leisure and hospitality sectors.[1] Given this context, as well as South Florida's connections to global trade, understanding the potential impacts of a severe flood event to businesses is critical for decision-making regarding resilience investments.

The Study Area consists of nine upstream and six downstream watershed basins with a network of seven primary canals managed by nine water control structures (seven of which are coastal structures), in addition to other existing water control structures not directly relevant to this study. The analysis focuses on the 302 square miles of managed watersheds upstream of the coastal water control structures, shown in **Figure 1** and described in **Table 1**.

[1] Bureau of Labor Statistics, Miami Area Economic Summary. July 3, 2024. Website: https://www.bls.gov/regions/southeast/summary/blssummary_miami.pdf.

Figure 1. Study Area basins, primary canals, and primary water control structures.

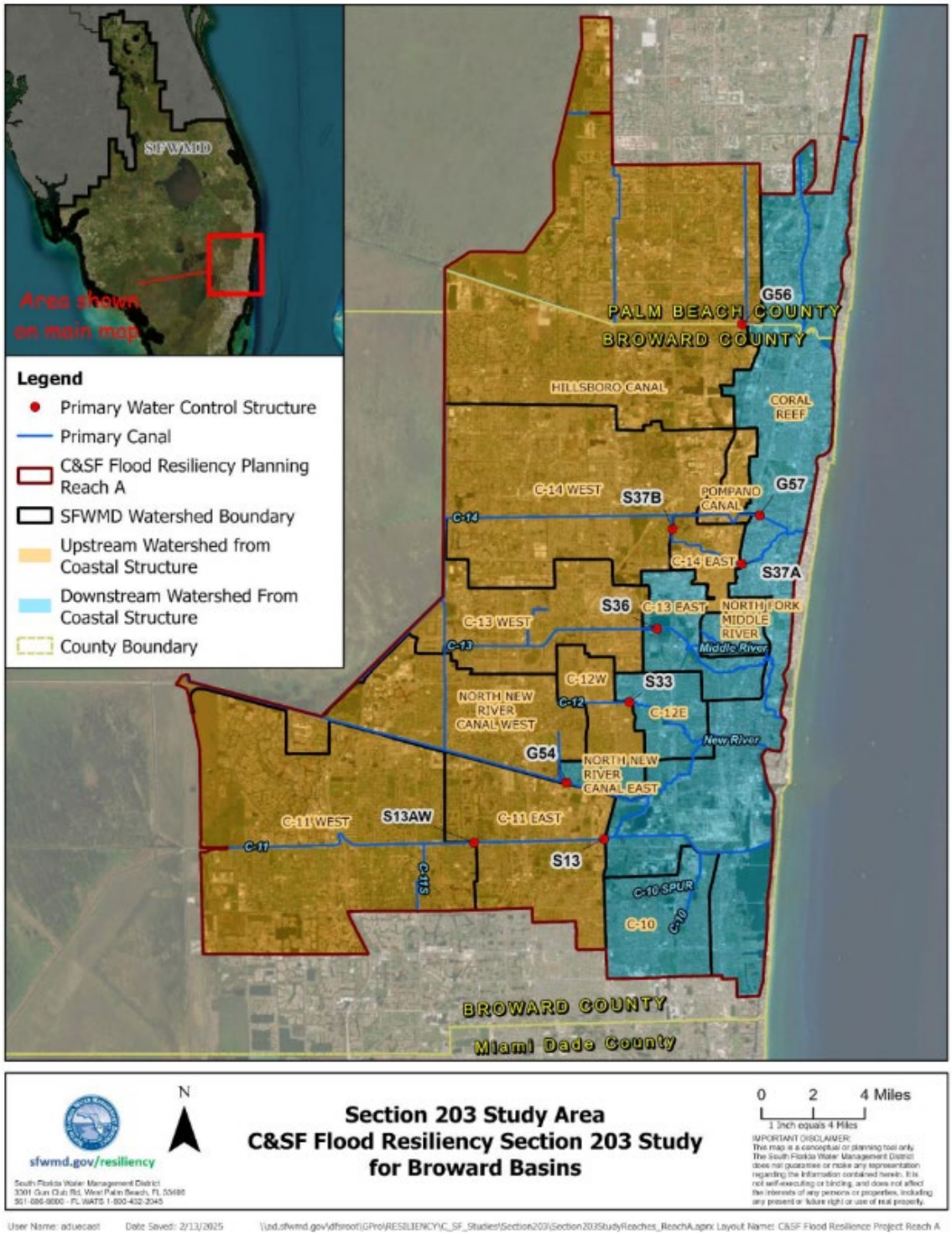


Table 1. Study Area Basins.

Managed Upstream Watershed Basin	Primary Canal	Primary Water Control Structure	Downstream Watershed Basin
Hillsboro Canal Basin	G-08 (Hillsboro) Canal	G-56 Gated Spillway	Coral Reef Basin
Pompano Canal Basin	G-16 (Pompano) Canal	G-57 Gated Spillway	Coral Reef Basin
C-14 West Basin	C-14 (Cypress Creek) Canal	S-37B Gated Spillway	C-14 East Basin
C-14 East Basin	C-14 (Cypress Creek) Canal	S-37A Gated Spillway	Coral Reef Basin
C-13 West Basin	C-13 (Middle River) Canal	S-36 Gated Spillway	C-13 East, North Fork Middle River, and Coral Reef Basins
C-12 West Basin	C-12 (Plantation) Canal	S-33 Gated Spillway	C-12 East and Coral Reef Basins
North New River Canal West Basin	C-15 (North New River) Canal	G-54 Gated Spillway	North New River Canal East and Coral Reef Basins
C-11 West Basin	C-11 (South New River) Canal	S-13AW Gated Culvert	C-11 East Basin
C-11 East Basin	C-11 (South New River) Canal	S-13 Pump Station and Gated Spillway	Coral Reef and C-10 Basins

This report documents the quantification of economic impact for buildings in the Study Area. The intent of this report is to supplement a parent document about the comprehensive benefits analysis in support of the alternative plans (*Section 4.0 of the Main Report).*

1.2 Flood Scenarios

Modeling by a separate consultant was conducted to calculate flood depths across the Study Area using MIKE SHE and MIKE Hydro. Flood depths from this modeling are provided as peak flood depths (feet). This modeling quantifies depth duration and peak flood depths for eight compound flood frequency events at the base year (2035) and the outyear (2085). The 2085 future conditions incorporate low, intermediate, and high SLR (SLR) scenarios. This business interruption analysis evaluates exposure to structures in the Study

Area and is calculated using HEC-FDA Version 2.0. As of September 5, 2025, the modeled structural flood data are being refined because in some cases, structures located across two raster cells may have inconsistencies in flood depth values due to variations in the MIKE model cell extraction. As a result, the HEC-FDA modeling results produce some unexpected flood depths for certain structures in certain flood scenarios, such as structures which show greater flood depths in one or more alternative relative to FWOP. The implications of these modeling inconsistencies are further examined in the Discussion section. **Table 2** describes the three flood scenarios used in this analysis. For every flood scenario, the analysis considers both intermediate and high SLR projections.

Table 2. Design storm scenarios for the business interruption analysis

Coastal Water Level Return Period (CHS Data)	Rainfall Return Period (NOAA-Atlas 14)	Compound Flooding Frequency	Probability Event % (AEP)	Scenario Flooding Focus
2-year	25-year	30-year	3.33%	- Upstream Events - Rainfall Events
2-year	100-year	110-year	0.91%	- Upstream Events - Rainfall Events
100-year	100-year	430-year	0.23%	- Compound Flooding and Rainfall Events - Storm Surge Events

1.3 Alternative Plans

Four conditions were included in this Section 203 analysis, the Future Without Project (FWOP), and three project alternatives (Alternatives A, B, and C). Each alternative contains effective features in reducing flood levels in the managed upstream water basins. These features consist of storage and nature based proposed projects, primary structure modifications, and Central and South Florida (C&SF) canal improvements (*Section 3.0 of the Main Report).*

2 Direct Output Loss

2.1 Methodology

This analysis calculates business interruption in the Study Area using the Direct Output Loss metric. Direct Output Loss refers to reduced sales and production value due to functional disruption of a building's use. Direct Output Loss is calculated using the methodology described in the HAZUS Flood Technical Manual, Equation 6-7.

Equation 6-7. Direct Output Loss by Occupancy

$$\boldsymbol{Direct\ Output\ Loss_i} = \sum_j (1 - WRF_i) \times FA_{ij} \times DO_i \times RT_{ij}$$

Where:

i = HAZUS-specific occupancy *i*
WRF_i = Wage recapture factor for occupancy *i*
FA_{ij} = Floor area of occupancy *i* (in ft²) at depth *j*
DO_i = Direct output ($/ft²/day) for occupancy *i*
RT_{ij} = Restoration time (in days) for occupancy *i* and water depth *j* (see Table 6-4 through Table 6-15)

The Direct Output Loss equation calculates how a given flood inundation depth impacts the economic production of the building's services by considering the building's wage recapture factor, floor area of occupancy, direct output for occupancy, and restoration time for occupancy and flood depth.

Damage to non-residential buildings in the Study Area can have direct impacts on the South Florida economy, including non-recoverable and non-transferrable loss of sales and revenues due to business closure. Direct Output Loss estimates are calculated using HAZUS building occupancy definitions and national standard values for output expected for varying types of building occupancies and economic industries. The standard values for direct output and wage recapture factor applied to the calculations in order to assume potential recouped losses, are provided in **Table 3**.

Table 3: HAZUS Occupancies, Standard Values for Direct Output and Wage Recapture Factor

HAZUS Code	Definition	Direct Output per Square Foot ($)	Wage Recapture Factor (%)
RES 4	Temporary Lodging	0.69	60
RES 6	Nursing Home	1.15	60
COM 1	Retail Trade	0.60	87
COM 2	Wholesale Trade	0.78	87
COM 3	Personal and Repair Services	0.92	51
COM 4	Professional, Technical, Business Services	1.35	90
COM 5	Banks	4.38	90
COM 6	Hospital	1.15	60
COM 7	Medical Office or Clinic	2.31	60
COM 8	Entertainment and Recreation	1.45	60
COM 9	Theatres	1.38	60
IND 1	Heavy Industry	2.32	98
IND 2	Light Industry	2.32	98
IND 3	Food, Drugs, Chemical	3.12	98
IND 4	Metals, Minerals Processing	2.47	98
IND 5	High Technology	4.68	98
IND 6	Construction	2.32	98
AGR 1	Agriculture	1.15	75
REL 1	Church or Membership Organization	2.31	60
GOV 1	General Services	0.92	80
GOV 2	Emergency Response	1.06	0
EDU 1	Schools and Libraries	4.47	60
EDU 2	Colleges and Universities	6.8	60

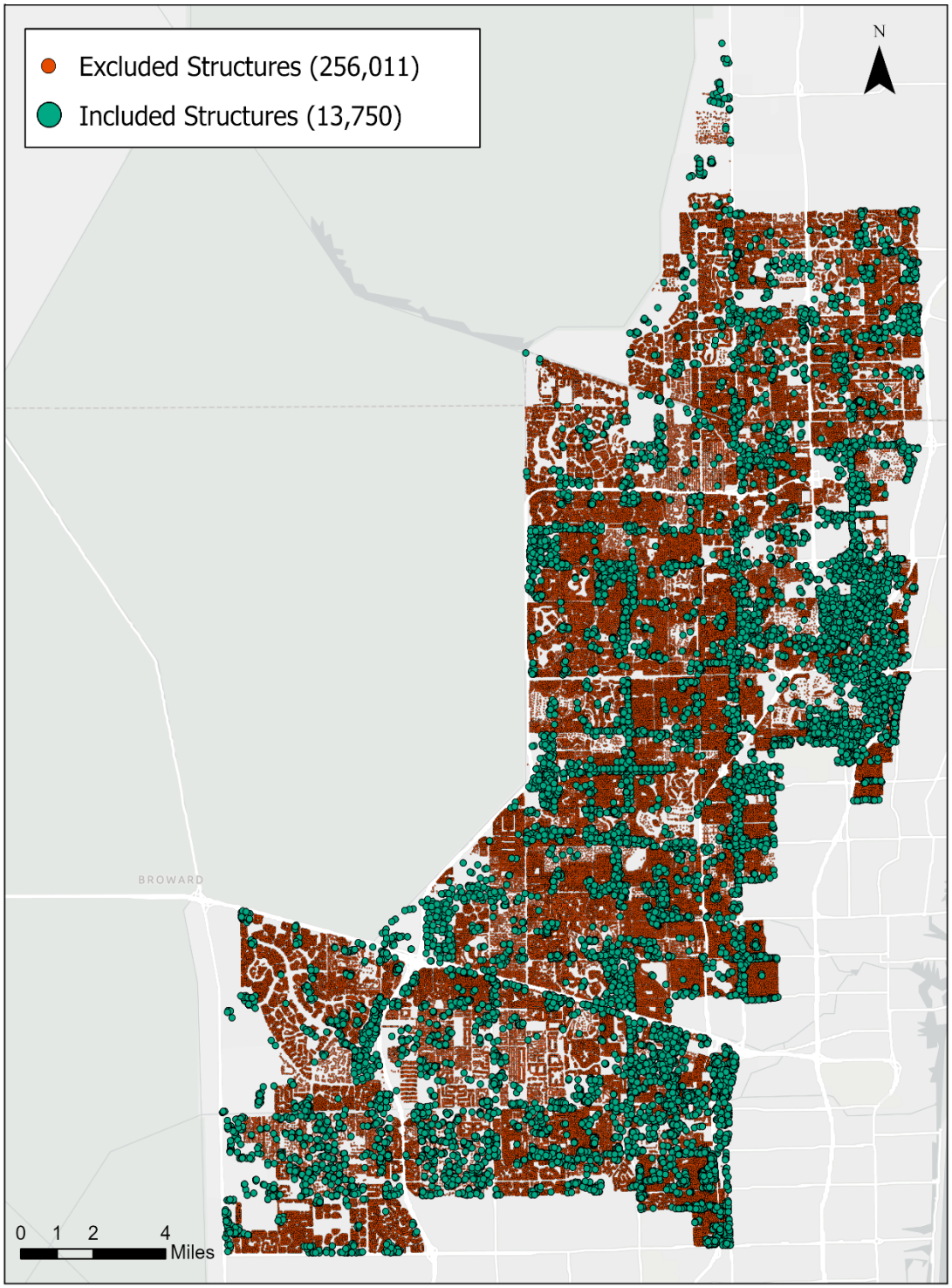
The following building types do not generate business sales or revenue, so the Direct Output Loss value associated with these structures is $0:

- COM-10 (parking structure)
- ESSM (electric substation)
- PWTM (water treatment plant)
- WWTM (wastewater treatment plant)
- RES1 (single-family dwelling)

- RES2 (mobile home)
- RES 3C – RES3F (multi-family dwellings)
- RES5 (institutional dormitory)

The structure inventory includes 269,761 buildings in the Study Area. The majority of these buildings - 256,011 structures – are structures that do not produce revenues and are therefore excluded from this analysis. Direct output losses are calculated for the remaining 13,750 structures (**Figure 2**).

Figure 2. Structures in the Study Area.



Business interruption losses depend on the amount of time required to restore business operations. HAZUS provides restoration times related to maximum flood depths in four-foot increments in Tables 6-4 through 6-15 of the HAZUS Flood Model Technical Manual.[2] To develop restoration times with greater flood depth-specificity, this analysis computed unique restoration time polynomial functions for each HAZUS structure type to provide finer resolution estimates of restoration time for flood depths within the four food increments. Each restoration time function is derived by performing a regression analysis of maximum flood depth versus restoration time, based on data from Tables 6-4 through 6-15 in the HAZUS Flood Model Technical Manual. The resulting regression lines exhibit high goodness-of-fit, with R-squared values ranging from 0.995 to 1 (**Appendix A**).

After calculating Direct Output Loss for each flood scenario, analysts aggregated these losses to compute an annualized value for each future condition (either Future Without Project or Alternative A, B, or C) using the following equation:

$$\text{Annualized Direct Output Loss}_{\text{Future Condition}} = 3.33\% \times \text{Direct Output Loss}_{\text{3.33\% AEP}} + 0.91\% \times \text{Direct Output Loss}_{\text{0.91\% AEP}} + 0.23\% \times \text{Direct Output Loss}_{\text{0.23\% AEP}}$$

This analysis utilizes Quickbase, a low-code application development platform to aid in running calculations and creating illustrative graphics and reports. Use of this software was approved by the U.S. Army Corps of Engineers after a demonstration of the product and its intended use.

2.2 Data Sources

- *Structure Inventory* – Microsoft Building Footprint database enriched by normalized tax assessor parcel, US Census Florida 2020, and CDC data sources (2025)
    - The structure inventory also provides the HAZUS codes, originally derived from the tax assessor parcel data
- *Flood-Depths* – HEC-FDA output flood depths above first floor (2025)
- *Watershed Boundaries* – SFWMD Broward Basins (2024)

[2] Hazus 7.0 Flood Model Technical Manual

3 Results

3.1 Structures Exposed to Flooding

Of the 13,750 structures in the Study Area, 945 structures are exposed to flooding under at least one flood event and SLR projection. The remaining 93.1% of structures are not exposed to flooding under any scenario evaluated in this analysis (**Figure 3**).

Figure 3. Structures exposed to flooding in the Study Area.

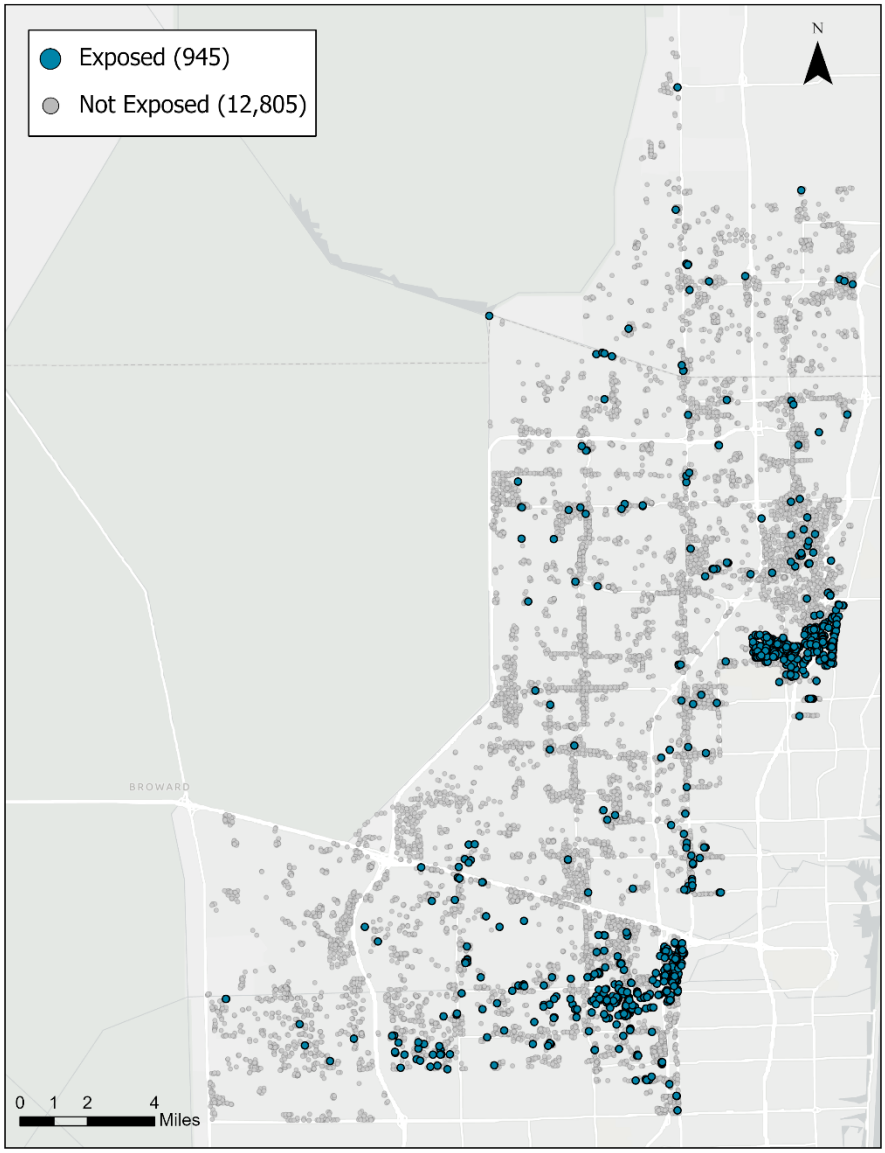


Figure 4. Change from FWOP in the number of buildings exposed to > 0 ft. of flooding.

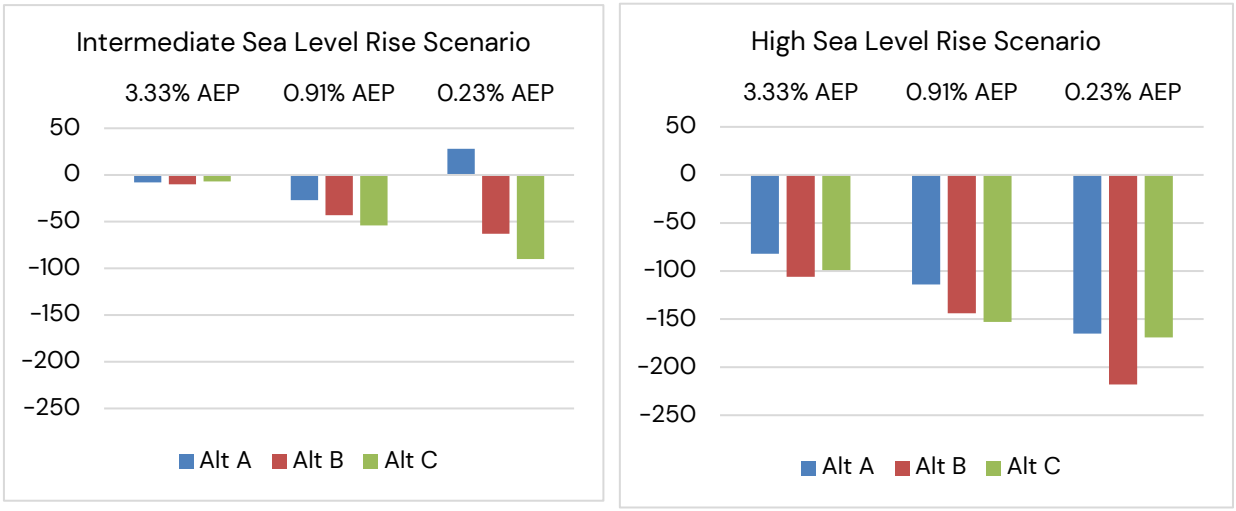
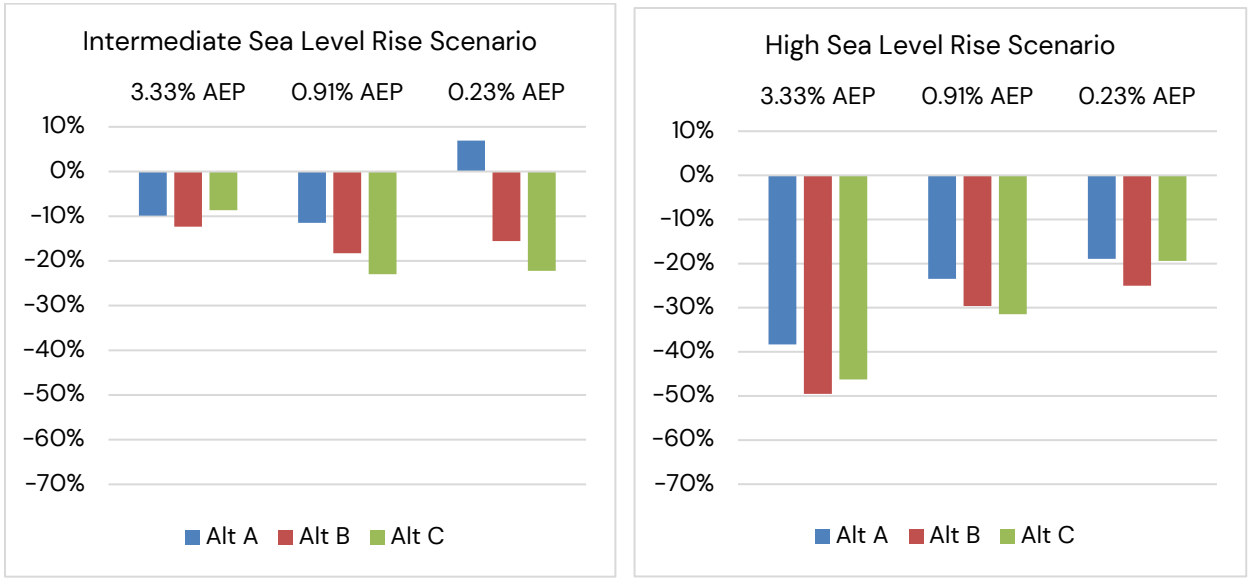


Figure 4. Percent change from FWOP in number of buildings exposed to > 0 ft. of flooding.



There are fewer structures exposed to flooding in Alternatives B and C compared to FWOP for every flooding event under both intermediate and high SLR scenarios. In Alternative A, the number of buildings exposed to flooding above 0 ft. is less than FWOP for *almost* every flood event under both SLR scenarios, the exception being the 0.23% AEP flood under an intermediate SLR scenario, in which the number of buildings exposed increases by 28, representing a +7% change (see **Figure 4** and **Figure 5**). This inconsistency is due to 20 structures, mostly in the C-14 East basin, that have greater flood depths in Alternative A than in FWOP. These unexpected flood depths are likely due to the modeling inconsistencies described in **Section 1.2**.

Across all flood events and SLR scenarios, the greatest reduction in total number of buildings exposed relative to FWOP occurs during the 0.23% AEP event under the high SLR scenario—the most severe future condition modeled. Under this scenario, Alternative B provides the highest level of protection, reducing exposure by 218 buildings, a 25% decrease from the FWOP condition. Alternative A reduces exposure by 165 buildings, while Alternative C reduces exposure by 169 buildings, each representing an approximate 19% reduction from the FWOP condition.

Across all flood events and SLR scenarios, the largest proportional reduction in building exposure relative to FWOP occurs during the 3.33% AEP event under the high SLR scenario. Under this condition, Alternative B offers the greatest level of protection, reducing the number of buildings exposed by 50%—from 204 buildings under the FWOP condition to 108 buildings. Alternative A reduces exposure by 38% (to 132 buildings), while Alternative C reduces exposure by 46% (to 115 buildings).

3.2 Direct Output Loss

Annualized Direct Output Losses range from $2M to $5M across the various design alternatives. These values are presented by basin in Appendix B and by HAZUS building type in **Appendix D**. Individual structure Direct Output Losses are presented in the maps in **Appendix C**.

Direct output losses are highly correlated with flood exposure. Since flood depths are generally greater in FWOP than in the project alternatives, Direct Output Losses also tend to be greater in FWOP than in alternatives A, B, or C (**Table 4** and **Table 5**).

Table 4: Total Direct Output Losses among structures exposed to >0ft. of flooding.

	Intermediate Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
FWOP	$23,775,316	$83,178,578	$204,746,376	$2,024,836
Alt A	$33,459,123	$78,992,002	$212,008,020	$2,326,457
Alt B	$33,450,487	$72,550,195	$148,807,944	$2,120,629
Alt C	$33,459,157	$66,304,469	$134,491,460	$2,030,845
	High Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
FWOP	$42,440,726	$155,137,835	$308,351,766	$5,268,073
Alt A	$42,440,726	$155,137,835	$308,351,766	$3,542,135
Alt B	$39,834,365	$107,411,455	$269,194,159	$2,930,316

	Intermediate Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
Alt C	$39,357,632	$105,720,829	$301,294,892	$2,973,709

Table 5: Change from FWOP in total Direct Output Losses among structures exposed to >0ft. of flooding.

	Intermediate Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
Alt A	+$9,683,806	-$4,186,575	+$7,261,643	$301,621
Alt B	+$9,675,171	-$10,628,383	-$55,938,431	$95,793
Alt C	+$9,683,841	-$16,874,109	-$70,254,916	-$4,055,681
	High Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
Alt A	-$28,961,642	-$70,485,559	-$51,502,311	-$1,725,938
Alt B	-$31,568,002	-$118,211,939	-$90,659,918	-$2,337,757
Alt C	-$32,044,735	-$119,902,566	-$58,559,185	-$2,294,364

The exceptions to this trend are the 0.23% AEP flood event under the intermediate SLR scenario, which induces greater Direct Output Losses in Alternative A than in FWOP, and the 3.33% AEP flood event under the intermediate SLR scenario, which induces greater Direct Output Losses in each of the design alternatives than in FWOP. The 0.23% AEP anomaly is due to the 20 structures, primarily in the C-14 East basin, that have greater flood depths in Alternative A than in FWOP. The resulting Direct Output Losses for these structures are greater in Alternative A than in FWOP. The 3.33% AEP anomaly is driven by greater flood exposure to eleven structures in the design alternatives than in FWOP. The structures are included in **Table 6**.

Table 6: Structures for which flood exposure is greater in the design alternatives than in FWOP. 3.33% AEP; Intermediate SLR scenario.

Structure FID	Hazus Code	FWOP Depth (ft)	Alt A Depth (ft)	Alt B Depth (ft)	Alt C Depth (ft)	FWOP Direct Output Loss ($)	Alt A Direct Output Loss ($)	Alt B Direct Output Loss ($)	Alt C Direct Output Loss ($)
12111131	COM4	0.097	0.579	0.579	0.579	$172,562.62	$180,999.11	$180,999.11	$180,999.11
21273307	COM1	0.605	0.605	0.618	0.47	$11,192.43	$11,192.43	$11,237.03	$10,727.55
12203030	IND2	0.445	0.447	0.446	0.451	$1,453.54	$1,460.07	$1,456.81	$1,473.14
40363605	AGR1	0.418	0.397	0.397	2.152	$828.65	$787.02	$787.02	$4,266.18

Structure FID	Hazus Code	FWOP Depth (ft)	Alt A Depth (ft)	Alt B Depth (ft)	Alt C Depth (ft)	FWOP Direct Output Loss ($)	Alt A Direct Output Loss ($)	Alt B Direct Output Loss ($)	Alt C Direct Output Loss ($)
12180803	IND2	0.048	0.05	0.049	0.055	$157.16	$163.71	$160.44	$180.08
40394048	IND3	-0.024	0.119	0.119	0.119	$0	$212,321.25	$212,321.25	$212,321.25
20015802	COM1	-0.3	0.048	0.048	0.048	$0	$362,736.31	$362,736.31	$362,736.31
40369282	AGR1	-0.552	-0.629	-0.629	2.174	$0	$0	$0	$5,679.48
40376777	AGR1	-0.996	-1.001	-1.001	2.159	$0	$0	$0	$9,219.62
48144717	EDU1	-1.068	0.149	0.149	0.149	$0	$12,042,960.98	$12,042,960.98	$12,042,960.98
40373218	AGR1	-1.24	-1.24	-1.24	2.15	$0	$0	$0	$9,805.11

Direct output losses among structures exposed to >0 ft. of flooding are less than FWOP under almost every flood event and SLR scenario for all Alternatives (**Figure 6**). The 3.33% AEP flood event under an intermediate SLR scenario is the major exception, as all three Alternatives are associated with an approximately $9.7 million increase in Direct Output Losses for buildings experiencing flooding above the first floor, representing a 41% change from FWOP. Alternative A is also associated with an approximately $7.2 million increase in Direct Output Losses for a 0.23% AEP flood event under an intermediate SLR scenario, representing a 4% change from FWOP. These anomalies are a direct result of the modeling inconsistencies discussed above.

Across all flood events and SLR scenarios, the largest total reduction and proportional reduction in Direct Output Losses occurs during the 0.91% AEP flood event under a high SLR scenario. Under this condition Alternative C offers the greatest proportional reduction in Direct Output Losses, decreasing losses by 53%, or approximately $119.9 million. Alternative A reduces Direct Output Losses by 31% (approximately $70.5 million), while Alternative B reduces Direct Output Losses by 52% (approximately $118.2 million). Proportional reductions in Direct Output Losses compared to FWOP for each alternative are provided in **Figure 7**.

Figure 5. Change from FWOP in direct output losses among structures exposed to >0 ft. of flooding.

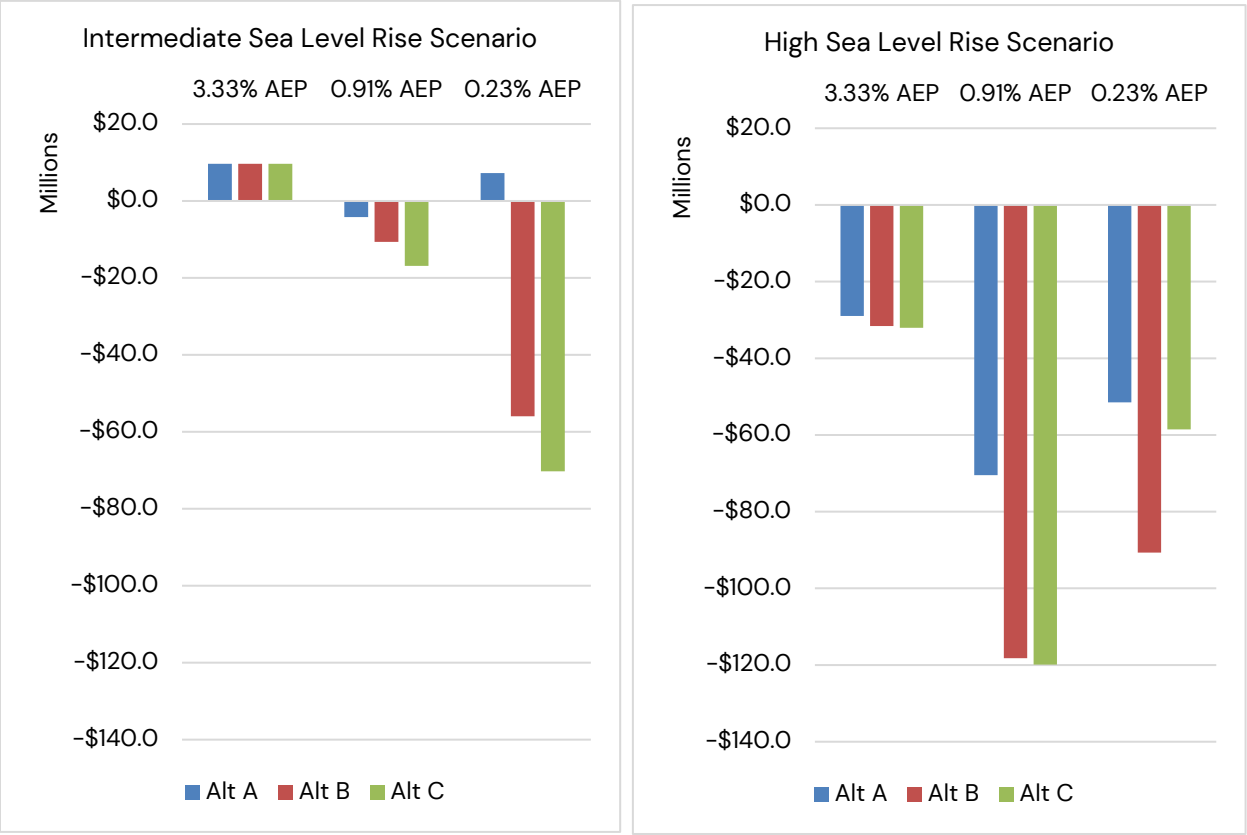


Table 7. Percent change from FWOP in total Direct Output Losses among structures exposed to >0ft. of flooding.

	Intermediate Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
Alternative A	41%	-5%	4%	+14%
Alternative B	41%	-13%	-27%	+4.7%
Alternative C	41%	-20%	-34%	+0.3%
	High Sea Level Rise Scenario			
	3.33% AEP	***0.91% AEP***	***0.23% AEP***	***Annualized Damages***
Alternative A	-41%	-31%	-14%	-32%
Alternative B	-44%	-52%	-25%	-44%
Alternative C	-45%	-53%	-16%	-44%

Discussion

The research team identified two areas with high concentrations of structures exposed to flooding (**Figure 3**). One cluster is on the border between Fort Lauderdale and Pompano Beach, along West McNab Road and Interstate 95 and between Northwest 21st Avenue and South Dixie Highway. The other cluster is in Davie, situated between South University Drive and South State Road 7, and between Interstate 595/FL 84 and Sheridan Street.

The cluster in Fort Lauderdale/Pompano Beach is located along C-14 Canal in C-14 East Basin between primary water control structures S-37B and S-37A. The cluster in Davie is located around C-11 (South New River) Canal at the approximate site of primary water control structure S-13 along the easternmost border of C-11 East Basin (**Figure 1**).

Many businesses in both areas are home improvement retailers and contractors (mattress stores, plumbers, glass repair stores, countertop stores, roofers, upholsterers, fence contractors, floor contractors, HVAC contractors, garage door suppliers, cabinet makers, etc.). These areas also have a significant number of wholesalers and commercial contractors (aircraft repair contractors, computer wholesalers, commercial printers, scuba equipment suppliers, vending machine suppliers, industrial equipment suppliers, turf suppliers, petroleum product wholesalers, etc.). Both areas have a relatively high number of pharmaceutical manufacturers (examples include Health Genesis, Kaycha Labs, Teva Pharmaceutical Company, and SKNV). HAZUS generally classifies these types of structures as retail trade (COM1), wholesale trade (COM2), professional, technical, business services (COM4), and light industry (IND2).

The Fort Lauderdale/Pompano Beach area also has a small number of general retail storefronts, such as grocery stores and shopping centers that include amenities like ATMs and urgent care centers, as well as franchise businesses like Chipotle and UPS. The area immediately off exit 33B from Interstate 95 in Fort Lauderdale has a few businesses of note, including the Westin Fort Lauderdale Hotel and corporate offices for Microsoft.

The cluster of buildings in the Davie area, in contrast to Fort Lauderdale/Pompano Beach, has a significant number of agricultural businesses (like plant nurseries, farmers markets, and stables). HAZUS classifies these structures as agricultural (ARG1).

These HAZUS types are associated with relatively low direct output per square foot, likely contributing to the small percent change in Direct Output Losses. Among the most common HAZUS types in these clusters, light industry (IND2) has the highest direct output per square foot at $2.32. This is approximately 50% less than the highest possible direct output per square foot ($4.68 for IND5, or “high technology” structures, of which there is only one in the entire Study Area).

Conclusion

ICF conducted this business interruption analysis to support the Section 203 Study with an understanding of economic effects of flooding from multiple food events and SLR scenarios and multiple project Alternatives in comparison to the FWOP condition.

This study finds that Alternatives B and C are generally associated with decreases in the number of buildings exposed to flooding and decreases in Direct Output Losses. For the most extreme flooding and SLR scenarios, Alternative B provides more protection than Alternative C in terms of reducing the number of buildings exposed to SLR and reducing Direct Output Losses. Alternative A does not consistently reduce the number of buildings exposed to flooding for all flood events and SLR scenarios. Additionally, this alternative is associated with increases in Direct Output Losses for more flood events and SLR scenarios than Alternatives B and C.

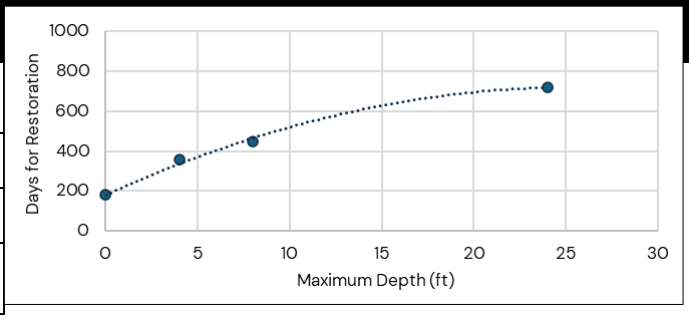
All alternatives tend to provide the most protection under the most extreme flood events and SLR scenarios, both in terms of reducing the number of buildings exposed to more than 0 ft. of flooding and in terms of reducing Direct Output Losses.

Complete results of this analysis are attached to this technical memorandum under **Appendices B** and **D**.

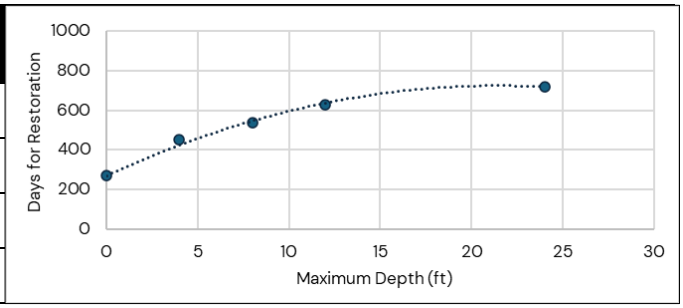
Appendix A

Table 8: Direct Output Loss equations using Maximum Depth and Days for Restoration.

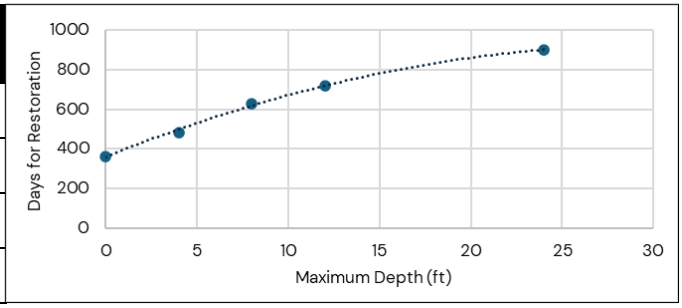
COM3				
Line of Best Fit				$y = -0.8241x^2 + 42.237x + 180$
R^2 Value				0.995
Maximum Depth (ft)				0
Days for Restoration	180	360	450	720



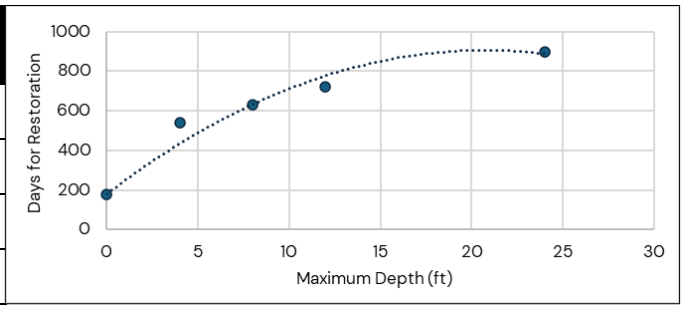
RES4					
Line of Best Fit	$y = -0.9986x^2 + 42.632x + 270$				
R^2 Value	0.9945				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	270	450	540	630	720



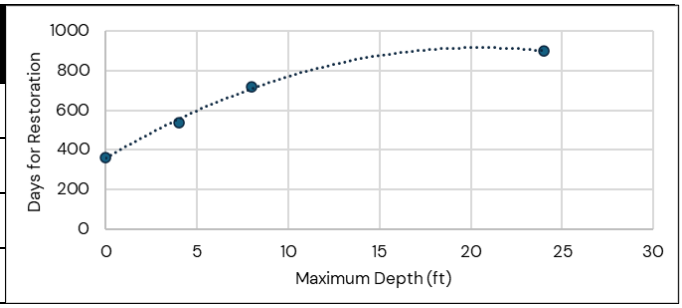
RES5, RES6, COM4, COM5, COM7, GOV1, GOV2, EDU1, and EDU2					
Line of Best Fit	$y = -0.6149x^2 + 37.297x + 360$				
R^2 Value	0.9974				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	360	480	630	720	900



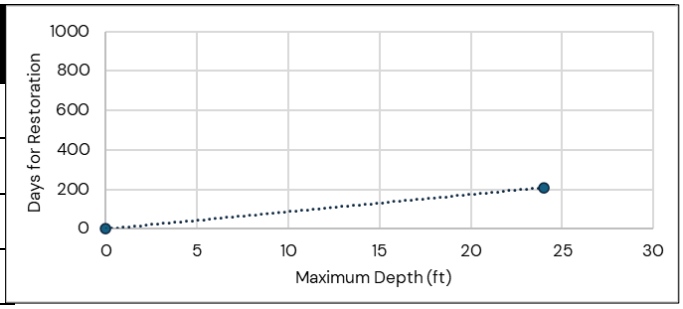
COM1, COM2, COM8, COM9, and REL1					
Line of Best Fit	$y = -1.6886x^2 + 70.042x + 180$				
R^2 Value	0.9565				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	180	540	630	720	900



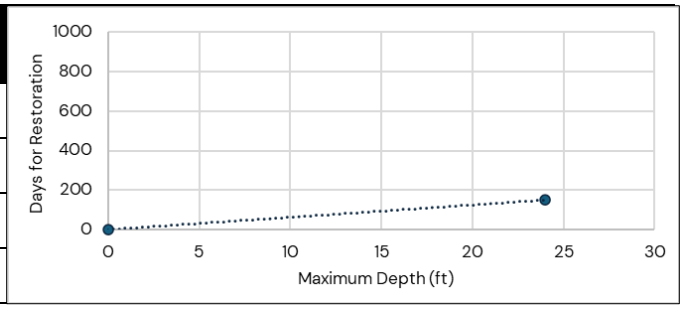
COM6					
Line of Best Fit	$y = -1.3256x^2 + 54.342x + 360$				
R^2 Value	0.9980				
Maximum Depth (ft)	0	4	8	24	
Days for Restoration	360	540	720	900	



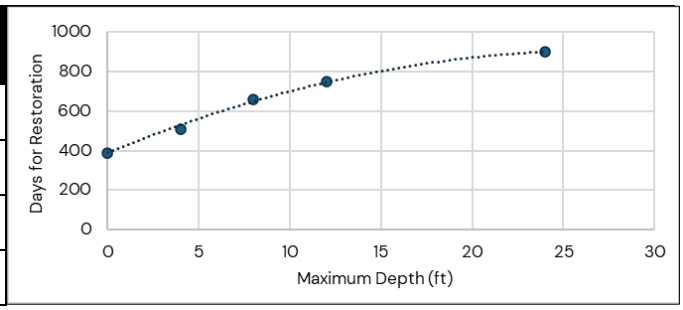
IND1 and AGR1		
Line of Best Fit	$y = 8.75x$	
R^2 Value	1	
Maximum Depth (ft)	0	24
Days for Restoration	0	210



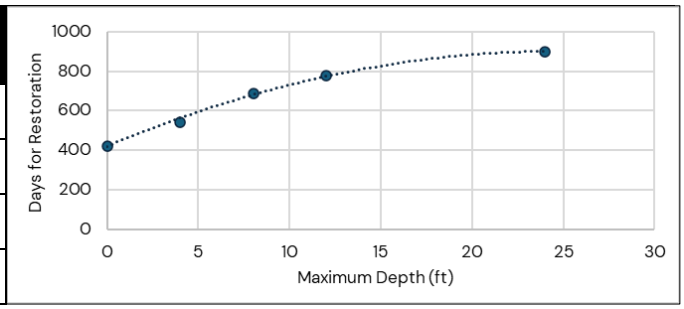
IND2 and IND6		
Line of Best Fit	$y = 6.25x$	
R^2 Value	1	
Maximum Depth (ft)	0	24
Days for Restoration	0	150



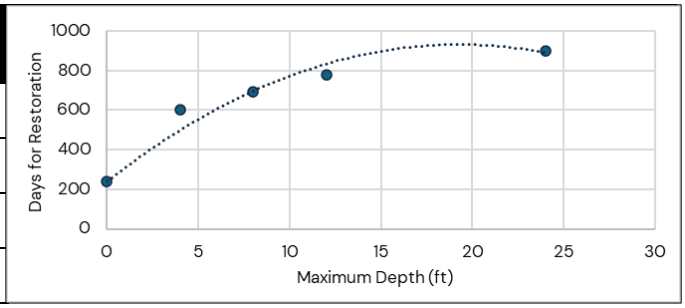
IND3					
Line of Best Fit	$y = -0.7021x^2 + 38.154x + 390$				
R^2 Value	0.9968				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	390	510	660	750	900



IND4					
Line of Best Fit	$y = -0.7892x^2 + 39.011x + 420$				
R^2 Value	0.9960				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	420	540	690	780	900



IND5					
Line of Best Fit	$y = -1.8629x^2 + 71.756x + 240$				
R^2 Value	0.9556				
Maximum Depth (ft)	0	4	8	12	24
Days for Restoration	240	600	690	780	900



Appendix B

Table 9: Direct Output Loss Summary Table by Sub-basin.

3.33% AEP Intermediate SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$7,859,382.46	$5,223,766.23	$5,223,466.35	$5,223,479.83
C-11 WEST	$777,002.69	$776,512.92	$776,501.77	$776,481.71
C-12W	$4,011,251.85	$3,988,172.36	$3,988,172.36	$3,988,170.12
C-13 WEST	$0	$362,736.31	$362,736.31	$362,736.31
C-14 EAST	$4,470,382.62	$4,455,722.84	$4,451,528.71	$4,449,792.23
C-14 WEST	$2,271,428.11	$2,135,634.30	$2,135,433.11	$2,135,433.11
HILLSBORO CANAL	$1,652,789.93	$1,762,292.84	$1,762,292.84	$1,790,476.20
NORTH NEW RIVER CANAL WEST	$2,733,078.38	$14,754,285.22	$14,750,355.66	$14,732,587.56
POMPANO CANAL	$0	$0	$0	$0
Total	**$23,775,316.04**	**$33,459,123.02**	**$33,450,487.11**	**$33,459,157.07**
3.33% AEP High SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$38,537,552.05	$8,698,267.78	$6,760,657.00	$5,987,700.79
C-11 WEST	$777,140.93	$776,664.35	$776,586.50	$776,550.82
C-12W	$4,011,599.05	$3,988,526.98	$3,988,524.74	$3,988,522.51
C-13 WEST	$133,053.90	$502,148.41	$363,012.79	$362,736.31
C-14 EAST	$20,005,615.13	$8,537,367.68	$8,032,338.02	$8,348,868.77
C-14 WEST	$2,273,693.24	$2,137,248.21	$2,136,043.34	$2,135,493.64
HILLSBORO CANAL	$1,651,940.20	$1,763,318.66	$1,762,102.61	$1,796,255.92
NORTH NEW RIVER CANAL WEST	$2,777,286.82	$14,812,579.93	$14,790,998.08	$14,743,545.15

POMPANO CANAL	$1,234,486.85	$1,224,603.52	$1,224,102.40	$1,217,958.42
Total	**$71,402,368.18**	**$42,440,725.50**	**$39,834,365.48**	**$39,357,632.34**
0.91% AEP Intermediate SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$24,382,697.70	$13,037,961.07	$11,112,459.34	$10,655,287.47
C-11 WEST	$2,761,602.60	$2,917,600.28	$2,914,522.62	$2,781,544.05
C-12W	$4,439,877.91	$4,276,427.68	$4,276,425.45	$4,276,423.22
C-13 WEST	$9,625,385.43	$7,274,486.37	$2,801,451.82	$2,653,686.89
C-14 EAST	$18,158,693.16	$16,938,891.41	$16,905,167.64	$11,556,920.96
C-14 WEST	$9,424,920.02	$11,149,342.22	$11,146,934.02	$11,148,064.74
HILLSBORO CANAL	$5,548,681.37	$5,434,824.17	$5,434,802.32	$5,303,214.50
NORTH NEW RIVER CANAL WEST	$6,905,040.82	$16,042,082.30	$16,038,169.84	$16,008,558.85
POMPANO CANAL	$1,931,679.31	$1,920,386.99	$1,920,261.97	$1,920,768.12
Total	**$83,178,578.32**	**$78,992,002.48**	**$72,550,195.03**	**$66,304,468.80**
0.91 % AEP High SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$59,647,896.09	$21,032,621.98	$17,819,053.75	$17,691,534.64
C-11 WEST	$2,862,567.53	$2,969,170.26	$2,963,109.93	$2,900,303.53
C-12W	$4,636,589.69	$4,416,982.28	$4,416,834.80	$4,417,179.12
C-13 WEST	$9,998,515.89	$10,726,559.25	$9,932,875.17	$8,883,051.98
C-14 EAST	$117,666,338.19	$74,487,684.00	$36,231,337.63	$35,782,831.69
C-14 WEST	$9,437,658.05	$11,152,595.23	$11,148,795.76	$11,153,210.54
HILLSBORO CANAL	$5,549,069.95	$5,434,063.42	$5,434,081.17	$5,463,924.22
NORTH NEW RIVER CANAL WEST	$12,397,555.53	$21,504,227.67	$16,055,260.19	$16,030,288.56

POMPANO CANAL	$3,427,203.42	$3,413,930.64	$3,410,106.13	$3,398,503.53
Total	**$225,623,394.34**	**$155,137,834.73**	**$107,411,454.54**	**$105,720,827.82**
0.23% AEP Intermediate SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$52,129,741.34	$25,675,438.26	$29,487,625.53	$24,231,083.11
C-11 WEST	$4,524,161.60	$4,805,223.26	$4,537,380.61	$4,624,389.49
C-12W	$8,749,266.94	$8,020,372.65	$7,803,428.30	$8,102,000.83
C-13 WEST	$10,727,583.33	$11,204,231.61	$8,282,813.53	$3,843,456.87
C-14 EAST	$71,662,065.10	$116,340,711.51	$43,390,443.05	$36,555,253.25
C-14 WEST	$32,318,553.09	$19,917,998.08	$31,434,141.82	$31,246,661.15
HILLSBORO CANAL	$13,984,890.63	$5,582,886.67	$5,726,879.52	$5,812,561.84
NORTH NEW RIVER CANAL WEST	$7,290,295.15	$18,357,147.48	$16,044,409.60	$17,976,430.46
POMPANO CANAL	$3,359,818.79	$2,104,010.13	$2,100,822.24	$2,099,622.97
Total	**$204,746,375.97**	**$212,008,019.66**	**$148,807,944.20**	**$134,491,459.97**
0.23% AEP High SLR				
Sub-basin	***FWOP***	***Alt A***	***Alt B***	***Alt C***
C-11 EAST	$102,774,220.77	$62,920,939.26	$51,299,364.50	$60,982,190.82
C-11 WEST	$4,760,069.99	$3,491,017.45	$3,237,391.51	$4,715,269.34
C-12W	$8,824,004.91	$13,570,632.15	$13,570,104.03	$13,598,558.01
C-13 WEST	$10,346,221.62	$10,882,100.24	$10,198,887.69	$11,231,656.39
C-14 EAST	$161,966,213.58	$140,460,216.76	$136,572,003.97	$137,697,315.61
C-14 WEST	$27,454,974.39	$31,627,347.95	$19,203,481.66	$33,983,991.42
HILLSBORO CANAL	$23,923,271.29	$15,636,688.09	$5,447,800.79	$15,890,921.47
NORTH NEW RIVER CANAL WEST	$14,434,285.35	$24,066,348.57	$23,967,358.01	$17,906,091.95

POMPANO CANAL	$5,370,815.49	$5,696,475.37	$5,697,767.16	$5,288,896.68
Total	**$359,854,077.38**	**$308,351,765.84**	**$269,194,159.32**	**$301,294,891.68**

Appendix C

Figure 6. Annualized direct output loss for structures with depth greater than 0 ft under the FWOP High SLR scenario.

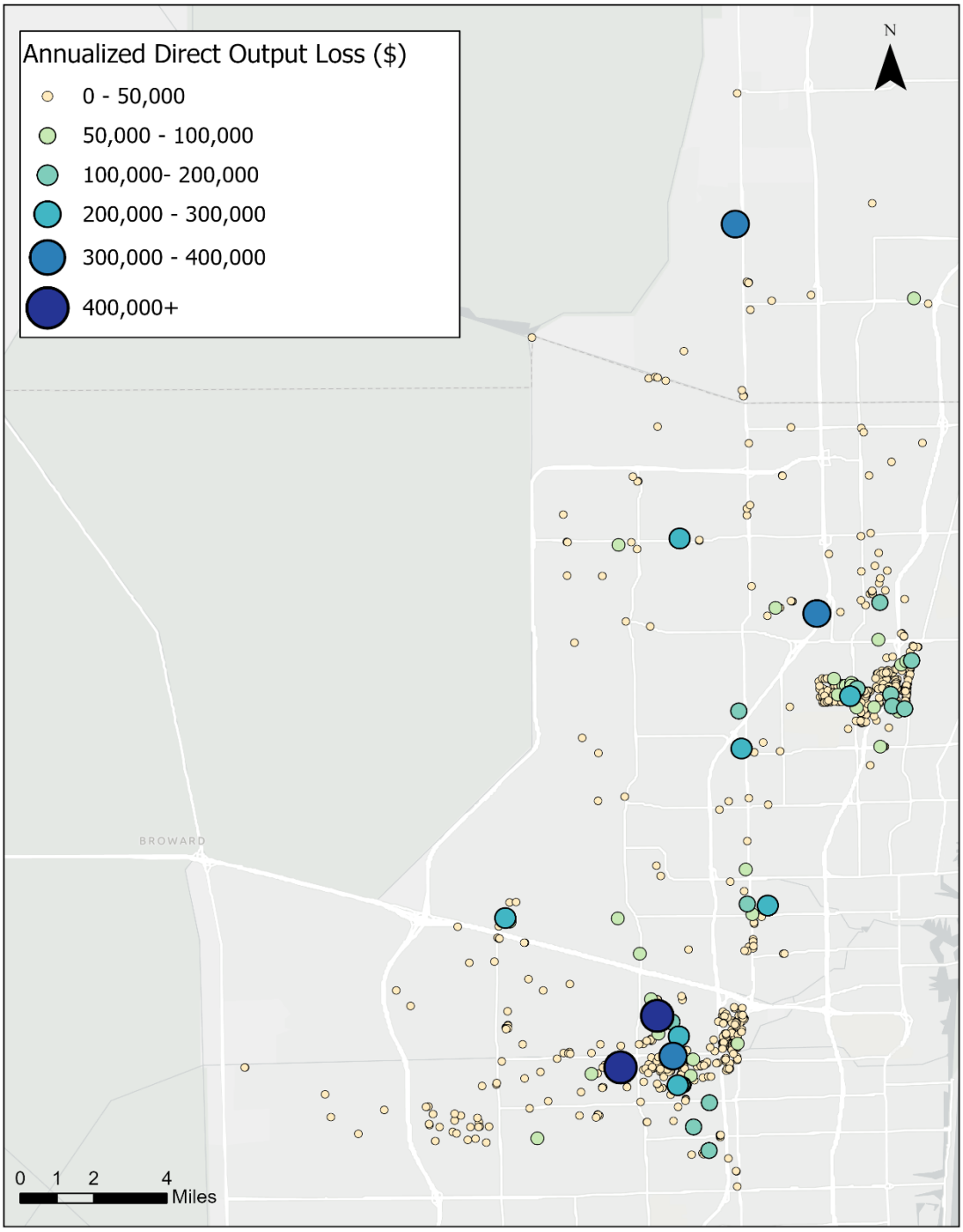


Figure 87. Annualized direct output loss for structures with depth greater than 0 ft under the Alt A High SLR scenario.

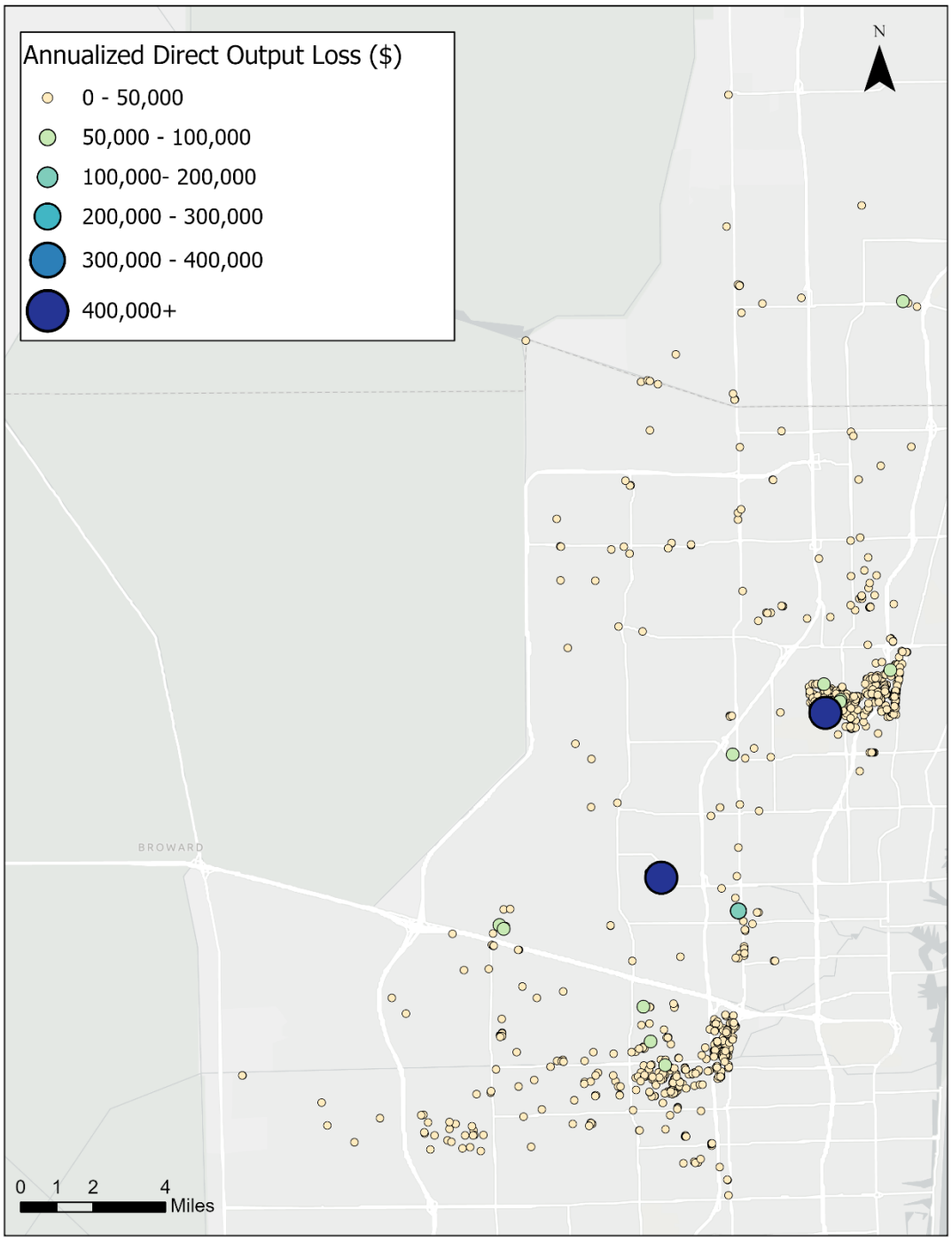


Figure 8. Annualized direct output loss for structures with depth greater than 0 ft under the Alt B High SLR scenario.

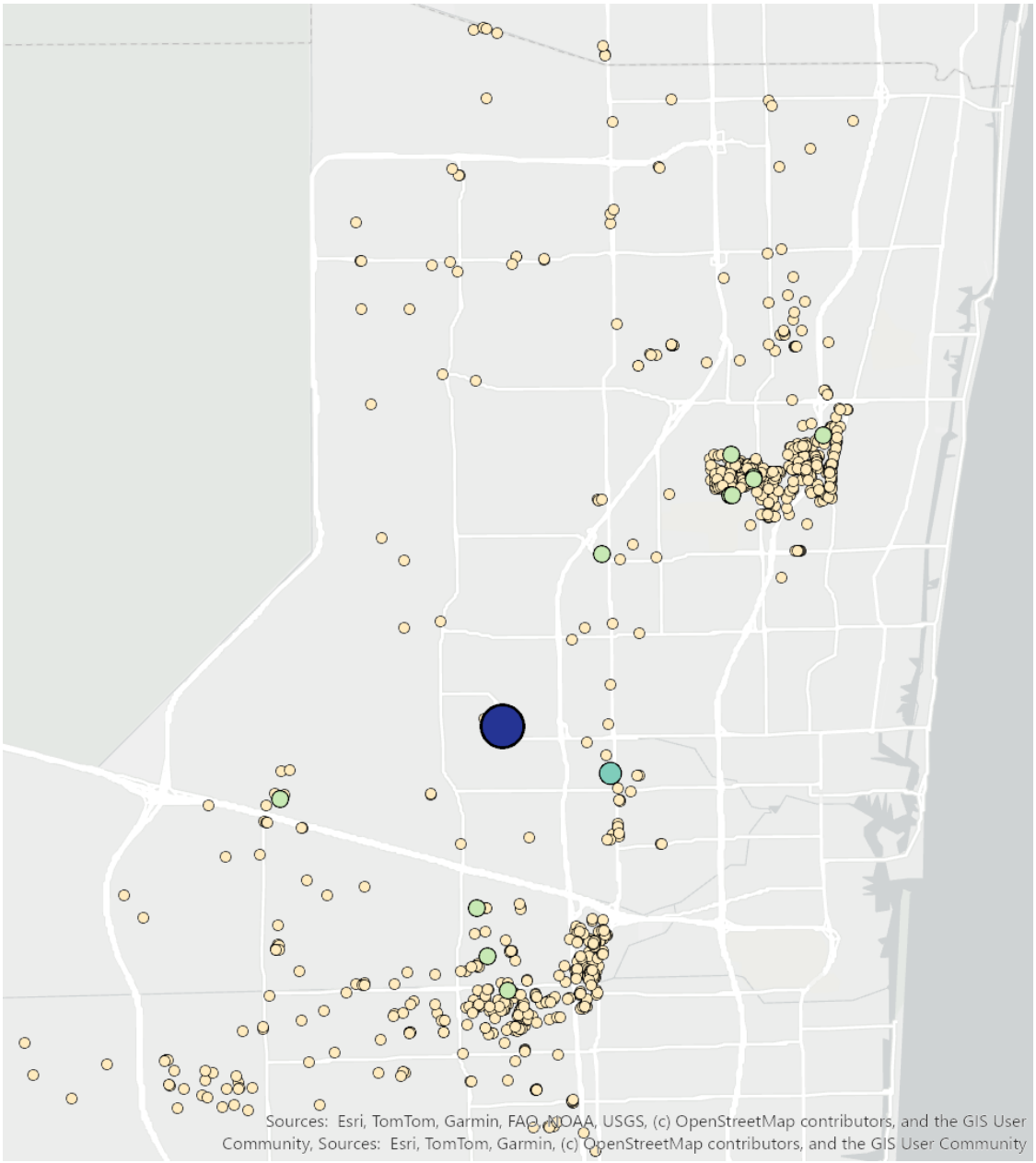
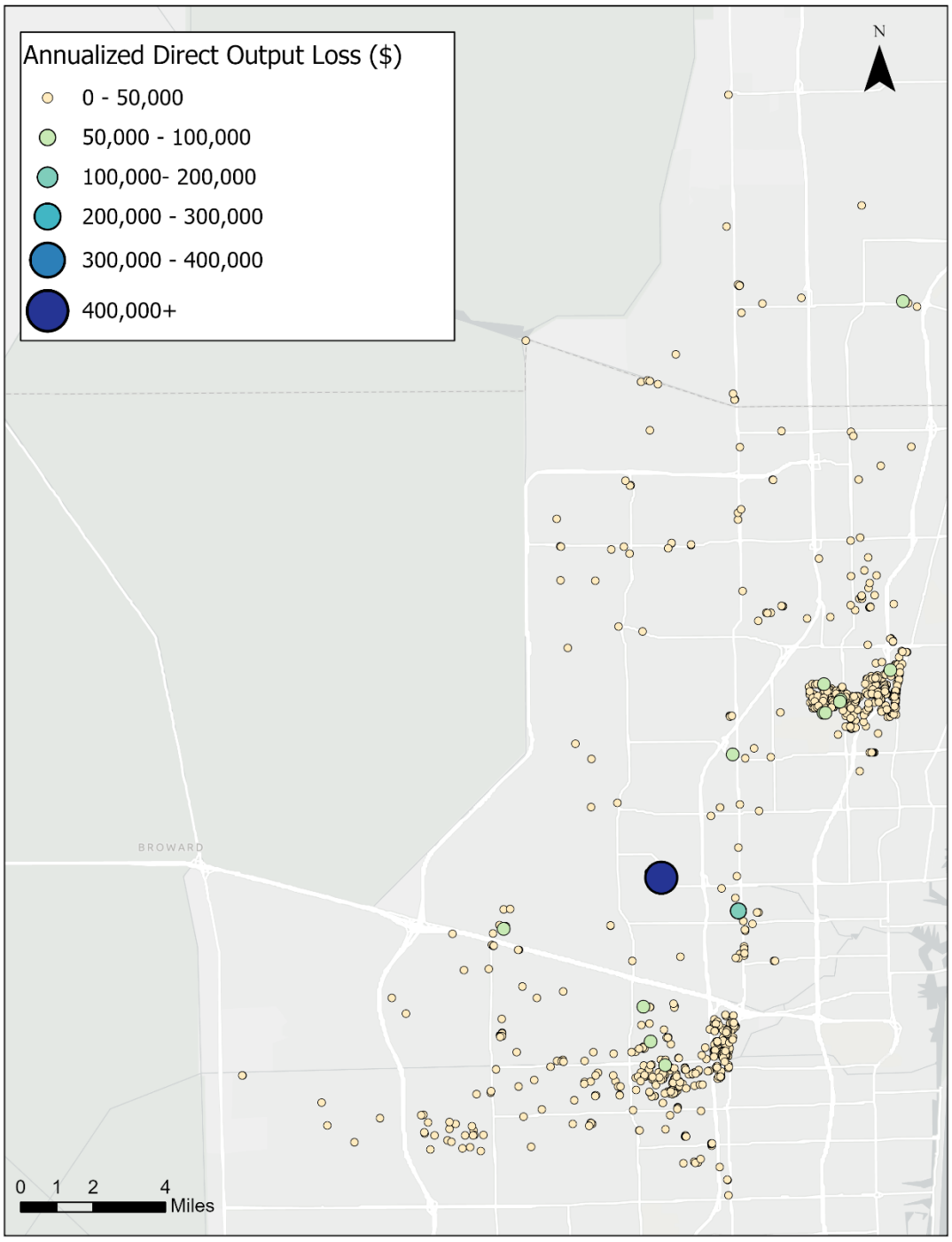


Figure 9. Annualized direct output loss for structures with depth greater than 0 ft under the Alt C High SLR scenario.



Appendix D

Table 10: Direct Output Loss Summary Table by Hazus Code.

3.33% AEP Intermediate SLR				
Hazus Code	***FWOP***	***Alt A***	***Alt B***	***Alt C***
AGR1	$80,747.12	$78,178.04	$77,873.55	$106,042.26
COM1	$50,389.54	$373,928.74	$373,973.34	$373,463.87
COM2	$20,337.22	$20,204.34	$20,204.34	$20,204.34
COM3	$0	$0	$0	$0
COM4	$5,148,211.14	$5,135,293.14	$5,135,293.14	$5,135,293.14
COM5	$344,011.33	$237,165.40	$237,165.40	$237,165.40
COM6	$0	$0	$0	$0
COM8	$0	$0	$0	$0
COM9	$0	$0	$0	$0
EDU1	$10,958,974.01	$20,864,400.68	$20,860,269.92	$20,842,501.83
EDU2	$0	$0	$0	$0
GOV1	$99,490.60	$0	$0	$0
IND1	$0	$0	$0	$0
IND2	$53,648.19	$45,510.93	$41,460.96	$40,630.66
IND3	$588,491.47	$676,827.84	$676,827.84	$676,825.60
IND4	$0	$0	$0	$0
IND5	$0	$0	$0	$0
REL1	$388,642.63	$0	$0	$0
RES4	$0	$0	$0	$0
RES6	$6,042,372.78	$6,027,613.91	$6,027,418.62	$6,027,029.98
Total	**$23,775,316.04**	**$33,459,123.02**	**$33,450,487.11**	**$33,459,157.07**

3.33% AEP High SLR				
Hazus Code	***FWOP***	***Alt A***	***Alt B***	***Alt C***
AGR1	$192,960.18	$92,288.99	$83,074.14	$115,401.49
COM1	$4,092,941.25	$2,976,620.37	$2,362,199.18	$2,704,985.34
COM2	$43,419.81	$41,019.47	$41,120.43	$41,664.21
COM3	$0	$0	$0	$0
COM4	$12,645,054.96	$7,481,442.45	$7,386,711.19	$7,382,516.83
COM5	$344,612.14	$237,606.22	$237,536.64	$237,513.44
COM6	$0	$0	$0	$0

COM8	$0	$0	$0	$0
COM9	$0	$0	$0	$0
EDU1	$35,549,251.17	$22,520,758.26	$20,901,791.25	$20,853,526.49
EDU2	$0	$0	$0	$0
GOV1	$538,169.33	$0	$0	$0
IND1	$0	$0	$0	$0
IND2	$216,690.70	$102,436.87	$90,335.12	$91,021.04
IND3	$588,568.32	$677,051.33	$676,956.89	$676,870.84
IND4	$0	$0	$0	$0
IND5	$0	$0	$0	$0
REL1	$4,694,392.93	$1,046,057.61	$790,122.70	$0
RES4	$4,270,629.37	$0	$0	$0
RES6	$8,225,678.00	$7,265,443.93	$7,264,517.95	$7,254,132.66
Total	**$71,402,368.18**	**$42,440,725.50**	**$39,834,365.48**	**$39,357,632.34**

0.91% AEP Intermediate SLR

Hazus Code	*FWOP*	*Alt A*	*Alt B*	*Alt C*
AGR1	$151,745.82	$132,917.56	$122,139.52	$142,051.27
COM1	$7,693,597.61	$7,895,371.62	$3,201,662.08	$3,066,050.25
COM2	$22,054.05	$21,929.98	$21,922.68	$21,886.17
COM3	$0	$0	$0	$0
COM4	$10,550,766.61	$9,712,569.66	$9,715,917.84	$8,147,498.74
COM5	$8,479,893.74	$5,288,130.07	$5,288,291.73	$5,288,174.34
COM6	$0	$0	$0	$0
COM8	$318,291.05	$332,661.44	$330,896.46	$294,228.48
COM9	$0	$0	$0	$0
EDU1	$37,385,232.95	$37,935,416.25	$36,293,241.69	$36,255,184.18
EDU2	$0	$0	$0	$0
GOV1	$102,276.68	$0	$0	$0
IND1	$0	$0	$0	$0
IND2	$168,381.32	$139,957.46	$138,782.54	$129,356.98
IND3	$2,544,480.10	$2,280,633.53	$2,280,650.12	$2,120,817.52
IND4	$0	$0	$0	$0
IND5	$0	$0	$0	$0
REL1	$1,525,845.79	$1,056,871.18	$960,694.73	$370,619.95
RES4	$0	$0	$0	$0
RES6	$14,236,012.61	$14,195,543.72	$14,195,995.64	$10,468,600.94
Total	**$83,178,578.32**	**$78,992,002.48**	**$72,550,195.03**	**$66,304,468.80**

0.91% AEP High SLR				
Hazus Code	***FWOP***	***Alt A***	***Alt B***	***Alt C***
AGR1	$369,315.74	$214,150.86	$173,964.14	$175,018.31
COM1	$13,759,735.93	$12,618,196.12	$11,909,459.58	$11,477,230.10
COM2	$215,427.83	$207,997.63	$209,827.76	$220,520.32
COM3	$154,757.80	$0	$0	$0
COM4	$21,199,313.42	$20,569,992.51	$19,671,501.67	$19,569,576.41
COM5	$9,944,076.95	$5,289,256.89	$5,288,222.26	$5,287,650.48
COM6	$2,097,965.38	$0	$0	$0
COM8	$432,887.15	$341,257.36	$338,568.47	$321,632.04
COM9	$0	$0	$0	$0
EDU1	$139,487,228.70	$84,384,822.47	$43,757,549.10	$42,794,904.54
EDU2	$0	$0	$0	$0
GOV1	$558,115.54	$0	$0	$0
IND1	$0	$0	$0	$0
IND2	$910,611.05	$574,681.41	$477,433.43	$346,171.75
IND3	$2,778,188.96	$2,299,971.29	$2,299,569.96	$2,327,511.39
IND4	$0	$0	$0	$0
IND5	$12,770.43	$0	$0	$0
REL1	$8,689,761.59	$6,905,689.81	$1,597,778.41	$1,498,711.02
RES4	$4,501,853.83	$4,397,175.78	$4,356,378.33	$4,385,077.04
RES6	$20,511,384.04	$17,334,642.60	$17,331,201.42	$17,316,824.43
Total	**$225,623,394.34**	**$155,137,834.73**	**$107,411,454.54**	**$105,720,827.82**

0.23% AEP Intermediate SLR				
Hazus Code	***FWOP***	***Alt A***	***Alt B***	***Alt C***
AGR1	$214,570.89	$181,067.39	$142,415.10	$164,289.87
COM1	$11,528,723.25	$15,249,098.99	$10,907,559.51	$6,018,926.75
COM2	$42,788.72	$24,269.50	$23,260.06	$41,991.33
COM3	$0	$0	$0	$0
COM4	$21,964,806.09	$24,732,807.97	$20,763,230.04	$16,357,414.13
COM5	$13,492,030.82	$15,563,004.75	$12,511,794.56	$16,410,795.56
COM6	$0	$0	$0	$0
COM8	$322,362.17	$417,457.23	$414,935.05	$294,756.73
COM9	$0	$0	$0	$0
EDU1	$116,995,098.42	$127,621,068.86	$68,130,360.59	$63,132,631.93
EDU2	$8,552,017.32	$0	$0	$0

GOV1	$105,636.28	$0	$0	$0
IND1	$0	$0	$0	$0
IND2	$418,046.15	$895,052.14	$298,335.37	$239,460.44
IND3	$3,484,975.69	$3,132,587.92	$3,257,255.79	$3,255,980.29
IND4	$0	$0	$0	$0
IND5	$0	$0	$0	$0
REL1	$4,530,019.40	$4,224,911.34	$3,405,073.62	$1,429,431.44
RES4	$4,249,410.06	$4,427,056.88	$4,169,952.72	$4,211,960.35
RES6	$18,845,890.71	$15,539,636.69	$24,783,771.79	$22,933,821.16
Total	**$204,746,375.97**	**$212,008,019.66**	**$148,807,944.20**	**$134,491,459.97**

0.23% AEP High SLR

Hazus Code	***FWOP***	***Alt A***	***Alt B***	***Alt C***
AGR1	$573,941.29	$370,430.60	$324,338.39	$354,720.41
COM1	$23,159,636.47	$19,408,983.70	$18,921,104.03	$18,011,419.61
COM2	$579,968.79	$519,740.59	$517,883.16	$517,791.88
COM3	$473,799.80	$174,202.81	$170,458.83	$172,707.41
COM4	$52,145,254.33	$42,728,348.89	$31,473,079.92	$42,329,769.64
COM5	$18,443,483.85	$15,902,517.91	$15,832,488.21	$19,992,173.17
COM6	$2,727,961.16	$2,116,113.69	$2,099,177.00	$2,097,359.56
COM8	$2,402,731.91	$795,926.93	$787,328.55	$767,724.23
COM9	$0	$0	$0	$0
EDU1	$197,703,877.02	$174,268,338.94	$153,543,068.68	$165,233,189.35
EDU2	$0	$0	$0	$0
GOV1	$2,109,729.16	$1,212,837.64	$1,204,883.06	$846,217.59
IND1	$0	$0	$0	$0
IND2	$2,106,201.41	$1,529,444.78	$1,444,961.46	$1,351,586.45
IND3	$4,057,724.67	$3,700,430.27	$2,819,738.55	$4,104,029.75
IND4	$0	$0	$0	$0
IND5	$16,026.81	$14,639.18	$14,418.96	$14,607.76
REL1	$15,779,640.93	$13,247,291.06	$10,673,007.67	$12,940,767.98
RES4	$6,603,657.09	$4,730,236.96	$4,680,511.43	$4,687,982.72
RES6	$30,970,442.68	$27,632,281.88	$24,687,711.43	$27,872,844.15
Total	**$359,854,077.38**	**$308,351,765.84**	**$269,194,159.32**	**$301,294,891.68**

D.8 Regional Economic Development Benefits Temporary Displacement Technical Memorandum

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins Temporary Displacement Analysis

1 Introduction and Purpose:

This memo outlines the temporary displacement analysis, carried out as part of the South Florida Water Management District's (SFWMD) Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (203 Study).

This Section 203 Study focuses on enhancing the resiliency of the water control structures and adjacent primary canals in Broward Basins Reach A, a reach of the ongoing U.S. Army Corps of Engineers (USACE) C&SF Section 216 Study. Broward Basins Reach A is referred to herein as the Section 203 Study Area (or Study Area).

This analysis estimates the impact that flooding of the analysis area under three design storms and associated storm surges, and two sea level rise (SLR) scenarios, would have on residents and the costs they would incur to temporarily relocate while the flooding recedes and their homes are restored to habitable condition. The benefits of three proposed build alternatives were then compared to the Future Without Project (FWOP) alternative to estimate the benefits of the proposed build alternatives.

2 Methodology

The temporary displacement analysis was based on HECFDA analyses for 9 watersheds in Broward County:

- C-11 East
- C-11 West
- C-12 West
- C-13 West
- C-14 East
- C-14 West
- Hillsboro
- North New River West
- Pompano

For each watershed, the MKE SHE output presents the projected number of properties with projected flooding above 0.25, 1, 2, 3, 4, and 5 feet above the first floor elevation for 3 design storms for the year 2085:

- 25 year storm and 2 year storm surge (2S25R)
- 100 year storm and 2 year storm surge (2S110R), and
- 100 year storm and 100 year storm surge (100S100R).

Each of these design storms and storm surge scenarios was examined with an intermediate SLR and under a high SLR condition (6 total scenarios). The flooding was estimated for the year 2085 conditions for the FWOP alternative and 4 build alternatives (Alternatives A, B, C, and RO, with Alternative RO being the Recommended Plan). While the initial HEC-FDA results were presented for all properties in each watershed, the results were sorted to isolate only residential properties that would be the subject of this temporary displacement analysis.

The average persons per household in Broward County was then applied to the number of residential properties impacted at each flood depth to estimate the number of people estimated to be impacted by the forecast flooding.

Hazus Flood Model Table 6-4 presents the maximum restoration time for Res 1, Res 3A, Res 3B, and Com 3 occupancies based on Flood Depth. For this analysis, it was assumed that the average restoration time would be approximately 75% of the maximum restoration days, and that re-occupancy would be 90% of the estimated average restoration days.

An estimate of the number of person days displaced was then estimated by multiplying the persons at risk by flood depth for each alternative by the flood re-occupancy days by flood depth.

The difference between the number of person days displaced for each of the build alternatives and the FWOP alternative was then calculated.

The person days displaced by storm was then multiplied by the annual probabilities for the 3 design storms and associated intermediate and high SLR, to derive the estimated annual average person days displaced associated with each alternative.

Per diem rates for lodging and food and incidentals for Fort Lauderdale were then applied to the estimated annual person days displaced to determine the estimated annual costs associated with the displacements. It was assumed that only 25% of the food and incidentals per diem costs would be applicable due to residents obtaining food and incidentals over longer periods from grocery stores and other usual sources.

The difference between the estimated annual costs associated with the displacements for the FWOP and the build alternatives was then calculated to determine the resulting savings associated with the build alternatives as compared to the FWOP.

3 Assumptions

1. Assumes the average population per household in Broward County of 2.56 based on U.S. Census Bureau Quick Facts (American Community Survey 2023: ACS 1 Year Estimates Subject Tables).
2. Person Days displaced based on flood depth derived from Hazus Flood Technical Manual, which provided maximum days for restoration by flood depth for -4 to +4 feet above first floor flood elevation. Interpolation was used to develop estimated maximum days of restoration for intermediate flood depths.
3. It was assumed that the average days of flood restoration would be 75% of the maximum days of flood restoration.

4. It is assumed for this analysis that average time for re-occupancy will be 90% of the average restoration time. Person days displaced based on average time for re-occupancy by flood depth multiplied by the number of people at risk by flood depth.
5. For the purposes of this analysis, it was assumed that there would not be any permanent dislocations due to the flooding.
6. Storm probabilities were based on storm and storm surge frequencies.
7. Per diem rates were based on U.S. General Services Administration FY 2025 per diem rates for Fort Lauderdale Florida of $177 per day for lodging and $86 per day for food and incidentals.
8. Analysis assumes that flood displacements would increase food and incidental expenses by 25% of the food and incidentals per diem rates.

4 Results

Table 1 summarizes the estimated annual temporary displacement costs for the FWOP and the four build alternatives. The table shows that under the FWOP the total annual impact in the 9 watersheds amounts to $12.2 million under the intermediate SLR. The results are shown for one year (2085), and reflect the impacts of each storm adjusted for their annual probability of occurring. Comparatively, the total annual impact based on the 2085 results for Alternative A is $10.7 million. For Alternative B, the impact is $10.5 million, for Alternative C it is $10.2 million, and for Alternative RO the impact is $10.7 million. Under high SLR, these impacts are estimated at $17.5 million for the FWOP alternative, $13.1 million for Alternative A, $12.3 million for Alternative B, $11.8 million for Alternative C, and $13.1 million for Alternative RO.

Table 1.
SFWMD Broward 203 Study
Benefits Analysis - Annualized Value of Net Temporary Displacements
2085

Intermediate Sea Level Rise	**Design Storm**			
	2S25R	2S100R	100S100R	Total
Annualized Total Displacement Days				
Future Without Project (FWOP)	30,414	24,378	6,655	61,447
Option A	26,456	21,328	5,802	53,586
Option B	26,083	20,967	5,473	52,523
Option C	25,761	20,282	5,308	51,351
Option RO	26,500	21,197	5,882	53,579
Annualized Value of Total Displacement Days				
Future Without Project (FWOP)	$6,052,338	$4,851,237	$1,324,374	$12,227,949
Option A	$5,264,734	$4,244,342	$1,154,529	$10,663,604
Option B	$5,190,532	$4,172,374	$1,089,096	$10,452,002
Option C	$5,126,508	$4,036,111	$1,056,199	$10,218,818
Option RO	$5,273,488	$4,218,186	$1,170,523	$10,662,196

High Sea Level Rise	Design Storm			
	2S25R	2S100R	100S100R	Total
Annualized Total Displacement Days				
Future Without Project (FWOP)	42,330	33,190	12,173	87,693
Option A	31,007	25,835	8,989	65,831
Option B	29,422	24,322	8,317	62,060
Option C	28,332	23,249	7,843	59,424
Option RO	30,566	25,520	9,498	65,583
Annualized Value Total Displacement Days				
Future Without Project (FWOP)	$8,423,768	$6,604,833	$2,422,392	$17,450,992
Option A	$6,170,444	$5,141,134	$1,788,782	$13,100,360
Option B	$5,854,890	$4,840,037	$1,655,017	$12,349,944
Option C	$5,638,136	$4,626,461	$1,560,719	$11,825,316
Option RO	$6,082,653	$5,078,387	$1,890,004	$13,051,045

Notes: 2S25R = 2-year coastal, 25-year rainfall event; 2S100R = 2-year coastal, 100-year rainfall event; 100S100R = 100-year coastal, 100-year rainfall event; RO = Resilience Optimized

The savings associated with each of the build alternatives as compared to the FWOP is presented in **Table 2**. The table shows that Alternative A would reduce the temporary displacement costs by $1.6 million, as compared to FWOP under the intermediate SLR scenario, while Alternative B would reduce these costs by $1.8 million, Alternative C would reduce the temporary displacement costs by $2.0 million, and Alternative RO by $1.6 million. Under the high SLR scenario, Alternative A would save $4.4 million annually, Alternative B would save $5.1 million, Alternative C would save $5.6 million, and Alternative RO would save $4.4 million as compared to the FWOP condition.

Table 2.
SFWMD Broward 203 Study
Benefits Analysis - Annualized Value of Net Temporary Displacements
2085

Intermediate Sea Level Rise	Design Storm			
	2S25R	2S100R	100S100R	Total
Annualized Net Change in Displacement Days				
Option A	(3,958)	(3,050)	(853)	(7,861)
Option B	(4,331)	(3,411)	(1,182)	(8,924)
Option C	(4,652)	(4,096)	(1,348)	(10,096)
Option RO	(3,914)	(3,181)	(773)	(7,868)
Annualized Value of Change in Displacement Days				
Option A	$(787,604)	$(606,895)	$(169,846)	$(1,564,345)
Option B	$(861,806)	$(678,863)	$(235,279)	$(1,775,948)
Option C	$(925,830)	$(815,126)	$(268,176)	$(2,009,131)

Option RO	$(778,850)	$(633,051)	$(153,852)	$(1,565,753)

High Sea Level Rise	**Design Storm**			
	2S25R	2S100R	100S100R	Total
Annualized Net Change in Displacement Days				
Option A	(11,323)	(7,355)	(3,184)	(21,862)
Option B	(12,909)	(8,868)	(3,856)	(25,633)
Option C	(13,998)	(9,942)	(4,330)	(28,270)
Option RO	(11,764)	(7,671)	(2,675)	(22,110)
Annualized Value of Change in Displacement Days				
Option A	$(2,253,324)	$(1,463,699)	$(633,609)	$(4,350,632)
Option B	$(2,568,878)	$(1,764,796)	$(767,374)	$(5,101,048)
Option C	$(2,785,631)	$(1,978,372)	$(861,672)	$(5,625,676)
Option RO	$(2,341,115)	$(1,526,446)	$(532,387)	$(4,399,947)

Notes: 2S25R = 2-year coastal, 25-year rainfall event; 2S100R = 2-year coastal, 100-year rainfall event; 100S100R = 100-year coastal, 100-year rainfall event; RO = Resilience Optimized

References

1. U.S. Census Bureau Quick Facts: Broward County Persons per Household S1101: Households and Families - Census Bureau Table
2. Hazus Flood Technical Manual, Hazus 5.1, July 2022 FEMA. Table 6-4. Maximum Restoration Time for RES1, RES3A, RES3B and COM3 Occupancies. Hazus 5.1 Flood Model Technical Manual
3. U.S. General Services Administration, FY 2025 per diem rates for Fort Lauderdale Florida. FY 2025 per diem rates for Fort Lauderdale, Florida | GSA

APPENDIX D
BENEFITS ANALYSES

D.9 Regional Economic Development Benefits IMPLAN Technical Memorandum

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	April 15, 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins, RED Analysis

1 Purpose

This technical memorandum documents the economic benefits analysis and more specifically the analysis conducted for the Regional Economic Development (RED) account, as part of the South Florida Water Management District's (SFWMD) Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (Section 203 Study).

The Section 203 Study focuses on enhancing the resiliency of the water control structures and adjacent primary canals in Broward Basins Reach A, a reach of the ongoing U.S. Army Corps of Engineers (USACE) C&SF Section 216 Study. Broward Basins Reach A is referred to herein as the Section 203 Study Area (or Study Area). However, for the purposes of evaluating the RED analysis, a larger area encompassing the Miami-Fort Lauderdale-West Palm Beach Metropolitan Statistical and which is comprised of the three counties of Broward, Miami-Dade, and Palm Beach was assumed to represent the Study Area. This is referred to as the 3-County Study Area in this technical memorandum.

The RED account is one four accounts used to evaluate the project alternatives associated with water resources project per the following federal guidelines:

- These evaluations will be based on the acceptable USACE methods as prescribed in specific documents including the following: Principles, Requirements, and Guidelines for Federal Investments in Water Resources, 2013.
- Final Interagency Guidelines on the Principles, Requirements and Guidelines for Water and Land Related Resources Implementation Studies, 2014.
- Policy for Conducting Civil Works Planning Studies (ER 1105-2-103), 2023.
- USACE Institute for Water Resources Regional Economic Development (RED) Procedures Handbook (2011-RPT-01). March 2011.
- Water Resources Policies and Authorities Studies of Water Resources Development Projects by Non-Federal Interests (ER 1165-2-209), 2016.

The RED account measures the changes in the distribution of the regional economic activity resulting from an action and does not account for gains or losses out of the region of study. Section 2 of this technical memorandum consists of the introduction. Section 3 describes the technical approach including a brief discussion of the model used and the inputs from other studies that form the basis for the RED analysis. The RED analysis and results are summarized and discussed in Section 4.

2 Introduction

The RED analysis is primarily focused with the evaluation of the short-term construction, long-term operation, and temporary displacement and relocation impacts associated with the Section 203 Study.

The RED account registers changes in regional economic activity that result from each alternative evaluated in the Section 203 Study.

The USACE uses the RECONS 2.0 model to evaluate regional economics. However, because the RECONS 2.0 model uses the 2015 IMPLAN model's multipliers, ratios, and regional purchase coefficients (RPCs), it was determined that it would not accurately capture any changes in the underlying economy resulting from the effects of the COVID-19 pandemic. Instead, the IMPLAN Input-Output model was proposed as an alternative as it uses more recent economic data. The most recent IMPLAN data available at the time of this analysis is the 2023 IMPLAN data.

3 Methodology, Assumptions, and Inputs

3.1 IMPLAN

The IMPLAN model is the most widely used input-output impact model system in the U.S. It is much more than a set of multipliers; it provides users with the ability to define industries, economic relationships, and projects to be analyzed. It can be customized for any county, region, or state, and used to assess the "ripple effects" or "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This is used primarily to assess the economic impacts of facilities or industries, or changes in their level of activity in a given area.

IMPLAN is a static model that estimates impacts for a snapshot in time when the impacts are expected to occur, based on the makeup of the economy at the time of the underlying IMPLAN data. IMPLAN measures the initial impact to the economy but does not consider long-term adjustments as labor and capital move into alternative uses. This approach was used to compare the final array of alternatives. Realistically, the structure of the economy will adapt and change; therefore, the IMPLAN results can only be used to compare relative changes between the specific alternative and the Future Without Project (FWOP) alternative and cannot be used to predict or forecast future employment, labor income, or output (sales).

Input-output models measure commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries produce goods and services for final demand and purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues until leakages from the analysis area (imports and value added) stop the cycle. These indirect and induced effects (the effects of household spending) can be mathematically derived using a set of multipliers. The multipliers describe the change in output for each regional industry caused by a $1 change in final demand. **Figure 1** illustrates the concept of input-output modeling.

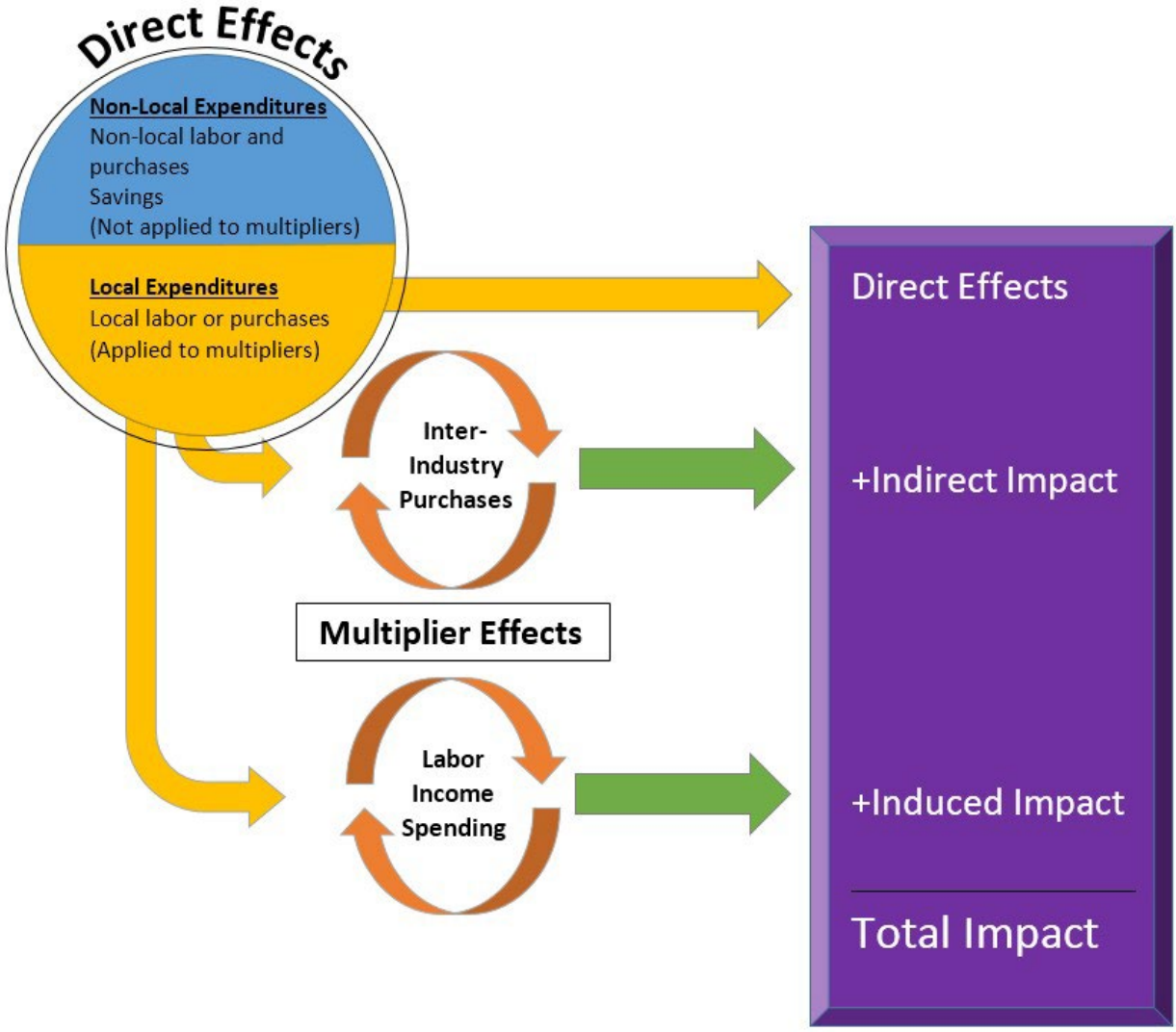


Figure 1. Input-Output Modeling Concept[1]

The IMPLAN model package includes state-level or county-level data to describe the local economy in a given year and a licensed cloud-based tool that allows users to input more refined and/or accurate input data reflecting the regional economy.

The economic impacts associated with the construction and operation of the each of the final array of alternatives as well as those associated with temporary displacement under each of these alternatives were evaluated using the IMPLAN model representing the combined regional economy of the three counties of Broward, Miami-Dade, and Palm Beach. The model uses 2023 IMPLAN data, the most current available data which represents the economy of the 3-County Study Area in 2023.

[1] Leakages resulting after the direct effects are not captured in the figure.

3.2 Assumptions

Construction of the final array of alternatives is expected to take 7 years (from 2029 through 2035) with operations commencing in 2035. The material and labor inputs required to construct the new structures under of each of the alternatives is assumed to be sourced from within the 3-County Study Area (i.e., local) as well as outside the study area (nonlocal). For the purposes of evaluating the RED analysis, the local portion of these costs are assumed to be 80 percent with the remaining 20 percent assumed to be nonlocal.

The avoided evacuation and relocation costs associated with the temporary displacement of households affected by the flooding were estimated using estimates of the population affected. The estimates of the affected population were developed by evaluating the difference between the population under FWOP and final array of alternatives. The alternatives in this case include both sea level rise scenarios (intermediate and high) under each of the three design storms (2S25R, 2S100R, 100S100R) scenarios and the estimated impacts are for 2085 only. The probabilities of each combination of sea level rise and storm events is applied to derive an annual average cost savings estimate associated with each sea level rise/storm. The average annual costs associated with each storm is summed up to derive the total annual costs savings of the final array of alternatives related to the FWOP. These annual costs savings are based on population estimates associated with each sea level rise and storm event combination and multiplied by the GSA per diem rates for Fort Lauderdale (see **Section D.8**). The per diem rate is a combined lodging and meals and incidentals rate.

The estimated temporary displacement costs are assumed to be split between lodging and food with the food expenditure further split between grocery purchases (85 percent) and restaurants (15 percent).

The alternatives are assumed to be operational over a 50-year period and are expected to require additional operations and maintenance (O&M) costs net of the existing SFWMD's O&M expenditures.

All inputs into the model are in 2025 dollars and by using the IMPLAN model's BLS Growth Model to convert nominal dollars into 2025 dollars, the results are also reported in 2025 dollars.

3.3 Inputs

3.3.1 Construction Costs

Table 1 summarizes the construction cost estimates for each of the three alternatives in the final array of alternatives and the Recommended Plan (RP).

Table 1. ROM Construction Costs (Millions 2025 Dollars)

Cost	Alternative A	Alternative B	Alternative C	RP/Alternative RO
Total ROM Estimated Construction Cost	$734.54	$1,226.07	$2,038.89	$1,219.91
Local ROM Construction Cost (80%)	$587.63	$980.86	$1,631.11	$975.93
Annual Local ROM Construction Costs	$83.95	$140.12	$233.02	$139.42

Notes: ROM = rough order of magnitude; RO = Resilience Optimized; RP = Recommended Plan

The annual local rough order of magnitude (ROM) construction costs were run through IMPLAN's sector 51, the construction of other new non-residential structures. This sector is assumed to best represent the construction of the components associated with each of the final array of alternatives and the RP.

3.3.2 Temporary Displacement Cost Savings

Table 2 summarizes the total temporary displacement cost savings net of the temporary displacement costs under the FWOP while **Table 3** shows these displacement cost savings split between lodging, grocery purchases and restaurants. The cost savings were run through IMPLAN sectors 489 (Hotels and motels), 389 (Retail – food and beverage stores) and 492 (Limited-service restaurants) to estimate regional economic impacts associated with the temporary displacement cost savings under each of the alternatives.

Table 2. Total Temporary Displacement Costs (Millions 2025 Dollars)

	2S25R	2S100R	100S100R	Total
Intermediate Sea Level Rise				
Alternative A	($0.8)	($0.6)	($0.2)	($1.6)
Alternative B	($0.9)	($0.7)	($0.2)	($1.8)
Alternative C	($0.9)	($0.8)	($0.3)	($2.0)
RP/Alternative RO	($0.8)	($0.6)	($0.2)	($1.6)
High Sea Level Rise				
Alternative A	($2.3)	($1.5)	($0.6)	($4.4)
Alternative B	($2.6)	($1.8)	($0.8)	($5.1)
Alternative C	($2.8)	($2.0)	($0.9)	($5.6)
RP/Alternative RO	($2.3)	($1.5)	($0.5)	($4.4)

Notes: 2S25R = 2 year coastal, 25 year rainfall event; 2S100R = 2 year coastal, 100 year rainfall event; 100S100R = 100 year coastal, 100 year rainfall event; RO = Resilience Optimized; RP = Recommended Plan

Table 3. Temporary Displacement Costs by Expenditure Category (Millions 2025 Dollars)

	Lodging	Grocery	Restaurant	Total
Intermediate Sea Level Rise				
Alternative A	($1.4)	($0.1)	($0.0)	($1.6)
Alternative B	($1.6)	($0.2)	($0.0)	($1.8)
Alternative C	($1.8)	($0.2)	($0.0)	($2.0)
RP/Alternative RO	($1.4)	($0.1)	($0.0)	($1.6)
High Sea Level Rise				
Alternative A	($3.9)	($0.4)	($0.1)	($4.3)
Alternative B	($4.5)	($0.5)	($0.1)	($5.1)
Alternative C	($5.0)	($0.5)	($0.1)	($5.6)
RP/Alternative RO	($3.9)	($0.4)	($0.1)	($4.4)

Notes: RO = Resilience Optimized; RP = Recommended Plan

The totals from **Table 3** are slightly different from those in **Table 2** due to rounding. For the purposes of using these estimates in the IMPLAN model these slight differences are not significant enough to generate different results.

3.3.3 Business Interruption: Direct Output Losses

Table 4 summarizes the annualized direct output losses, under the high sea level rise scenario, associated with business interruption due to reduced sales and production value resulting from flooding in structures. The direct output losses under each alternative were estimated and compared to the direct output losses under FWOP. The estimates shown in the table represent the net output loss under each the alternatives and the RP compared to the FWOP therefore these numbers represent the annual savings (i.e., reduction in direct output losses) under each of the alternative. For details on the methodology, assumptions and detailed data see **Section D.7**.

While the direct output losses were estimated for both the intermediate and high sea level rise scenarios, the estimates for the intermediate scenario were not large enough to run through the IMPLAN model to estimate the potential economic impacts. Thus, only the annual direct output losses under the high sea level rise shown in **Table 4** below were used to estimate the economic impacts under each of the three final array of alternatives and the RP.

Table 4. Annualized Direct Output Loss – High Sea Level Rise (2025 Dollars)

Hazus Code	IMPLAN Sector	Alternative A	Alternative B	Alternative C	RP/Alternative RO
AGR1	3	($5,240)	($6,019)	($4,861)	($4,610)
COM1	394	($95,247)	($123,197)	($117,837)	($60,460)
COM2	383	($288)	($272)	($157)	($241)
COM3	499	($2,104)	($2,112)	($2,107)	($1,429)
COM4	449	($211,194)	($241,724)	($217,542)	($97,512)
COM5	424	($54,085)	($54,260)	($44,592)	($16,251)
COM6	472	($20,495)	($20,535)	($20,539)	($20,421)
COM8	486	($4,570)	($4,614)	($4,814)	($4,522)
EDU1	462	($1,569,730)	($2,027,205)	($2,010,479)	($1,367,184)
GOV1	516	($25,099)	($25,117)	($25,951)	($16,619)
IND2	374	($8,259)	($9,736)	($11,121)	($5,034)
IND3	177	($9,346)	($11,393)	($8,163)	($6,277)
IND5	289	($119)	($120)	($119)	($119)
RES1	503	($149,215)	($206,491)	($233,949)	($109,704)
RES4	489	($147,663)	($148,149)	($147,871)	($7,415)
RES6	473	($68,650)	($75,560)	($68,630)	($67,976)
	Total	**($2,371,304)**	**($2,956,504)**	**($2,918,732)**	**($1,785,773)**

Notes: AGR = agriculture; COM = commercial; EDU = education; GOV = government; IND = industry; RES = residence; RO = Resilience Optimized; RP = Recommended Plan

Table 5 summarizes the O&M costs incurred by SFWMD annually to operate and maintain the structures both under the FWOP as well as the under each of the three alternatives and the RP. The FWOP O&M costs were adjusted from 2010 Q1 dollars to 2025 Q1 dollars using the BEA's GDP Implicit Price Deflators (BEA 2025). The net annual O&M costs under of the three alternatives represents the incremental O&M costs incurred by the SFWMD to operate and maintain the final array of alternatives. The annual O&M costs for the RP are shown separately as the baseline used to evaluate this cost changed between when the O&M costs for the final array of alternatives were developed and when these costs were refined for the RP.

3.3.4 Operations

Table 5. Annual O&M Costs (Millions 2025 Dollars)

Cost	FWOP	Alternative A	Alternative B	Alternative C	RP/Alternative RO[a/]
2010$	$1.1	$2.1	$2.8	$4.5	n/a
2025$	$1.7	$3.0	$4.2	$6.5	n/a
Net Annual O&M Costs		**$1.3**	**$2.5**	**$4.9**	n/a
Annual O&M Costs		n/a	n/a	n/a	**$0.8**

a/ O&M estimates for the Recommended Plan were estimated for level 3 cost estimated structures using historical SFWMD operating costs over the past 10 years.
Notes: FWOP = future without project; O&M = operations and maintenance; RO = Resilience Optimized; RP = Recommended Plan

In addition to the O&M costs, SFWMD also estimated total repair, replacement, and rehabilitation (RR&R) costs for the FWOP as well as the final array of alternatives and the RP over the 50-year operational life. While SFWMD is most likely to incur these costs between 2058 to 2062 (i.e., over a 5-year period), for the purposes of evaluating the economic impacts the costs were annualized over the 50-year operational period. **Table 6** presents both the total and annual RR&R costs. The RR&R costs for the RP are shown separately as the baseline used to evaluate this cost changed between the RR&R cost for the Array of Alternatives were developed and when these costs were refined for the RP.

Table 6. Repair, Replacement, and Rehabilitation Costs (Millions 2025 Dollars)

Cost	FWOP	Alternative A	Alternative B	Alternative C	RP/Alternative RO[a/]
Total	$45.8	$70.7	$91.7	$156.1	n/a
Annual	$0.9	$1.4	$1.8	$3.1	n/a
Net Annual RR&R Costs		**$0.5**	**$0.9**	**$2.2**	
Total R&R Costs		n/a	n/a	n/a	**$33.35**
Annual RR&R Costs		n/a	n/a	n/a	**$0.7**

a/ O&M estimates for the Recommended Plan were estimated for level 3 cost estimated structures using historical SFWMD operating costs over the past 10 years.
Notes: FWOP = future without project; RR&R = repair, replacement, rehabilitation; RO = Resilience Optimized; RP = Recommended Plan

Table 7 summarizes the combined annual operations, maintenance, repair, replacement, and rehabilitation (OMRR&R) costs for the FWOP as well as the final array of alternatives and the RP. Any differences in the numbers are due to rounding.

Table 7. Annual OMRR&R Costs (Millions 2025 Dollars)

Cost	FWOP	Alternative A	Alternative B	Alternative C	RP/Alternative RO[a/]
Annual	$2.6	$4.4	$6.0	$9.7[2]	n/a
Net Annual OMRR&R Costs		**$1.8**	**$3.4**	**$7.1**	n/a
Net OMRR&R Costs		n/a	n/a	n/a	**$1.5**

a/ O&M estimates for the Recommended Plan were estimated for level 3 cost estimated structures using historical SFWMD operating costs over the past 10 years.
Notes: FWOP = future without project; OMRR&R = operations, maintenance, repair, replacement, rehabilitation; RO = Resilience Optimized; RP = Recommended Plan

The net annual OMRR&R costs, in 2025 dollars, were run through IMPLAN's sector 55, maintenance and repair of nonresidential structures, to estimate the regional economic impacts associated with the OMRR&R under each of the alternatives.

4 Results

The impacts associated with the construction phase are temporary and thus different from the long-term effects associated with the operational phase of the project. These impacts are measured in terms employment, labor income, value added and total industry output. Employment is a combination of wage and salary employment and proprietor employment and is converted to full-time equivalent (FTE) using IMPLAN's job to FTE conversion factors. Labor income includes both wage and salary income as well as proprietor income. Value added is a large proportion of total industry output and includes labor income, other property income (e.g., dividends, royalties, corporate profits, and interest income), and taxes on production and imports. Total industry output (i.e., output) is the value of production that occurred in an economy during the calendar year.

4.1 Construction

Construction of the final array of alternatives is expected to take 7 years. **Tables 8 through 11** show the annual direct and secondary (indirect and induced) economic impacts within 3-County Study Area associated with the construction of each of the three alternatives and the RP. Due to rounding, direct and secondary impact values may not add up to the total shown in the tables.

The construction of Alternative A results in 481 FTE direct annual jobs and another 259 FTEs in annual secondary jobs for a total of 739 total annual FTEs (**Table 8**). These jobs are associated with a total $50.7 million in labor income, $84.6 million in value added and $143.3 million in output.

[2] Total shown here is slightly different due to rounding of the two estimates combined to get this number: net annual O&M cost of $3.1M and net annual RR&R of $6.5M.

Table 8. Alternative A: Annual Construction Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	481	$31.9	$50.3	$84.0
Secondary	259	$18.8	$34.3	$59.3
Total	**739**	**$50.7**	**$84.6**	**$143.3**

Notes: FTE = Full Time Employees

The construction of Alternative B is expected to result in 802 direct (FTE) annual jobs during the construction period and lead to the creation or support of an additional 431 secondary jobs annually, for a total of 1,234 annual jobs within the 3-County Study Area (**Table 9**). These additional jobs are estimated to generate a total of $84.7 million in labor income, $141.2 million in value added, and $239 million in output.

Table 9. Alternative B: Annual Construction Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	802	$53.2	$84.0	$140.1
Secondary	431	$31.5	$57.2	$98.9
Total	**1,234**	**$84.7**	**$141.2**	**$239.0**

Notes: FTE = Full Time Employees

The construction of Alternative C is expected to result in 1,334 direct (FTE) annual jobs during the construction period and lead to the creation or support of an additional 718 annual secondary jobs annually, for a total of 2,052 annual jobs within the 3-County Study Area (**Table 10**). These additional jobs are estimated to generate a total of $140.7 million in labor income, $234.8 million in value added, and $397.5 million in output.

Table 10. Alternative C: Annual Construction Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	1,334	$88.4	$139.6	$233.0
Secondary	718	$52.3	$95.2	$164.5
Total	**2,051**	**$140.7**	**$234.8**	**$397.5**

Notes: FTE = Full Time Employees

The construction of the RP is expected to result in 885 direct (FTE) annual jobs during the construction period and lead to the creation or support of an additional 476 annual secondary jobs annually, for a total of 1,361 annual jobs within the 3-County Study Area (**Table 11**). These additional jobs are estimated to generate a total of $93.4 million in labor income, $155.8 million in value added, and $263.8 million in output.

Table 11. Alternative RO (RP): Annual Construction Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	798	$58.7	$92.7	$154.7
Secondary	429	$34.7	$63.2	$109.2
Total	**1,227**	**$93.4**	**$155.8**	**$263.8**

Notes: FTE = Full Time Employees

Because the annual local construction cost under Alternative B is higher than that under Alternative A, the impacts under Alternative B are higher than those under Alternative A. Alternative C has the highest annual local construction cost and the highest impacts among the three alternatives. The RP's annual construction costs are higher than those under both Alternative A and Alternative B and lower than those under Alternative C. Thus, the impacts under the RP are higher than those under both Alternative A and Alternative B and lower than those under Alternative C.

4.2 Temporary Displacement

The regional economic impacts associated with savings in temporary displacement costs are summarized in **Tables 12 through 15**. The savings in displacement costs are not the full savings but rather the annualized savings based on the probabilities of the combination of sea level rise and storm events occurring, which are summed for the each of the final array of alternatives analyzed and the RP. The estimates shown in the tables correspond to the direct and secondary (indirect and induced) economic impacts within the 3-County Study Area associated with temporary displacement cost savings under each of the three alternatives and the RP net of the FWOP. Due to rounding, direct and secondary impact values may not add up to the total shown in the tables.

Table 12. Alternative A: Temporary Displacement Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Intermediate Sea Level Rise				
Direct	(8)	($0.5)	($1.0)	($1.3)
Secondary	(4)	($0.3)	($0.5)	($0.8)
Total	**(12)**	**($0.7)**	**($1.5)**	**($2.1)**
High Sea Level Rise				
Direct	(21)	($1.4)	($3.1)	($4.1)
Secondary	(11)	($0.8)	($1.4)	($2.4)
Total	**(32)**	**($2.2)**	**($4.5)**	**($6.4)**

Notes: FTE = Full Time Employees

Table 13. Alternative B: Temporary Displacement Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Intermediate Sea Level Rise				
Direct	(9)	($0.6)	($1.3)	($1.7)
Secondary	(5)	($0.3)	($0.6)	($1.0)
Total	**(13)**	**($0.9)**	**($1.8)**	**($2.6)**
High Sea Level Rise				
Direct	(25)	($1.6)	($3.6)	($4.8)
Secondary	(13)	($0.9)	($1.6)	($2.8)
Total	**(38)**	**($2.5)**	**($5.2)**	**($7.5)**

Notes: FTE = Full Time Employees

Table 14. Alternative C: Temporary Displacement Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Intermediate Sea Level Rise				
Direct	(10)	($0.6)	($1.4)	($1.9)
Secondary	(5)	($0.4)	($0.6)	($1.1)
Total	**(15)**	**($1.0)**	**($2.1)**	**($3.0)**
High Sea Level Rise				
Direct	(27)	($1.8)	($4.0)	($5.2)
Secondary	(14)	($1.0)	($1.8)	($3.1)
Total	**(41)**	**($2.8)**	**($5.8)**	**($8.3)**

Notes: FTE = Full Time Employees

Table 15. Alternative RO (RP): Temporary Displacement Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Intermediate Sea Level Rise				
Direct	(21)	($0.5)	($1.1)	($1.5)
Secondary	(11)	($0.3)	($0.5)	($0.9)
Total	**(32)**	**($0.8)**	**($1.6)**	**($2.3)**
High Sea Level Rise				
Direct	(26)	($1.4)	($3.1)	($4.1)
Secondary	(14)	($0.8)	($1.4)	($2.4)
Total	**(40)**	**($2.2)**	**($4.5)**	**($6.5)**

Notes: FTE = Full Time Employees; RO = Resilience Optimized; RP = Recommended Plan

4.3 Business Interruption

The regional economic impacts associated with the savings in direct output losses under each of the Final Array Alternatives and the RP are summarized in **Tables 16 through 19**. The savings in direct output losses are not the full savings but rather the annualized savings based on the probabilities of the combination of sea level rise and storm events occurring, which are summed for the each of the final array of alternatives analyzed and the RP. The estimates shown in the tables correspond to the direct and secondary (indirect and induced) economic impacts within the 3-County Study Area associated reduction in direct output losses under each of the three alternatives and the RP net of the FWOP. Due to rounding, direct and secondary impact values may not add up to the total shown in the tables.

Table 16. Alternative A: Annual Business Interruption Impacts, High Sea Level Rise (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	(30)	($1.9)	($1.8)	($2.3)
Secondary	(10)	($0.6)	($1.2)	($2.0)
Total	**(40)**	**($2.6)**	**($3.0)**	**($4.3)**

Notes: FTE = Full Time Employees

Table 17. Alternative B: Annual Business Interruption Impacts, High Sea Level Rise (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	(39)	($2.4)	($2.3)	($2.9)
Secondary	(12)	($0.8)	($1.5)	($2.6)
Total	**(51)**	**($3.3)**	**($3.8)**	**($5.4)**

Notes: FTE = Full Time Employees

Table 18. Alternative C: Annual Business Interruption Impacts, High Sea Level Rise (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	(38)	($2.4)	($2.3)	($2.8)
Secondary	(12)	($0.8)	($1.5)	($2.5)
Total	**(51)**	**($3.2)**	**($3.8)**	**($5.4)**

Notes: FTE = Full Time Employees

Table 19. Alternative RO (RP): Annual Business Interruption Impacts, High Sea Level Rise (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	(25)	($1.6)	($1.4)	($1.7)
Secondary	(8)	($0.5)	($0.9)	($1.6)
Total	**(32)**	**($2.1)**	**($2.4)**	**($3.3)**

Notes: FTE = Full Time Employees; RO = Resilience Optimized; RP = Recommended Plan

4.4 Operation

In addition to the economic benefits resulting from the construction of the alternatives, there will be ongoing economic benefits from the OMRR&R under each of the alternatives. **Tables 20 through 21** summarize the annual direct and secondary (indirect and induced) economic impacts within 3-County Study Area associated with the operation of each of the three alternatives and the RP. Due to rounding, direct and secondary impact values may not add up to the total shown in the tables.

Table 20 shows that the operation of Alternative A results in the addition of 8 full-time equivalent (FTE) direct jobs on top of the current/existing SFWMD operational workforce. The additional operations expenditures results in another 6 FTEs in secondary jobs for a total of 14 total FTEs. These jobs are associated with a total $0.9 million in labor income, $1.7 million in value added and $3.1 million in output.

Table 20. Alternative A: Annual Operation Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	8	$0.5	$0.9	$1.8
Secondary	6	$0.4	$0.8	$1.3
Total	**14**	**$0.9**	**$1.7**	**$3.1**

Notes: FTE = Full Time Employees

The operation of Alternative B is expected to require an additional 15 direct annual (FTE) jobs on top of the existing SFMWD operational workforce and lead to the creation or support of an additional 11 annual secondary jobs annually, within the 3-County Study Area, for a total of 26 annual FTEs (**Table 21**). These additional jobs are estimated to generate a total of $1.8 million in labor income, $3.1 million in value added, and $5.8 million in output.

Table 21. Alternative B: Annual Operation Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	15	$1.0	$1.7	$3.4
Secondary	11	$0.8	$1.4	$2.4
Total	**26**	**$1.8**	**$3.1**	**$5.8**

Notes: FTE = Full Time Employees

The operation of Alternative C is expected to require an additional 32 direct annual (FTE) jobs on top of the existing SFMWD operational workforce and lead to the creation or support of an additional 22 annual secondary jobs annually, within the 3-County Study Area, for a total of 54 annual FTEs (**Table 22**). These additional jobs are estimated to generate a total of $3.7 million in labor income, $6.5 million in value added, and $12.2 million in output.

Table 22. Alternative C: Annual Operation Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	32	$2.1	$3.6	$7.1
Secondary	22	$1.6	$3.0	$5.1
Total	**54**	**$3.7**	**$6.5**	**$12.2**

Notes: FTE = Full Time Employees

The operation of the RP is expected to require an additional 15 direct annual (FTE) jobs on top of the existing SFMWD operational workforce and lead to the creation or support of an additional 10 annual secondary jobs annually, within the 3-County Study Area, for a total of 25 annual FTEs (**Table 23**). These additional jobs are estimated to generate a total of $1.7 million in labor income, $3.0 million in value added, and $5.6 million in output.

Table 23. Alternative RO (RP): Annual Operation Impacts (Millions 2025 Dollars)

Impact	Employment (FTEs)	Labor Income	Value Added	Output
Direct	7	$0.5	$0.8	$1.5
Secondary	4	$0.4	$0.7	$1.1
Total	**11**	**$0.8**	**$1.4**	**$2.6**

Notes: FTE = Full Time Employees

Because the annual OMRR&R cost under Alternative B is higher than that under Alternative A, the impacts under Alternative B are higher than those under Alternative A. Alternative C has the highest annual OMRR&R cost and the highest impacts among the three alternatives. The annual OMRR&R cost under the RP is lower than the annual OMRR&R cost under both Alternative B and Alternative C though higher than the cost under Alternative A. Thus, the impacts under the RP are lower than those under both Alternative B and Alternative C and higher than those under Alternative A.

5 References

U.S. Bureau of Economic Analysis (BEA). 2025. “GDP and Personal Income, National Data.” Table 1.1.9. Implicit Price Deflators for Gross Domestic Product. Accessed July 9. "Table 1.1.9. Implicit Price Deflators for Gross Domestic Product"

D.10 Environmental Quality and Other Social Effects Benefits Technical Memorandum

Impacts to Septic Tanks and Cultural Resources

Central and Southern Florida Flood Resiliency Study Broward Basins (Section 203)

South Florida Water Management District

Broward County, Florida
April 1, 2026

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Tables

Table 1. Flood Hazard Simulations 1

Attachment

Attachment 1 – Results of Septic Tank and Cultural Resource Analysis

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1 Introduction

South Florida Water Management District (SFWMD) is utilizing Section 203 of the Water Resources Development Act of 1986, as amended, to advance the Central and Southern Florida (CS&F) Flood Resiliency Study – Broward Basins with support from the Florida Department of Environmental Protection, Broward County, and technical/federal assistance from the U.S. Army Corps of Engineers (USACE) – Jacksonville District, for inclusion in the Water Resources Development Act of 2026.

This memorandum documents the quantification of economic indicators for both septic tanks and cultural resources within the Study Area. The intent of this memorandum is supplemental to a parent document about the comprehensive benefits analysis in support of the alternative plans.

1.1 Flood Scenarios

An integrated/coupled surface-groundwater MIKE SHE/MIKE Hydro (2022) model was created by the SFWMD and was used to generate flood hazard information for use in the flood damage assessment. This 2D hydrologic and hydraulic model covers the entire Study Area and extends past the tidal boundary condition to the east. The focus on this study is the primary canal system; however, the model includes a high level of detail within the secondary and tertiary canal systems.

Table 1 includes all flood scenarios included in the modeling, three of which are included in the quantification of indicators discussed in this memorandum.

Table 1. Flood Hazard Simulations

Coastal Water Level Return Period (CHS Data)	Rainfall Return Period (NOAA Atlas 14 Data)	Joint Probability (%)	Joint Recurrent Frequency (years)	Used in Indicator Analysis?
2-year	5-year	0.125	8	
2-year	10-year	0.0714	14	
2-year	25-year	0.0333	30	X
10-year	10-year	0.0313	32	
20-year	25-year	0.0133	75	
2-year	100-year	0.0091	110	X
100-year	100-year	0.0023	430	X
2-year	500-year	0.0019	538	

1.2 Alternative Plans

Five conditions over two planning horizons (2035 and 2085) were included in this Section 203 analysis. In addition to the Future Without Project alternative, the final array of alternatives considered in this analysis are denoted as Alternatives A, B, and C, plus Alternative RO (the Recommended Plan), which is based on the results of the first alternatives. Each alternative contains features shown to be effective in improving flood levels in the seven upstream drainage areas of the study. The features consist of primary structure modifications, primary C&SF canal improvements, and storage and nature-based proposed projects.

2 Metrics/Benefits

This technical memorandum focuses on two indicators of project performance in the Study Area: septic tanks and cultural resources. Both metrics are social and/or environmental in nature and are non-monetary.

2.1 Septic Tank Impacts

Impacts to underground septic tanks or onsite sewage treatment and disposal systems can occur from a flood hazard and can cause difficulties for the owner and long-term environmental impairments to the watershed. Unlike above-ground assets, septic tanks have an indirect relationship with flooding. Septic tanks may still be damaged during flood events even if no surface water flooding is present above the asset. Additionally, flooding above the septic tank does not necessarily constitute an impact.

Direct impacts to septic tanks are based on a variety of factors: the condition of the septic tank, the design and configuration of the various components, the soil and groundwater conditions, and the influent and effluent quality. Failure modes of septic tanks, in relation to floodwaters, are commonly caused by buoyancy of the tank, soil saturation that prevents effluent infiltration, or inflow into compromised pieces of the system. Therefore, it is difficult to predict risks for a large-scale Study Area.

To provide comparison of the various alternative project plans' ability to reduce flood impacts to septic tanks, two metrics were quantified across the Study Area.

- The **number of septic tanks at-risk of any form of surface flooding** shows the total number of assets that are removed from the floodplain.
- The **number of septic tanks with some reduction in flood risk** shows assets that experience lesser surface flooding due to the project.

Together, these metrics intend to provide a high-level comparison across alternative plans and flood scenarios.

2.1.1 Data Sources

- *Septic Tanks* – Florida Water Management Inventory (FDEP FLWMI, May 2025).

- *Flood-Depth Rasters* – 36 grids supplied by SFWMD (2023 hindcast, 2040 & 2070 SLR scenarios, multiple return periods; processed June 2025).
    - *Refer to separate hydrologic and hydraulic technical memorandum for more information on the flood hazard information used in this analysis.*
- *Watershed Boundaries* – SFWMD Broward Basins (2024).

2.1.2 Methodology

The process below overviews how metrics were quantified using ArcGIS Pro. Model Builder was utilized to automate most tasks:

1. Downloaded septic tank data layer, selected only tanks within the Section 203 Study Area to include in final feature class layer in file geodatabase.
2. Used ArcGIS Pro's "Multipart to Single part" tool to ensure discrete sampling locations. Converted features to centroid points using ArcGIS Pro's "Feature to Point" tool.
3. Joined basin names to septic tank point feature class using ArcGIS Pro's spatial join, preserving the "NAME" attribute from the attributes from the *AHED_Watersheds* Watershed layer.
4. Used the "Sample" tool to extract values from each of the 36 peak flood depth rasters to each septic point.
5. Created binary "is flooded" *isf_* fields* (Short Int), where value = 1 if sampled depth > 0.0 ft.
6. Created binary "flood reduced" *reduced_** fields for each alternative scenario (Alt A, Alt B, Alt C), where value = 1 if:
    - Alternative depth < Base depth (without project); and
    - Base depth > 0 ft.
7. Used the "Summary Statistics" tool to total each isf_* and reduced_* field by BASINNAME.
8. Output summary tables as separate geodatabase tables for each scenario and indicator.
9. Exported these summary table results to excel along with the raw attribute table displaying all original and result fields that were added.

2.1.3 Discussion

The results of this septic tank impact analysis show that each alternative plan provides a reduction in the number of septic tanks that experience any kind of surface flooding (i.e., total removal of septic tanks from the associated flood scenario) and provides overall reduction in flood depths above septic tanks across the Study Area.

Results from analysis are shown in the *"Number of Septic Tanks with Reduced Flood Values"* in the Attachment. In the 100S100R35i scenario, Alternative C reduced flooding for 8,984 septic systems, with prominent gains in C-11 EAST (5,164), HILLSBORO CANAL (1,451), and C-11 WEST (1,745). As flood severity increased (e.g., 100S100R85h and 100S100R85i), Alternative C provided even greater reductions (9,354 and 9,033, respectively).

The 2S100R scenarios demonstrated similar performance. Under 2S100R85i, Alternative C reduced flooding for 9,033 septic systems—again with major reductions in C-11 EAST,

C-11 WEST, and HILLSBORO CANAL. Even under lower storm return periods (2S25R), Alternative C outperformed others (e.g., 7,164 reduced in 2S25R85i).

Similarly, Alternative RO achieved comparable or greater flood reduction benefits across basins, with the highest reductions again observed in C-11 EAST, C-11 WEST, and HILLSBORO CANAL, ranging from approximately 7,000 to 9,300 septic systems reduced across scenarios.

2.2 Cultural Resource Impacts

Cultural resources are important to community identity, quality of life, property values, equity, and other community values. Several publicly available data sets were used in this analysis and include cemeteries, cultural centers, and tribal areas. Some of these cultural resources represent structures, such as community centers, while others represent generally open areas of land for public gatherings, such as parks or cemeteries. Economic damage to structures may already be accounted for under the HEC-FDA analysis, which is presented in a separate technical memorandum; however, this indictor is treated as a social indicator for areas of cultural significance. Regardless of direct damage to the asset, impacts to cultural resources cause strain on a community.

For the purposes of this indicator and noting the broad scale of the Study Area, two metrics have been quantified:

- The **number of cultural resources that are impacted by surface flooding** shows the total number of assets removed from the floodplain.
- The **number of cultural resources with some reduction in flood risk flooding**, shows assets that experience lesser flooding due to the project.

A foundation height estimate was acquired for all cultural resources that have an identifiable structure on the asset area, and this was used to determine whether the asset is impacted or not. For example, if an asset has a foundation height of 0.5-feet, but a flood depth of 0.4-feet, it would not be noted as impacted by flooding.

Some assets that are noted as impacted may not experience significant damage or restriction in usage. A cultural center that becomes impacted may be closed for a period of time after the flood event, causing a social impact to the community members that gain value from that asset. However, a non-structural asset, such as a cemetery, may be noted as impacted if it experiences surface flooding on the site, but may still have social and cultural benefit directly after the flood event. The purpose of this metric is to draw correlations among the various alternative plans in regard to their potential to reduce flood risk for the cultural resources within the study area.

2.2.1 Data Sources

- *SHPO Resource Groups* – Florida Master Site File (FMSF), updated April 2025.
- *Cemeteries & Cultural Centers* – Florida Geographic Data Library (May 2025).
- *NRHP & SHPO Eligible Bridges* – National Park Service & FMSF (March 2025).
- *American Indian & Tribal Lands* – SFWMD (2024)

- *Flood-Depth Rasters* – 36 grids supplied by USACE (2023 hindcast, 2040 & 2070 SLR scenarios, multiple return periods; processed June 2025).
- *National Structures Inventory* (NSI) – Attributes used: foundation height (feet).

2.2.2 Methodology

1. Downloaded all cultural resource data and clipped or selected data within the Section 203 Study Area to include in file geodatabase layers.
2. Used the "Multipart to Single part" and "Feature to Point" tools to ensure discrete sampling locations.
3. Combined all points into one feature class using ArcGIS Pro's "Merge" tool preserving the unique attributes of all data layers and added a "source_layer" attribute to maintain the source layer's origin throughout the merging process.
4. Added available foundation heights from the NSI to structures in cultural resource layer, and added as attribute (found_ht), if none were available, attributed as "0".
5. Used the "Sample" tool to extract values from each of the 36 requested peak flood depth rasters to each cultural point.
6. Created binary "is flooded" *isf_* fields* (Short Int), where value = 1 if sampled depth > 0.0 ft.
7. Created binary "flood reduced" *reduced_** fields for each alternative scenario (Alt A, Alt B, Alt C), where value = 1 if:
    - Alternative depth < Base depth(without project); and
    - Base depth > 0 ft.
8. Used the "Summary Statistics" tool to total each isf_* and reduced_* field by BASINNAME.
9. Output summary tables as separate geodatabase tables for each scenario and indicator.
10. Exported these summary table results to excel along with the raw attribute table displaying all original and result fields that were added.

2.2.3 Discussion

Results from analysis are shown in the *"Number of Cultural Resources with Reduced Flood Values"* in the Attachment. The updated analysis of cultural resources under reduced flooding conditions shows variations across basins and alternatives. Overall, reduced inundation impacts were greatest in the HILLSBORO CANAL and NORTH NEW RIVER CANAL WEST basins across all scenarios. Among the alternatives, Alternative C generally resulted in the greatest number of cultural resource points with reduced flood exposure, followed closely by Alternatives B and A.

Under the 100S100R35i scenario, Alternative C yielded the highest reduction (135 features), with substantial mitigation in the HILLSBORO CANAL (57) and NORTH NEW RIVER CANAL WEST (17) basins. This trend continues under the 100S100R85h and 100S100R85i scenarios, where reductions increased with flood intensity, especially for Alternative C (137 and 139 features, respectively).

A similar pattern is observed in the 2S scenarios. For example, under 2S100R85i, Alternative C again showed the highest reduction (139), with HILLSBORO CANAL (56) and NORTH NEW RIVER CANAL WEST (17) being major contributors. Notably, 2S25R85h and 2S25R85i had lower overall reductions but still followed the same hierarchy across alternatives.

Alternative RO results reflect a similar distribution, with the highest reductions occurring in the HILLSBORO CANAL, C-11 EAST, and C-14 WEST basins, totaling between approximately 97 and 132 cultural resources with reduced flood exposure across scenarios.

3 Conclusion

The results of these two indicators affirm that Alternatives A, B, C, and RO provide substantial benefit and reduction of flood risk for septic tanks and cultural resources. All plans considered provide similar levels of improvement across the various flood scenarios. Alternative C provided notable improvements beyond Alternative A and B. Reductions were consistently highest in HILLSBORO CANAL, NORTH NEW RIVER CANAL WEST, and C-11 EAST basins, demonstrating the geographic concentration of benefits. Alternative RO yielded comparable or greater reductions across both resource types, further emphasizing the effectiveness of the selected measures in these key basins.

Complete results of this analysis are attached to this technical memorandum under **Attachment 1**.

Attachment 1

Impacts to Septic Tanks
(Direct Impacts)

Number of Septic tanks with Flood Values

100S100R 35i					100S100R 85h				100S100R 85i			
Basin Name	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	5307	5185	5180	5177	5637	5426	5414	5405	5374	5247	5208	5202
C-11 WEST	1847	1839	1841	1836	1882	1866	1869	1869	1853	1850	1851	1848
C-12W	215	215	215	215	215	215	215	215	215	215	215	215
C-13 WEST	13	13	13	13	14	14	14	14	13	13	13	13
C-14 EAST	18	18	18	18	18	18	18	18	18	18	18	18
C-14 WEST	44	42	42	42	44	42	42	42	44	42	42	42
HILLSBORO CANAL	1484	1460	1457	1440	1489	1465	1467	1441	1485	1461	1460	1440
NORTH NEW RIVER CANAL WEST	331	323	320	310	389	372	360	323	345	334	332	314
POMPANO CANAL	21	19	20	20	25	24	22	23	21	20	21	20
Total	**9280**	**9114**	**9106**	**9071**	**9713**	**9442**	**9421**	**9350**	**9368**	**9200**	**9160**	**9112**

2S100R 35i					2S100R 85h				2S100R 85i			
Basin Name	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	5261	5179	5182	5181	5497	5332	5310	5288	5332	5206	5199	5192
C-11 WEST	1846	1846	1842	1840	1890	1866	1862	1870	1851	1849	1849	1846
C-12W	215	215	215	215	215	215	215	215	215	215	215	215
C-13 WEST	13	13	13	13	14	14	14	14	13	13	13	13
C-14 EAST	18	18	18	18	18	18	18	18	18	18	18	18
C-14 WEST	44	42	42	42	44	42	42	42	44	42	42	42
HILLSBORO CANAL	1483	1453	1443	1440	1487	1459	1459	1441	1483	1462	1462	1440
NORTH NEW RIVER CANAL WEST	326	317	316	305	362	354	346	323	335	327	324	310
POMPANO CANAL	21	20	19	20	23	23	23	23	21	21	21	20
Total	**9227**	**9103**	**9090**	**9074**	**9550**	**9323**	**9289**	**9234**	**9312**	**9153**	**9143**	**9096**

Number of Septic tanks with Flood Values

2S25R 35i					2S25R 85h				2S25R 85i			
Basin Name	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	4477	4415	4411	4407	4669	4494	4479	4466	4499	4432	4429	4421
C-11 WEST	1564	1572	1571	1568	1592	1581	1578	1577	1570	1574	1572	1570
C-12W	197	195	195	195	198	196	196	195	198	195	195	195
C-13 WEST	11	11	11	11	12	12	11	11	11	11	11	11
C-14 EAST	13	13	13	13	15	14	14	14	13	13	13	13
C-14 WEST	36	35	35	35	36	35	35	35	36	35	35	35
HILLSBORO CANAL	1269	1258	1258	1256	1270	1257	1257	1256	1269	1258	1258	1256
NORTH NEW RIVER CANAL WEST	240	231	231	222	269	261	255	236	251	244	242	224
POMPANO CANAL	6	6	6	6	10	10	10	8	7	7	7	7
Total	**7813**	**7736**	**7731**	**7713**	**8071**	**7860**	**7835**	**7798**	**7854**	**7769**	**7762**	**7732**

Number of Septic tanks with Flood Values

100S100R35i			*100S100R85h*		*100S100R85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	5307	5240	5637	5470	5374	5295
C-11 WEST	1847	1832	1882	1860	1853	1840
C-12W	215	215	215	215	215	215
C-13 WEST	13	12	14	14	13	13
C-14 EAST	18	18	18	18	18	18
C-14 WEST	44	41	44	41	44	41
HILLSBORO CANAL	1484	1443	1489	1462	1485	1460
NORTH NEW RIVER CANAL WEST	331	316	389	345	345	329
POMPANO CANAL	21	21	25	24	21	21
Total	**9280**	**9138**	**9713**	**9449**	**9368**	**9232**

2S100R35i			*2S100R85h*		*2S100R85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	5261	5185	5497	5338	5332	5245
C-11 WEST	1846	1836	1890	1861	1851	1838
C-12W	215	215	215	215	215	215
C-13 WEST	13	12	14	14	13	13
C-14 EAST	18	18	18	18	18	18
C-14 WEST	44	41	44	41	44	41
HILLSBORO CANAL	1483	1443	1487	1445	1483	1443
NORTH NEW RIVER CANAL WEST	326	310	362	327	335	318
POMPANO CANAL	21	20	23	23	21	21
Total	**9227**	**9080**	**9550**	**9282**	**9312**	**9152**

Number of Septic tanks with Flood Values

2S25R 35i			*2S25R 85h*		*2S25R 85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	4477	4421	4669	4515	4499	4436
C-11 WEST	1564	1573	1592	1578	1570	1574
C-12W	197	194	198	195	198	194
C-13 WEST	11	11	12	11	11	11
C-14 EAST	13	13	15	15	13	13
C-14 WEST	36	34	36	34	36	34
HILLSBORO CANAL	1269	1259	1270	1259	1269	1259
NORTH NEW RIVER CANAL WEST	240	224	269	240	251	233
POMPANO CANAL	6	6	10	9	7	7
Total	**7813**	**7735**	**8071**	**7856**	**7854**	**7761**

Impacts to Septic Tanks
(Reduced Flooding)

Number of Septic Tanks with Reduced Flood Values

100S100R 35i				100S100R 85h			100S100R 85i		
Basin Name	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	5169	5171	5164	5605	5607	5604	5237	5241	5213
C-11 WEST	1513	1562	1745	1658	1713	1717	1442	1463	1724
C-12W	215	215	215	215	215	214	215	215	215
C-13 WEST	8	9	10	9	10	10	9	8	10
C-14 EAST	18	15	18	18	18	18	12	18	18
C-14 WEST	39	39	39	39	39	39	39	39	39
HILLSBORO CANAL	1354	1366	1451	1177	1327	1352	1270	1297	1452
NORTH NEW RIVER CANAL WEST	325	325	330	381	386	386	332	341	345
POMPANO CANAL	15	17	12	16	21	14	10	9	17
Total	**8656**	**8719**	**8984**	**9118**	**9336**	**9354**	**8566**	**8631**	**9033**

2S100R 35i				2S100R 85h			2S100R 85i		
Basin Name	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	5123	5124	5119	5443	5447	5452	5170	5195	5199
C-11 WEST	1548	1603	1744	1733	1733	1756	1429	1484	1742
C-12W	215	215	215	215	215	215	215	215	215
C-13 WEST	8	10	10	8	10	10	8	8	10
C-14 EAST	18	18	18	18	18	18	18	18	18
C-14 WEST	39	39	39	39	39	39	39	39	39
HILLSBORO CANAL	1380	1452	1450	1182	1198	1348	1302	1331	1451
NORTH NEW RIVER CANAL WEST	319	325	325	347	358	359	331	334	335
POMPANO CANAL	19	17	13	18	18	14	9	10	15
Total	**8669**	**8803**	**8933**	**9003**	**9036**	**9211**	**8521**	**8634**	**9024**

Number of Septic Tanks with Reduced Flood Values

2S25R 35i				2S25R 85h			2S25R 85i		
Basin Name	Alt A	Alt B	Alt C	Alt A	Alt B	Alt C	Alt A	Alt B	Alt C
C-11 EAST	4348	4356	4360	4573	4574	4583	4368	4372	4371
C-11 WEST	1298	1381	1422	1356	1357	1420	1321	1357	1391
C-12W	196	196	196	197	197	197	197	197	197
C-13 WEST	10	11	11	9	12	12	10	11	11
C-14 EAST	13	13	12	14	15	15	12	12	13
C-14 WEST	34	34	34	35	34	34	34	34	34
HILLSBORO CANAL	1044	1044	1042	1158	977	985	896	897	900
NORTH NEW RIVER CANAL WEST	226	228	232	263	266	269	233	239	242
POMPANO CANAL	5	6	1	4	9	10	5	6	5
Total	7174	7269	7310	7609	7441	7525	7076	7125	7164

TSP									
Basin Name	100S100R 35i	100S100R 85h	100S100R 85i	2S100R 35i	2S100R 85h	2S100R 85i	2S25R 35i	2S25R 85h	2S25R 85i
C-11 EAST	4994	5595	5106	5103	5453	5159	4336	4580	4342
C-11 WEST	1728	1723	1687	1685	1851	1710	1357	1418	1365
C-12W	213	213	214	213	213	213	193	194	194
C-13 WEST	12	10	13	12	13	12	8	9	8
C-14 EAST	15	18	16	17	15	16	12	15	11
C-14 WEST	38	38	38	38	38	38	33	33	33
HILLSBORO CANAL	1450	1221	1376	1451	1369	1445	1046	988	896
NORTH NEW RIVER CANAL WEST	331	388	346	326	362	335	233	271	243
POMPANO CANAL	12	18	10	13	21	14	6	9	5
Total	8793	9224	8806	8858	9335	8942	7224	7517	7097

Impacts to Cultural Resources (Directly Impacted)

Number of Cultural Resources with Flood Values

100S100R 35i					100S100R 85h				100S100R 85i			
Basin Name	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	20	20	20	20	22	22	22	22	20	20	20	20
C-11 WEST	6	6	6	6	6	6	6	6	6	6	6	6
C-12W	5	5	5	5	5	5	5	5	5	5	5	5
C-13 WEST	5	4	4	4	5	5	5	5	5	5	5	4
C-14 EAST	5	5	5	5	5	5	5	5	5	5	5	5
C-14 WEST	8	8	8	8	9	9	8	8	8	8	8	8
HILLSBORO CANAL	50	50	50	48	50	48	50	48	50	50	50	48
NORTH NEW RIVER CANAL WEST	16	16	16	16	17	16	16	16	16	16	16	16
POMPANO CANAL	1	1	1	1	2	2	2	2	1	1	2	1
Total	**116**	**115**	**115**	**113**	**121**	**118**	**119**	**117**	**116**	**116**	**117**	**113**

2S100R 35i					2S100R 85h				2S100R 85i			
Basin Name	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**	**Without Project**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	20	20	20	20	21	20	20	20	20	20	20	20
C-11 WEST	6	6	6	6	6	6	6	6	6	6	6	6
C-12W	5	5	5	5	5	5	5	5	5	5	5	5
C-13 WEST	4	4	4	4	5	5	5	5	5	5	5	4
C-14 EAST	5	5	5	5	5	5	5	5	5	5	5	5
C-14 WEST	8	8	8	8	9	9	8	8	8	8	8	8
HILLSBORO CANAL	50	50	50	48	50	50	50	48	50	50	50	48
NORTH NEW RIVER CANAL WEST	16	16	16	16	16	16	16	16	16	16	16	16
POMPANO CANAL	1	1	1	1	2	2	2	2	1	1	1	1
Total	**115**	**115**	**115**	**113**	**119**	**118**	**117**	**115**	**116**	**116**	**116**	**113**

Number of Cultural Resources with Flood Values

2S25R 35i					2S25R 85h				2S25R 85i			
Basin Name	Without Project	Alt A	Alt B	Alt C	Without Project	Alt A	Alt B	Alt C	Without Project	Alt A	Alt B	Alt C
C-11 EAST	16	15	15	15	17	17	17	17	17	17	16	16
C-11 WEST	5	5	5	5	5	5	5	5	5	5	5	5
C-12W	5	5	5	5	5	5	5	5	5	5	5	5
C-13 WEST	3	4	4	4	5	5	5	4	3	4	4	4
C-14 EAST	5	5	5	5	5	5	5	5	5	5	5	5
C-14 WEST	7	7	7	7	7	7	7	7	7	7	7	7
HILLSBORO CANAL	45	45	45	43	45	45	45	43	45	45	45	43
NORTH NEW RIVER CANAL WEST	16	16	16	16	16	16	16	16	16	16	16	16
POMPANO CANAL	1	1	1	1	1	1	1	1	1	1	1	1
Total	**103**	**103**	**103**	**101**	**106**	**106**	**106**	**103**	**104**	**105**	**104**	**102**

Number of Cultural Resources with Flood Values

100S100R35i			*100S100R85h*		*100S100R85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	20	20	22	22	20	20
C-11 WEST	6	6	6	6	6	6
C-12W	5	5	5	5	5	5
C-13 WEST	5	4	5	5	5	5
C-14 EAST	5	5	5	5	5	5
C-14 WEST	8	8	9	8	8	8
HILLSBORO CANAL	50	50	50	48	50	50
NORTH NEW RIVER CANAL WEST	16	16	17	16	16	16
POMPANO CANAL	1	1	2	2	1	1
Total	**116**	**115**	**121**	**117**	**116**	**116**

2S100R35i			*2S100R85h*		*2S100R85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	20	20	21	20	20	20
C-11 WEST	6	6	6	6	6	6
C-12W	5	5	5	5	5	5
C-13 WEST	4	4	5	5	5	4
C-14 EAST	5	5	5	5	5	5
C-14 WEST	8	8	9	9	8	8
HILLSBORO CANAL	50	50	50	48	50	50
NORTH NEW RIVER CANAL WEST	16	16	16	16	16	16
POMPANO CANAL	1	1	2	2	1	1
Total	**115**	**115**	**119**	**116**	**116**	**115**

Number of Cultural Resources with Flood Values

2S25R 35i			*2S25R 85h*		*2S25R 85i*	
Basin Name	***Without Project***	***TSP***	***Without Project***	***TSP***	***Without Project***	***TSP***
C-11 EAST	16	16	17	17	17	17
C-11 WEST	5	5	5	5	5	5
C-12W	5	5	5	5	5	5
C-13 WEST	3	4	5	4	3	4
C-14 EAST	5	5	5	5	5	5
C-14 WEST	7	7	7	7	7	7
HILLSBORO CANAL	45	45	45	45	45	45
NORTH NEW RIVER CANAL WEST	16	16	16	16	16	16
POMPANO CANAL	1	1	1	1	1	1
Total	**103**	**104**	**106**	**105**	**104**	**105**

Impacts to Cultural Resources (Reduced Flooding)

Number of Cultural Resources with Reduced Flood Tables

100S100R 35i				100S100R 85h			100S100R 85i		
Basin Name	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	26	26	27	27	27	27	25	25	26
C-11 WEST	6	7	7	4	7	8	2	4	7
C-12W	4	4	4	2	2	3	4	4	5
C-13 WEST	6	6	6	5	7	6	5	7	6
C-14 EAST	6	5	2	6	6	6	5	6	6
C-14 WEST	13	14	14	15	15	15	10	14	14
HILLSBORO CANAL	51	54	57	46	44	55	40	46	57
NORTH NEW RIVER CANAL WEST	17	17	17	12	14	16	13	13	17
POMPANO CANAL	1	1	1	2	2	1	1	1	1
Total	**130**	**134**	**135**	**119**	**124**	**137**	**105**	**120**	**139**

2S100R 35i				2S100R 85h			2S100R 85i		
Basin Name	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**	**Alt A**	**Alt B**	**Alt C**
C-11 EAST	25	26	27	27	27	27	26	26	27
C-11 WEST	7	7	7	5	5	7	2	4	7
C-12W	4	4	5	2	2	3	4	4	5
C-13 WEST	5	5	5	5	7	6	6	7	6
C-14 EAST	6	6	6	6	6	6	6	6	6
C-14 WEST	13	14	14	15	15	15	13	14	14
HILLSBORO CANAL	54	54	56	44	35	47	42	51	56
NORTH NEW RIVER CANAL WEST	17	17	17	11	11	15	12	13	17
POMPANO CANAL	1	1	1	2	2	1	1	1	1
Total	**132**	**134**	**138**	**117**	**110**	**127**	**112**	**126**	**139**

Number of Cultural Resources with Reduced Flood Tables

2S25R 35i				2S25R 85h			2S25R 85i		
Basin Name	Alt A	Alt B	Alt C	Alt A	Alt B	Alt C	Alt A	Alt B	Alt C
C-11 EAST	22	22	22	23	23	23	23	23	23
C-11 WEST	2	3	3	3	2	4	2	2	2
C-12W	4	4	4	5	5	5	4	4	4
C-13 WEST	4	3	4	3	4	5	4	4	4
C-14 EAST	6	5	6	6	6	6	5	5	6
C-14 WEST	12	12	12	12	11	11	10	12	12
HILLSBORO CANAL	37	37	40	28	27	45	42	44	46
NORTH NEW RIVER CANAL WEST	14	14	14	14	15	15	11	11	14
POMPANO CANAL	1	1	1	1	1	1	1	1	1
Total	**102**	**101**	**106**	**95**	**94**	**115**	**102**	**106**	**112**

TSP									
Basin Name	100S100R 35i	100S100R 85h	100S100R 85i	2S100R 35i	2S100R 85h	2S100R 85i	2S25R 35i	2S25R 85h	2S25R 85i
C-11 EAST	21	26	24	24	27	24	20	23	19
C-11 WEST	8	5	8	7	8	4	2	2	2
C-12W	4	2	4	4	3	5	4	5	4
C-13 WEST	6	7	6	5	6	6	4	5	4
C-14 EAST	5	6	5	5	1	5	5	6	5
C-14 WEST	13	15	13	13	14	13	12	12	11
HILLSBORO CANAL	54	47	54	56	41	53	36	31	44
NORTH NEW RIVER CANAL WEST	17	12	17	17	16	17	13	15	14
POMPANO CANAL	1	1	0	1	1	1	1	1	1
Total	**129**	**121**	**131**	**132**	**117**	**128**	**97**	**100**	**104**

D.11 Life Safety Assessment

Prepared for:	South Florida Water Management District
Prepared by:	J-Tech, an Alliance between Jacobs Engineering and Tetra Tech, Inc.
Date:	February 23, 2026
Subject:	C&SF Flood Resiliency (Section 203) Study for Broward Basins Life Safety Assessment

1 Introduction

Life safety is integral to Flood Risk Management (FRM) and requires evaluating potential life loss consequences, characteristics of the flood hazard (depths and velocities) and likelihood of the flood hazard occurring. U.S. Army Corps of Engineers (USACE) Planning Bulleting 2019-04 requires life safety considerations be incorporated into FRM studies. High levels of risk analysis may be required when activities involve constructing a new dam or levee, or when modifying an existing dam or levee. or whenever life safety is a concern within the study area (USACE 2019a). Life safety risk assessments seek to estimate incremental life risk to understand any risk reduction measure's (e.g. levee) contribution to the total life risk (from flooding). Risk assessments treat flood risk, or life risk from flooding, as a function of probability and consequences. This Section 203 Study is subject to this requirement and must account for life safety considerations during plan formulation.

2 Study Assumptions

The Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study – Broward Basins integrates life safety through the study, and life safety is clearly identified in the study's problems and opportunities. The current C&SF system includes multiple features, constructed since the 1950s, that continue to provide flood protection, drainage and groundwater recharge.. The C&SF Section 203 study accounts for surge and rainfall, but does not include wave attack, or events where there would be deep fast-moving water that would threaten the stability of pedestrians, vehicles or structures. Rather, the Section 203 seeks to mitigate frequent flooding that distresses the system and causes damages to property and infrastructure.. The potential for flood-induced consequences generally increases as flood severity increases and while frequent flooding causes recurring consequences, life loss consequences are generally driven by more severe, lower probability floods.

3 Life Safety in Plan Formulation

As directed by PB 2019-04a, life safety should be considered throughout the project. Life safety was incorporated into the problems, opportunities, objectives and constraints for the project at the start. One the study's opportunities it to manage public health and safety, including life safety, impacted by flood risk.. Measures were defined, and integrated into alternatives that reduce flood risk to property, critical assets and human health and safety to make up the array of alternatives. The measures and alternatives that aligned with the problems, objectives and opportunities were carried forward to the final array.

4 Comparison of Plans for Life Safety

The study team also assessed life safety through the qualitative assessment of incremental change in flood depths at critical infrastructure within the action area. This exercise was completed to determine if alternatives would support less disruption to critical infrastructure such as hospitals, government facilities, etc. Disruption is considered for any critical infrastructure with flood depths at the first floor elevation exceeding 0.2 ft. The assessment considered flood depths at critical infrastructure for the 0.03 annual exceedance probability (AEP), 0.009 AEP, and 0.002 AEP events. The 0.002 AEP event was included although that level of flooding would be expected to prompt hazard communication, emergency warning to the public, or evacuation of the Study Area. Based on the assessment results and the absence of structural flood-control features (e.g., levees or dams), life-safety risk is low. The assessment results are summarized in **Table 1** below.

Table 1. Summary of Critical Infrastructure with Flood Values Greater than 0.25 feet above First Floor Elevation

	Intermediate Sea Level Rise			High Sea Level Rise		
Critical Infrastructure	**0.03 AEP**	**0.009 AEP**	**0.002 AEP**	**0.03 AEP**	**0.009 AEP**	**0.002 AEP**
Future Without Project	4	10	13	5	15	26
Alternative A	3	7	10	3	13	18
Alternative B	3	7	10	3	13	17
Alternative C	3	7	8	3	13	15
Alternative RO (RP)	4	9	11	4	14	11

Notes: AEP = annual exceedance probability; RO = Resilience Optimized; RP = Recommended Plan

5 Discussion

USACE Planning Bulletin 2019-04 requires that life safety be incorporated into FRM studies when construction activities involve levees or dams, or whenever life safety is a concern within the Study Area. As discussed in study assumptions in Section 3.2 of the Integrated Feasibility Study and Environmental Assessment, the life safety risk of the existing C&SF system is anticipated to be moderate. The likelihood of reduced system capacity or impaired functionality increases with event severity. For severe weather events, the functionality of the existing C&SF system in addition to state and federal emergency management and response actions collectively manage life safety risk. Measures and alternatives were formed to improve the functionality and capacity of the existing C&SF system in the interest of public and life safety with careful consideration of risk transformation or tradeoffs. Future With Project conditions thereby are designed to lower life safety risk. Compounding hazards such as wave action were not included in the analysis, and are not considered likely for the compound flood scenarios evaluated as part of this study. No dams or levees are included in the final array of alternatives.. Uncertainty associated with proposed changes or additional features is managed through the review of existing geotechnical data and collection of new geotechnical data within the Study Area. A semi-quantitative risk assessment or fully quantitative risk assessment , including LifeSim modeling to estimate potential life loss, may be considered during the preconstruction engineering and design phase if additional analysis is needed to support final design prior to construction.

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ANNEX D-1
Flood Damage Assessment Technical Memorandum

Flood Damage Assessment Technical Memorandum

Central and Southern Florida Flood Resiliency Study - Broward Basins (C&SF Section 203)

South Florida Water Management District

Broward County, Florida

January 16, 2026

Updated on April 2, 2026

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Resilience Optimized

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Introduction

South Florida Water Management District (SFWMD) is utilizing Section 203 of the Water Resources Development Act of 1986, as amended, to advance the Central and Southern Florida (C&SF) Flood Resiliency Study – Broward Basins with support from the Florida Department of Environmental Protection, Broward County, and technical/federal assistance from the U.S. Army Corps of Engineers (USACE) – Jacksonville District, for inclusion in the Water Resources Development Act of 2026.

This memorandum documents a flood damage assessment in support of the overall C&SF Flood Resiliency (Section 203) Study – Broward Basins, including the detailed assumptions and settings for the application of the USACE's Hydrologic Engineering Center's (HEC) Flood Damage Assessment software (HEC-FDA) version 2.0. Inputs to the HEC-FDA software, such as the structure exposure dataset, stage-frequency curves, and depth-damage functions are described in this document, as used to calculate expected annual damage, the average value of economic flood damage. Appendices D1.A to D1.F present additional details on structure inventory attributes, foundation heights, as well as sensitivity tests performed to address additional technical and public review comments and explore the sensitivity of HED-FDA application with modified assumptions as a means of further understanding the expected performance of the recommended plan. Particularly, Appendix D1.F presents the effect of applying more conservative assumptions in the HEC-FDA damage analysis, as well as incorporating future rainfall changing factors to reflect potential increase in rainfall intensity under future conditions, into the flood damage calculations.

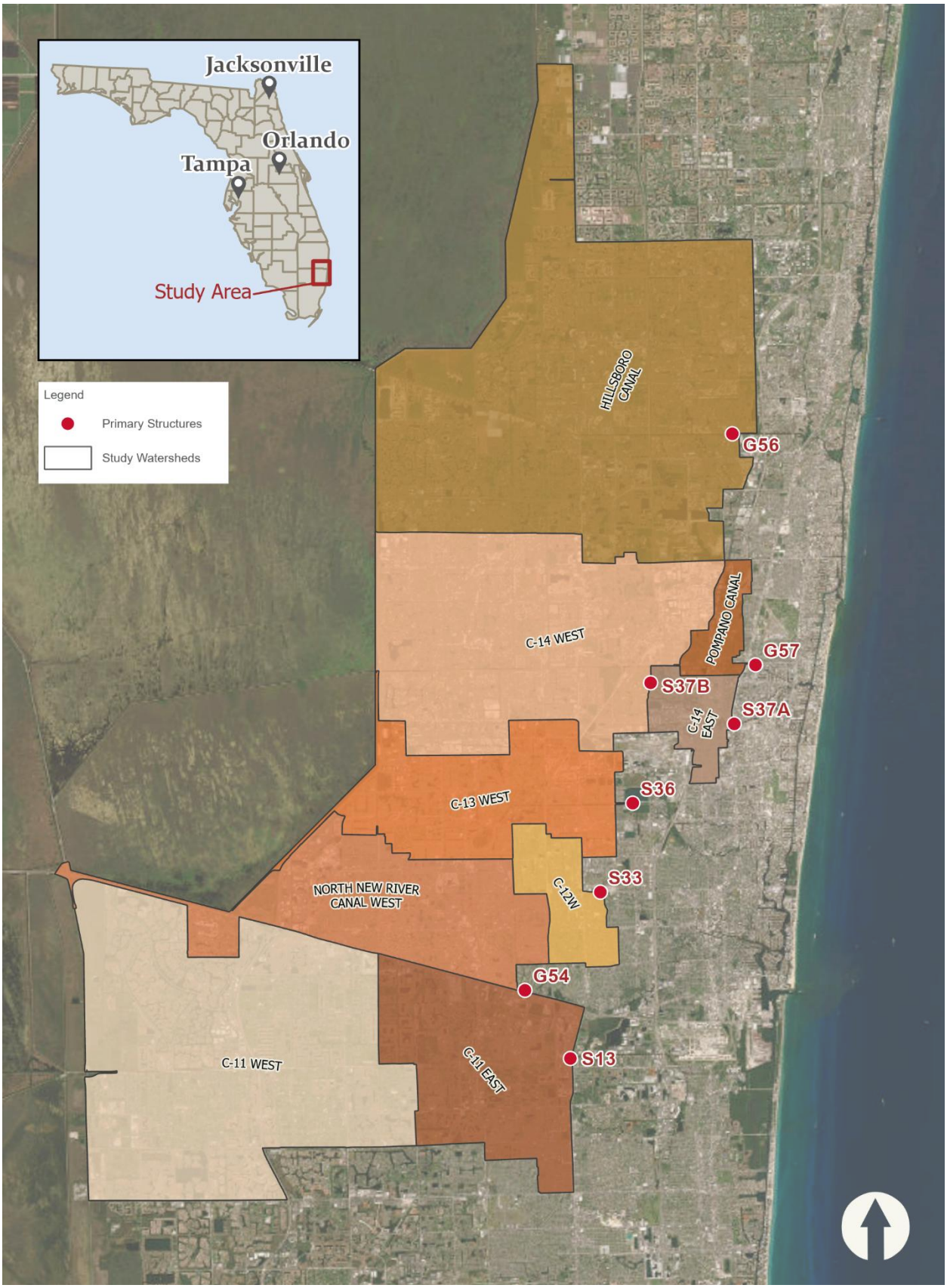


Figure 1 – Study Watersheds in Broward County

Existing Studies and Data Sources

C&SF Section 216 Study

This C&SF Section 203 Study is split from the C&SF Flood Resiliency Section 216 Study, which includes four reaches. The Broward and Hillsboro Basins of the C&SF Section 203 Study are known as Reach A within this C&SF Section 216 Study. The target completion date of the C&SF Section 216 Study is currently aiming to be incorporated into the 2030 Water Resources Development Act.

Flood Hazard Data (H&H Modeling)

An integrated/coupled surface-groundwater MIKE SHE/MIKE Hydro (2022) model was created by the SFWMD and was used to generate flood hazard information for use in the flood damage assessment. This 2D hydrologic and hydraulic (H&H) model covers the entire Study Area and extends past the tidal boundary condition to the east. The focus on this study is the primary canal system; however, the model includes a high level of detail within the secondary and tertiary canal systems (Model Documentation Report 2025).

The South Atlantic Coastal Study Coastal Hazard System (CHS) was utilized as downstream boundary conditions in the modeling. This study provides numerical and probabilistic modeling results for coastal forcings, including storm surge. Three (3) scenarios or conditions were analyzed in the modeling: the Existing Condition Baseline for 2035 (ECB); the Future Without Project for 2085 (FWOP); and the Future With Project for 2085 (FWP). A combination of eight (8) simulations were conducted for various combinations of rainfall-based (pluvial) flooding and coastal hazards such as storm surge. The calculation of joint probability, or probability of both coastal hazard and rainfall return periods occurring together and at the same point in time, was documented in the report, Incorporating ATLAS14 and CHS data into the joint probability framework for C&SF Flood Resiliency (Section 216) Study (University of Central Florida 2025). Coastal water level return periods, rainfall return periods, joint probabilities, and associated joint return frequencies are shown in Table 1.

Table 1. Flood Hazard Simulations

Coastal Water Level Return Period (CHS Data)	Rainfall Return Period (NOAA Atlas 14 Data)	Joint Probability (%)	Joint Recurrent Frequency (years)
2-year	5-year	0.125	8
2-year	10-year	0.0714	14
2-year	25-year	0.0333	30
10-year	10-year	0.0313	32
20-year	25-year	0.0133	75
2-year	100-year	0.0091	110
100-year	100-year	0.0023	430

Table 1. Flood Hazard Simulations			
Coastal Water Level Return Period (CHS Data)	Rainfall Return Period (NOAA Atlas 14 Data)	Joint Probability (%)	Joint Recurrent Frequency (years)
2-year	500-year	0.0019	538

Project Alternatives

The Final Array of Alternatives consists of three alternatives (denoted as A, B, and C) which were built in the H&H model. Each alternative contains features shown to be effective in improving flood levels in the seven upstream drainage areas of the study. The features consist of primary structure modifications, primary C&SF Canal improvements, and storage and nature based proposed projects. Primary structure modifications may include increased gravity capacity by adding additional gates and/or pumps, hardening of the structures to block backflow during high tide conditions, and alternative operation of the structure with pre-storm drawdown and, where available, operation of pumps both pre- storm and during the storm to maintain lower canal water levels. It should be noted that operations for pre-storm drawdown also are applied to the secondary system due to improved primary canal stages and structure discharge capability.

The three alternatives increase in complexity starting with Alternative A, which has the least number of features and expected lower cost; Alternative B, which adds additional complexity and project features; and Alternative C, which includes the most projects and therefore expected to be the most expensive. The table below provides an overview of the modeled alternatives.

A Resilience Optimized Alternative (Alternative RO) was also assessed and further documented in the next section.

Table 2. Project Alternatives Components Overview*

Project Type	Project Type Detail	Alternatives		
		A	B	C
Primary Structure Modification	Gates	S-37A (4 x 25 ft) - C-14 East, S-36 (2 x 25 ft) - C-13 West	G-56 (5 x 20 ft) - Hillsboro S-37B (2 x 35 ft) - C-14 West, G-57 (2 x 21 ft) - Pompano, S-33 (2 x 20 ft) - C-12 West, G-54 (5 x 16 ft) - NNR West	G-56 (5 x 20 ft) - Hillsboro, S-37A (4 x 25 ft) - C-14 East, G-57 (2 x 21 ft) - Pompano, S-36 (2 x 25 ft) - C-13 West, S-33 (2 x 20 ft) - C-12 West, G-54 (5 x 16 ft) - NNR West
	Pump	S-37A (add new 1200 Cfs) - C-14 East, S-33 (add new 510 cfs) - C-12 West, S-13 (add'l 160 cfs) - C-11 East	S-37A (add new 1500 Cfs) - C-14 East, S-36 (add new 510 cfs) - C-13 West, S-33 (add new 510 cfs) - C-12 West, S-13 (add'l 540 cfs) - C-11 East	G-56 (add new 1000 cfs) - Hillsboro S-37A (add new 1200 cfs) - C-14 East, G-57 (add new 300 cfs) - Pompano, S-36 (add new 600 cfs) - C-13 West, S-33 (add new 700 cfs) - C-12 West, G-54 (add new 800 cfs) - NNR West, S-13 (add'l 960 cfs) - C-11 East
	Hardening	G-56 (Hillsboro), S-37A (Cypress Creek/C-14), G-57 (Pompano), S-36 (C-13 West), S-33 (C-12 West), G-54 (NNR West), S-13 (C-11 East)	G-56 (Hillsboro), S-37A (Cypress Creek/C-14), G-57 (Pompano), S-36 (C-13 West), S-33 (C-12 West), G-54 (NNR West), S-13 (C-11 East)	G-56 (Hillsboro), S-37A (Cypress Creek/C-14), G-57 (Pompano), S-36 (C-13 West), S-33 (C-12 West), G-54 (NNR West), S-13 (C-11 East)
Primary C&SF Canals	Canal Cross Section Modification		Hillsboro, C-14 West, C-11 West, C-11 East	Hillsboro, C-14 West, C-14 East, C-13 West, C-12 West, NNR, C-11 West C-11 East
	Culverts/Bridges	Triple culvert u/s of G-57 - Pompano Canal	Triple culvert u/s of G-57 - Pompano Canal	G-65 - Pompano Canal, Triple culvert u/s of G-57 - Pompano Canal Winkopp Bridge - C-11 West
Storage & Nature Based			NNR West	Hillsboro, NNR West
Primary Structure Modification	Pre-storm Drawdown	All basins, all alternatives -except C-11 West, C-14 West	All basins, all alternatives - except C-11 West	All basins, all alternatives - except C-11 West
Assumed Inflows from Secondary to Primary	Pre-storm Drawdown	All basins, all alternatives		

*Note: If not listed, the structure retains its current geometry & capacity in the Alternative

Flood Damage Assessment

This flood damage assessment estimated five (5) types of quantitative flood risk reduction benefits: avoided damages to structures, contents, vehicles, roadways, and "other," which includes emergency clean-up costs associated with an asset. Life risk benefits were not included as the forms of flood hazards are relatively low in energy, velocity and depth, thus not likely to threaten human life. Damages caused by wave action and other hazards, that might create potential for direct life loss, were not included.

The benefits of each alternative were estimated using the USACE's Hydrologic Engineering Center's (HEC) Flood Damage Assessment software (HEC-FDA) version 2.0. Inputs to the HEC-FDA software, such as the structure exposure dataset, stage-frequency curves, and depth-damage functions are described later in this section and are derived from a variety of best-available sources. These relationships are combined within HEC-FDA to calculate expected annual damage, the average value of economic flood damage. Economic flood damages relate the potential harm to property, infrastructure, and other assets, quantified in dollars, to the likelihood of that harm occurring.

Hydraulics

The HEC-FDA analysis uses gridded data in the form of peak flood depth rasters, which are results of the MIKE SHE H&H model. The modeling set-up and approach are described under a separate report (Model Documentation Report 2025).

Under the 216 study, USACE Jacksonville Office developed a worksheet for performing monotonicity adjustments on H&H input datasets required for HEC-FDA Version 1.4.3. This approach was reviewed and approved by the USACE Planning Center of Expertise team. In this C&SF Section 203 Study, building on that methodology, a Python script was developed to apply the same monotonicity adjustments while preserving the flood depth data from eight storm events in TIFF format— the required format for HEC-FDA Version 2.0. *(Reference: Python Script for Adjusting MIKE SHE Overland Depth Result Rasters and Creating Georeferenced TIFFs for Input to HEC-FDA 2.0, March 2025, SFWMD).*

Frequency Functions

The frequency function defines the relationship between annual peak flood magnitude or stage and the probability of that flood magnitude or stage being exceeded at an index point. The index point is normally chosen at a location along the reach that best represents the point that is the driver of overbank flooding such as a low spot in the levee or channel bank. For this study, this is not possible as the overbank flooding is based on two disparate factors: precipitation and storm surge.

- The precipitation is applied to the model as rain on mesh. This means that the precipitation is being applied in all overbank locations, as opposed to the usual method of applying discharge hydrographs (such as from HEC-HMS) to the canal system and having the hydraulic model predict overbank flooding. The rain on mesh approach means flooding may occur within the Study Area even if the canal banks are not overtopped.
- The storm surge is applied as a boundary condition to the drainage channels and the overland. As such the storm surge directly affects the overland

flooding and the hydraulics within the drainage channel and can cause overbank flooding early on for the downstream (easterly) study domain.

At the extremes both of the factors are the primary driver of the overbank flooding. With the storm surge dominating near the channel (easterly and downstream) and precipitation dominating in the areas furthest from the channel (westerly and upstream). The issue is that the majority of the overbank flooding and affect inventory is located between these two extremes and are each affected by the 2 factors to differing degrees based on the distance from the drainage channel and the overall overbank drainage patterns. As a result, there is no single location that accurately represents the performance of the drainage system across the entire overbank area that could be used as a reliable index point. To develop a frequency curve that more realistically reflects overbank flooding conditions, the average depth values of individual structures within the floodplain were used for each storm event. Specifically, the frequency function was derived using peak flood depth TIFF files generated from the H&H model outputs for eight storm events, each associated with different joint probabilities. The methodology for developing the frequency curve is outlined below:

1. First, the maximum flood depth grids for all eight storm events were directly extracted from the MIKE SHE/MIKE HYDRO model for the nine impact areas (nine study basins).
2. For each basin, grid cells with positive flood depths from the most frequent event (with a joint probability of 0.125, corresponding to a 2-year surge and 5-year rainfall) were selected for the frequency curve calculation for this point on the frequency curve.
3. To develop the remaining points on the frequency curve, the same set of grid cells were then used for frequency curve calculations across the remaining seven storm events with different joint probabilities. This was done to use a consistent dataset for calculations at all points. A Python script was developed to automate these calculations for each impact area.

Stage Frequency Curves

For each basin, each sea level rise (SLR) condition, and each baseline and alternative scenario, a unique set of three stage–frequency curves was developed to represent the assets evaluated in the HEC-FDA analysis. These curves correspond to (1) structures (25 occupancy types), (2) roads, and (3) vehicles, with each curve derived from flood depths extracted within the spatial domains encompassing the respective asset types (e.g., roadway locations versus structural footprints).

To ensure transparency and repeatability, a Python script was developed to extract the H&H model outputs and generate the stage–frequency curves in a consistent and repeatable manner, so that results are objective and reproducible. While the stage–frequency curves were developed

outside of HEC-FDA, the associated confidence limits were computed within HEC-FDA version 2.0.1 using a 50-year equivalent record length. Minor discrepancies were observed for the most frequent events when comparing the curves with the lower (2.5 percent) confidence limits; these differences are attributable to the graphical uncertainty estimation approach used by HEC-FDA and do not materially affect the overall results.

Differences in slope are mainly due to the locations used to extract flood depths and the H&H tiff files as simulated for different basins and different scenarios. Uncertainty associated with stage is documented and incorporated into the analysis through the stage-frequency relationships developed from the H&H modeling, including the associated confidence limits. These stage-frequency relationships are used by HEC-FDA v2.0.1 to propagate stage uncertainty through the damage calculations and resulting expected annual damage estimates. All the stage frequency curves with 95% confidence limits are included in the Appendix D1.D to this annex. An example plot is presented in Figure 2. In general, the following characteristics were observed.

1. Relative Magnitude Across Asset Types.

For a given exceedance probability, road depths are generally higher than structure and vehicle depths, while structure and vehicle depths are very similar across most events. This reflects expected elevation differences: roadways are typically constructed at lower elevations, whereas vehicles are often located near building pads or finished floors.

2. Monotonic Increase with Decreasing Probability

For all three asset types, stage depth increases as exceedance probability decreases (i.e., toward rarer events). This monotonic behavior indicates internally consistent stage–frequency relationships and physically reasonable hydraulic response across the full probability range.

3. Increasing Uncertainty for Rarer Events

The width of the uncertainty bands (97.5% – 2.5%) increases substantially for lower-probability events (e.g., 0.0133 and below). This pattern is consistent across structures, roads, and vehicles and reflects greater uncertainty associated with rarer and more extreme flood events, a demonstration of heteroskedastic behavior.

4. Similar Uncertainty Structure Across Asset Types

Although absolute depths differ, the relative structure of uncertainty bands is similar across asset types, particularly for structures and vehicles. This indicates that uncertainty characterization is being applied consistently and is driven primarily by the underlying hydrologic and hydraulic uncertainty rather than asset-specific artifacts.

5. Greater Sensitivity at for Rare Events

At the lowest exceedance probabilities (e.g., 0.0023 and 0.0019), small changes in probability correspond to relatively large increases in depth. This demonstrates increased system sensitivity

for rare events and confirms that the curves appropriately reflect nonlinear flood response under extreme conditions.

6. Alignment with the overall Results

As demonstrated in the section, Results for Alternatives, the curves respond to project alternatives in a reasonable and expected manner. The generate damage aligns with the modeled depths in a hydraulically reasonable way and demonstrating sensitivity to changes in system performance and improvement. The report will be updated to include these discussions.

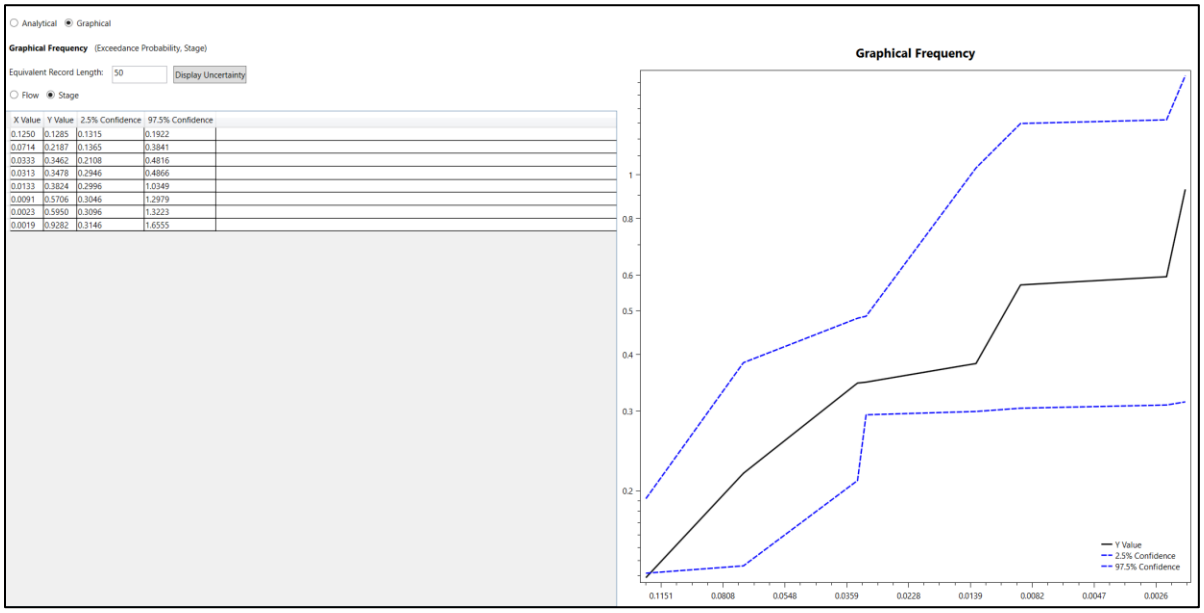


Figure 2 – Example Stage – Frequency Curve with 95% Confidence Limits

Economics

Inventory

Valued Assets (Structures)

The structure inventory, which represents buildings at-risk of flooding within our Study Area, was taken from an exposure dataset developed by SFWMD, in consultation with USACE and FEMA HAZUS teams, starting in 2020 and using NSI 1.0 data, for the application of the customized SFWMD FIAT Tool (Deltares USA, 2022) in flood adaptation assessments, and later updated with NSI 2.0 data for the C&SF 216 Study. This spatially georeferenced point feature dataset represents building centroids within Study Area.

The structure inventory quality control (QC) was performed by the USACE Jacksonville office under the C&SF 216 Study. To avoid overestimating flood damages, some structures located near waterbodies were repositioned away from these. As part of the quality control process, asset coordinates (x, y) were spatially adjusted to reduce the risk of placing assets within waterbodies (e.g., canals, ponds), which can occur due to the resolution of the MIKE SHE grid. This adjustment was completed in GIS by creating a buffer polygon—equal to the grid cell resolution

in feet—around each waterbody, and snapping any assets found within the buffer to the nearest edge of the polygon.

The exposure dataset was refined to ensure compliance with 33 U.S. Code §2318 (Floodplain Management). The updated inventory excludes buildings constructed after 1991 that do not comply with the most recent effective FEMA Base Flood Elevation (BFE) based on the construction or structural improvement date of the structure. Specifically, a filter was applied to identify structures built or improved after 1991 in which the finished floor elevation (FFE) is lower than the most recent effective FEMA BFE for the year of construction, which resulted in 491 buildings being excluded from the damage calculations.

The resulting structure inventory shapefile served as the baseline for integrating additional attribute data, as described in the sections below.

The following HEC-FDA asset inventory required attributes were used:

- **Structure ID**
    - This is a unique ID created for each structure point and combines the watershed (first two digits) with the GIS ObjectID (last six digits) to create an eight-character integer.
- **Depreciated Replacement Value (DRV) – Structure**
    - DRVs are used in flood risk planning studies to reflect the cost of replacing an asset less deductions for physical deterioration. A structure value was calculated for each individual structure and then depreciated using the methodology below. This methodology mirrors the USACE-provided depreciation method (Reference: Deriving the Depreciated Replacement Values for the Structure Inventory, USACE), with the only difference being the use of 2024 as the base year (instead of 2035, as used in the C&SF Section 216 Study). This adjustment was reviewed and approved by USACE, as it better reflects the current condition of the exposure dataset. Using 2035 assumes no maintenance or changes to structures between now and that year, which may lead to over-depreciation, since there is no assumption of any property maintenance investments either.
        1) Structure values (not depreciated) were first taken from the original SFWMD FIAT exposure dataset. This field (Max Potential Damage: Structure) was calculated using the square footage of each structure and a per-square-foot structure replacement cost from the FEMA HAZUS technical manual 4.0.
        2) Each structure was then matched to a structure effective age-built year value from data provided by USACE, taken from

Census data. Refer to the *Deriving the Depreciated Replacement Values for the Structure Inventory* outline provided by USACE as part of the C&SF Section 216 study.

3) Effective structure age was calculated by subtracting 2024 (year of inventory) from the effective age-built year.

4) Depreciation was applied using curves from the FEMA HAZUS technical manual, Section 6.4. Curves are linear percent (%) reductions in structure value based on effective structure age. This percent reduction was applied in ArcGIS Pro, with the result being the Depreciated Replacement Value of each structure.

- **Contents Value**

1) The contents value for each individual structure was calculated based on a structure-to-contents ratio and the Depreciated Replacement Value. The resultant value represents a depreciated contents value for each individual structure and was used in HEC-FDA to estimate damage to contents.

2) The CSVR for residential structures was derived from Engineering Manual 1110-2-1619 "Risk-Based Analysis for Flood Damage Reduction Studies". Table 6-4 of the EM estimates an average and standard deviation from over 120,000 sampled NFIP claims.

3) Non-residential CSVR's were estimated based on IWR's "Nonresidential Flood Depth-Damage Functions Derived from Expert Elicitation" based on occupancy type

4) A detailed review suggested revisions to four occupancy types are needed to meet the conditions for the Broward County Study Area. The review focused on the actual structures classified by occupancy types of the exposure database to determine if the structure-to-content ratios reflected real-world assets. It was determined that most of the COM1 occupancies within Reach A were grocery stores which have a higher structure-to-content ration than the suggested 36%. Professional offices are a majority of COM4, most COM6 are hospitals, and RES4 were hotels. For this reason, the *Nonresidential Flood Depth-Damage Functions Derived from Expert Elicitation, published April 2009,* was referenced for the

contents to structure ratios. This document was produced by expert loss-risk specialists throughout the Country. Recommended replacement structure-to-content ratios are shown in Table 3.

Table 3. Recommended structure-to-content ratios

Occupancy (Primary Object Class)	Recommended Replacement (%)	CSVR from HEC-FDA (%)
AGR1		12
COM1	70	~~36~~
COM10		66
COM2		0
COM3		66
COM4	18	~~12~~
COM5		28
COM6	43.9	~~28~~
COM8		27
COM9		7
EDU1		7
EDU2		69
GOV1		69
IND1		38
IND2		38
IND3		38
IND4		38
IND5		38
REL1		7
RES1		43
RES2		64
RES3A-F		43
RES4	26	~~15~~
RES5		10
RES6		28

- **Other (Emergency Clean-Up Costs) Value**

    1) "Other" values were provided by the USACE for each structure and include emergency clean-up costs associated with flood impacts.

- **Foundation Height**

This section and Table 3 below summarize the techniques applied to develop foundation heights and standard deviations for different structures inventories.

1) Structure foundation height was estimated for each individual structure using averages obtained from elevation certificates (FDEM, 2023) within the Study Area. In cases where an elevation certificate exists, a “C- “prefix was used in the occupancy type field and the actual foundation height from the certificate was applied.
2) To accurately estimate foundation heights for various structure types without elevation certificates, a random point sampling method was applied using ArcGIS and Google Earth Street View. Based on the sampling results, average foundation heights were recommended for RES1-1SNB and RES2-SNB structures (Appendix D1.A).
3) For all other structure categories, a robust statistical analysis was conducted to estimate average foundation heights and standard deviations, using limited data from certified structures and triangular distribution parameters provided by the Jacksonville office (Appendix D1.B)

Table 4. Foundation Heights and Standard Deviation used in Structures Inventory

Occupancy (Primary Object Class)	Average Foundation Height (ft)	Std. Dev. for Normal Distribution (ft)
AGR1	1.24	0.50
COM1	1.27	1.14
COM10	1.20	0.87
COM2	1.27	1.14
COM3	1.27	1.14
COM5	0.58	0.26
COM6	2.94	1.06
COM8	2.03	2.48
COM9	1.27	1.14
EDU1	1.08	0.59
EDU2	1.08	0.59
ESSM	1.75	0.75
GOV1	1.68	2.44
IND1	1.42	1.35
IND2	1.42	1.35
IND3	0.65	0.30
IND4	1.42	1.35
IND5	1.42	1.35
PWTM	1.75	0.75
REL1	1.88	2.26
RES1-1SNB	0.75	0.61
RES1-2SNB	0.75	0.46
RES2	2.92	2.00
RES3C	1.27	0.70
RES3E	1.18	0.54
RES4	1.61	1.39
RES5	0.86	0.16
RES6	1.00	0.27
WWTM	1.75	0.75

- **Ground Elevation**

    1) Ground elevations were obtained at each individual structure using LiDAR DEM. These values were extracted at each structure location point in the original FIAT exposure dataset and were converted to NGVD 29 to match the water surface elevation datum from H&H modeling.
    2) Conversions from NAVD 88 (original LiDAR data datum) to NGVD 29 were handled using the VDatum tool by NOAA. This tool provides conversion factors at each individual point, rather than using a Study Area average. Vertical datum conversions across the Study Area range up to 0.2'.

Valued Assets (Transportation)

An inventory of transportation assets, specifically roadway infrastructure, was included in the HEC-FDA analysis. This dataset was taken from the SFWMD FIAT exposure dataset and was unmodified as part of this analysis.

Valued Assets (Vehicles)

Economic Guidance Memo 09-04 was followed for estimating the exposure value of vehicles in the Study Area. In details,

1) Census data was used to estimate an average number of vehicles per household (1.63).
2) All single-family and mobile homes are represented using one household. For multi-family residences, the number of residential units was determined using the NSI's "RESUnit" field. A spot check (windshield survey) of 50 units demonstrated a sufficient level of accuracy to utilize this field. Any locations missing RESUnit in the field were replaced by the average based on the occupancy type. Some RESUnit values in the NSI appeared erroneously large and a maximum of 50 res-units was placed on any given multi-family residence (building code limits 50 units per acre). So the number of residential units was then multiplied by 1.63 to determine total number of vehicles for each multi-family residence.
3) The average used vehicle value was determined using Edmunds and a zip code for each unique reach.
4) The most-likely (remaining) value was estimated at 19.4% using USACE Economic Guidance Memorandum (EGM) 09-04, Generic Depth-Damage Relationships for Vehicles (2009) assuming at least 6-12 hours of warning time. A maximum value of 49.5% and minimum value of 11.5% was assumed based on

EGM 09-04 survey of less than 6-hour warning time and greater than 24-hour time respectively.

Table 5. Vehicles Per Household

Average Vehicles Per Household	1.63
Remaining value 6-12 Hours of warning (EGM 09-04)	0.194

Vulnerability/Damage Functions

Vulnerability is the susceptibility to harm of people, property, and the environment exposed to a hazard. Although flood damage can be a function of a number of variables, such as flood depth, velocity, and duration, flood depth is the primary factor used in HEC-FDA, as described by depth-percent damage or similar functions. Depth-damage functions (DDFs) estimate damage either as a percentage of an asset's economic value or as a percentage of an asset's direct flood damage. Appendix D1.E presents the HEC-FDA depth-damage functions applied in this study by occupancy type.

Residential damage functions and several non-residential damage functions were assigned based on the North Atlantic Coast Comprehensive Study: Physical Depth Damage Function Summary Report. The majority of non-residential occupancy types were assigned damage functions derived from IWR's "Nonresidential Flood Depth-Damage Functions Derived from Expert Elicitation *published April 2009*. This document was produced by expert loss-risk specialists throughout the Country.

Results for Alternatives

Expected Annual Damage (EAD)

Expected annual damage (EAD) is calculated as the integral of a damage-probability function, which weights the damage for each flood event by the annual exceedance probability of that event happening and then sums across all possible events. As described above, this analysis accounted for damage to structures, contents, roads, and vehicles. The EAD values are the means of each probability distribution resulting from the analyses of the Without Project and With Project scenarios described above.

The EAD for each basin for structures (including contents and others), roads, vehicles for alternatives A, B, and C are reported in Table 6 through Table 14. Exposure databases were developed at different times, structures and roads use 2021 dollars, while vehicles use 2024 dollars.

Table 6. EAD Structure Damage Alt A (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt A 2035 ($)	Alt A low 2085 ($)	Alt A i 2085 ($)	Alt A h 2085 ($)
C-11 EAST	240,668,446	240,578,385	241,409,103	256,573,344	237,432,763	237,711,215	238,267,387	244,992,400
C-11 WEST	395,763,018	396,006,810	395,808,144	396,978,558	393,837,620	393,761,483	393,814,488	394,189,175
C-12 West	70,693,692	70,770,402	70,716,548	71,852,512	68,187,574	68,204,778	68,265,257	69,021,485
C-13 WEST	176,117,172	176,499,224	176,717,730	180,726,197	174,855,519	175,096,382	175,335,206	178,725,787
C-14 EAST	49,453,276	49,565,064	49,946,262	65,220,662	48,726,656	48,885,853	49,449,101	56,010,671
C-14 WEST	420,481,254	419,079,139	420,440,440	421,226,388	414,352,923	414,226,599	414,383,527	414,768,587
HILLSBORO CANAL	676,664,528	676,622,842	676,378,914	677,416,986	671,590,642	671,431,702	671,571,940	671,876,464
NORTH NEW RIVER CANAL WEST	181,198,801	181,222,059	181,586,296	183,647,644	178,996,312	179,027,541	179,136,579	180,456,223
POMPANO CANAL	27,836,875	27,915,588	27,997,683	28,582,576	27,598,836	27,672,456	27,785,096	28,340,071

Table 7. EAD Structure Damage Alt B (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt B 2035 ($)	Alt B low 2085 ($)	Alt B i 2085 ($)	Alt B h 2085 ($)
C-11 EAST	240,668,446	240,578,385	241,409,103	256,573,344	237,343,295	237,532,214	238,043,690	244,254,315
C-11 WEST	395,763,018	396,006,810	395,808,144	396,978,558	393,817,403	393,585,934	393,796,125	394,431,619
C-12 West	70,693,692	70,770,402	70,716,548	71,852,512	68,184,777	68,198,732	68,256,385	68,990,258
C-13 WEST	176,117,172	176,499,224	176,717,730	180,726,197	174,553,631	174,864,185	175,010,204	176,351,834
C-14 EAST	49,453,276	49,565,064	49,946,262	65,220,662	48,553,862	48,703,391	48,975,322	54,211,756
C-14 WEST	420,481,254	419,079,139	420,440,440	421,226,388	414,505,246	414,141,583	414,083,269	415,024,474
HILLSBORO CANAL	676,664,528	676,622,842	676,378,914	677,416,986	671,853,951	671,476,476	671,470,489	672,397,046
NORTH NEW RIVER CANAL WEST	181,198,801	181,222,059	181,586,296	183,647,644	178,926,450	179,012,045	179,119,041	180,060,209
POMPANO CANAL	27,836,875	27,915,588	27,997,683	28,582,576	27,607,103	27,687,599	27,753,047	28,312,380

Table 8. EAD Structure Damage Alt C (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt C 2035 ($)	Alt C low 2085 ($)	Alt C i 2085 ($)	Alt C h 2085 ($)
C-11 EAST	240,668,446	240,578,385	241,409,103	256,573,344	237,124,154	237,385,341	237,960,045	244,416,721
C-11 WEST	395,763,018	396,006,810	395,808,144	396,978,558	393,412,896	393,276,462	393,431,651	393,599,896
C-12 West	70,693,692	70,770,402	70,716,548	71,852,512	68,132,741	68,153,634	68,203,887	68,957,946
C-13 WEST	176,117,172	176,499,224	176,717,730	180,726,197	174,245,527	174,297,758	174,432,222	175,156,045
C-14 EAST	49,453,276	49,565,064	49,946,262	65,220,662	48,471,545	48,630,730	48,882,753	54,165,899
C-14 WEST	420,481,254	419,079,139	420,440,440	421,226,388	413,942,541	413,928,133	414,034,185	414,145,039
HILLSBORO CANAL	676,664,528	676,622,842	676,378,914	677,416,986	672,036,292	672,039,434	672,096,438	673,002,763
NORTH NEW RIVER CANAL WEST	181,198,801	181,222,059	181,586,296	183,647,644	178,690,894	178,674,292	178,818,425	179,270,084
POMPANO CANAL	27,836,875	27,915,588	27,997,683	28,582,576	27,613,364	27,689,310	27,786,750	28,182,124

Table 9. EAD Road Damage Alt A (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt A 2035 ($)	Alt A low 2085 ($)	Alt A i 2085 ($)	Alt A h 2085 ($)
C-11 EAST	22,390,701	22,384,305	22,659,980	26,103,607	21,856,725	21,954,128	22,096,719	23,781,120
C-11 WEST	28,251,083	28,345,945	28,280,294	28,664,635	27,951,764	27,970,618	27,997,695	28,161,620
C-12 West	11,169,485	11,179,662	11,192,868	11,621,318	10,718,435	10,725,174	10,742,436	10,973,755
C-13 WEST	14,171,830	14,224,044	14,346,855	15,349,931	13,838,772	13,920,922	14,022,531	14,874,286
C-14 EAST	5,821,589	5,832,655	5,947,845	8,663,881	5,578,536	5,624,977	5,711,996	6,932,340
C-14 WEST	35,408,831	35,322,048	35,405,949	35,640,997	34,119,614	34,106,823	34,132,417	34,216,893
HILLSBORO CANAL	46,608,665	46,334,537	46,541,719	46,743,274	45,393,067	45,367,498	45,392,703	45,456,122
NORTH NEW RIVER CANAL WEST	15,674,097	15,615,831	15,868,708	16,709,268	14,971,232	15,023,891	15,103,528	15,643,402
POMPANO CANAL	2,336,462	2,388,767	2,399,844	2,638,968	2,285,438	2,315,153	2,348,476	2,595,606

Table 10. EAD Road Damage Alt B (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt B 2035 ($)	Alt B low 2085 ($)	Alt B i 2085 ($)	Alt B h 2085 ($)
C-11 EAST	22,390,701	22,384,305	22,659,980	26,103,607	21,842,830	21,926,423	22,063,602	23,638,139
C-11 WEST	28,251,083	28,345,945	28,280,294	28,664,635	27,975,221	27,944,069	27,981,362	28,162,738
C-12 West	11,169,485	11,179,662	11,192,868	11,621,318	10,716,550	10,721,858	10,735,136	10,946,629
C-13 WEST	14,171,830	14,224,044	14,346,855	15,349,931	13,768,404	13,829,494	13,904,974	14,328,597
C-14 EAST	5,821,589	5,832,655	5,947,845	8,663,881	5,528,543	5,572,525	5,633,019	6,628,184
C-14 WEST	35,408,831	35,322,048	35,405,949	35,640,997	34,115,602	34,081,270	34,079,817	34,213,935
HILLSBORO CANAL	46,608,665	46,334,537	46,541,719	46,743,274	45,423,987	45,372,714	45,378,988	45,518,247
NORTH NEW RIVER CANAL WEST	15,674,097	15,615,831	15,868,708	16,709,268	15,004,745	15,062,190	15,129,694	15,549,144
POMPANO CANAL	2,336,462	2,388,767	2,399,844	2,638,968	2,286,220	2,314,275	2,346,539	2,590,748

Table 11. EAD Road Damage Alt C (Q1 2021 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt C 2035 ($)	Alt C low 2085 ($)	Alt C i 2085 ($)	Alt C h 2085 ($)
C-11 EAST	22,390,701	22,384,305	22,659,980	26,103,607	21,819,741	21,908,873	22,054,418	23,744,494
C-11 WEST	28,251,083	28,345,945	28,280,294	28,664,635	27,911,502	27,909,624	27,924,936	28,077,779
C-12 West	11,169,485	11,179,662	11,192,868	11,621,318	10,705,390	10,710,796	10,721,441	10,908,171
C-13 WEST	14,171,830	14,224,044	14,346,855	15,349,931	13,694,078	13,715,933	13,754,924	13,913,955
C-14 EAST	5,821,589	5,832,655	5,947,845	8,663,881	5,514,620	5,561,091	5,620,432	6,639,223
C-14 WEST	35,408,831	35,322,048	35,405,949	35,640,997	34,050,560	34,048,153	34,069,846	34,116,678
HILLSBORO CANAL	46,608,665	46,334,537	46,541,719	46,743,274	45,444,863	45,445,460	45,460,676	45,608,966
NORTH NEW RIVER CANAL WEST	15,674,097	15,615,831	15,868,708	16,709,268	14,942,418	14,964,577	15,006,752	15,205,990
POMPANO CANAL	2,336,462	2,388,767	2,399,844	2,638,968	2,290,883	2,318,569	2,348,470	2,488,512

Table 12. EAD Vehicle Damage Alt A (Q1 2024 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt A 2035 ($)	Alt A low 2085 ($)	Alt A i 2085 ($)	Alt A h 2085 ($)
C-11 EAST	5,239,183	5,306,212	5,385,660	7,225,919	5,045,123	5,091,522	5,197,337	6,287,661

C-11 WEST	11,029,543	11,031,042	11,032,913	11,101,336	10,895,976	10,893,383	10,897,676	10,918,549
C-12 West	5,692,623	5,714,257	5,696,956	5,878,779	5,433,152	5,435,873	5,442,257	5,542,168
C-13 WEST	6,486,703	6,561,531	6,538,964	6,875,632	6,420,115	6,443,760	6,470,912	6,760,399
C-14 EAST	1,981,975	1,982,042	2,003,806	3,154,401	1,903,557	1,899,039	1,929,826	2,364,008
C-14 WEST	16,023,548	16,041,173	16,019,992	16,095,767	15,658,742	15,650,515	15,661,935	15,692,400
HILLSBORO CANAL	19,035,080	18,987,605	19,018,476	19,074,824	18,692,029	18,682,367	18,690,052	18,706,540
NORTH NEW RIVER CANAL WEST	5,194,592	5,195,316	5,222,635	5,382,202	5,040,762	5,045,275	5,055,274	5,147,120
POMPANO CANAL	1,021,204	1,059,828	1,102,634	1,419,702	993,060	1,028,574	1,074,409	1,341,236

Table 13. EAD Vehicle Damage Alt B (Q1 2024 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt B 2035 ($)	Alt B low 2085 ($)	Alt B i 2085 ($)	Alt B h 2085 ($)
C-11 EAST	5,239,183	5,306,212	5,385,660	7,225,919	5,045,123	5,091,522	5,197,337	6,287,661
C-11 WEST	11,029,543	11,031,042	11,032,913	11,101,336	10,895,976	10,893,383	10,897,676	10,918,549
C-12 West	5,692,623	5,714,257	5,696,956	5,878,779	5,433,152	5,435,873	5,442,257	5,542,168
C-13 WEST	6,486,703	6,561,531	6,538,964	6,875,632	6,420,115	6,443,760	6,470,912	6,760,399
C-14 EAST	1,981,975	1,982,042	2,003,806	3,154,401	1,903,557	1,899,039	1,929,826	2,364,008
C-14 WEST	16,023,548	16,041,173	16,019,992	16,095,767	15,658,742	15,650,515	15,661,935	15,692,400
HILLSBORO CANAL	19,035,080	18,987,605	19,018,476	19,074,824	18,692,029	18,682,367	18,690,052	18,706,540
NORTH NEW RIVER CANAL WEST	5,194,592	5,195,316	5,222,635	5,382,202	5,040,762	5,045,275	5,055,274	5,147,120
POMPANO CANAL	1,021,204	1,059,828	1,102,634	1,419,702	993,060	1,028,574	1,074,409	1,341,236

Table 14. EAD Vehicle Damage Alt C (Q1 2024 Dollars)

Impact area	ECB 2035 ($)	FWOP low 2085 ($)	FWOP i 2085 ($)	FWOP h 2085 ($)	Alt C 2035 ($)	Alt C low 2085 ($)	Alt C i 2085 ($)	Alt C h 2085 ($)
C-11 EAST	5,239,183	5,306,212	5,385,660	7,225,919	5,019,929	5,063,934	5,185,145	6,270,385
C-11 WEST	11,029,543	11,031,042	11,032,913	11,101,336	10,872,320	10,866,623	10,874,825	10,887,709
C-12 West	5,692,623	5,714,257	5,696,956	5,878,779	5,427,541	5,430,745	5,435,824	5,537,897
C-13 WEST	6,486,703	6,561,531	6,538,964	6,875,632	6,375,456	6,383,281	6,394,702	6,461,968
C-14 EAST	1,981,975	1,982,042	2,003,806	3,154,401	1,902,458	1,909,802	1,924,536	2,303,945
C-14 WEST	16,023,548	16,041,173	16,019,992	16,095,767	15,627,952	15,626,687	15,634,046	15,647,691
HILLSBORO CANAL	19,035,080	18,987,605	19,018,476	19,074,824	18,709,243	18,709,193	18,711,742	18,751,693
NORTH NEW RIVER CANAL WEST	5,194,592	5,195,316	5,222,635	5,382,202	5,023,586	5,024,537	5,033,030	5,066,415
POMPANO CANAL	1,021,204	1,059,828	1,102,634	1,419,702	1,005,665	1,038,857	1,075,286	1,244,078

Avoided Flood Damage

The difference in EAD between the "with project condition" and the "without Project condition" is the damage reduced (or avoided damages). The avoided damage values for each basin for structures (including contents and others), roads, vehicles for alternatives A, B, and C are reported in Table 15 through Table 23.

Table 15. Avoided Damage Structure Models Alt A (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	3,235,683	2,867,170	3,141,716	11,580,944
C-11 WEST	1,925,398	2,245,327	1,993,656	2,789,384
C-12 West	2,506,118	2,565,624	2,451,291	2,831,027
C-13 WEST	1,261,653	1,402,842	1,382,524	2,000,411
C-14 EAST	726,620	679,211	497,161	9,209,991
C-14 WEST	6,128,332	4,852,540	6,056,914	6,457,802
HILLSBORO CANAL	5,073,886	5,191,140	4,806,974	5,540,522
NORTH NEW RIVER CANAL WEST	2,202,489	2,194,519	2,449,717	3,191,421
POMPANO CANAL	238,039	243,132	212,587	242,505
Total	23,298,218	22,241,505	22,992,540	43,844,005

Table 16. Avoided Damage Structure Models Alt B (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	3,325,151	3,046,170	3,365,413	12,319,029
C-11 WEST	1,945,615	2,420,877	2,012,019	2,546,940
C-12 West	2,508,915	2,571,670	2,460,162	2,862,254
C-13 WEST	1,563,540	1,635,039	1,707,526	4,374,363
C-14 EAST	899,415	861,673	970,940	11,008,906

C-14 WEST	5,976,008	4,937,556	6,357,171	6,201,914
HILLSBORO CANAL	4,810,578	5,146,366	4,908,426	5,019,940
NORTH NEW RIVER CANAL WEST	2,272,351	2,210,015	2,467,255	3,587,435
POMPANO CANAL	229,772	227,990	244,636	270,196
Total	23,531,345	23,057,356	24,493,547	48,190,976

Table 17. Avoided Damage Structure Models Alt C (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	3,544,292	3,193,043	3,449,058	12,156,623
C-11 WEST	2,350,123	2,730,349	2,376,493	3,378,662
C-12 West	2,560,951	2,616,768	2,512,661	2,894,565
C-13 WEST	1,871,645	2,201,466	2,285,508	5,570,153
C-14 EAST	981,731	934,334	1,063,509	11,054,763
C-14 WEST	6,538,713	5,151,006	6,406,256	7,081,349
HILLSBORO CANAL	4,628,236	4,583,408	4,282,477	4,414,223
NORTH NEW RIVER CANAL WEST	2,507,907	2,547,767	2,767,870	4,377,560
POMPANO CANAL	223,511	226,278	210,933	400,452
Total	25,207,108	24,184,419	25,354,764	51,328,350

Table 18. Avoided Damage Road Models Alt A (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	533,977	430,177	563,261	2,322,487
C-11 WEST	299,319	375,327	282,599	503,015
C-12 West	451,050	454,488	450,432	647,564
C-13 WEST	333,057	303,122	324,323	475,645
C-14 EAST	243,053	207,678	235,848	1,731,541
C-14 WEST	1,289,217	1,215,225	1,273,532	1,424,104
HILLSBORO CANAL	1,215,598	967,038	1,149,016	1,287,152
NORTH NEW RIVER CANAL WEST	702,865	591,940	765,180	1,065,866
POMPANO CANAL	51,024	73,614	51,368	43,362
Total	5,119,161	4,618,610	5,095,560	9,500,734

Table 19. Avoided Damage Road Models Alt B (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	547,871	457,882	596,378	2,465,468
C-11 WEST	275,862	401,875	298,933	501,897
C-12 West	452,935	457,804	457,732	674,689
C-13 WEST	403,426	394,549	441,881	1,021,334
C-14 EAST	293,047	260,130	314,825	2,035,696
C-14 WEST	1,293,229	1,240,778	1,326,132	1,427,062
HILLSBORO CANAL	1,184,679	961,823	1,162,731	1,225,027
NORTH NEW RIVER CANAL WEST	669,351	553,641	739,014	1,160,124
POMPANO CANAL	50,242	74,493	53,305	48,220
Total	5,170,642	4,802,976	5,390,931	10,559,518

Table 20. Avoided Damage Road Models Alt C (Q1 2021 Dollars)

Impact area	ECB 2035 – Alt C 2035 ($)	FWOP low – Alt C low 2085 ($)	FWOP i – Alt C i 2085 ($)	FWOP h – Alt C h 2085 ($)
C-11 EAST	570,960	475,433	605,562	2,359,113
C-11 WEST	339,581	436,321	355,359	586,856
C-12 West	464,095	468,866	471,427	713,148
C-13 WEST	477,751	508,111	591,931	1,435,976
C-14 EAST	306,969	271,565	327,412	2,024,658
C-14 WEST	1,358,271	1,273,895	1,336,103	1,524,319
HILLSBORO CANAL	1,163,803	889,077	1,081,043	1,134,308
NORTH NEW RIVER CANAL WEST	731,678	651,254	861,956	1,503,278
POMPANO CANAL	45,580	70,198	51,374	150,456
Total	5,458,689	5,044,719	5,682,166	11,432,110

Table 21. Avoided Damage Vehicle Models Alt A (Q1 2024 Dollars)

Impact area	ECB 2035 – Alt A 2035 ($)	FWOP low – Alt A low 2085 ($)	FWOP i – Alt A i 2085 ($)	FWOP h – Alt A h 2085 ($)
C-11 EAST	194,060	214,689	188,323	938,258
C-11 WEST	133,567	137,659	135,237	182,786
C-12 West	259,471	278,384	254,698	336,611
C-13 WEST	66,588	117,771	68,051	115,233
C-14 EAST	78,419	83,003	73,981	790,393
C-14 WEST	364,806	390,658	358,057	403,367
HILLSBORO CANAL	343,051	305,238	328,424	368,283
NORTH NEW RIVER CANAL WEST	153,830	150,040	167,361	235,082
POMPANO CANAL	28,144	31,254	28,225	78,466
Total	1,621,935	1,708,697	1,602,357	3,448,480

Table 22. Avoided Damage Vehicle Models Alt B (Q1 2024 Dollars)

Impact area	ECB 2035 – Alt B 2035 ($)	FWOP low – Alt B low 2085 ($)	FWOP i – Alt B i 2085 ($)	FWOP h – Alt B h 2085 ($)
C-11 EAST	205,470	233,019	204,661	1,002,831
C-11 WEST	133,835	145,808	136,854	172,860
C-12 West	260,329	279,779	255,734	343,660
C-13 WEST	89,524	140,270	101,380	316,741
C-14 EAST	78,507	71,772	80,214	887,454
C-14 WEST	384,328	398,614	380,907	394,728
HILLSBORO CANAL	329,200	302,650	334,144	342,394
NORTH NEW RIVER CANAL WEST	157,897	152,121	170,597	264,045
POMPANO CANAL	27,738	30,843	32,013	82,626
Total	1,666,826	1,754,875	1,696,503	3,807,338

Table 23. Avoided Damage Vehicle Models Alt C (Q1 2024 Dollars)

Impact area	ECB 2035 – Alt C 2035 ($)	FWOP low – Alt C low 2085 ($)	FWOP i – Alt C i 2085 ($)	FWOP h – Alt C h 2085 ($)
C-11 EAST	219,254	242,277	200,515	955,535
C-11 WEST	157,223	164,419	158,088	213,627
C-12 West	265,082	283,512	261,132	340,883
C-13 WEST	111,246	178,250	144,262	413,665
C-14 EAST	79,517	72,240	79,270	850,456
C-14 WEST	395,596	414,486	385,947	448,076
HILLSBORO CANAL	325,837	278,411	306,734	323,131
NORTH NEW RIVER CANAL WEST	171,006	170,778	189,605	315,787
POMPANO CANAL	15,539	20,971	27,348	175,624
Total	1,740,300	1,825,344	1,752,901	4,036,782

Avoided Annual Damage for the Alternative C Enhancement for Structures

Enhancement of Alternative C (E_Alt C) includes the incorporation of nonstructural measures such as dry floodproofing and elevating foundation heights. Accordingly, the avoided damages for structures for this alternative were recalculated and summarized in Table 24 below.

Table 24. Avoided Damage Structure Models Optimization of Alternative C (Q1 2025 Dollars)

Impact area	ECB 2035 – E_Alt C 2035 ($)	FWOP low – E_Alt C low 2085 ($)	FWOP i – E_Alt C i 2085 ($)	FWOP h – E_Alt C h 2085 ($)
C-11 EAST	4,196,441	3,780,563	4,083,684	14,393,441
C-11 WEST	2,977,637	3,428,797	3,012,276	4,197,933
C-12 West	9,217,929	9,283,938	9,159,238	9,629,505
C-13 WEST	2,301,680	2,694,883	2,794,923	6,685,130
C-14 EAST	2,143,403	2,103,280	2,281,526	14,328,845
C-14 WEST	7,917,621	6,275,284	7,761,280	8,560,632
HILLSBORO CANAL	5,587,317	5,535,861	5,180,590	5,343,408
NORTH NEW RIVER CANAL WEST	3,592,778	3,642,025	3,901,363	5,796,062
POMPANO CANAL	272,458	277,804	261,025	486,556
Total	38,207,263	37,022,436	38,435,906	69,421,511

It is important to note the first three sets of data provided as input to HEC-FDA were ECB, FWOPi, and FWOPh. These sets used a custom coordinate system NAD 1983 (2011) Florida State Plane East in feet. The custom coordinate system was assigned via an accompanying "world" file (*.tfw) for each tif. For all other scenarios, a standard NAD 1983 projection with Well Known ID (WKID) 2236 was applied and embedded in the *.tif files. The NAD 1983 (2011) shift is an adjustment to the NAD 1983 geographic projection that considers updated coordinates of the North American NGS Continuous Operating Reference Stations (CORS) in a 'National Adjustment of 2011 Project' conducted by NGS. A review indicated approximate 5-foot horizontal shift between the Existing and Future Without Project Rasters and the Final Array/ALT RO Rasters. To evaluate the impact of the shift, a rerun of ECB, FWOPi, and FWOPh were conducted using tiffs

projected with NAD 1983, WKID 2236. The results, summarized in Appendix D1.C, confirmed that the differences are negligible. Accordingly, comparisons utilizing the HEC-FDA results in plan formulation remain valid.

Resilience Optimized Alternative and Damage Assessment Results

Resilience Optimized Alternative (ALT RO) Summary

The Resilience Optimized Alternative is documented in the Model Documentation Report (2025). Table 25 summarizes the components included in the ALT RO plan.

Table 25. Resilience Optimized Alternative (ALT RO) Components

Project Type	Project Type Detail	Alternative RO	Existing
Primary Structure Modification	Gates	G-56 (4 x 25 ft) - Hillsboro, S-37A (3 x 25 ft) - C-14 East, G-57 (2x21ft) S-33 (2 x 20 ft) - C-12 West, G-54 (4 x 20 ft) - NNR West, S-36 (2x16), S-13 gate (2x14)	G-56 (3 x 20 ft) - Hillsboro, S-37A (2 x 25 ft) - C-14 East, S-37B (2 x 25 ft) - C-14 West, G-57 (2 x 14 ft) - Pompano, S-33 (1 x 20 ft) - C-12 West, G-54 (3 x 16 ft) - NNR West, S-36 (1 x 25 ft), C-13 West, S-13 (1 x 16 ft)
	Pump	S-37A (add new 1200 Cfs) - C-14 East, S-36 (add new 510 cfs) - C-13 West, S-33 (add new 510 cfs) - C-12 West, G-54 (add new 810 cfs) - NNR West, S-13 (add add'l 540 cfs) - C-11 East	S-13 (540 cfs) - C-11 East
	Hardening	G-56 (Hillsboro), S-37A (Cypress Creek/C-14), G-57 (Pompano), S-36 (C-13 West), S-33 (C-12 West), G-54 (NNR West), S-13 (C-11 East)	n/a
Primary C&SF Canals	Canal Cross Section Modification	Hillsboro (AltB) C-11 West (AltB) C-11 East (AltB) C-14 at S37B	n/a
	Culverts/Bridges	Triple culvert u/s of G-57 - Pompano Canal	10' dia RCP, ~ 1474' long
Storage & Nature Based		None	
Secondary Structure Modification	Pump	allow to prestorm drain	
Primary Structure Modification	Pre-storm Drawdown	All basins, all alternatives - except C-11 West	
Assumed Inflows from Secondary to Primary	Pre-storm Drawdown	All upstream basins	
Other		turn off pump & add'l gravity based on tidal reach sensors	

HEC-FDA Assessment Results

This section summarizes the ALT RO assessment results.

- **Tables 26–28** present the EAD results for structures (in Q1 2021 dollars), vehicles (in Q1 2024 dollars), and roads (in Q1 2021 dollars) across four scenarios: ALT RO 2035, ALT RO 2085low, ALT RO 2085i, and ALT RO 2085h.
- **Tables 29–31** summarize the avoided annual damages for structures (in Q1 2021 dollars), vehicles (in Q1 2024 dollars), and roads (in Q1 2021 dollars) across four scenarios: ALT RO 2035, ALT RO 2085low, ALT RO 2085i, and ALT RO 2085h.
- **Tables 32–34** document the avoided annual damages for structures, vehicles, and roads after conversion to Q1 2025 dollars.

Table 26. ALT RO Structure Damage EAD (Q1 2021 Dollars)

Impact area	ALT RO 2035 ($)	ALT RO low 2085 ($)	ALT RO i 2085 ($)	ALT RO h 2085 ($)
C-11 EAST	237,329,627	237,844,726	238,703,520	246,054,188
C-11 WEST	393,510,978	393,462,506	394,094,276	394,460,869
C-12 West	68,224,672	68,284,942	68,525,084	69,045,900
C-13 WEST	174,545,311	174,798,856	175,018,240	175,809,061
C-14 EAST	48,619,582	48,819,606	49,147,074	57,170,702
C-14 WEST	413,950,514	414,017,732	415,091,727	415,270,120
HILLSBORO CANAL	671,279,571	671,299,624	672,540,626	672,679,604
NORTH NEW RIVER CANAL WEST	178,779,929	178,901,823	179,328,792	180,015,215
POMPANO CANAL	27,663,817	27,754,309	27,856,233	28,385,178

Table 27. ALT RO Vehicle Damage EAD (Q1 2024 Dollars)

Impact area	ALT RO 2035 ($)	ALT RO low 2085 ($)	ALT RO i 2085 ($)	ALT RO h 2085 ($)
C-11 EAST	5,042,538	5,107,971	5,221,869	6,387,953
C-11 WEST	10,878,338	10,877,119	10,909,829	10,929,931
C-12 West	5,437,984	5,444,062	5,464,685	5,539,287
C-13 WEST	6,395,104	6,416,227	6,434,458	6,510,331
C-14 EAST	1,912,532	1,920,204	1,936,774	2,558,439
C-14 WEST	15,628,785	15,633,572	15,700,254	15,717,000
HILLSBORO CANAL	18,673,718	18,674,886	18,739,384	18,746,885
NORTH NEW RIVER CANAL WEST	5,028,526	5,036,300	5,057,953	5,113,995
POMPANO CANAL	1,001,854	1,038,748	1,083,146	1,355,203

Table 28. ALT RO Road Damage EAD (Q1 2021 Dollars)

Impact area	ALT RO 2035 ($)	ALT RO low 2085 ($)	ALT RO i 2085 ($)	ALT RO h 2085 ($)
C-11 EAST	21,855,773	21,982,801	22,170,603	23,997,441
C-11 WEST	27,913,779	27,930,561	28,004,712	28,176,278
C-12 West	10,729,977	10,750,382	10,790,401	11,029,700
C-13 WEST	13,756,292	13,823,109	13,886,788	14,128,060
C-14 EAST	5,548,170	5,604,707	5,666,646	7,150,637
C-14 WEST	34,054,805	34,065,609	34,184,462	34,245,938
HILLSBORO CANAL	45,351,029	45,353,548	45,506,952	45,534,015
NORTH NEW RIVER CANAL WEST	14,912,528	14,956,468	15,177,855	15,299,214
POMPANO CANAL	2,324,398	2,356,487	2,391,687	2,634,228

Table 29. ALT RO Structures Avoided Annual Damage (Q1 2021 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	3,338,819	2,733,659	2,705,583	10,519,156
C-11 WEST	2,252,040	2,544,304	1,713,869	2,517,689
C-12 West	2,469,020	2,485,461	2,191,464	2,806,611
C-13 WEST	1,571,860	1,700,368	1,699,491	4,917,137
C-14 EAST	833,694	745,458	799,188	8,049,960
C-14 WEST	6,530,741	5,061,407	5,348,713	5,956,268
HILLSBORO CANAL	5,384,957	5,323,217	3,838,288	4,737,382
NORTH NEW RIVER CANAL WEST	2,418,871	2,320,237	2,257,504	3,632,429
POMPANO CANAL	173,058	161,279	141,450	197,399
Total	24,973,060	23,075,390	20,695,550	43,334,032

Table 30. ALT RO Vehicles Avoided Annual Damage (Q1 2024 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	196,645	198,240	163,792	837,966
C-11 WEST	151,205	153,924	123,084	171,404
C-12 West	254,639	270,195	232,270	339,492
C-13 WEST	91,599	145,304	104,506	365,301
C-14 EAST	69,443	61,838	67,032	595,962
C-14 WEST	394,763	407,600	319,738	378,767
HILLSBORO CANAL	361,363	312,718	279,091	327,938
NORTH NEW RIVER CANAL WEST	166,066	159,016	164,681	268,207
POMPANO CANAL	19,350	21,080	19,488	64,499
Total	1,705,072	1,729,914	1,473,683	3,349,536

Table 31. ALT RO Roads Avoided Annual Damage (Q1 2021 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	534,928	401,505	489,377	2,106,166
C-11 WEST	337,304	415,384	275,582	488,358
C-12 West	439,507	429,280	402,467	591,618
C-13 WEST	415,538	400,935	460,066	1,221,871
C-14 EAST	273,420	227,948	281,199	1,513,244
C-14 WEST	1,354,026	1,256,439	1,221,488	1,395,059
HILLSBORO CANAL	1,257,636	980,989	1,034,766	1,209,259
NORTH NEW RIVER CANAL WEST	761,569	659,363	690,854	1,410,054
POMPANO CANAL	12,064	32,280	8,157	4,740
Total	5,385,992	4,804,123	4,863,957	9,940,368

Table 32. ALT RO Structures Avoided Annual Damage (Q1 2025 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	3,953,162	3,236,652	3,203,410	12,454,681
C-11 WEST	2,666,416	3,012,456	2,029,220	2,980,944
C-12 West	2,923,319	2,942,785	2,594,693	3,323,028
C-13 WEST	1,861,083	2,013,236	2,012,197	5,821,890
C-14 EAST	987,093	882,622	946,239	9,531,153
C-14 WEST	7,732,397	5,992,706	6,332,877	7,052,221
HILLSBORO CANAL	6,375,789	6,302,689	4,544,533	5,609,060
NORTH NEW RIVER CANAL WEST	2,863,944	2,747,160	2,672,885	4,300,796
POMPANO CANAL	204,900	190,955	167,476	233,720
Total	29,568,104	27,321,262	24,503,531	51,307,493

Table 33. ALT RO Vehicles Avoided Annual Damage (Q1 2025 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	201,757	203,395	168,050	859,753
C-11 WEST	155,137	157,926	126,285	175,861
C-12 West	261,260	277,220	238,309	348,318
C-13 WEST	93,980	149,082	107,223	374,799
C-14 EAST	71,249	63,446	68,775	611,457
C-14 WEST	405,026	418,198	328,051	388,615
HILLSBORO CANAL	370,758	320,849	286,348	336,465
NORTH NEW RIVER CANAL WEST	170,384	163,150	168,963	275,180
POMPANO CANAL	19,853	21,628	19,995	66,176

Total	1,749,404	1,774,892	1,511,999	3,436,624

Table 34. ALT RO Roads Avoided Annual Damage (Q1 2025 Dollars)

Impact area	ECB 2035 – ALT RO 2035 ($)	FWOP low – ALT RO low 2085 ($)	FWOP i – ALT RO i 2085 ($)	FWOP h – ALT RO h 2085 ($)
C-11 EAST	633,355	475,382	579,422	2,493,700
C-11 WEST	399,368	491,815	326,290	578,216
C-12 West	520,377	508,267	476,521	700,476
C-13 WEST	491,997	474,707	544,719	1,446,695
C-14 EAST	323,729	269,891	332,939	1,791,681
C-14 WEST	1,603,167	1,487,624	1,446,242	1,651,750
HILLSBORO CANAL	1,489,041	1,161,491	1,225,163	1,431,763
NORTH NEW RIVER CANAL WEST	901,697	780,686	817,971	1,669,504
POMPANO CANAL	14,284	38,220	9,658	5,612
Total	6,377,014	5,688,082	5,758,925	11,769,396

Results from Risk Assessment

This section provides additional HEC-FDA results on economic performance in line with ER 1105-2-101. Selected tables are included to communicate the magnitude of flood damages, damage reduction benefits, and some associated uncertainty to support informed decision making.

Table 35. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative A 2035

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative A 2035	C-11 EAST	$317,364	$312,694	$4,670	$2,349	$4,327	$6,074
	C-11 WEST	$514,197	$511,421	$2,776	$829	$2,077	$3,353
	C-12 WEST	$102,930	$99,157	$3,773	$1,751	$3,289	$5,550
	C-13 WEST	$232,338	$230,378	$1,960	$777	$1,594	$3,132
	C-14 EAST	$67,589	$66,359	$1,230	$405	$832	$1,794
	C-14 WEST	$557,126	$547,954	$9,172	$2,680	$6,226	$12,282
	HILLSBORO CANAL	$877,332	$869,521	$7,811	$2,375	$6,472	$11,321
	NORTH NEW RIVER CANAL WEST	$238,821	$235,217	$3,604	$1,279	$3,038	$5,025
	POMPANO CANAL	$36,833	$36,462	$372	$230	$352	$545
	TOTAL	$2,944,531	$2,909,163	$35,367	$12,674	$28,208	$49,077

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 36. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative A 2085 Low

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative A 2085 low	C-11 EAST	$317,318	$313,187	$4,131	$2,195	$3,870	$5,386
	C-11 WEST	$514,600	$511,351	$3,249	$983	$2,381	$3,782
	C-12 WEST	$103,056	$99,188	$3,867	$1,811	$3,374	$5,677
	C-13 WEST	$232,930	$230,786	$2,144	$814	$1,662	$3,261
	C-14 EAST	$67,735	$66,598	$1,137	$393	$797	$1,739
	C-14 WEST	$555,378	$547,781	$7,597	$2,496	$5,707	$10,418
	HILLSBORO CANAL	$876,909	$869,292	$7,617	$2,229	$6,247	$11,438
	NORTH NEW RIVER CANAL WEST	$238,780	$235,321	$3,459	$1,282	$3,015	$4,711
	POMPANO CANAL	$37,028	$36,621	$408	$248	$374	$551
	TOTAL	$2,943,734	$2,910,125	$33,609	$12,451	$27,427	$46,964

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 37. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative A 2085 Intermediate

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative A 2085 Intermediate	C-11 EAST	$318,712	$314,124	$4,587	$2,300	$4,143	$6,276
	C-11 WEST	$514,289	$511,450	$2,838	$897	$2,191	$3,341
	C-12 WEST	$102,990	$99,287	$3,703	$1,702	$3,193	$5,498
	C-13 WEST	$233,312	$231,217	$2,094	$890	$1,734	$3,073
	C-14 EAST	$68,346	$67,401	$945	$260	$514	$1,365
	C-14 WEST	$557,070	$548,009	$9,061	$2,632	$6,131	$11,970
	HILLSBORO CANAL	$876,897	$869,496	$7,401	$2,269	$6,262	$10,846
	NORTH NEW RIVER CANAL WEST	$239,540	$235,555	$3,985	$1,466	$3,437	$5,333
	POMPANO CANAL	$37,183	$36,841	$342	$201	$297	$516
	TOTAL	$2,948,338	$2,913,381	$34,957	$12,616	$27,901	$48,218

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 38. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative A 2085 High

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative A 2085 High	C-11 EAST	$342,669	$325,217	$17,452	$7,745	$14,393	$26,264
	C-11 WEST	$516,203	$512,110	$4,092	$1,006	$2,611	$4,908
	C-12 WEST	$105,032	$100,561	$4,471	$1,616	$3,492	$6,685
	C-13 WEST	$239,601	$236,546	$3,055	$798	$2,023	$4,354
	C-14 EAST	$90,863	$77,076	$13,788	$3,280	$8,056	$23,527
	C-14 WEST	$558,359	$548,597	$9,762	$2,592	$6,351	$12,981
	HILLSBORO CANAL	$878,425	$869,949	$8,475	$2,355	$7,058	$12,467
	NORTH NEW RIVER CANAL WEST	$243,145	$237,855	$5,290	$1,403	$4,009	$7,237
	POMPANO CANAL	$38,485	$38,066	$420	$171	$313	$650
	TOTAL	$3,012,782	$2,945,977	$66,805	$20,966	$48,307	$99,073

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 39. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative B 2035

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative B 2035	C-11 EAST	$317,364	$312,559	$4,804	$2,403	$4,475	$6,361
	C-11 WEST	$514,197	$511,425	$2,772	$827	$2,084	$3,405
	C-12 WEST	$102,930	$99,151	$3,780	$1,753	$3,292	$5,561
	C-13 WEST	$232,338	$229,913	$2,425	$989	$2,023	$3,703
	C-14 EAST	$67,589	$66,095	$1,495	$437	$943	$2,350
	C-14 WEST	$557,126	$548,110	$9,016	$2,578	$5,992	$12,038
	HILLSBORO CANAL	$877,332	$869,884	$7,448	$2,255	$6,127	$10,784
	NORTH NEW RIVER CANAL WEST	$238,821	$235,170	$3,651	$1,287	$3,100	$5,144
	POMPANO CANAL	$36,833	$36,473	$361	$222	$337	$536
	TOTAL	$2,944,531	$2,908,780	$35,751	$12,751	$28,372	$49,880

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 40. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative B 2085 Low

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative B 2085 low	C-11 EAST	$317,318	$312,923	$4,395	$2,324	$4,142	$5,733
	C-11 WEST	$514,600	$511,103	$3,497	$1,085	$2,618	$4,137
	C-12 WEST	$103,056	$99,176	$3,880	$1,815	$3,382	$5,700
	C-13 WEST	$232,930	$230,379	$2,551	$942	$1,966	$3,873
	C-14 EAST	$67,735	$66,331	$1,404	$420	$894	$2,273
	C-14 WEST	$555,378	$547,642	$7,736	$2,543	$5,826	$10,594
	HILLSBORO CANAL	$876,909	$869,354	$7,555	$2,210	$6,192	$11,345
	NORTH NEW RIVER CANAL WEST	$238,780	$235,346	$3,434	$1,245	$2,969	$4,713
	POMPANO CANAL	$37,028	$36,638	$390	$233	$350	$531
	TOTAL	$2,943,734	$2,908,891	$34,843	$12,817	$28,339	$48,900

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 41. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative B 2085 Intermediate

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative B 2085 Intermediate	C-11 EAST	$318,712	$313,803	$4,909	$2,477	$4,493	$6,828
	C-11 WEST	$514,289	$511,407	$2,881	$924	$2,222	$3,372
	C-12 WEST	$102,990	$99,267	$3,723	$1,711	$3,212	$5,534
	C-13 WEST	$233,312	$230,658	$2,653	$1,028	$2,128	$3,908
	C-14 EAST	$68,346	$66,739	$1,607	$449	$918	$2,712
	C-14 WEST	$557,070	$547,567	$9,503	$2,855	$6,603	$12,496
	HILLSBORO CANAL	$876,897	$869,354	$7,543	$2,310	$6,384	$11,054
	NORTH NEW RIVER CANAL WEST	$239,540	$235,562	$3,978	$1,425	$3,391	$5,330
	POMPANO CANAL	$37,183	$36,797	$386	$237	$349	$571
	TOTAL	$2,948,338	$2,911,154	$37,184	$13,415	$29,699	$51,805

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 42. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative B 2085 High

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative B 2085 High	C-11 EAST	$342,669	$324,105	$18,563	$8,312	$15,332	$27,845
	C-11 WEST	$516,203	$512,410	$3,793	$848	$2,324	$4,529
	C-12 WEST	$105,032	$100,484	$4,547	$1,615	$3,526	$6,851
	C-13 WEST	$239,601	$232,876	$6,724	$2,150	$4,797	$8,994
	C-14 EAST	$90,863	$74,482	$16,381	$3,727	$9,242	$27,469
	C-14 WEST	$558,359	$548,906	$9,453	$2,298	$5,921	$12,588
	HILLSBORO CANAL	$878,425	$870,667	$7,758	$2,084	$6,372	$11,358
	NORTH NEW RIVER CANAL WEST	$243,145	$237,244	$5,902	$1,565	$4,463	$8,175
	POMPANO CANAL	$38,485	$38,023	$462	$197	$356	$711
	TOTAL	$3,012,782	$2,939,197	$73,584	$22,797	$52,333	$108,520

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 43. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative C 2035

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative C 2035	C-11 EAST	$317,364	$312,258	$5,106	$2,580	$4,839	$6,773
	C-11 WEST	$514,197	$510,846	$3,351	$1,101	$2,707	$4,123
	C-12 WEST	$102,930	$99,071	$3,860	$1,813	$3,382	$5,654
	C-13 WEST	$232,338	$229,438	$2,901	$1,239	$2,492	$4,258
	C-14 EAST	$67,589	$65,980	$1,610	$479	$1,024	$2,544
	C-14 WEST	$557,126	$547,354	$9,772	$2,976	$6,846	$12,975
	HILLSBORO CANAL	$877,332	$870,128	$7,204	$1,855	$5,504	$10,442
	NORTH NEW RIVER CANAL WEST	$238,821	$234,803	$4,018	$1,469	$3,477	$5,638
	POMPANO CANAL	$36,833	$36,498	$335	$224	$331	$487
	TOTAL	$2,944,531	$2,906,375	$38,155	$13,735	$30,602	$52,895

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 44. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative C 2085 Low

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative C 2085 low	C-11 EAST	$317,318	$312,719	$4,599	$2,437	$4,381	$6,022
	C-11 WEST	$514,600	$510,676	$3,924	$1,255	$3,002	$4,699
	C-12 WEST	$103,056	$99,105	$3,950	$1,868	$3,455	$5,783
	C-13 WEST	$232,930	$229,533	$3,396	$1,439	$2,873	$4,954
	C-14 EAST	$67,735	$66,231	$1,504	$454	$970	$2,464
	C-14 WEST	$555,378	$547,333	$8,045	$2,703	$6,139	$10,986
	HILLSBORO CANAL	$876,909	$870,133	$6,776	$1,634	$5,090	$10,225
	NORTH NEW RIVER CANAL WEST	$238,780	$234,811	$3,969	$1,500	$3,521	$5,642
	POMPANO CANAL	$37,028	$36,655	$373	$234	$345	$485
	TOTAL	$2,943,734	$2,907,196	$36,539	$13,525	$29,776	$51,259

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 45. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative C 2085 Intermediate

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative C 2085 Intermediate	C-11 EAST	$318,712	$313,697	$5,015	$2,558	$4,651	$7,027
	C-11 WEST	$514,289	$510,886	$3,402	$1,132	$2,693	$4,093
	C-12 WEST	$102,990	$99,183	$3,807	$1,773	$3,294	$5,645
	C-13 WEST	$233,312	$229,751	$3,561	$1,523	$3,064	$5,161
	C-14 EAST	$68,346	$66,615	$1,731	$490	$1,018	$2,925
	C-14 WEST	$557,070	$547,492	$9,578	$2,882	$6,662	$12,624
	HILLSBORO CANAL	$876,897	$870,221	$6,676	$1,674	$5,144	$9,739
	NORTH NEW RIVER CANAL WEST	$239,540	$235,041	$4,500	$1,614	$3,861	$6,073
	POMPANO CANAL	$37,183	$36,844	$339	$197	$291	$515
	TOTAL	$2,948,338	$2,909,730	$38,608	$13,843	$30,678	$53,803

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 46. Expected value and probabilistic Values of EAD and EAD Reduced for Alternative C 2085 High

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
Alternative C 2085 High	C-11 EAST	$342,669	$324,473	$18,196	$8,471	$15,195	$26,809
	C-11 WEST	$516,203	$511,281	$4,922	$1,321	$3,341	$5,944
	C-12 WEST	$105,032	$100,403	$4,628	$1,740	$3,627	$6,888
	C-13 WEST	$239,601	$230,867	$8,734	$3,119	$6,546	$11,738
	C-14 EAST	$90,863	$74,479	$16,385	$3,808	$9,312	$27,504
	C-14 WEST	$558,359	$547,693	$10,666	$3,053	$7,304	$14,053
	HILLSBORO CANAL	$878,425	$871,513	$6,912	$946	$4,759	$10,517
	NORTH NEW RIVER CANAL WEST	$243,145	$235,847	$7,299	$2,135	$5,735	$9,977
	POMPANO CANAL	$38,485	$37,652	$834	$266	$580	$1,178
	TOTAL	$3,012,782	$2,934,206	$78,576	$24,859	$56,399	$114,609

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 47. Expected value and probabilistic Values of EAD and EAD Reduced for ALT RO 2035

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
ALT RO 2035	C-11 EAST	$317,364	$312,568	$4,796	$2,444	$4,533	$6,240
	C-11 WEST	$514,197	$510,971	$3,226	$1,038	$2,566	$3,895
	C-12 WEST	$102,930	$99,220	$3,711	$1,731	$3,246	$5,451
	C-13 WEST	$232,338	$229,887	$2,451	$987	$2,020	$3,808
	C-14 EAST	$67,589	$66,205	$1,384	$420	$890	$2,176
	C-14 WEST	$557,126	$547,369	$9,756	$2,971	$6,833	$12,970
	HILLSBORO CANAL	$877,332	$869,083	$8,249	$2,501	$6,847	$11,990
	NORTH NEW RIVER CANAL WEST	$238,821	$234,879	$3,942	$1,431	$3,383	$5,486
	POMPANO CANAL	$36,833	$36,594	$239	$174	$243	$345
	TOTAL	$2,944,531	$2,906,775	$37,755	$13,697	$30,559	$52,361

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 48. Expected value and probabilistic Values of EAD and EAD Reduced for ALT RO 2085 Low

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
ALT RO 2085 low	C-11 EAST	$317,318	$313,396	$3,922	$2,118	$3,690	$4,994
	C-11 WEST	$514,600	$510,932	$3,668	$1,160	$2,769	$4,390
	C-12 WEST	$103,056	$99,322	$3,734	$1,738	$3,252	$5,508
	C-13 WEST	$232,930	$230,289	$2,641	$985	$2,059	$4,008
	C-14 EAST	$67,735	$66,517	$1,218	$382	$789	$1,934
	C-14 WEST	$555,378	$547,467	$7,911	$2,633	$6,010	$10,804
	HILLSBORO CANAL	$876,909	$869,111	$7,798	$2,284	$6,407	$11,697
	NORTH NEW RIVER CANAL WEST	$238,780	$235,083	$3,697	$1,352	$3,212	$5,223
	POMPANO CANAL	$37,028	$36,777	$251	$168	$236	$352
	TOTAL	$2,943,734	$2,908,894	$34,840	$12,819	$28,424	$48,910

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 49. Expected value and probabilistic Values of EAD and EAD Reduced for ALT RO 2085 Intermediate

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
ALT RO 2085 Intermediate	C-11 EAST	$318,712	$314,754	$3,957	$1,968	$3,477	$5,428
	C-11 WEST	$514,289	$511,803	$2,486	$690	$1,820	$2,894
	C-12 WEST	$102,990	$99,675	$3,315	$1,407	$2,789	$5,128
	C-13 WEST	$233,312	$230,643	$2,668	$973	$2,058	$4,038
	C-14 EAST	$68,346	$66,996	$1,350	$380	$772	$2,261
	C-14 WEST	$557,070	$548,950	$8,120	$1,979	$5,037	$10,762
	HILLSBORO CANAL	$876,897	$870,831	$6,066	$1,782	$4,922	$8,847
	NORTH NEW RIVER CANAL WEST	$239,540	$235,874	$3,666	$1,086	$2,877	$4,644
	POMPANO CANAL	$37,183	$36,985	$197	$133	$175	$336
	TOTAL	$2,948,338	$2,916,512	$31,826	$10,397	$23,927	$44,339

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 50. Expected value and probabilistic Values of EAD and EAD Reduced for ALT RO 2085 High

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
ALT RO 2085 High	C-11 EAST	$342,669	$326,835	$15,833	$6,887	$13,085	$23,835
	C-11 WEST	$516,203	$512,462	$3,741	$736	$2,219	$4,409
	C-12 WEST	$105,032	$100,653	$4,379	$1,514	$3,382	$6,652
	C-13 WEST	$239,601	$231,945	$7,656	$2,474	$5,442	$10,454
	C-14 EAST	$90,863	$78,910	$11,953	$2,930	$7,258	$20,654
	C-14 WEST	$558,359	$549,252	$9,107	$2,092	$5,561	$12,119
	HILLSBORO CANAL	$878,425	$871,036	$7,389	$1,919	$5,954	$10,827
	NORTH NEW RIVER CANAL WEST	$243,145	$236,890	$6,256	$1,569	$4,603	$8,532
	POMPANO CANAL	$38,485	$38,179	$306	$144	$245	$481
	TOTAL	$3,012,782	$2,946,162	$66,620	$20,263	$47,748	$97,962

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 51. Expected value and probabilistic Values of EAD and EAD Reduced for E_Alt C 2035

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
E_Alt C 2035	C-11 EAST	$317,364	$311,056	$6,308	$2,820	$5,600	$8,559
	C-11 WEST	$514,197	$510,650	$3,547	$1,140	$2,836	$4,726
	C-12 WEST	$102,930	$92,874	$10,056	$3,577	$8,259	$15,075
	C-13 WEST	$232,338	$229,352	$2,986	$1,260	$2,537	$4,372
	C-14 EAST	$67,589	$64,997	$2,593	$571	$1,336	$4,293
	C-14 WEST	$557,126	$547,178	$9,948	$2,985	$6,880	$13,278
	HILLSBORO CANAL	$877,332	$870,021	$7,311	$1,877	$5,556	$10,608
	NORTH NEW RIVER CANAL WEST	$238,821	$234,179	$4,642	$1,650	$3,930	$6,685
	POMPANO CANAL	$36,833	$36,490	$343	$225	$334	$497
	TOTAL	$2,944,531	$2,896,797	$47,734	$16,106	$37,269	$68,093

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 52. Expected value and probabilistic Values of EAD and EAD Reduced for E_Alt C 2085 Low

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
E_Alt C 2085 low	C-11 EAST	$317,318	$319,769	$(2,451)	$1,027	$137	$(7,558)
	C-11 WEST	$514,600	$510,862	$3,739	$1,222	$2,949	$4,500
	C-12 WEST	$103,056	$93,846	$9,209	$3,235	$7,536	$13,813
	C-13 WEST	$232,930	$230,461	$2,469	$1,108	$2,061	$3,565
	C-14 EAST	$67,735	$71,554	$(3,818)	$(196)	$(1,113)	$(6,376)
	C-14 WEST	$555,378	$547,413	$7,965	$2,661	$5,987	$10,972
	HILLSBORO CANAL	$876,909	$871,158	$5,751	$890	$3,822	$9,046
	NORTH NEW RIVER CANAL WEST	$238,780	$234,903	$3,877	$1,493	$3,446	$5,432
	POMPANO CANAL	$37,028	$37,227	$(199)	$119	$83	$(357)
	TOTAL	$2,943,734	$2,917,193	$26,541	$11,560	$24,908	$33,037

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 53. Expected value and probabilistic Values of EAD and EAD Reduced for E_Alt C 2085 Intermediate

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
E_Alt C 2085 Intermediate	C-11 EAST	$318,712	$312,463	$6,249	$2,813	$5,537	$8,773
	C-11 WEST	$514,289	$510,688	$3,601	$1,168	$2,886	$4,595
	C-12 WEST	$102,990	$92,988	$10,002	$3,538	$8,170	$15,062
	C-13 WEST	$233,312	$229,662	$3,650	$1,548	$3,113	$5,288
	C-14 EAST	$68,346	$65,591	$2,755	$590	$1,389	$4,736
	C-14 WEST	$557,070	$547,315	$9,755	$2,891	$6,697	$12,936
	HILLSBORO CANAL	$876,897	$870,111	$6,786	$1,698	$5,237	$9,917
	NORTH NEW RIVER CANAL WEST	$239,540	$234,415	$5,125	$1,790	$4,336	$7,191
	POMPANO CANAL	$37,183	$36,832	$350	$199	$296	$532
	TOTAL	$2,948,338	$2,900,065	$48,273	$16,236	$37,661	$69,030

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

Table 54. Expected value and probabilistic Values of EAD and EAD Reduced for E_Alt C 2085 High

Alternative	Subbasin	EAD ($1,000)		Damage Reduced ($1,000)	Uncertainty in EAD Reduced; probability Distribution Quartiles ($1,000)		
		Without Alternative	With Alternative	Mean	25 percentile	50 percentile[1]	75 percentile
E_Alt C 2085 High	C-11 EAST	$342,669	$314,921	$27,748	$10,476	$21,090	$44,346
	C-11 WEST	$516,203	$510,701	$5,502	$1,434	$3,780	$6,879
	C-12 WEST	$105,032	$93,253	$11,779	$3,914	$9,283	$17,674
	C-13 WEST	$239,601	$229,761	$9,840	$3,489	$7,473	$13,378
	C-14 EAST	$90,863	$66,915	$23,948	$4,721	$12,343	$40,281
	C-14 WEST	$558,359	$547,259	$11,100	$3,113	$7,526	$14,711
	HILLSBORO CANAL	$878,425	$870,261	$8,164	$1,732	$6,237	$12,167
	NORTH NEW RIVER CANAL WEST	$243,145	$234,514	$8,632	$2,498	$6,684	$12,048
	POMPANO CANAL	$38,485	$37,057	$1,428	$386	$853	$2,065
	TOTAL	$3,012,782	$2,904,641	$108,141	$31,763	$75,268	$163,550

1. The 0.5 quartile is the median estimate; it differs from the mean when the probability distribution is asymmetrical.

In accordance with ER 1105-2-101, representative Annual Exceedance Probability (AEP) tables (Tables 55 through 62), the conditional Long-Term Exceedance Probability (LTEP) table (Table 63), and Assurance (conditional non-exceedance probability by event) tables (Tables 64 through 71) are included in this section. For representational purposes, two complete sets of tables are provided: one for the Base/Future Without Project (FWOP) conditions and one for Alternative A, covering all evaluated sea-level-rise scenarios for both AEP (Tables 55 through 62) and Assurance (Tables 64 through 71). The LTEP results for these scenarios are summarized in a single table (Table 63). Tables for all other evaluated alternatives have been archived on the South Florida Water Management District server and are available for review upon request. All AEP, LTEP, and Assurance statistics were generated by HEC-FDA in response to the default threshold values which were also calculated by HEC-FDA.

For this study, the AEP/LTEP results are expected to be of limited sensitivity when comparing alternatives. The examples provided in ER 1105-2-101 are primarily focused on levee performance and failure mechanisms, where exceedance metrics are evaluated relative to defined structural thresholds. As documented in the HEC-FDA User Manual (https://www.hec.usace.army.mil/confluence/fdadocs/fdaum/Scenario-results-152636882.html), Annual Exceedance Probability (AEP) represents the probability that a specified threshold is exceeded at a given location in any given year, while Long-Term Exceedance Probability (LTEP) represents the probability that the threshold is exceeded at least once over a defined time interval.

In contrast, the 203 Study is designed to evaluate basin-wide flood depth reduction, rather than structural or levee failure. None of the alternatives are intended to, nor do they, completely eliminate flooding across the basin; therefore, some degree of exceedance will always remain under all scenarios. Several aspects of the study further affect the applicability and interpretation of AEP/LTEP metrics. The analysis departs from the traditional single index-location approach because flooding is governed by two independent and spatially variable drivers—precipitation and storm surge—rather than by failure at a single structural control point. Flooding is characterized by system capacity exceedance within a highly managed drainage network, not by levee breach or geotechnical failure. Precipitation is applied as rain-on-mesh, allowing flooding to occur throughout the basin independent of canal overtopping, while storm surge is represented as a boundary condition that influences both channel hydraulics and overland flow, with the greatest effects occurring in downstream areas. Flood risk is therefore characterized as non-failure flooding driven by the joint probabilities of rainfall and storm surge, with the relative influence of each varying spatially across the basin. The Study Area's flat topography and complex operational controls further limit the representativeness of a single index location. Accordingly, stage–frequency relationships were developed using average structure-level flood depths, derived from maximum flood-depth grids produced by the H&H models for eight storm events spanning a range of joint probabilities. For each basin, grid cells exhibiting positive flood depths under the most frequent event were used to anchor the frequency curves.

Given this formulation, applying the default threshold values by basin and scenario, the resulting AEP/LTEP metrics provide limited incremental insight into relative economic performance. While included for consistency with ER 1105-2-101, these metrics do not materially influence the comparison of alternatives or the identification of the plan that maximizes net economic benefits. The economic implications of residual flood risk and exceedance are more effectively captured through expected annual damage estimates, which form the basis of the National Economic Development (NED) evaluation.

Table 55. AEP by Event for Existing Baseline Conditions 2035

Scenario	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Existing Baseline Conditions 2035	C-11 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00

Table 56. AEP by Event for Future Without Project 2085 Low

Scenario	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 Low	C-11 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00

Table 57. AEP by Event for Future Without Project 2085 Intermediate

Scenario	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 Intermediate	C-11 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00

Table 58. AEP by Event for Future Without Project 2085 High

Scenario	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 High	C-11 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00

Table 59. AEP by Event for Alternative A 2035

Alternative	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Alternative A 2035	C-11 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00

Table 60. AEP by Event for Alternative A 2085 Low

Alternative	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 Low	C-11 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00

Table 61. AEP by Event for Alternative A 2085 Intermediate

Alternative	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 Intermediate	C-11 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00

Table 62. AEP by Event for Alternative A 2085 High

Alternative	Subbasin	Target Stage Annual Exceedance Probability		Conditional Non-Exceedance Probability by Events					
		Mean	Median	10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 High	C-11 EAST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-11 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-12 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	C-13 WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 EAST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	C-14 WEST	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00
	HILLSBORO CANAL	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	NORTH NEW RIVER CANAL WEST	0.9990	0.9989	0.00	0.00	0.00	0.00	0.00	0.00
	POMPANO CANAL	0.9990	0.9991	0.00	0.00	0.00	0.00	0.00	0.00

The table below presents LTEP results for the 10-, 30-, and 50-year time periods are provided as a representative result of the analysis across all subbasins and scenarios. As shown, LTEP values equal 1.00, which is a function of the modeling approach and Study Area characteristics. The rain-on-grid flood results produce flooding at each point across the Study Area. Additionally, the Study Area is highly flood-prone. This results in LTEP values of 1.00 over multi-year periods. Consequently, the LTEP does not provide meaningful differentiation between alternatives, and project performance is instead characterized through EAD and other performance metrics.

Table 63. Representative Long-Term Exceedance Probability (LTEP) Results for All Scenarios

Alternative	Subbasin	LTEP (Probability of Exceedance over Indicated Time)		
		10 Years	30 Years	50 Years
All Scenarios	C-11 EAST	1.00	1.00	1.00
	C-11 WEST	1.00	1.00	1.00
	C-12 WEST	1.00	1.00	1.00
	C-13 WEST	1.00	1.00	1.00
	C-14 EAST	1.00	1.00	1.00
	C-14 WEST	1.00	1.00	1.00
	HILLSBORO CANAL	1.00	1.00	1.00
	NORTH NEW RIVER CANAL WEST	1.00	1.00	1.00
	POMPANO CANAL	1.00	1.00	1.00

Table 64. Assurance (Conditional Non-Exceedance Probability by Event) for Existing Baseline Conditions 2035

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Existing Baseline Conditions 2035	C-11 EAST	0.2468	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1544	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2642	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1812	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2213	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1409	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1254	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 65. Assurance (Conditional Non-Exceedance Probability by Event) for Future Without Project 2085 Low

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 Low	C-11 EAST	0.2478	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2049	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1549	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2646	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1812	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2212	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1414	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1343	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 66. Assurance (Conditional Non-Exceedance Probability by Event) for Future Without Project 2085 Intermediate

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 Intermediate	C-11 EAST	0.2502	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2045	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1549	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2664	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1811	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2212	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1420	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1386	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 67. Assurance (Conditional Non-Exceedance Probability by Event) for Future Without Project 2085 High

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Future Without Project 2085 High	C-11 EAST	0.3051	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.1873	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3252	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1547	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.3978	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1827	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1516	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1799	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 68. Assurance (Conditional Non-Exceedance Probability by Event) for Alternative A 2035

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Alternative A 2035	C-11 EAST	0.2431	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2595	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1774	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1352	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 69. Assurance (Conditional Non-Exceedance Probability by Event) for Alternative A 2085 Low

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 Low	C-11 EAST	0.2439	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2600	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1774	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1355	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1227	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 70. Assurance (Conditional Non-Exceedance Probability by Event) for Alternative A 2085 Intermediate

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 Intermediate	C-11 EAST	0.2462	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1511	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.2601	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1774	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1361	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1317	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table 71. Assurance (Conditional Non-Exceedance Probability by Event) for Alternative A 2085 High

Alternative	Subbasin	Threshold	Conditional Non-Exceedance Probability by Events					
			10%	4%	2%	1%	0.40%	0.20%
Alternative A 2085 High	C-11 EAST	0.2805	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-11 WEST	0.2041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-12 WEST	0.3155	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-13 WEST	0.1564	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 EAST	0.3066	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	C-14 WEST	0.1775	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	HILLSBORO CANAL	0.2191	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	NORTH NEW RIVER CANAL WEST	0.1391	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	POMPANO CANAL	0.1665	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

A life loss analysis was not performed for this study; accordingly, no life loss tables are presented. Probabilistic values of costs are not included in this section. Refer to Appendix D.3 and Appendix D.4 for deterministic cost estimates of each alternative plan . Additionally, tables for probabilistic net benefits are not included in this annex nor probabilistic values for B/C ratios. Refer to Appendix D (Table D.2.1) for information on the B/C ratios and annualized benefits from this analysis. Further discussion of the National Economic Development (NED) analysis for the evaluated alternatives is provided in Appendix D.3 and Appendix D.4, National Economic Development Benefits Technical Memorandum.

Appendix D1. A: Review of First Floor Elevations and Other Structure Inventory Attributes for Residential Structure Category

This document has been developed to present findings from a comparison of the current structure inventory attributes with visual documentation of those attributes. Primarily this document looks at the first-floor elevation (FFE) values in the existing structure inventory dataset. Additionally other required structure inventory attributes have been reviewed during the completion of this work and other key findings from these visual inspections are discussed.
This document presents the following:

(1) Preliminary findings of cursory review of first floor elevations.
(2) Proposed sampling methodology for visually reviewing FFEs.
(3) Presentation of results from sampling of three representative basins within the Study Area.
(4) Recommendation for updating FFE for key residential structures.
(5) Discussion of additional findings from sampling process.

First Floor Elevation Preliminary Findings

As preliminary results from the FDA models were generated, additional review of the structure inventory was conducted to better understand the results from the FDA runs. In delving deeper into the structure inventory data some attributes stood out as potentially inconsistent with the actual structures in the Study Area. The first-floor elevation (FFE) was one of these parameters. In looking at just the one-story, single family residential structure category (occupancy: RES1-1SNB) all of the structures in the inventory have a FFE value input of 1.24 feet. A cursory review of available imagery using Google Earth Streetview, and other readily available imagery sources, showed that many structures have an FFE below the 1.24 value in the database. After performing this cursory review, it was determined that a larger sample of structures should be reviewed to verify the accuracy of the 1.24 feet, as well as the accuracy of the input values for the other structure occupancy types.
Therefore, a sampling of one reach was performed to analyze potential discrepancies between the actual structure elevations and the values found in the current structure inventory. This initial sampling was performed on basin C-10 which contains 20,452 total structures. Given the high number of structures in the reach a relatively small portion of the Study Area could reasonably be sampled at this time. But a sample of approximately one percent of total structures was the goal which would equate to reviewing at minimum 205 structures.

Sampling Methodology

Flood damage studies that use depth-to-damage curves require structure points to have a first-floor elevation (FFE). The FFE signifies the elevation at which a structure's first living floor is above the ground elevation immediately below, or immediately surrounding, the structure. A standard practice in developing structure inventories for flood damage analysis is a visual inspection to approximate the FFE for structures. Based on the size of a Study Area, and primarily the number of structures potentially inundated, FFE elevations are often sampled in order to reasonably estimate an average FFE for a neighborhood, reach, county, etc. For the sampling completed for this document the following steps were taken:

- Perform random number generator, random point selection using ArcGIS, or other method to determine which structures to sample in each basin.
- Number of structures sampled in each reach is dependent on number of residential structures in the reach. Given large scale of project, assume approximately one percent (1%) of all structures in a given basin.

- Used Google Earth Streetview to visually review a selected structure's first floor elevation.

- Typically assume 0.5-ft of elevation for each step leading up to first floor. Most slab-on-grade residential structures are applied a 0.5-ft elevation for the foundation. Even if a structure appears to be built at-grade, a 0.5-ft elevation was documented during the survey. Figures 1 and 2 present sample FFE of two structures with differing foundation heights.

Figure 1 – Typical Slab-on-Grade Structure in Study Area

Figure 2 – Typical Raised Slab Residential Structure in Study Area

- Additionally, when looking in Streetview, other structures directly around the sampled building were reviewed to make sure the structure is not a significant outlier in terms of FFE.
- Given that the single-family residential occupancies make up a majority of structures in a given reach, much of the sampling focus is aimed at obtaining information on those structures.

Sampling Results

The following summary table (Table 1) presents the results of the sampling for basin C-10. The table provides the number of structures by occupancy in the inventory, the current average FFE for each occupancy, the number of structures surveyed for the occupancy type, and the resulting FFE found through the sampling process.

Table 1 – Summary of FFE Sampling by Occupancy Type

Occupancy	Count	Average FFE (ft)	Surveyed Count	Percent Surveyed	Avg. FFE of Surveyed Structures (ft)
AGR1	8	1.26	0	0.0%	-
C-COM1	4	0.94	4	100.0%	0.38
C-COM10	1	1.00	0	0.0%	-
C-COM4	3	1.07	1	33.3%	0.00
C-COM6	1	0.71	0	0.0%	-
C-IND2	3	0.53	1	33.3%	0.00

Occupancy	Count	Average FFE (ft)	Surveyed Count	Percent Surveyed	Avg. FFE of Surveyed Structures (ft)
COM1	252	1.26	10	4.0%	0.50
COM10	82	1.26	3	3.7%	0.50
COM2	11	1.46	2	18.2%	0.50
COM3	7	1.46	2	28.6%	0.25
COM4	332	1.21	12	3.6%	1.38
COM5	7	0.62	1	14.3%	0.50
COM6	21	2.73	3	14.3%	0.83
COM8	247	1.46	3	1.2%	1.17
COM9	1	1.46	1	100.0%	1.00
C-REL1	1	0.60	1	100.0%	1.00
C-RES1-1SNB	258	1.15	10	3.9%	0.65
C-RES2	1	13.90	1	100.0%	5.00
C-RES3C	21	1.29	3	14.3%	0.67
C-RES3E	1	0.50	0	0.0%	-
EDU1	139	1.10	8	5.8%	0.63
ESSM	5	1.00	0	0.0%	-
GOV1	38	1.21	3	7.9%	1.17
IND2	378	1.63	11	2.9%	0.41
IND3	36	0.63	3	8.3%	0.50
PWTM	3	1.00	0	0.0%	-
REL1	111	1.46	5	4.5%	0.70
RES1-1SNB	15,030	1.24	129	0.9%	0.61
RES1-2SNB	583	0.96	7	1.2%	0.50
RES2	534	2.99	1	0.2%	2.50
RES3C	1,681	1.32	17	1.0%	0.68
RES3E	598	1.23	0	0.0%	-
RES4	30	1.73	0	0.0%	-
RES5	4	0.84	0	0.0%	-
RES6	20	0.99	0	0.0%	-
TOTAL	**20,452**		**242**	**1.18%**	

This sample of the Study Area resoundingly showed that the RES1-1SNB and RES1-2SNB occupancies predominantly are slab on grade structures, with less than 1.24 feet of elevation above the existing grade. In noting this finding, two additional basins have been sampled to verify the findings in different locations of the Study Area that would provide additional coverage that could account for potential variability in structures throughout the extents of the study.

Additional Basin Sampling Results

Basins C14 West and C-12 West were selected as additional basins to sample based on their geographical representativeness. Similar findings were encountering upon performing the random sample analysis. Table 2 provides the findings for the two primary residential occupancies in question for the two additional basins reviewed.

Table 2 – Summary of Additional Basins Residential Sampling

Occupancy	Count	Average FFE (ft)	Surveyed Count	Percent Surveyed	Avg. FFE of Surveyed Structures (ft)
Basin C-12 West					
RES1-1SNB	8,541	1.24	91	1.1%	0.54
RES1-2SNB	445	0.96	6	1.3%	0.50
Basin C-14 West					
RES1-1SNB	44,903	1.24	348	0.8%	0.51
RES1-2SNB	2,737	0.96	17	0.6%	0.5

As with the findings from basin C-10, the residential structures are overwhelmingly slab on grade structures that are below the 1.24-feet currently listed in the inventory. Basin C-14 West was found to consist of relatively newer structures, with far more neighborhoods that street views were not readily available for. As such the percent surveyed is slightly lower than the other reviewed basins, but as it was the largest of the basins reviewed, it still provides a sufficient sample of structures.

First Floor Elevation Recommendation

Overall, 598 single family residential structures were reviewed, and an overwhelming majority of the structures were found to be slab on grade structures with no significant elevation beyond the existing grades. The results show some variation between the three basins with the lowest average FFE being 0.51-feet and the highest basin average being 0.61-feet for the RES1 occupancy types. Given these findings it would be reasonable to lower the FFE for the RES1-1SNB and RES1-2SNB occupancy types.
It is recommended at this time that the FFE for these occupancies be both set at 0.75-feet for all structures in the Study Area. This value, based on the sampling presented herein, would be a conservative value between the current structure inventory input of 1.24 and the averages found during this survey. The following table (Table 3) provides the summary of the current inventory elevations, the average survey elevations, and the recommended FFE for the two occupancies in question.

Table 3 – Recommended First Floor Elevations for Single Family Residential Structures

Occupancy	Current Inventory FFE (ft)	Average FFE from Sample (ft)*	Recommended FFE for Use in FDA (ft)
RES1-1SNB	1.24	0.54	0.75
RES1-2SNB	0.96	0.50	0.75

- These are the samples surveyed by Google Earth Streetview under this task.

Additional Findings

The following is a list of additional findings from the sampling process, and other topics of concern regarding the current structure inventory.

- Occupancy Types – During the survey of the three basins mentioned above it was apparent that many structures have been assigned occupancies that do not accurately represent the structure point in question. In large structure inventory datasets, there are always going to be mistakes, incorrect identification, typos, etc. However, the review of these three basins found relatively large chunks of occupancies being incorrectly applied. The C-10 basin contained a large mobile home park, in excess of 100 structures, all being classified as commercial structures. There were numerous large apartment/condominium structures that were classified as single-family occupancies. The scope of this effort was not to review these, but it may be important to understand the impacts of this categorization issue and better understand if the structure values, depth-to-damage curves, and other key flood damage modeling components are reasonably being applied.
- Depreciation – USACE flood damage studies require the use of depreciated replacement values (DRV) for all structures. A visual estimation of structure depreciation was also completed during the visual survey of the FFE. Given the rates of depreciation currently applied to the structure inventory, there may be justification for adjusting the depreciation similar to the FFE. The visual survey of the depreciation rates found differing rates of relative depreciation between the three surveyed basins, but the average depreciation rate for each basin was found to be less than what is currently in the inventory dataset. However, due to the subjective nature of visual depreciation estimates, it is not recommended at this time to adjust the depreciation values in the current inventory.

Appendix D1.B: Mean and Standard Deviation Estimates of Foundation Heights by Structure Category

HEC-FDA utilizes both normal and triangular distributions as an input to simulate Finished Floor Levels for a variety of building types. Results based on triangular distribution produces unrealistic results (extremely high estimated annual flood damage) near the distribution tails. In consultation with subject matter experts (SMEs) from USACE, it was recommended to apply a normal distribution. In this memorandum, we address this issue by mapping the triangular distribution to a normal distribution that is more stable near the tails and its two parameters (mean and standard deviation) are derived using Quantile Mapping.

Quantile Mapping Process

1. Understanding Distributions: A triangular distribution is defined by a minimum, maximum, and mode, while a normal distribution is characterized by a mean and standard deviation.

2. Quantile Mapping: This technique involves mapping each quantile (or percentile) of the triangular distribution to the corresponding quantile of the normal distribution.

3. Steps:

Generate Samples: Draw samples from the triangular distribution using its parameters (min, max, mode).

Obtain quantiles such as Minimum, 5%, 10%, Median, Average, 90%, 95%, and Maximum.

Compute

A) The mean is a weighted average of Average and Median;

$$\mu = \text{Average} * P_1 + \text{Median} * P_2, \text{ where } P_1 + P_2 = 1.0$$

B) The standard deviation as an average of the

$$\sigma_1 = (P_{95} - \mu) / 1.645$$
$$\sigma_2 = (\mu - P_5) / 1.645$$
$$\sigma_3 = (P_{90} - \mu) / 1.28$$
$$\sigma_4 = (\mu - P_{10}) / 1.628$$
$$\sigma_{avg} = \text{Avg}(\sigma_1, \sigma_2, \sigma_3, \sigma_4)$$

The above equations were applied for a variety if values for P_1 and P_2 to calculate the normal distribution parameters and found that $P_1 = 0.75$ and $P_2 = 0.25$ to provide similar performance to that of the triangular distribution away from the tails. Graphical depiction of Triangular-Normal quantile mapping and tail sensitivity is shown below

Graphical Justification and Use of Triangular Distributions for Normal Approximation

To better understand the validity and behavior of triangular distributions when estimating normal distributions, we developed a set of comparative graphs. These figures demonstrate the behavior of two triangular distributions: one with mild skewness and another with clear skewness. These visual comparisons support the mapping method described above and help justify when and how a triangular distribution can be treated as a proxy for a normal distribution using quantile mapping.

1. Mild Skewness (Mean ≈ Median)

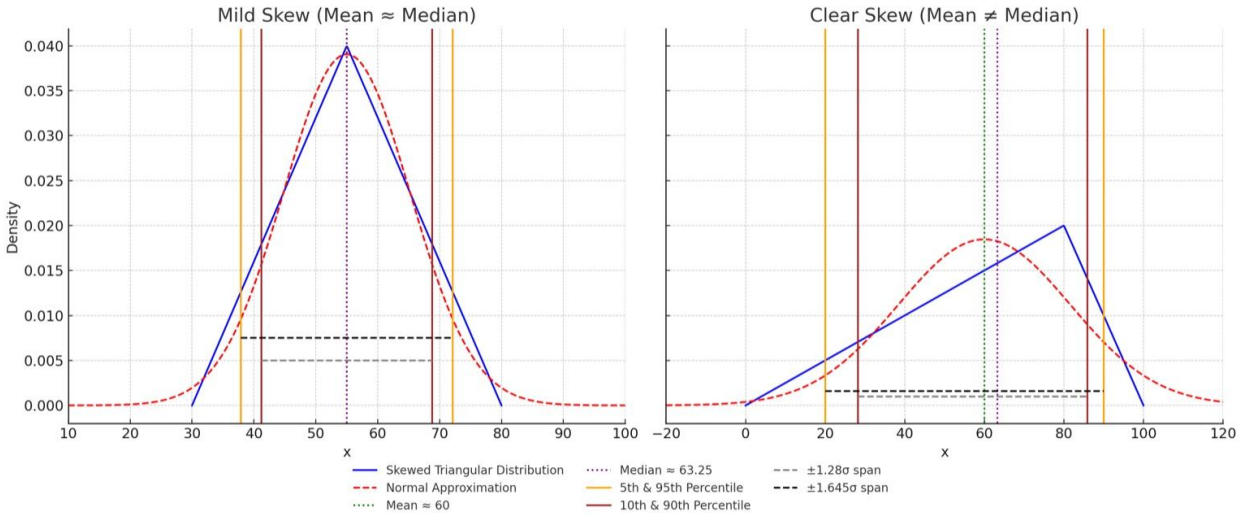
In this case, the triangular distribution is nearly symmetric. As shown in Figure 1a below, the superimposed normal distribution aligns closely with the triangular distribution — especially around the peak. The tails remain reasonably close, making this a good candidate for approximation. This supports the use of quantile mapping with P1 = 0.75 and P2 = 0.25, as the weighted average between the mean and median results in a normal distribution that mirrors the original distribution well.

2. Clear Skewness (Mean ≠ Median)

Figure 1b highlights a more pronounced skew. The triangular distribution diverges more visibly from the normal approximation, particularly in the tails. However, quantile mapping improves tail accuracy, especially when multiple percentile-based standard deviations are averaged, as described in the σ_1 through σ_4 definitions. While the normal distribution cannot fully capture the asymmetry, the mapping still yields a stable central estimate and significantly reduces instability in the tails, which is critical for applications such as HEC-FDA modeling.

Both figures were generated using fixed triangular parameters and overlayed with their normal counterparts derived via quantile mapping. These visuals reinforce the observation that triangular distributions can serve as an effective stand-in for normal ones, particularly in applications where stability and simplicity are preferred, and especially when the tails are stabilized using the quantile method.

Figures 1a and 1b: Superimposed triangular and normal distributions under mild and clear skewness.



(a) (b)

Figure 1: Graphical comparison of triangular and normal distributions under two types of skewness.

This approach was applied to calculate average foundation heights and std. divisions for different occupancy types as summarized in Table 1.

Table 1. Calculated average foundation heights and Std. Deviations

Occupancy	Revised FDA Distribution Type	Average	Std. Dev. for Normal Distribution
AGR1	N	1.24	0.50
COM1	N	1.27	1.14
COM10	N	1.20	0.87
COM2	N	1.27	1.14
COM3	N	1.27	1.14
COM5	N	0.58	0.26
COM6	N	2.94	1.06
COM8	N	2.03	2.48
COM9	N	1.27	1.14
EDU1	N	1.08	0.59
EDU2	N	1.08	0.59
ESSM	N	1.75	0.75
GOV1	N	1.68	2.44
IND1	N	1.42	1.35
IND2	N	1.42	1.35
IND3	N	0.65	0.30
IND4	N	1.42	1.35
IND5	N	1.42	1.35
PWTM	N	1.75	0.75
REL1	N	1.88	2.26
RES2	N	2.92	2.00
RES3C	N	1.27	0.70
RES3E	N	1.18	0.54
RES4	N	1.61	1.39
RES5	N	0.86	0.16
RES6	N	1.00	0.27
WWTM	N	1.75	0.75

Appendix D1.C: Coordinate System Sensitivity Testing

It is important to note the first three sets of data provided as input to HEC-FDA were ECB, FWOPi, and FWOPh. These sets used a custom coordinate system NAD 1983 (2011) Florida State Plane East in feet. The custom coordinate system was assigned via an accompanying “world” file (*.tfw) for each tif. For all other scenarios, a standard NAD 1983 projection with Well Known ID (WKID) 2236 was applied and embedded in the *.tif files. The NAD 1983 (2011) shift is an adjustment to the NAD 1983 geographic projection that considers updated coordinates of the North American NGS Continuous Operating Reference Stations (CORS) in a 'National Adjustment of 2011 Project' conducted by NGS. A review indicated approximate 5-foot horizontal shift between the Existing and Future Without Project Rasters and the Final Array/ALT RO Rasters. To evaluate the impact of the shift, a rerun of ECB, FWOPi, and FWOPh were conducted using tiffs projected with NAD 1983, WKID 2236. The results, summarized in Table 1 below, confirmed that the differences are negligible. Accordingly, comparisons utilizing the HEC-FDA results in plan formulation remain valid.

Table 72. Sensitivity run comparison

	ECB_2035_initial run ($)	ECB_2035_rerun ($)	diff ($)	diff (%)
C-11 East (upstream)	240,668,446	240,266,228	402,218	0.17%
C-11 West (upstream)	395,763,018	396,144,312	-381,294	-0.10%
C-12 West (upstream)	70,693,692	70,798,238	-104,547	-0.15%
C-13 West (upstream)	176,117,172	176,270,754	-153,583	-0.09%
C-14 East (upstream)	49,453,276	49,405,359	47,917	0.10%
C-14 West (upstream)	420,481,254	419,164,145	1,317,109	0.31%
Hillsboro Canal (upstream)	676,664,528	677,075,024	-410,496	-0.06%
North New River Canal West (upstre	181,198,801	181,034,939	163,862	0.09%
Pompano Canal (upstream)	27,836,875	27,849,470	-12,595	-0.05%
Total	2,238,877,062	2,238,008,470	868,592	0.04%

	FWOP_i_2085_initial run ($)	FWOP_i_2085_rerun ($)	diff ($)	diff (%)
C-11 East (upstream)	241,409,103	241,159,843	249,260	0.10%
C-11 West (upstream)	395,808,144	396,181,236	-373,091	-0.09%
C-12 West (upstream)	70,716,548	70,820,621	-104,073	-0.15%
C-13 West (upstream)	176,717,730	176,888,311	-170,580	-0.10%
C-14 East (upstream)	49,946,262	49,889,688	56,575	0.11%
C-14 West (upstream)	420,440,440	419,120,077	1,320,363	0.31%
Hillsboro Canal (upstream)	676,378,914	676,789,915	-411,000	-0.06%
North New River Canal West (upstre	181,586,296	181,422,878	163,418	0.09%
Pompano Canal (upstream)	27,997,683	28,010,949	-13,266	-0.05%
Total	2,241,001,121	2,240,283,517	717,604	0.03%

	FWOP_h_2085_initial run ($)	FWOP_h_2085_rerun ($)	diff ($)	diff (%)
C-11 East (upstream)	256,573,344	256,859,659	-286,315	-0.11%
C-11 West (upstream)	396,978,558	397,358,455	-379,897	-0.10%
C-12 West (upstream)	71,852,512	72,000,521	-148,009	-0.21%
C-13 West (upstream)	180,726,197	180,933,958	-207,760	-0.11%
C-14 East (upstream)	65,220,662	65,240,350	-19,687	-0.03%
C-14 West (upstream)	421,226,388	419,885,072	1,341,316	0.32%
Hillsboro Canal (upstream)	677,416,986	677,801,761	-384,775	-0.06%
North New River Canal West (upstre	183,647,644	183,447,579	200,065	0.11%
Pompano Canal (upstream)	28,582,576	28,597,969	-15,392	-0.05%
Total	2,282,224,868	2,282,125,322	99,546	0.00%

Data for WKID 2236
Projected Coordinate System NAD 1983 StatePlane Florida East FIPS 0901 (US Feet)

Projection	Transverse Mercator
WKID	2236
Previous WKID	102658
Authority	EPSG
Linear Unit	US Survey Feet (0.3048006096012192)
False Easting	656166.6666666665
False Northing	0.0
Central Meridian	-81.0
Scale Factor	0.9999411764705882
Latitude Of Origin	24.33333333333333

Geographic Coordinate System NAD 1983

WKID	4269
Authority	EPSG
Angular Unit	Degree (0.0174532925199433)
Prime Meridian	Greenwich (0.0)
Datum	D North American 1983
Spheroid	GRS 1980
Semimajor Axis	6378137.0
Semiminor Axis	6356752.314140356
Inverse Flattening	298.257222101

Data for Custom Projection
Projected Coordinate System NAD_1983_2011_StatePlane_Florida_East_FIPS_0901_Ft_US

Projection	Transverse Mercator
Authority	Custom
Linear Unit	US Survey Feet (0.3048006096012192)
False Easting	656166.667
False Northing	0.0
Central Meridian	-81.0
Scale Factor	0.999941177
Latitude Of Origin	24.3333333333333

Geographic Coordinate System NAD 1983 (2011)

WKID	6318
Previous WKID	104145
Authority	EPSG
Angular Unit	Degree (0.0174532925199433)
Prime Meridian	Greenwich (0.0)
Datum	D NAD 1983 2011
Spheroid	GRS 1980
Semimajor Axis	6378137.0
Semiminor Axis	6356752.314140356
Inverse Flattening	298.257222101

Appendix D1.D: Stage-Frequency Curves with Confidence Limits

Table 73. Stage-Frequency – C-11 East – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ECB 2035i	0.1250	0.2482	0.2520	0.2801	0.3001	0.3038	0.3354	0.2454	0.2492	0.2768
	0.0714	0.2933	0.2570	0.3776	0.3500	0.3088	0.4418	0.2897	0.2542	0.3727
	0.0333	0.3594	0.2940	0.4248	0.4210	0.3491	0.4929	0.3547	0.2906	0.4188
	0.0313	0.3598	0.3453	0.4298	0.4216	0.4034	0.4979	0.3551	0.3414	0.4238
	0.0133	0.3693	0.3503	0.7437	0.4328	0.4084	0.8095	0.3641	0.3464	0.7340
	0.0091	0.4815	0.3553	0.9179	0.5450	0.4134	0.9793	0.4751	0.3514	0.9063
	0.0023	0.4985	0.3603	0.9349	0.5601	0.4184	0.9944	0.4914	0.3564	0.9225
	0.0019	0.6760	0.3653	1.1124	0.7315	0.4234	1.1658	0.6689	0.3614	1.1001
FWOP_h_2085	0.1250	0.3075	0.3107	0.3543	0.3510	0.3542	0.3996	0.2988	0.3021	0.3449
	0.0714	0.3738	0.3157	0.4990	0.4197	0.3592	0.5463	0.3640	0.3071	0.4876
	0.0333	0.4726	0.3207	0.8585	0.5176	0.3642	0.8439	0.4618	0.3121	0.8204
	0.0313	0.4970	0.3257	0.8635	0.5372	0.3692	0.8489	0.4840	0.3171	0.8254
	0.0133	0.5546	0.3307	0.9587	0.5889	0.3742	0.9856	0.5418	0.3221	0.9462
	0.0091	0.6565	0.3357	1.1989	0.6909	0.3792	1.2059	0.6437	0.3271	1.1826
	0.0023	0.8006	0.3407	1.3430	0.8106	0.3842	1.3256	0.7845	0.3321	1.3234
	0.0019	0.9442	0.4018	1.4867	0.9535	0.4384	1.4686	0.9305	0.3917	1.4694
FWOP_i_2085	0.1250	0.2517	0.2555	0.2850	0.3035	0.3071	0.3405	0.2490	0.2527	0.2815
	0.0714	0.2988	0.2605	0.3886	0.3558	0.3121	0.4526	0.2950	0.2577	0.3827
	0.0333	0.3701	0.2877	0.4525	0.4310	0.3461	0.5160	0.3648	0.2840	0.4455
	0.0313	0.3716	0.3280	0.4575	0.4324	0.3900	0.5210	0.3662	0.3237	0.4505
	0.0133	0.3981	0.3330	0.7712	0.4588	0.3950	0.8341	0.3919	0.3287	0.7604
	0.0091	0.5030	0.3380	0.9364	0.5644	0.4000	0.9894	0.4957	0.3337	0.9241
	0.0023	0.5414	0.3430	0.9749	0.5929	0.4050	1.0179	0.5331	0.3387	0.9615
	0.0019	0.7179	0.3480	1.1513	0.7643	0.4100	1.1893	0.7106	0.3437	1.1390
FWOP_low_2085	0.1250	0.2493	0.2530	0.2816	0.3013	0.3049	0.3371	0.2465	0.2502	0.2783
	0.0714	0.2951	0.2580	0.3816	0.3519	0.3099	0.4456	0.2915	0.2552	0.3764
	0.0333	0.3634	0.2908	0.4360	0.4246	0.3452	0.5039	0.3584	0.2878	0.4291
	0.0313	0.3643	0.3357	0.4410	0.4257	0.3910	0.5089	0.3592	0.3324	0.4341
	0.0133	0.3828	0.3407	0.7516	0.4475	0.3960	0.8130	0.3767	0.3374	0.7418
	0.0091	0.4896	0.3457	0.9162	0.5519	0.4010	0.9634	0.4828	0.3424	0.9063
	0.0023	0.5157	0.3507	0.9424	0.5725	0.4060	0.9839	0.5084	0.3474	0.9319
	0.0019	0.6930	0.3557	1.1197	0.7444	0.4110	1.1558	0.6860	0.3524	1.1096

Table 74. Stage-Frequency – C-11 East – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_A_2035	0.1250	0.2445	0.2483	0.2755	0.2958	0.2994	0.3309	0.2422	0.2460	0.2731
	0.0714	0.2884	0.2533	0.3707	0.3454	0.3044	0.4366	0.2858	0.2510	0.3675
	0.0333	0.3530	0.2597	0.4463	0.4158	0.3140	0.5175	0.3498	0.2574	0.4422
	0.0313	0.3559	0.2626	0.4491	0.4189	0.3189	0.5189	0.3526	0.2602	0.4450
	0.0133	0.4160	0.2676	0.6709	0.4825	0.3239	0.7403	0.4122	0.2652	0.6644
	0.0091	0.4706	0.2726	0.7415	0.5366	0.3289	0.7995	0.4662	0.2702	0.7346
	0.0023	0.5302	0.2776	0.8010	0.5910	0.3339	0.8538	0.5257	0.2752	0.7941
	0.0019	0.6586	0.3877	0.9294	0.7182	0.4554	0.9811	0.6537	0.3852	0.9221
Alt_A_h_2085	0.1250	0.2822	0.2858	0.3174	0.3219	0.3253	0.3617	0.2791	0.2828	0.3134
	0.0714	0.3320	0.2908	0.4287	0.3782	0.3303	0.4839	0.3276	0.2878	0.4216
	0.0333	0.4098	0.2958	0.6893	0.4611	0.3353	0.6968	0.4033	0.2928	0.6582
	0.0313	0.4270	0.3008	0.7140	0.4744	0.3403	0.7106	0.4187	0.2978	0.6820
	0.0133	0.5035	0.3058	0.8056	0.5496	0.3453	0.8515	0.4948	0.3028	0.7954
	0.0091	0.5661	0.3108	0.9539	0.6127	0.3503	0.9724	0.5571	0.3078	0.9407
	0.0023	0.7026	0.3148	1.0904	0.7230	0.3632	1.0828	0.6909	0.3128	1.0745
	0.0019	0.8427	0.4549	1.2305	0.8625	0.5027	1.2223	0.8330	0.4494	1.2166
Alt_A_i_2085	0.1250	0.2476	0.2514	0.2793	0.2987	0.3023	0.3347	0.2458	0.2497	0.2772
	0.0714	0.2924	0.2564	0.3777	0.3496	0.3073	0.4435	0.2902	0.2547	0.3744
	0.0333	0.3601	0.2614	0.5122	0.4223	0.3123	0.5447	0.3569	0.2597	0.5112
	0.0313	0.3676	0.2664	0.5237	0.4269	0.3173	0.5498	0.3647	0.2647	0.5228
	0.0133	0.4335	0.2714	0.6951	0.4947	0.3223	0.7648	0.4294	0.2697	0.6869
	0.0091	0.4878	0.2764	0.7732	0.5509	0.3273	0.8366	0.4829	0.2747	0.7649
	0.0023	0.5611	0.2814	0.8465	0.6183	0.3326	0.9040	0.5560	0.2797	0.8379
	0.0019	0.6925	0.4072	0.9779	0.7432	0.4576	1.0289	0.6877	0.4058	0.9697
Alt_A_low_2085	0.1250	0.2453	0.2491	0.2766	0.2968	0.3005	0.3322	0.2432	0.2470	0.2743
	0.0714	0.2896	0.2541	0.3734	0.3469	0.3055	0.4391	0.2872	0.2520	0.3702
	0.0333	0.3558	0.2594	0.4523	0.4182	0.3145	0.5218	0.3526	0.2575	0.4478
	0.0313	0.3588	0.2610	0.4566	0.4214	0.3182	0.5246	0.3556	0.2592	0.4519
	0.0133	0.4219	0.2660	0.6802	0.4873	0.3232	0.7502	0.4177	0.2642	0.6728
	0.0091	0.4763	0.2710	0.7630	0.5420	0.3282	0.8210	0.4716	0.2692	0.7565
	0.0023	0.5504	0.2760	0.8370	0.6084	0.3294	0.8873	0.5461	0.2742	0.8310
	0.0019	0.6735	0.3869	0.9602	0.7288	0.4499	1.0078	0.6688	0.3839	0.9538

Table 75. Stage-Frequency – C-11 East – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_B_2035	0.1250	0.2444	0.2482	0.2753	0.2955	0.2992	0.3305	0.2420	0.2458	0.2728
	0.0714	0.2881	0.2532	0.3695	0.3450	0.3042	0.4357	0.2855	0.2508	0.3663
	0.0333	0.3515	0.2585	0.4445	0.4149	0.3135	0.5162	0.3485	0.2562	0.4407
	0.0313	0.3545	0.2590	0.4499	0.4180	0.3179	0.5181	0.3513	0.2568	0.4459
	0.0133	0.4160	0.2640	0.6645	0.4817	0.3229	0.7349	0.4123	0.2618	0.6587
	0.0091	0.4680	0.2690	0.7239	0.5343	0.3279	0.7865	0.4639	0.2668	0.7191
	0.0023	0.5229	0.2740	0.7788	0.5841	0.3319	0.8363	0.5195	0.2718	0.7748
	0.0019	0.6530	0.3972	0.9088	0.7136	0.4614	0.9658	0.6482	0.3930	0.9034
Alt_B_h_2085	0.1250	0.2807	0.2844	0.3144	0.3202	0.3237	0.3585	0.2779	0.2816	0.3107
	0.0714	0.3283	0.2894	0.4204	0.3744	0.3287	0.4753	0.3243	0.2866	0.4143
	0.0333	0.4024	0.2944	0.6797	0.4531	0.3337	0.6852	0.3967	0.2916	0.6484
	0.0313	0.4198	0.2994	0.7009	0.4663	0.3387	0.6985	0.4120	0.2966	0.6682
	0.0133	0.4891	0.3044	0.7739	0.5369	0.3437	0.8269	0.4807	0.3016	0.7620
	0.0091	0.5492	0.3094	0.9140	0.5981	0.3487	0.9374	0.5400	0.3066	0.8992
	0.0023	0.6735	0.3144	1.0383	0.6964	0.3572	1.0357	0.6621	0.3116	1.0212
	0.0019	0.8233	0.4585	1.1881	0.8448	0.5055	1.1841	0.8136	0.4545	1.1727
Alt_B_i_2085	0.1250	0.2475	0.2513	0.2791	0.2985	0.3021	0.3342	0.2457	0.2495	0.2770
	0.0714	0.2922	0.2563	0.3759	0.3490	0.3071	0.4418	0.2900	0.2545	0.3729
	0.0333	0.3579	0.2613	0.5121	0.4206	0.3121	0.5424	0.3549	0.2595	0.5119
	0.0313	0.3657	0.2663	0.5241	0.4253	0.3171	0.5467	0.3630	0.2645	0.5242
	0.0133	0.4299	0.2713	0.6833	0.4912	0.3221	0.7525	0.4264	0.2695	0.6764
	0.0091	0.4824	0.2763	0.7626	0.5454	0.3271	0.8238	0.4782	0.2745	0.7545
	0.0023	0.5573	0.2770	0.8375	0.6128	0.3345	0.8911	0.5520	0.2757	0.8283
	0.0019	0.6809	0.4006	0.9612	0.7338	0.4554	1.0121	0.6762	0.3999	0.9525
Alt_B_low_2085	0.1250	0.2452	0.2490	0.2763	0.2966	0.3002	0.3318	0.2430	0.2468	0.2739
	0.0714	0.2892	0.2540	0.3714	0.3464	0.3052	0.4378	0.2867	0.2518	0.3684
	0.0333	0.3536	0.2575	0.4496	0.4168	0.3142	0.5194	0.3506	0.2553	0.4459
	0.0313	0.3567	0.2577	0.4557	0.4200	0.3182	0.5218	0.3536	0.2556	0.4517
	0.0133	0.4196	0.2627	0.6702	0.4847	0.3232	0.7415	0.4159	0.2606	0.6639
	0.0091	0.4717	0.2677	0.7511	0.5380	0.3282	0.8113	0.4675	0.2656	0.7458
	0.0023	0.5470	0.2727	0.8264	0.6041	0.3308	0.8774	0.5434	0.2706	0.8217
	0.0019	0.6649	0.3855	0.9442	0.7218	0.4485	0.9951	0.6602	0.3820	0.9385

Table 76. Stage-Frequency – C-11 East – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_C_2035	0.1250	0.2445	0.2483	0.2753	0.2956	0.2992	0.3304	0.2421	0.2459	0.2727
	0.0714	0.2881	0.2533	0.3690	0.3448	0.3042	0.4349	0.2854	0.2509	0.3658
	0.0333	0.3510	0.2591	0.4429	0.4141	0.3137	0.5145	0.3479	0.2566	0.4391
	0.0313	0.3539	0.2601	0.4476	0.4172	0.3181	0.5163	0.3507	0.2577	0.4438
	0.0133	0.4143	0.2651	0.6570	0.4802	0.3231	0.7306	0.4107	0.2627	0.6518
	0.0091	0.4650	0.2701	0.7375	0.5323	0.3281	0.8052	0.4611	0.2677	0.7334
	0.0023	0.5390	0.2751	0.8115	0.6022	0.3293	0.8751	0.5359	0.2727	0.8082
	0.0019	0.6465	0.3740	0.9189	0.7080	0.4351	0.9809	0.6418	0.3696	0.9141
Alt_C_h_2085	0.1250	0.2846	0.2883	0.3172	0.3225	0.3260	0.3599	0.2811	0.2849	0.3132
	0.0714	0.3307	0.2933	0.4186	0.3754	0.3310	0.4732	0.3264	0.2899	0.4127
	0.0333	0.4006	0.2983	0.6959	0.4512	0.3360	0.7019	0.3949	0.2949	0.6606
	0.0313	0.4197	0.3033	0.7215	0.4662	0.3410	0.7179	0.4117	0.2999	0.6837
	0.0133	0.4873	0.3083	0.7601	0.5348	0.3460	0.8153	0.4783	0.3049	0.7476
	0.0091	0.5444	0.3133	0.9279	0.5939	0.3510	0.9554	0.5348	0.3099	0.9122
	0.0023	0.6948	0.3183	1.0783	0.7187	0.3572	1.0802	0.6823	0.3149	1.0598
	0.0019	0.8164	0.4329	1.1998	0.8389	0.4774	1.2004	0.8058	0.4284	1.1833
Alt_C_i_2085	0.1250	0.2479	0.2517	0.2793	0.2986	0.3022	0.3341	0.2461	0.2499	0.2772
	0.0714	0.2923	0.2567	0.3753	0.3488	0.3072	0.4410	0.2901	0.2549	0.3723
	0.0333	0.3573	0.2617	0.5173	0.4198	0.3122	0.5424	0.3545	0.2599	0.5176
	0.0313	0.3656	0.2667	0.5293	0.4246	0.3172	0.5462	0.3631	0.2649	0.5299
	0.0133	0.4285	0.2717	0.6763	0.4892	0.3222	0.7475	0.4253	0.2699	0.6704
	0.0091	0.4798	0.2767	0.7568	0.5431	0.3272	0.8190	0.4760	0.2749	0.7500
	0.0023	0.5556	0.2786	0.8326	0.6098	0.3339	0.8858	0.5511	0.2771	0.8251
	0.0019	0.6729	0.3959	0.9499	0.7265	0.4505	1.0024	0.6682	0.3942	0.9423
Alt_C_low_2085	0.1250	0.2452	0.2490	0.2763	0.2965	0.3001	0.3316	0.2430	0.2468	0.2738
	0.0714	0.2891	0.2540	0.3709	0.3462	0.3051	0.4370	0.2866	0.2518	0.3677
	0.0333	0.3529	0.2590	0.4539	0.4160	0.3128	0.5192	0.3499	0.2568	0.4508
	0.0313	0.3565	0.2640	0.4595	0.4193	0.3177	0.5209	0.3535	0.2618	0.4565
	0.0133	0.4178	0.2690	0.6619	0.4826	0.3227	0.7367	0.4144	0.2668	0.6563
	0.0091	0.4686	0.2740	0.7519	0.5357	0.3277	0.8183	0.4646	0.2718	0.7471
	0.0023	0.5519	0.2790	0.8352	0.6109	0.3282	0.8935	0.5487	0.2768	0.8312
	0.0019	0.6574	0.3741	0.9408	0.7155	0.4328	0.9981	0.6530	0.3705	0.9355

Table 77. Stage-Frequency – C-11 East – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ALT RO_2035	0.1250	0.2446	0.2484	0.2757	0.2958	0.2995	0.3311	0.2422	0.2460	0.2732
	0.0714	0.2886	0.2534	0.3716	0.3456	0.3045	0.4373	0.2860	0.2510	0.3684
	0.0333	0.3540	0.2602	0.4478	0.4164	0.3151	0.5176	0.3508	0.2579	0.4437
	0.0313	0.3568	0.2642	0.4494	0.4194	0.3217	0.5226	0.3536	0.2619	0.4453
	0.0133	0.4165	0.2692	0.6737	0.4816	0.3267	0.7444	0.4126	0.2669	0.6670
	0.0091	0.4720	0.2742	0.7625	0.5378	0.3317	0.8287	0.4675	0.2719	0.7545
	0.0023	0.5461	0.2792	0.8367	0.6098	0.3367	0.9007	0.5406	0.2769	0.8276
	0.0019	0.6587	0.3681	0.9492	0.7185	0.4276	1.0094	0.6538	0.3668	0.9407
ALT RO_h_2085	0.1250	0.2845	0.2882	0.3207	0.3245	0.3280	0.3649	0.2812	0.2849	0.3162
	0.0714	0.3356	0.2932	0.4333	0.3817	0.3330	0.4885	0.3307	0.2899	0.4255
	0.0333	0.4135	0.2982	0.7932	0.4652	0.3380	0.7757	0.4063	0.2949	0.7589
	0.0313	0.4390	0.3032	0.8269	0.4845	0.3430	0.7962	0.4297	0.2999	0.7920
	0.0133	0.5141	0.3082	0.8319	0.5593	0.3480	0.8596	0.5047	0.3049	0.8035
	0.0091	0.5765	0.3132	0.9673	0.6220	0.3530	0.9802	0.5669	0.3099	0.9532
	0.0023	0.7165	0.3256	1.1073	0.7320	0.3739	1.0901	0.7035	0.3171	1.0898
	0.0019	0.8622	0.4714	1.2531	0.8792	0.5211	1.2374	0.8515	0.4651	1.2378
ALT RO_i_2085	0.1250	0.2478	0.2515	0.2803	0.2991	0.3026	0.3358	0.2461	0.2498	0.2781
	0.0714	0.2938	0.2565	0.3818	0.3510	0.3076	0.4467	0.2913	0.2548	0.3779
	0.0333	0.3638	0.2615	0.4974	0.4250	0.3126	0.5454	0.3603	0.2598	0.4949
	0.0313	0.3696	0.2665	0.4981	0.4294	0.3129	0.5458	0.3662	0.2648	0.4958
	0.0133	0.4288	0.2715	0.7042	0.4938	0.3179	0.7746	0.4244	0.2698	0.6951
	0.0091	0.4901	0.2765	0.7767	0.5547	0.3229	0.8278	0.4847	0.2748	0.7663
	0.0023	0.5416	0.2815	0.8281	0.5958	0.3279	0.8689	0.5353	0.2798	0.8170
	0.0019	0.7016	0.4151	0.9881	0.7512	0.4781	1.0243	0.6968	0.4152	0.9784
ALT RO_low_2085	0.1250	0.2456	0.2494	0.2772	0.2972	0.3008	0.3330	0.2435	0.2473	0.2749
	0.0714	0.2903	0.2544	0.3760	0.3478	0.3058	0.4410	0.2879	0.2523	0.3725
	0.0333	0.3586	0.2622	0.4551	0.4198	0.3148	0.5249	0.3551	0.2606	0.4497
	0.0313	0.3614	0.2699	0.4601	0.4231	0.3218	0.5299	0.3579	0.2684	0.4547
	0.0133	0.4199	0.2749	0.6924	0.4862	0.3268	0.7610	0.4154	0.2734	0.6844
	0.0091	0.4806	0.2799	0.7953	0.5458	0.3318	0.8507	0.4755	0.2784	0.7871
	0.0023	0.5589	0.2849	0.8735	0.6192	0.3368	0.9241	0.5531	0.2834	0.8647
	0.0019	0.6776	0.3630	0.9922	0.7322	0.4272	1.0371	0.6729	0.3613	0.9846

Table 78. Stage-Frequency – C-11 West – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ECB 2035i	0.1250	0.2058	0.2097	0.2343	0.2826	0.2864	0.3141	0.2055	0.2095	0.2338
	0.0714	0.2461	0.2147	0.3173	0.3271	0.2914	0.4079	0.2456	0.2145	0.3161
	0.0333	0.2992	0.2455	0.3529	0.3888	0.3236	0.4541	0.2982	0.2453	0.3510
	0.0313	0.2996	0.2848	0.3579	0.3896	0.3645	0.4591	0.2986	0.2849	0.3560
	0.0133	0.3093	0.2898	0.5977	0.4060	0.3695	0.7315	0.3074	0.2899	0.5910
	0.0091	0.3947	0.2948	0.7139	0.5002	0.3745	0.8547	0.3917	0.2949	0.7063
	0.0023	0.3960	0.2998	0.7151	0.5038	0.3795	0.8583	0.3929	0.2999	0.7076
	0.0019	0.5368	0.3048	0.8559	0.6596	0.3845	1.0141	0.5302	0.3049	0.8448
FWOP_h_2085	0.1250	0.1885	0.1924	0.2175	0.2582	0.2620	0.2905	0.1885	0.1924	0.2173
	0.0714	0.2295	0.1974	0.3020	0.3039	0.2670	0.3867	0.2293	0.1974	0.3011
	0.0333	0.2836	0.2243	0.3428	0.3670	0.2933	0.4407	0.2827	0.2243	0.3410
	0.0313	0.2844	0.2567	0.3478	0.3684	0.3290	0.4457	0.2835	0.2564	0.3460
	0.0133	0.3024	0.2617	0.5971	0.3919	0.3340	0.7323	0.3011	0.2614	0.5898
	0.0091	0.3864	0.2667	0.7134	0.4878	0.3390	0.8652	0.3834	0.2664	0.7037
	0.0023	0.3993	0.2717	0.7262	0.5060	0.3440	0.8833	0.3959	0.2714	0.7161
	0.0019	0.5321	0.2767	0.8590	0.6547	0.3490	1.0320	0.5257	0.2764	0.8460
FWOP_i_2085	0.1250	0.2057	0.2096	0.2342	0.2827	0.2865	0.3143	0.2055	0.2094	0.2338
	0.0714	0.2461	0.2146	0.3177	0.3273	0.2915	0.4088	0.2456	0.2144	0.3166
	0.0333	0.2998	0.2442	0.3554	0.3899	0.3233	0.4564	0.2987	0.2440	0.3535
	0.0313	0.3004	0.2819	0.3604	0.3907	0.3638	0.4614	0.2993	0.2816	0.3585
	0.0133	0.3124	0.2869	0.5979	0.4082	0.3688	0.7329	0.3108	0.2866	0.5908
	0.0091	0.3960	0.2919	0.7111	0.5017	0.3738	0.8541	0.3929	0.2916	0.7024
	0.0023	0.3999	0.2969	0.7150	0.5058	0.3788	0.8582	0.3965	0.2966	0.7060
	0.0019	0.5386	0.3019	0.8537	0.6616	0.3838	1.0140	0.5319	0.3016	0.8414
FWOP_low_2085	0.1250	0.2061	0.2100	0.2346	0.2827	0.2865	0.3141	0.2058	0.2098	0.2342
	0.0714	0.2464	0.2150	0.3177	0.3272	0.2915	0.4080	0.2459	0.2148	0.3166
	0.0333	0.2996	0.2422	0.3571	0.3891	0.3205	0.4576	0.2986	0.2421	0.3551
	0.0313	0.3004	0.2756	0.3621	0.3901	0.3563	0.4626	0.2993	0.2756	0.3601
	0.0133	0.3164	0.2806	0.5934	0.4121	0.3613	0.7280	0.3147	0.2806	0.5866
	0.0091	0.3958	0.2856	0.6959	0.5011	0.3663	0.8398	0.3927	0.2856	0.6878
	0.0023	0.4005	0.2906	0.7006	0.5080	0.3713	0.8468	0.3971	0.2906	0.6922
	0.0019	0.5382	0.2956	0.8384	0.6607	0.3763	0.9994	0.5316	0.2956	0.8267

Table 79. Stage-Frequency – C-11 West – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_A_2035	0.1250	0.2052	0.2091	0.2333	0.2827	0.2864	0.3141	0.2054	0.2093	0.2332
	0.0714	0.2449	0.2141	0.3150	0.3271	0.2914	0.4072	0.2447	0.2143	0.3140
	0.0333	0.2971	0.2201	0.3742	0.3880	0.2975	0.4785	0.2963	0.2204	0.3721
	0.0313	0.2996	0.2206	0.3786	0.3909	0.3025	0.4848	0.2987	0.2214	0.3759
	0.0133	0.3502	0.2256	0.5495	0.4511	0.3075	0.6885	0.3481	0.2264	0.5429
	0.0091	0.3914	0.2306	0.6003	0.5002	0.3125	0.7534	0.3884	0.2314	0.5918
	0.0023	0.4403	0.2314	0.6493	0.5623	0.3175	0.8155	0.4356	0.2322	0.6390
	0.0019	0.5349	0.3260	0.7438	0.6655	0.4123	0.9187	0.5281	0.3247	0.7315
Alt_A_h_2085	0.1250	0.2053	0.2093	0.2336	0.2872	0.2910	0.3196	0.2054	0.2094	0.2335
	0.0714	0.2454	0.2143	0.3173	0.3329	0.2960	0.4166	0.2451	0.2144	0.3162
	0.0333	0.2998	0.2202	0.3794	0.3973	0.3030	0.4916	0.2988	0.2205	0.3771
	0.0313	0.3023	0.2216	0.3830	0.4002	0.3041	0.4964	0.3013	0.2223	0.3802
	0.0133	0.3540	0.2266	0.5585	0.4620	0.3091	0.7080	0.3519	0.2273	0.5518
	0.0091	0.3964	0.2316	0.6232	0.5132	0.3141	0.7791	0.3933	0.2323	0.6161
	0.0023	0.4574	0.2366	0.6843	0.5796	0.3191	0.8455	0.4539	0.2373	0.6767
	0.0019	0.5464	0.3195	0.7732	0.6849	0.4190	0.9508	0.5393	0.3165	0.7621
Alt_A_i_2085	0.1250	0.2053	0.2092	0.2335	0.2831	0.2869	0.3151	0.2054	0.2094	0.2333
	0.0714	0.2451	0.2142	0.3155	0.3284	0.2919	0.4091	0.2449	0.2144	0.3144
	0.0333	0.2976	0.2201	0.3751	0.3892	0.2989	0.4796	0.2967	0.2204	0.3730
	0.0313	0.3000	0.2202	0.3798	0.3921	0.3039	0.4858	0.2991	0.2208	0.3773
	0.0133	0.3512	0.2252	0.5542	0.4522	0.3089	0.6909	0.3493	0.2258	0.5476
	0.0091	0.3933	0.2302	0.6187	0.5018	0.3139	0.7653	0.3904	0.2308	0.6095
	0.0023	0.4538	0.2352	0.6791	0.5714	0.3189	0.8349	0.4487	0.2358	0.6678
	0.0019	0.5371	0.3117	0.7624	0.6649	0.4014	0.9283	0.5303	0.3112	0.7494
Alt_A_low_2085	0.1250	0.2052	0.2092	0.2333	0.2828	0.2866	0.3142	0.2054	0.2093	0.2332
	0.0714	0.2450	0.2142	0.3151	0.3272	0.2916	0.4073	0.2447	0.2143	0.3141
	0.0333	0.2973	0.2200	0.3746	0.3881	0.2979	0.4784	0.2964	0.2204	0.3725
	0.0313	0.2997	0.2202	0.3792	0.3910	0.3029	0.4844	0.2988	0.2210	0.3766
	0.0133	0.3507	0.2252	0.5519	0.4510	0.3079	0.6898	0.3487	0.2260	0.5454
	0.0091	0.3924	0.2302	0.6151	0.5007	0.3129	0.7604	0.3894	0.2310	0.6069
	0.0023	0.4520	0.2352	0.6747	0.5666	0.3179	0.8264	0.4474	0.2360	0.6649
	0.0019	0.5365	0.3138	0.7591	0.6644	0.4046	0.9241	0.5297	0.3122	0.7471

Table 80. Stage-Frequency – C-11 West – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_B_2035	0.1250	0.2053	0.2092	0.2332	0.2831	0.2869	0.3142	0.2054	0.2094	0.2331
	0.0714	0.2448	0.2142	0.3146	0.3270	0.2919	0.4065	0.2446	0.2144	0.3137
	0.0333	0.2969	0.2204	0.3734	0.3875	0.2983	0.4767	0.2960	0.2207	0.3714
	0.0313	0.2993	0.2214	0.3771	0.3904	0.2993	0.4814	0.2984	0.2221	0.3746
	0.0133	0.3490	0.2264	0.5477	0.4486	0.3043	0.6878	0.3471	0.2271	0.5411
	0.0091	0.3904	0.2314	0.6020	0.4991	0.3093	0.7534	0.3875	0.2321	0.5929
	0.0023	0.4412	0.2364	0.6527	0.5575	0.3143	0.8118	0.4363	0.2371	0.6418
	0.0019	0.5340	0.3225	0.7456	0.6613	0.4070	0.9156	0.5273	0.3219	0.7328
Alt_B_h_2085	0.1250	0.2053	0.2092	0.2335	0.2872	0.2909	0.3192	0.2054	0.2094	0.2334
	0.0714	0.2452	0.2142	0.3167	0.3325	0.2959	0.4157	0.2450	0.2144	0.3157
	0.0333	0.2992	0.2200	0.3785	0.3968	0.3023	0.4912	0.2983	0.2203	0.3762
	0.0313	0.3017	0.2210	0.3824	0.3997	0.3032	0.4963	0.3007	0.2217	0.3797
	0.0133	0.3535	0.2260	0.5580	0.4618	0.3082	0.7080	0.3514	0.2267	0.5514
	0.0091	0.3959	0.2310	0.6009	0.5129	0.3132	0.7616	0.3928	0.2317	0.5942
	0.0023	0.4376	0.2326	0.6425	0.5644	0.3157	0.8130	0.4344	0.2330	0.6359
	0.0019	0.5458	0.3408	0.7508	0.6842	0.4355	0.9329	0.5388	0.3374	0.7402
Alt_B_i_2085	0.1250	0.2052	0.2092	0.2334	0.2830	0.2868	0.3144	0.2054	0.2093	0.2333
	0.0714	0.2451	0.2142	0.3153	0.3274	0.2918	0.4074	0.2449	0.2143	0.3143
	0.0333	0.2974	0.2203	0.3744	0.3882	0.2982	0.4781	0.2965	0.2207	0.3723
	0.0313	0.2998	0.2209	0.3787	0.3910	0.3032	0.4840	0.2989	0.2216	0.3762
	0.0133	0.3504	0.2259	0.5540	0.4507	0.3082	0.6924	0.3484	0.2266	0.5475
	0.0091	0.3930	0.2309	0.6202	0.5014	0.3132	0.7694	0.3900	0.2316	0.6118
	0.0023	0.4536	0.2359	0.6809	0.5714	0.3182	0.8394	0.4491	0.2366	0.6708
	0.0019	0.5368	0.3095	0.7640	0.6646	0.3966	0.9326	0.5300	0.3083	0.7518
Alt_B_low_2085	0.1250	0.2052	0.2092	0.2333	0.2829	0.2867	0.3142	0.2054	0.2094	0.2332
	0.0714	0.2450	0.2142	0.3150	0.3272	0.2917	0.4069	0.2447	0.2144	0.3140
	0.0333	0.2971	0.2198	0.3743	0.3877	0.2973	0.4781	0.2962	0.2202	0.3723
	0.0313	0.2995	0.2248	0.3795	0.3906	0.3023	0.4855	0.2986	0.2205	0.3768
	0.0133	0.3508	0.2298	0.5525	0.4515	0.3073	0.6917	0.3487	0.2255	0.5459
	0.0091	0.3925	0.2348	0.6290	0.5013	0.3123	0.7817	0.3895	0.2305	0.6200
	0.0023	0.4641	0.2398	0.7006	0.5854	0.3173	0.8658	0.4589	0.2355	0.6894
	0.0019	0.5358	0.2993	0.7722	0.6632	0.3827	0.9437	0.5290	0.2986	0.7595

Table 81. Stage-Frequency – C-11 West – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_C_2035	0.1250	0.2053	0.2092	0.2332	0.2828	0.2866	0.3139	0.2053	0.2093	0.2331
	0.0714	0.2448	0.2142	0.3142	0.3268	0.2916	0.4057	0.2445	0.2143	0.3133
	0.0333	0.2963	0.2208	0.3719	0.3866	0.2986	0.4746	0.2955	0.2211	0.3700
	0.0313	0.2987	0.2223	0.3751	0.3894	0.3006	0.4781	0.2979	0.2230	0.3727
	0.0133	0.3476	0.2273	0.5432	0.4458	0.3056	0.6821	0.3457	0.2280	0.5371
	0.0091	0.3884	0.2323	0.6274	0.4962	0.3106	0.7800	0.3856	0.2330	0.6199
	0.0023	0.4653	0.2373	0.7044	0.5813	0.3156	0.8651	0.4612	0.2380	0.6955
	0.0019	0.5314	0.2924	0.7705	0.6586	0.3748	0.9425	0.5250	0.2908	0.7593
Alt_C_h_2085	0.1250	0.2054	0.2093	0.2335	0.2871	0.2908	0.3189	0.2054	0.2094	0.2333
	0.0714	0.2451	0.2143	0.3157	0.3321	0.2958	0.4142	0.2449	0.2144	0.3147
	0.0333	0.2980	0.2204	0.3756	0.3951	0.3023	0.4878	0.2971	0.2207	0.3735
	0.0313	0.3004	0.2219	0.3790	0.3980	0.3033	0.4927	0.2995	0.2227	0.3763
	0.0133	0.3506	0.2269	0.5479	0.4586	0.3083	0.6984	0.3485	0.2277	0.5414
	0.0091	0.3914	0.2319	0.6488	0.5083	0.3133	0.8022	0.3884	0.2327	0.6416
	0.0023	0.4844	0.2369	0.7418	0.6043	0.3183	0.8981	0.4807	0.2377	0.7338
	0.0019	0.5416	0.2841	0.7990	0.6806	0.3867	0.9744	0.5347	0.2815	0.7879
Alt_C_i_2085	0.1250	0.2052	0.2092	0.2333	0.2828	0.2865	0.3147	0.2054	0.2093	0.2332
	0.0714	0.2450	0.2142	0.3147	0.3280	0.2915	0.4080	0.2447	0.2143	0.3137
	0.0333	0.2967	0.2206	0.3727	0.3877	0.2996	0.4758	0.2958	0.2209	0.3708
	0.0313	0.2991	0.2216	0.3765	0.3905	0.3004	0.4806	0.2982	0.2223	0.3741
	0.0133	0.3486	0.2266	0.5449	0.4481	0.3054	0.6831	0.3467	0.2273	0.5387
	0.0091	0.3894	0.2316	0.6324	0.4976	0.3104	0.7818	0.3865	0.2323	0.6253
	0.0023	0.4700	0.2366	0.7131	0.5859	0.3154	0.8701	0.4663	0.2373	0.7050
	0.0019	0.5332	0.2901	0.7763	0.6608	0.3766	0.9450	0.5267	0.2880	0.7654
Alt_C_low_2085	0.1250	0.2052	0.2092	0.2333	0.2828	0.2866	0.3145	0.2054	0.2093	0.2331
	0.0714	0.2449	0.2142	0.3145	0.3277	0.2916	0.4074	0.2446	0.2143	0.3136
	0.0333	0.2966	0.2205	0.3726	0.3875	0.2979	0.4772	0.2958	0.2208	0.3707
	0.0313	0.2990	0.2215	0.3764	0.3904	0.2988	0.4821	0.2981	0.2223	0.3739
	0.0133	0.3485	0.2265	0.5436	0.4483	0.3038	0.6807	0.3465	0.2273	0.5375
	0.0091	0.3889	0.2315	0.6433	0.4969	0.3088	0.7887	0.3861	0.2323	0.6360
	0.0023	0.4806	0.2365	0.7351	0.5948	0.3138	0.8867	0.4767	0.2373	0.7267
	0.0019	0.5324	0.2780	0.7869	0.6597	0.3678	0.9516	0.5259	0.2760	0.7759

Table 82. Stage-Frequency – C-11 West – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ALT RO_2035	0.1250	0.2052	0.2091	0.2332	0.2827	0.2864	0.3140	0.2053	0.2093	0.2331
	0.0714	0.2448	0.2141	0.3147	0.3270	0.2914	0.4068	0.2446	0.2143	0.3137
	0.0333	0.2968	0.2204	0.3732	0.3875	0.3000	0.4751	0.2960	0.2207	0.3712
	0.0313	0.2992	0.2216	0.3769	0.3902	0.3033	0.4772	0.2983	0.2223	0.3743
	0.0133	0.3489	0.2266	0.5446	0.4459	0.3083	0.6858	0.3469	0.2273	0.5383
	0.0091	0.3894	0.2316	0.6200	0.4977	0.3133	0.7822	0.3865	0.2323	0.6123
	0.0023	0.4598	0.2366	0.6903	0.5787	0.3183	0.8632	0.4556	0.2373	0.6814
	0.0019	0.5332	0.3026	0.7638	0.6634	0.3788	0.9480	0.5265	0.3007	0.7522
ALT RO_h_2085	0.1250	0.2054	0.2094	0.2337	0.2873	0.2910	0.3196	0.2056	0.2095	0.2335
	0.0714	0.2453	0.2144	0.3160	0.3330	0.2960	0.4153	0.2451	0.2145	0.3149
	0.0333	0.2981	0.2204	0.3758	0.3956	0.2981	0.4930	0.2972	0.2207	0.3737
	0.0313	0.3006	0.2216	0.3796	0.3989	0.2989	0.4989	0.2996	0.2223	0.3769
	0.0133	0.3510	0.2266	0.5503	0.4597	0.3039	0.7006	0.3489	0.2273	0.5434
	0.0091	0.3923	0.2316	0.5815	0.5097	0.3089	0.7416	0.3892	0.2323	0.5736
	0.0023	0.4238	0.2345	0.6130	0.5501	0.3183	0.7820	0.4197	0.2353	0.6040
	0.0019	0.5416	0.3524	0.7308	0.6801	0.4483	0.9120	0.5347	0.3503	0.7190
ALT RO_i_2085	0.1250	0.2053	0.2093	0.2334	0.2831	0.2868	0.3145	0.2055	0.2094	0.2333
	0.0714	0.2451	0.2143	0.3151	0.3275	0.2918	0.4076	0.2448	0.2144	0.3141
	0.0333	0.2973	0.2204	0.3741	0.3883	0.2986	0.4781	0.2964	0.2207	0.3720
	0.0313	0.2997	0.2214	0.3780	0.3912	0.2992	0.4832	0.2988	0.2221	0.3754
	0.0133	0.3497	0.2264	0.5470	0.4501	0.3042	0.6849	0.3478	0.2271	0.5405
	0.0091	0.3906	0.2314	0.5847	0.4990	0.3092	0.7343	0.3876	0.2321	0.5754
	0.0023	0.4278	0.2337	0.6219	0.5462	0.3109	0.7816	0.4225	0.2347	0.6103
	0.0019	0.5345	0.3404	0.7286	0.6621	0.4267	0.8974	0.5278	0.3400	0.7156
ALT RO_low_2085	0.1250	0.2053	0.2092	0.2333	0.2832	0.2869	0.3145	0.2054	0.2094	0.2332
	0.0714	0.2449	0.2142	0.3148	0.3274	0.2919	0.4072	0.2447	0.2144	0.3138
	0.0333	0.2970	0.2204	0.3736	0.3881	0.2990	0.4771	0.2962	0.2207	0.3716
	0.0313	0.2994	0.2215	0.3773	0.3909	0.3003	0.4814	0.2985	0.2223	0.3748
	0.0133	0.3493	0.2265	0.5457	0.4489	0.3053	0.6844	0.3473	0.2273	0.5393
	0.0091	0.3899	0.2315	0.6313	0.4984	0.3103	0.7894	0.3870	0.2323	0.6232
	0.0023	0.4693	0.2365	0.7107	0.5927	0.3153	0.8838	0.4649	0.2373	0.7010
	0.0019	0.5332	0.2919	0.7746	0.6606	0.3695	0.9517	0.5266	0.2904	0.7627

Table 83. Stage-Frequency – C-12 West – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ECB 2035i	0.1250	0.3246	0.3278	0.3750	0.4201	0.4232	0.4690	0.3263	0.3294	0.3770
	0.0714	0.3958	0.3328	0.5287	0.4893	0.4282	0.6177	0.3981	0.3344	0.5321
	0.0333	0.4998	0.4033	0.5962	0.5893	0.4948	0.6837	0.5029	0.4056	0.6002
	0.0313	0.4999	0.4945	0.6012	0.5896	0.5798	0.6887	0.5031	0.4975	0.6052
	0.0133	0.5035	0.4995	1.1173	0.5959	0.5848	1.1719	0.5066	0.5025	1.1256
	0.0091	0.6923	0.5045	1.4024	0.7718	0.5898	1.4372	0.6970	0.5075	1.4131
	0.0023	0.6994	0.5095	1.4096	0.7817	0.5948	1.4470	0.7043	0.5125	1.4204
	0.0019	0.9722	0.5145	1.6823	1.0422	0.5998	1.7075	0.9794	0.5175	1.6955
FWOP_h_2085	0.1250	0.3281	0.3311	0.3845	0.4359	0.4389	0.4902	0.3298	0.3327	0.3867
	0.0714	0.4079	0.3361	0.5565	0.5126	0.4439	0.6548	0.4103	0.3377	0.5602
	0.0333	0.5239	0.3806	0.6671	0.6232	0.4920	0.7544	0.5272	0.3821	0.6723
	0.0313	0.5270	0.4617	0.6721	0.6257	0.5667	0.7594	0.5304	0.4638	0.6773
	0.0133	0.5547	0.4667	1.1739	0.6543	0.5717	1.2440	0.5585	0.4688	1.1828
	0.0091	0.7354	0.4717	1.4582	0.8255	0.5767	1.5100	0.7406	0.4738	1.4694
	0.0023	0.7804	0.4767	1.5032	0.8680	0.5817	1.5526	0.7862	0.4788	1.5150
	0.0019	1.0405	0.4817	1.7633	1.1171	0.5867	1.8017	1.0484	0.4838	1.7772
FWOP_i_2085	0.1250	0.3245	0.3277	0.3753	0.4215	0.4245	0.4716	0.3262	0.3293	0.3774
	0.0714	0.3964	0.3327	0.5320	0.4924	0.4295	0.6243	0.3986	0.3343	0.5354
	0.0333	0.5034	0.4018	0.6050	0.5953	0.4944	0.6961	0.5065	0.4041	0.6089
	0.0313	0.5037	0.4918	0.6100	0.5959	0.5757	0.7011	0.5068	0.4949	0.6139
	0.0133	0.5115	0.4968	1.1343	0.6090	0.5807	1.1923	0.5146	0.4999	1.1430
	0.0091	0.7013	0.5018	1.4221	0.7844	0.5857	1.4541	0.7062	0.5049	1.4336
	0.0023	0.7144	0.5068	1.4351	0.7997	0.5907	1.4693	0.7195	0.5099	1.4469
	0.0019	0.9867	0.5118	1.7075	1.0602	0.5957	1.7299	0.9942	0.5149	1.7216
FWOP_low_2085	0.1250	0.3247	0.3279	0.3752	0.4206	0.4237	0.4701	0.3264	0.3295	0.3773
	0.0714	0.3961	0.3329	0.5301	0.4905	0.4287	0.6205	0.3984	0.3345	0.5335
	0.0333	0.5012	0.4017	0.6008	0.5918	0.4934	0.6902	0.5044	0.4040	0.6047
	0.0313	0.5016	0.4904	0.6058	0.5923	0.5748	0.6952	0.5047	0.4935	0.6097
	0.0133	0.5088	0.4954	1.1239	0.6037	0.5798	1.1797	0.5120	0.4985	1.1324
	0.0091	0.6965	0.5004	1.4074	0.7776	0.5848	1.4392	0.7013	0.5035	1.4184
	0.0023	0.7081	0.5054	1.4190	0.7908	0.5898	1.4524	0.7130	0.5085	1.4301
	0.0019	0.9788	0.5104	1.6897	1.0505	0.5948	1.7120	0.9861	0.5135	1.7033

Table 84. Stage-Frequency – C-12 West – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_A_2035	0.1250	0.3157	0.3189	0.3637	0.4077	0.4109	0.4557	0.3169	0.3201	0.3652
	0.0714	0.3835	0.3239	0.5097	0.4756	0.4159	0.6001	0.3852	0.3251	0.5124
	0.0333	0.4819	0.3389	0.6249	0.5717	0.4335	0.7098	0.4844	0.3403	0.6284
	0.0313	0.4863	0.3402	0.6325	0.5758	0.4375	0.7142	0.4888	0.3416	0.6360
	0.0133	0.5811	0.3452	0.9555	0.6655	0.4425	1.0241	0.5843	0.3466	0.9615
	0.0091	0.6587	0.3502	1.0990	0.7403	0.4475	1.1530	0.6625	0.3516	1.1065
	0.0023	0.7923	0.3520	1.2327	0.8587	0.4525	1.2714	0.7974	0.3535	1.2414
	0.0019	0.9234	0.4831	1.3637	0.9948	0.5821	1.4075	0.9296	0.4856	1.3735
Alt_A_h_2085	0.1250	0.3181	0.3213	0.3681	0.4162	0.4192	0.4675	0.3192	0.3223	0.3696
	0.0714	0.3888	0.3263	0.5232	0.4887	0.4242	0.6229	0.3904	0.3273	0.5260
	0.0333	0.4955	0.3313	0.6763	0.5929	0.4299	0.7558	0.4980	0.3323	0.6808
	0.0313	0.5024	0.3363	0.6794	0.5985	0.4418	0.7608	0.5050	0.3373	0.6840
	0.0133	0.5972	0.3413	1.0147	0.6886	0.4468	1.0929	0.6006	0.3423	1.0218
	0.0091	0.6881	0.3463	1.1307	0.7774	0.4518	1.2058	0.6924	0.3473	1.1381
	0.0023	0.7800	0.3513	1.2227	0.8641	0.4568	1.2926	0.7843	0.3523	1.2301
	0.0019	1.0033	0.5606	1.4459	1.0748	0.6464	1.5032	1.0102	0.5645	1.4559
Alt_A_i_2085	0.1250	0.3157	0.3190	0.3639	0.4083	0.4114	0.4573	0.3169	0.3201	0.3655
	0.0714	0.3839	0.3240	0.5108	0.4776	0.4164	0.6034	0.3856	0.3251	0.5135
	0.0333	0.4828	0.3405	0.6251	0.5737	0.4363	0.7111	0.4853	0.3419	0.6287
	0.0313	0.4872	0.3449	0.6294	0.5778	0.4422	0.7135	0.4897	0.3462	0.6331
	0.0133	0.5792	0.3499	0.9712	0.6655	0.4472	1.0430	0.5825	0.3512	0.9775
	0.0091	0.6634	0.3549	1.1217	0.7469	0.4522	1.1775	0.6672	0.3562	1.1295
	0.0023	0.7913	0.3599	1.2497	0.8595	0.4572	1.2900	0.7967	0.3612	1.2589
	0.0019	0.9341	0.4758	1.3924	1.0080	0.5775	1.4385	0.9404	0.4782	1.4027
Alt_A_low_2085	0.1250	0.3157	0.3190	0.3638	0.4079	0.4110	0.4564	0.3169	0.3201	0.3653
	0.0714	0.3836	0.3240	0.5100	0.4765	0.4160	0.6018	0.3853	0.3251	0.5127
	0.0333	0.4822	0.3391	0.6253	0.5727	0.4348	0.7105	0.4847	0.3405	0.6289
	0.0313	0.4866	0.3415	0.6318	0.5768	0.4402	0.7135	0.4891	0.3429	0.6353
	0.0133	0.5805	0.3465	0.9622	0.6652	0.4452	1.0330	0.5836	0.3479	0.9683
	0.0091	0.6607	0.3515	1.1170	0.7433	0.4502	1.1753	0.6645	0.3529	1.1247
	0.0023	0.7997	0.3565	1.2560	0.8677	0.4552	1.2997	0.8048	0.3579	1.2650
	0.0019	0.9281	0.4718	1.3844	1.0007	0.5687	1.4327	0.9344	0.4742	1.3945

Table 85. Stage-Frequency – C-12 West – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_B_2035	0.1250	0.3157	0.3189	0.3637	0.4077	0.4108	0.4556	0.3169	0.3201	0.3652
	0.0714	0.3835	0.3239	0.5097	0.4754	0.4158	0.5999	0.3852	0.3251	0.5124
	0.0333	0.4818	0.3390	0.6247	0.5715	0.4336	0.7093	0.4843	0.3404	0.6282
	0.0313	0.4862	0.3404	0.6321	0.5756	0.4384	0.7129	0.4887	0.3418	0.6357
	0.0133	0.5809	0.3454	0.9546	0.6645	0.4434	1.0229	0.5841	0.3468	0.9606
	0.0091	0.6583	0.3504	1.0972	0.7395	0.4484	1.1478	0.6621	0.3518	1.1045
	0.0023	0.7911	0.3522	1.2299	0.8532	0.4534	1.2615	0.7961	0.3537	1.2386
	0.0019	0.9227	0.4839	1.3616	0.9937	0.5855	1.4020	0.9289	0.4864	1.3713
Alt_B_h_2085	0.1250	0.3180	0.3211	0.3677	0.4149	0.4180	0.4659	0.3190	0.3222	0.3692
	0.0714	0.3883	0.3261	0.5216	0.4871	0.4230	0.6196	0.3900	0.3272	0.5244
	0.0333	0.4937	0.3311	0.6722	0.5893	0.4283	0.7504	0.4962	0.3322	0.6767
	0.0313	0.5005	0.3361	0.6751	0.5950	0.4397	0.7554	0.5031	0.3372	0.6797
	0.0133	0.5939	0.3411	1.0100	0.6839	0.4447	1.0841	0.5973	0.3422	1.0170
	0.0091	0.6850	0.3461	1.1081	0.7718	0.4497	1.1746	0.6892	0.3472	1.1152
	0.0023	0.7593	0.3511	1.1824	0.8385	0.4547	1.2412	0.7634	0.3522	1.1895
	0.0019	0.9990	0.5759	1.4221	1.0684	0.6657	1.4711	1.0059	0.5799	1.4319
Alt_B_i_2085	0.1250	0.3158	0.3190	0.3640	0.4081	0.4113	0.4572	0.3169	0.3201	0.3655
	0.0714	0.3839	0.3240	0.5106	0.4775	0.4163	0.6031	0.3856	0.3251	0.5133
	0.0333	0.4827	0.3408	0.6246	0.5733	0.4364	0.7102	0.4851	0.3421	0.6282
	0.0313	0.4870	0.3452	0.6288	0.5774	0.4423	0.7126	0.4895	0.3465	0.6324
	0.0133	0.5788	0.3502	0.9695	0.6649	0.4473	1.0404	0.5820	0.3515	0.9757
	0.0091	0.6626	0.3552	1.1185	0.7458	0.4523	1.1767	0.6665	0.3565	1.1261
	0.0023	0.7895	0.3602	1.2453	0.8602	0.4573	1.2911	0.7946	0.3615	1.2542
	0.0019	0.9330	0.4771	1.3889	1.0064	0.5755	1.4373	0.9394	0.4798	1.3990
Alt_B_low_2085	0.1250	0.3157	0.3190	0.3637	0.4078	0.4109	0.4563	0.3169	0.3201	0.3653
	0.0714	0.3836	0.3240	0.5099	0.4763	0.4159	0.6015	0.3853	0.3251	0.5126
	0.0333	0.4821	0.3393	0.6249	0.5724	0.4350	0.7097	0.4846	0.3407	0.6285
	0.0313	0.4865	0.3419	0.6311	0.5765	0.4408	0.7122	0.4890	0.3433	0.6347
	0.0133	0.5800	0.3469	0.9611	0.6642	0.4458	1.0313	0.5832	0.3483	0.9672
	0.0091	0.6602	0.3519	1.1152	0.7424	0.4508	1.1713	0.6640	0.3533	1.1228
	0.0023	0.7982	0.3569	1.2531	0.8641	0.4558	1.2930	0.8034	0.3583	1.2622
	0.0019	0.9275	0.4726	1.3825	0.9998	0.5709	1.4287	0.9338	0.4750	1.3926

Table 86. Stage-Frequency – C-12 West – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_C_2035	0.1250	0.3157	0.3189	0.3637	0.4077	0.4109	0.4541	0.3168	0.3201	0.3652
	0.0714	0.3835	0.3239	0.5096	0.4733	0.4159	0.5968	0.3852	0.3251	0.5123
	0.0333	0.4817	0.3395	0.6239	0.5704	0.4322	0.7086	0.4842	0.3409	0.6274
	0.0313	0.4861	0.3419	0.6302	0.5745	0.4388	0.7102	0.4886	0.3434	0.6338
	0.0133	0.5794	0.3469	0.9527	0.6623	0.4438	1.0200	0.5826	0.3484	0.9586
	0.0091	0.6572	0.3519	1.1113	0.7375	0.4488	1.1661	0.6610	0.3534	1.1187
	0.0023	0.8022	0.3569	1.2562	0.8684	0.4538	1.2969	0.8074	0.3584	1.2650
	0.0019	0.9166	0.4625	1.3707	0.9866	0.5581	1.4151	0.9226	0.4650	1.3803
Alt_C_h_2085	0.1250	0.3189	0.3221	0.3684	0.4128	0.4159	0.4619	0.3201	0.3233	0.3700
	0.0714	0.3889	0.3271	0.5194	0.4822	0.4209	0.6107	0.3907	0.3283	0.5222
	0.0333	0.4909	0.3321	0.6889	0.5819	0.4259	0.7576	0.4934	0.3333	0.6940
	0.0313	0.4996	0.3371	0.6992	0.5890	0.4309	0.7659	0.5022	0.3383	0.7046
	0.0133	0.5950	0.3421	0.9935	0.6823	0.4359	1.0648	0.5985	0.3433	1.0000
	0.0091	0.6798	0.3471	1.1135	0.7630	0.4409	1.1758	0.6839	0.3483	1.1206
	0.0023	0.7840	0.3504	1.2177	0.8624	0.4496	1.2752	0.7888	0.3522	1.2255
	0.0019	0.9896	0.5560	1.4233	1.0539	0.6411	1.4667	0.9964	0.5597	1.4330
Alt_C_i_2085	0.1250	0.3158	0.3190	0.3641	0.4078	0.4110	0.4550	0.3169	0.3202	0.3656
	0.0714	0.3840	0.3240	0.5106	0.4745	0.4160	0.5993	0.3857	0.3252	0.5133
	0.0333	0.4825	0.3409	0.6241	0.5722	0.4343	0.7102	0.4850	0.3422	0.6277
	0.0313	0.4868	0.3455	0.6281	0.5763	0.4429	0.7152	0.4893	0.3468	0.6318
	0.0133	0.5781	0.3505	0.9643	0.6625	0.4479	1.0343	0.5814	0.3518	0.9703
	0.0091	0.6608	0.3555	1.1205	0.7428	0.4529	1.1766	0.6646	0.3568	1.1276
	0.0023	0.7950	0.3605	1.2547	0.8620	0.4579	1.2958	0.7999	0.3618	1.2629
	0.0019	0.9248	0.4651	1.3846	0.9959	0.5620	1.4297	0.9310	0.4680	1.3940
Alt_C_low_2085	0.1250	0.3157	0.3190	0.3638	0.4078	0.4109	0.4544	0.3169	0.3201	0.3653
	0.0714	0.3837	0.3240	0.5099	0.4737	0.4159	0.5978	0.3854	0.3251	0.5126
	0.0333	0.4820	0.3400	0.6239	0.5714	0.4330	0.7097	0.4844	0.3415	0.6274
	0.0313	0.4863	0.3439	0.6287	0.5755	0.4411	0.7098	0.4888	0.3454	0.6322
	0.0133	0.5783	0.3489	0.9585	0.6623	0.4461	1.0272	0.5815	0.3504	0.9645
	0.0091	0.6588	0.3539	1.1260	0.7402	0.4511	1.1839	0.6626	0.3554	1.1336
	0.0023	0.8066	0.3589	1.2737	0.8760	0.4561	1.3197	0.8117	0.3604	1.2827
	0.0019	0.9217	0.4546	1.3889	0.9917	0.5479	1.4354	0.9279	0.4569	1.3989

Table 87. Stage-Frequency – C-12 West – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ALT RO_2035	0.1250	0.3158	0.3190	0.3637	0.4090	0.4122	0.4565	0.3169	0.3202	0.3652
	0.0714	0.3836	0.3240	0.5100	0.4762	0.4172	0.6007	0.3853	0.3252	0.5127
	0.0333	0.4823	0.3396	0.6251	0.5730	0.4353	0.7106	0.4848	0.3409	0.6286
	0.0313	0.4867	0.3422	0.6312	0.5771	0.4420	0.7121	0.4892	0.3434	0.6349
	0.0133	0.5804	0.3472	0.9591	0.6644	0.4470	1.0315	0.5837	0.3484	0.9650
	0.0091	0.6598	0.3522	1.1100	0.7428	0.4520	1.1698	0.6635	0.3534	1.1169
	0.0023	0.7964	0.3572	1.2467	0.8623	0.4570	1.2893	0.8013	0.3584	1.2546
	0.0019	0.9242	0.4740	1.3745	0.9963	0.5692	1.4233	0.9304	0.4771	1.3838
ALT RO_h_2085	0.1250	0.3170	0.3201	0.3675	0.4216	0.4247	0.4713	0.3180	0.3211	0.3689
	0.0714	0.3884	0.3251	0.5234	0.4918	0.4297	0.6225	0.3901	0.3261	0.5262
	0.0333	0.4949	0.3265	0.6634	0.5937	0.4368	0.7507	0.4975	0.3273	0.6677
	0.0313	0.5008	0.3374	0.6643	0.5990	0.4476	0.7557	0.5035	0.3383	0.6686
	0.0133	0.5944	0.3424	1.0285	0.6879	0.4526	1.1013	0.5978	0.3433	1.0357
	0.0091	0.6910	0.3474	1.1259	0.7800	0.4576	1.1980	0.6953	0.3483	1.1335
	0.0023	0.7578	0.3524	1.1927	0.8468	0.4626	1.2648	0.7621	0.3533	1.2004
	0.0019	1.0083	0.5734	1.4432	1.0816	0.6635	1.4996	1.0153	0.5770	1.4535
ALT RO_i_2085	0.1250	0.3158	0.3191	0.3639	0.4116	0.4148	0.4593	0.3170	0.3202	0.3654
	0.0714	0.3838	0.3241	0.5112	0.4790	0.4198	0.6041	0.3855	0.3252	0.5138
	0.0333	0.4836	0.3405	0.6267	0.5763	0.4382	0.7144	0.4860	0.3418	0.6303
	0.0313	0.4879	0.3456	0.6303	0.5804	0.4454	0.7154	0.4904	0.3467	0.6340
	0.0133	0.5800	0.3506	0.9821	0.6678	0.4504	1.0549	0.5834	0.3517	0.9884
	0.0091	0.6673	0.3556	1.0233	0.7523	0.4554	1.1004	0.6712	0.3567	1.0296
	0.0023	0.6950	0.3606	1.0510	0.7819	0.4604	1.1300	0.6992	0.3617	1.0576
	0.0019	0.9388	0.5828	1.2948	1.0143	0.6662	1.3623	0.9452	0.5868	1.3036
ALT RO_low_2085	0.1250	0.3158	0.3190	0.3638	0.4100	0.4131	0.4580	0.3170	0.3202	0.3653
	0.0714	0.3837	0.3240	0.5104	0.4778	0.4181	0.6029	0.3853	0.3252	0.5131
	0.0333	0.4828	0.3397	0.6260	0.5746	0.4369	0.7123	0.4853	0.3410	0.6295
	0.0313	0.4872	0.3435	0.6309	0.5787	0.4439	0.7135	0.4897	0.3448	0.6345
	0.0133	0.5801	0.3485	0.9704	0.6658	0.4489	1.0450	0.5833	0.3498	0.9766
	0.0091	0.6634	0.3535	1.1174	0.7480	0.4539	1.1802	0.6672	0.3548	1.1249
	0.0023	0.7905	0.3585	1.2445	0.8596	0.4589	1.2918	0.7955	0.3598	1.2532
	0.0019	0.9317	0.4777	1.3857	1.0055	0.5733	1.4378	0.9380	0.4803	1.3957

Table 88. Stage-Frequency – C-13 West – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ECB 2035i	0.1250	0.1555	0.1595	0.1834	0.1767	0.1806	0.2059	0.1559	0.1599	0.1841
	0.0714	0.1949	0.1645	0.2785	0.2180	0.1856	0.3030	0.1958	0.1649	0.2802
	0.0333	0.2665	0.1810	0.3520	0.2894	0.2040	0.3748	0.2681	0.1814	0.3547
	0.0313	0.2682	0.2124	0.3570	0.2911	0.2350	0.3798	0.2698	0.2126	0.3597
	0.0133	0.3045	0.2174	0.7156	0.3275	0.2400	0.7547	0.3070	0.2176	0.7222
	0.0091	0.4172	0.2224	0.8541	0.4451	0.2450	0.9019	0.4206	0.2226	0.8611
	0.0023	0.4329	0.2274	0.8698	0.4624	0.2500	0.9192	0.4366	0.2276	0.8771
	0.0019	0.6338	0.2324	1.0708	0.6578	0.2550	1.1146	0.6408	0.2326	1.0813
FWOP_h_2085	0.1250	0.1565	0.1601	0.1975	0.1789	0.1825	0.2188	0.1570	0.1606	0.1985
	0.0714	0.2145	0.1651	0.3294	0.2353	0.1875	0.3495	0.2157	0.1656	0.3322
	0.0333	0.3086	0.1844	0.4328	0.3300	0.1970	0.4630	0.3110	0.1849	0.4371
	0.0313	0.3118	0.2134	0.4378	0.3339	0.2266	0.4680	0.3143	0.2140	0.4421
	0.0133	0.3729	0.2184	0.8112	0.3954	0.2316	0.8427	0.3765	0.2190	0.8199
	0.0091	0.4840	0.2234	0.9480	0.5091	0.2366	0.9795	0.4887	0.2240	0.9580
	0.0023	0.5289	0.2284	0.9930	0.5511	0.2416	1.0215	0.5347	0.2290	1.0039
	0.0019	0.7417	0.2777	1.2058	0.7544	0.2841	1.2248	0.7502	0.2809	1.2194
FWOP_i_2085	0.1250	0.1562	0.1601	0.1868	0.1780	0.1818	0.2095	0.1566	0.1605	0.1876
	0.0714	0.1995	0.1651	0.2920	0.2225	0.1868	0.3163	0.2005	0.1655	0.2940
	0.0333	0.2791	0.1785	0.3797	0.3025	0.2005	0.4046	0.2809	0.1790	0.3828
	0.0313	0.2814	0.2042	0.3847	0.3050	0.2248	0.4096	0.2833	0.2046	0.3878
	0.0133	0.3316	0.2092	0.7291	0.3570	0.2298	0.7611	0.3344	0.2096	0.7365
	0.0091	0.4344	0.2142	0.8402	0.4611	0.2348	0.8725	0.4383	0.2146	0.8481
	0.0023	0.4550	0.2192	0.8607	0.4826	0.2398	0.8939	0.4590	0.2196	0.8688
	0.0019	0.6614	0.2556	1.0671	0.6831	0.2717	1.0945	0.6690	0.2592	1.0789
FWOP_low_2085	0.1250	0.1561	0.1600	0.1850	0.1773	0.1813	0.2074	0.1565	0.1604	0.1858
	0.0714	0.1970	0.1650	0.2845	0.2199	0.1863	0.3089	0.1980	0.1654	0.2864
	0.0333	0.2724	0.1788	0.3659	0.2955	0.2013	0.3897	0.2740	0.1794	0.3687
	0.0313	0.2744	0.2058	0.3709	0.2976	0.2279	0.3947	0.2761	0.2063	0.3737
	0.0133	0.3191	0.2108	0.7181	0.3430	0.2329	0.7550	0.3215	0.2113	0.7253
	0.0091	0.4246	0.2158	0.8372	0.4523	0.2379	0.8801	0.4282	0.2163	0.8454
	0.0023	0.4423	0.2208	0.8549	0.4711	0.2429	0.8990	0.4462	0.2213	0.8634
	0.0019	0.6450	0.2324	1.0575	0.6684	0.2479	1.0963	0.6523	0.2351	1.0694

Table 89. Stage-Frequency – C-13 West – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_A_2035	0.1250	0.1516	0.1557	0.1770	0.1727	0.1767	0.1993	0.1517	0.1558	0.1773
	0.0714	0.1875	0.1607	0.2631	0.2104	0.1817	0.2888	0.1880	0.1608	0.2642
	0.0333	0.2520	0.1657	0.3548	0.2767	0.1867	0.3813	0.2529	0.1658	0.3565
	0.0313	0.2557	0.1707	0.3754	0.2803	0.1917	0.4004	0.2566	0.1708	0.3775
	0.0133	0.3331	0.1757	0.6496	0.3580	0.1967	0.6871	0.3349	0.1758	0.6543
	0.0091	0.3998	0.1807	0.6825	0.4285	0.2017	0.7305	0.4021	0.1808	0.6872
	0.0023	0.4305	0.1857	0.7133	0.4635	0.2067	0.7655	0.4329	0.1858	0.7180
	0.0019	0.6067	0.3239	0.8895	0.6312	0.3291	0.9332	0.6124	0.3273	0.8975
Alt_A_h_2085	0.1250	0.1580	0.1618	0.1949	0.1818	0.1855	0.2185	0.1581	0.1618	0.1953
	0.0714	0.2101	0.1668	0.3210	0.2337	0.1905	0.3456	0.2107	0.1668	0.3228
	0.0333	0.3054	0.1718	0.4855	0.3306	0.1955	0.5218	0.3070	0.1718	0.4912
	0.0313	0.3131	0.1768	0.4943	0.3391	0.2005	0.5284	0.3150	0.1768	0.5008
	0.0133	0.4020	0.1818	0.7586	0.4262	0.2055	0.7852	0.4052	0.1818	0.7672
	0.0091	0.4765	0.1868	0.8125	0.5021	0.2105	0.8407	0.4808	0.1868	0.8221
	0.0023	0.5285	0.1925	0.8645	0.5517	0.2130	0.8903	0.5338	0.1925	0.8752
	0.0019	0.7391	0.4031	1.0751	0.7503	0.4117	1.0890	0.7476	0.4063	1.0890
Alt_A_i_2085	0.1250	0.1522	0.1562	0.1798	0.1739	0.1779	0.2025	0.1523	0.1563	0.1802
	0.0714	0.1913	0.1612	0.2746	0.2144	0.1829	0.3005	0.1918	0.1613	0.2758
	0.0333	0.2629	0.1662	0.3741	0.2884	0.1879	0.4021	0.2640	0.1663	0.3761
	0.0313	0.2667	0.1712	0.3919	0.2922	0.1929	0.4182	0.2678	0.1713	0.3944
	0.0133	0.3478	0.1762	0.6942	0.3736	0.1979	0.7235	0.3498	0.1763	0.7005
	0.0091	0.4223	0.1812	0.7519	0.4490	0.2029	0.7928	0.4252	0.1813	0.7579
	0.0023	0.4687	0.1862	0.7983	0.5048	0.2079	0.8486	0.4713	0.1863	0.8039
	0.0019	0.6342	0.3047	0.9638	0.6570	0.3132	1.0008	0.6408	0.3082	0.9735
Alt_A_low_2085	0.1250	0.1518	0.1558	0.1782	0.1732	0.1772	0.2007	0.1518	0.1559	0.1785
	0.0714	0.1892	0.1608	0.2683	0.2120	0.1822	0.2937	0.1896	0.1609	0.2694
	0.0333	0.2568	0.1658	0.3633	0.2815	0.1872	0.3898	0.2578	0.1659	0.3652
	0.0313	0.2606	0.1708	0.3826	0.2853	0.1922	0.4076	0.2616	0.1709	0.3850
	0.0133	0.3395	0.1758	0.6657	0.3644	0.1972	0.6999	0.3415	0.1759	0.6710
	0.0091	0.4086	0.1808	0.7038	0.4363	0.2022	0.7469	0.4112	0.1809	0.7090
	0.0023	0.4424	0.1858	0.7376	0.4744	0.2072	0.7850	0.4452	0.1859	0.7430
	0.0019	0.6191	0.3239	0.9143	0.6424	0.3318	0.9530	0.6252	0.3274	0.9230

Table 90. Stage-Frequency – C-13 West – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_B_2035	0.1250	0.1514	0.1555	0.1761	0.1724	0.1764	0.1984	0.1515	0.1556	0.1764
	0.0714	0.1863	0.1605	0.2589	0.2091	0.1814	0.2848	0.1867	0.1606	0.2599
	0.0333	0.2477	0.1655	0.3471	0.2727	0.1864	0.3752	0.2485	0.1656	0.3488
	0.0313	0.2513	0.1705	0.3697	0.2764	0.1914	0.3974	0.2522	0.1706	0.3719
	0.0133	0.3279	0.1755	0.6404	0.3546	0.1964	0.6766	0.3296	0.1756	0.6453
	0.0091	0.3937	0.1805	0.6908	0.4227	0.2014	0.7317	0.3960	0.1806	0.6958
	0.0023	0.4399	0.1855	0.7369	0.4719	0.2064	0.7809	0.4425	0.1856	0.7423
	0.0019	0.6032	0.3062	0.9003	0.6272	0.3182	0.9363	0.6089	0.3091	0.9087
Alt_B_h_2085	0.1250	0.1519	0.1558	0.1835	0.1762	0.1801	0.2080	0.1521	0.1560	0.1839
	0.0714	0.1966	0.1608	0.2930	0.2212	0.1851	0.3177	0.1971	0.1610	0.2943
	0.0333	0.2801	0.1658	0.4048	0.3045	0.1901	0.4292	0.2813	0.1660	0.4073
	0.0313	0.2841	0.1708	0.4172	0.3085	0.1951	0.4416	0.2853	0.1710	0.4204
	0.0133	0.3703	0.1758	0.7407	0.3946	0.2001	0.7738	0.3729	0.1760	0.7488
	0.0091	0.4501	0.1808	0.8241	0.4772	0.2051	0.8574	0.4539	0.1810	0.8326
	0.0023	0.5180	0.1858	0.8919	0.5414	0.2101	0.9215	0.5222	0.1860	0.9010
	0.0019	0.7047	0.3308	1.0786	0.7194	0.3392	1.0995	0.7126	0.3339	1.0914
Alt_B_i_2085	0.1250	0.1516	0.1557	0.1775	0.1730	0.1770	0.2003	0.1517	0.1558	0.1779
	0.0714	0.1883	0.1607	0.2662	0.2116	0.1820	0.2924	0.1887	0.1608	0.2672
	0.0333	0.2551	0.1657	0.3628	0.2804	0.1870	0.3896	0.2560	0.1658	0.3647
	0.0313	0.2590	0.1707	0.3867	0.2842	0.1920	0.4110	0.2599	0.1708	0.3891
	0.0133	0.3416	0.1757	0.6835	0.3663	0.1970	0.7133	0.3436	0.1758	0.6891
	0.0091	0.4141	0.1807	0.7296	0.4405	0.2020	0.7697	0.4167	0.1808	0.7353
	0.0023	0.4548	0.1857	0.7704	0.4872	0.2070	0.8164	0.4577	0.1858	0.7763
	0.0019	0.6258	0.3102	0.9414	0.6494	0.3202	0.9786	0.6320	0.3134	0.9506
Alt_B_low_2085	0.1250	0.1517	0.1558	0.1769	0.1726	0.1766	0.1992	0.1518	0.1559	0.1772
	0.0714	0.1873	0.1608	0.2622	0.2102	0.1816	0.2881	0.1877	0.1609	0.2632
	0.0333	0.2512	0.1658	0.3543	0.2760	0.1866	0.3810	0.2520	0.1659	0.3559
	0.0313	0.2549	0.1708	0.3770	0.2797	0.1916	0.4024	0.2558	0.1709	0.3791
	0.0133	0.3339	0.1758	0.6547	0.3591	0.1966	0.6918	0.3356	0.1759	0.6595
	0.0091	0.4013	0.1808	0.6911	0.4300	0.2016	0.7410	0.4036	0.1809	0.6958
	0.0023	0.4359	0.1858	0.7257	0.4716	0.2066	0.7826	0.4381	0.1859	0.7303
	0.0019	0.6130	0.3232	0.9029	0.6368	0.3258	0.9478	0.6189	0.3267	0.9110

Table 91. Stage-Frequency – C-13 West – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
Alt_C_2035	0.1250	0.1515	0.1556	0.1756	0.1720	0.1761	0.1975	0.1515	0.1556	0.1758
	0.0714	0.1855	0.1606	0.2552	0.2080	0.1811	0.2814	0.1858	0.1606	0.2561
	0.0333	0.2439	0.1656	0.3389	0.2693	0.1861	0.3683	0.2446	0.1656	0.3404
	0.0313	0.2473	0.1706	0.3612	0.2728	0.1911	0.3902	0.2481	0.1706	0.3631
	0.0133	0.3210	0.1756	0.6170	0.3486	0.1961	0.6554	0.3225	0.1756	0.6219
	0.0091	0.3829	0.1806	0.6670	0.4130	0.2011	0.7112	0.3851	0.1806	0.6722
	0.0023	0.4305	0.1856	0.7147	0.4649	0.2061	0.7631	0.4329	0.1856	0.7199
	0.0019	0.5822	0.2980	0.8664	0.6109	0.3126	0.9091	0.5877	0.3007	0.8748
Alt_C_h_2085	0.1250	0.1517	0.1558	0.1782	0.1724	0.1764	0.2004	0.1518	0.1558	0.1786
	0.0714	0.1892	0.1608	0.2697	0.2120	0.1814	0.2958	0.1896	0.1608	0.2707
	0.0333	0.2586	0.1658	0.3724	0.2836	0.1864	0.4000	0.2596	0.1658	0.3744
	0.0313	0.2628	0.1708	0.4007	0.2879	0.1914	0.4271	0.2638	0.1708	0.4032
	0.0133	0.3521	0.1758	0.7049	0.3780	0.1964	0.7326	0.3541	0.1758	0.7110
	0.0091	0.4252	0.1808	0.7879	0.4513	0.2014	0.8168	0.4281	0.1808	0.7951
	0.0023	0.5051	0.1858	0.8678	0.5329	0.2064	0.8983	0.5090	0.1858	0.8760
	0.0019	0.6587	0.2960	1.0213	0.6774	0.3120	1.0429	0.6658	0.2988	1.0328
Alt_C_i_2085	0.1250	0.1518	0.1559	0.1766	0.1723	0.1764	0.1985	0.1518	0.1559	0.1769
	0.0714	0.1869	0.1609	0.2596	0.2094	0.1814	0.2856	0.1873	0.1609	0.2605
	0.0333	0.2482	0.1659	0.3476	0.2733	0.1864	0.3756	0.2490	0.1659	0.3492
	0.0313	0.2518	0.1709	0.3704	0.2770	0.1914	0.3966	0.2526	0.1709	0.3725
	0.0133	0.3286	0.1759	0.6372	0.3543	0.1964	0.6723	0.3303	0.1759	0.6419
	0.0091	0.3931	0.1809	0.7083	0.4215	0.2014	0.7497	0.3954	0.1809	0.7134
	0.0023	0.4594	0.1859	0.7746	0.4905	0.2064	0.8187	0.4622	0.1859	0.7802
	0.0019	0.6022	0.2870	0.9173	0.6269	0.2987	0.9551	0.6078	0.2897	0.9258
Alt_C_low_2085	0.1250	0.1516	0.1557	0.1761	0.1722	0.1762	0.1979	0.1516	0.1557	0.1764
	0.0714	0.1863	0.1607	0.2577	0.2086	0.1812	0.2834	0.1866	0.1607	0.2586
	0.0333	0.2463	0.1657	0.3438	0.2713	0.1862	0.3721	0.2470	0.1657	0.3453
	0.0313	0.2498	0.1707	0.3666	0.2749	0.1912	0.3937	0.2506	0.1707	0.3686
	0.0133	0.3255	0.1757	0.6285	0.3517	0.1962	0.6624	0.3270	0.1757	0.6335
	0.0091	0.3887	0.1807	0.6951	0.4169	0.2012	0.7360	0.3910	0.1807	0.7003
	0.0023	0.4514	0.1857	0.7578	0.4847	0.2062	0.8039	0.4539	0.1857	0.7632
	0.0019	0.5924	0.2860	0.8988	0.6179	0.2987	0.9371	0.5981	0.2888	0.9074

Table 92. Stage-Frequency – C-13 West – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)	depth (ft)	2.5 confidence (ft)	97.5 confidence (ft)
ALT RO_2035	0.1250	0.1515	0.1556	0.1760	0.1725	0.1766	0.1983	0.1515	0.1556	0.1763
	0.0714	0.1862	0.1606	0.2576	0.2090	0.1816	0.2836	0.1865	0.1606	0.2585
	0.0333	0.2462	0.1656	0.3440	0.2714	0.1866	0.3714	0.2470	0.1656	0.3455
	0.0313	0.2498	0.1706	0.3670	0.2750	0.1916	0.3922	0.2506	0.1706	0.3690
	0.0133	0.3256	0.1756	0.6302	0.3507	0.1966	0.6699	0.3272	0.1756	0.6352
	0.0091	0.3892	0.1806	0.6718	0.4189	0.2016	0.7215	0.3916	0.1806	0.6770
	0.0023	0.4298	0.1856	0.7123	0.4621	0.2066	0.7646	0.4322	0.1856	0.7176
	0.0019	0.5972	0.3147	0.8798	0.6226	0.3200	0.9252	0.6031	0.3177	0.8885
ALT RO_h_2085	0.1250	0.1516	0.1556	0.1798	0.1744	0.1783	0.2043	0.1518	0.1558	0.1801
	0.0714	0.1915	0.1606	0.2780	0.2167	0.1833	0.3055	0.1919	0.1608	0.2791
	0.0333	0.2668	0.1656	0.3822	0.2922	0.1883	0.4082	0.2678	0.1658	0.3842
	0.0313	0.2707	0.1706	0.3980	0.2961	0.1933	0.4246	0.2717	0.1708	0.4006
	0.0133	0.3531	0.1756	0.7093	0.3791	0.1983	0.7426	0.3552	0.1758	0.7160
	0.0091	0.4301	0.1806	0.7851	0.4581	0.2033	0.8274	0.4331	0.1808	0.7927
	0.0023	0.4906	0.1856	0.8457	0.5248	0.2083	0.8941	0.4945	0.1858	0.8541
	0.0019	0.6797	0.3247	1.0348	0.6977	0.3284	1.0670	0.6873	0.3277	1.0469
ALT RO_i_2085	0.1250	0.1517	0.1558	0.1772	0.1733	0.1773	0.2000	0.1518	0.1558	0.1775
	0.0714	0.1877	0.1608	0.2638	0.2111	0.1823	0.2899	0.1881	0.1608	0.2647
	0.0333	0.2527	0.1658	0.3568	0.2779	0.1873	0.3834	0.2535	0.1658	0.3584
	0.0313	0.2564	0.1708	0.3789	0.2816	0.1923	0.4031	0.2572	0.1708	0.3812
	0.0133	0.3357	0.1758	0.6588	0.3602	0.1973	0.6911	0.3375	0.1758	0.6639
	0.0091	0.4036	0.1808	0.6937	0.4309	0.2023	0.7391	0.4061	0.1808	0.6985
	0.0023	0.4366	0.1858	0.7267	0.4708	0.2073	0.7790	0.4390	0.1858	0.7314
	0.0019	0.6198	0.3297	0.9098	0.6438	0.3355	0.9520	0.6258	0.3334	0.9182
ALT RO_low_2085	0.1250	0.1517	0.1557	0.1767	0.1728	0.1768	0.1991	0.1517	0.1558	0.1770
	0.0714	0.1870	0.1607	0.2610	0.2100	0.1818	0.2871	0.1874	0.1608	0.2620
	0.0333	0.2499	0.1657	0.3509	0.2750	0.1868	0.3780	0.2507	0.1658	0.3524
	0.0313	0.2535	0.1707	0.3727	0.2787	0.1918	0.3976	0.2543	0.1708	0.3747
	0.0133	0.3306	0.1757	0.6438	0.3555	0.1968	0.6815	0.3322	0.1758	0.6484
	0.0091	0.3964	0.1807	0.6836	0.4254	0.2018	0.7305	0.3986	0.1808	0.6882
	0.0023	0.4338	0.1857	0.7210	0.4654	0.2068	0.7705	0.4362	0.1858	0.7258
	0.0019	0.6087	0.3215	0.8959	0.6332	0.3281	0.9383	0.6145	0.3248	0.9041

Table 93. Stage-Frequency – C-14 East – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ECB 2035i	0.1250	0.1782	0.1823	0.2002	0.3421	0.3452	0.3956	0.2631	0.2666	0.3040
	0.0714	0.2093	0.1873	0.2719	0.4177	0.3502	0.5582	0.3209	0.2716	0.4271
	0.0333	0.2610	0.1923	0.3424	0.5272	0.4182	0.6362	0.4029	0.3217	0.4841
	0.0313	0.2638	0.1973	0.3569	0.5280	0.5021	0.6412	0.4034	0.3852	0.4891
	0.0133	0.3239	0.2023	0.5618	0.5448	0.5071	1.0847	0.4153	0.3902	0.8641
	0.0091	0.3733	0.2073	0.6632	0.7053	0.5121	1.3602	0.5495	0.3952	1.0974
	0.0023	0.4668	0.2123	0.7568	0.7564	0.5171	1.4113	0.5923	0.4002	1.1402
	0.0019	0.5309	0.2409	0.8208	0.9727	0.5221	1.6276	0.7864	0.4052	1.3342
FWOP_h_2085	0.1250	0.4013	0.4039	0.4666	0.4670	0.4693	0.5404	0.3920	0.3947	0.4531
	0.0714	0.4937	0.4089	0.6641	0.5708	0.4743	0.7605	0.4784	0.3997	0.6387
	0.0333	0.6256	0.4139	1.6049	0.7165	0.4793	1.6307	0.6030	0.4047	1.5192
	0.0313	0.6964	0.4189	1.6709	0.7810	0.4843	1.7124	0.6692	0.4097	1.5702
	0.0133	0.7968	0.4239	1.6759	0.9190	0.4893	1.7174	0.7534	0.4147	1.5752
	0.0091	0.9176	0.4289	1.8219	1.0395	0.4943	1.9143	0.8735	0.4197	1.7584
	0.0023	1.3182	0.4339	2.2225	1.4151	0.5403	2.2899	1.2592	0.4247	2.1441
	0.0019	1.4140	0.5097	2.3183	1.5036	0.6289	2.3784	1.3629	0.4780	2.2478
FWOP_i_2085	0.1250	0.2685	0.2719	0.3124	0.3472	0.3501	0.4042	0.2644	0.2679	0.3062
	0.0714	0.3306	0.2769	0.4462	0.4278	0.3551	0.5758	0.3236	0.2729	0.4338
	0.0333	0.4208	0.2819	0.5936	0.5420	0.3678	0.7161	0.4097	0.2779	0.5699
	0.0313	0.4283	0.2976	0.5986	0.5478	0.4395	0.7211	0.4165	0.2962	0.5749
	0.0133	0.4677	0.3026	0.9695	0.5855	0.4445	1.1577	0.4545	0.3012	0.9426
	0.0091	0.6072	0.3076	1.2714	0.7475	0.4495	1.4817	0.5903	0.3062	1.2329
	0.0023	0.7352	0.3126	1.3995	0.8635	0.4545	1.5977	0.7114	0.3112	1.3539
	0.0019	0.9106	0.3176	1.5749	1.0485	0.4595	1.7827	0.8861	0.3162	1.5287
FWOP_low_2085	0.1250	0.2667	0.2701	0.3096	0.3441	0.3471	0.3987	0.2629	0.2664	0.3042
	0.0714	0.3274	0.2751	0.4401	0.4213	0.3521	0.5649	0.3213	0.2714	0.4291
	0.0333	0.4151	0.3206	0.5097	0.5331	0.4143	0.6519	0.4049	0.3146	0.4951
	0.0313	0.4164	0.3777	0.5147	0.5345	0.4875	0.6569	0.4061	0.3693	0.5001
	0.0133	0.4408	0.3827	0.9016	0.5651	0.4925	1.1010	0.4291	0.3743	0.8758
	0.0091	0.5737	0.3877	1.1567	0.7188	0.4975	1.3684	0.5582	0.3793	1.1212
	0.0023	0.6519	0.3927	1.2349	0.7877	0.5025	1.4373	0.6313	0.3843	1.1943
	0.0019	0.8441	0.3977	1.4272	1.0005	0.5075	1.6501	0.8208	0.3893	1.3838

Table 94. Stage-Frequency – C-14 East – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_A_2035	0.1250	0.2615	0.2650	0.3036	0.3338	0.3369	0.3868	0.2573	0.2609	0.2977
	0.0714	0.3211	0.2700	0.4296	0.4088	0.3419	0.5462	0.3145	0.2659	0.4186
	0.0333	0.4042	0.2868	0.5216	0.5147	0.3753	0.6541	0.3943	0.2801	0.5085
	0.0313	0.4077	0.2946	0.5266	0.5182	0.4012	0.6591	0.3977	0.2851	0.5104
	0.0133	0.4806	0.2996	0.7949	0.5938	0.4062	0.9876	0.4704	0.2901	0.7708
	0.0091	0.5484	0.3046	0.8991	0.6852	0.4112	1.1151	0.5340	0.2951	0.8666
	0.0023	0.6351	0.3096	0.9858	0.7646	0.4162	1.1945	0.6186	0.3001	0.9512
	0.0019	0.7761	0.4254	1.1267	0.9306	0.5007	1.3606	0.7548	0.4222	1.0874
Alt_A_h_2085	0.1250	0.3101	0.3127	0.3765	0.3886	0.3910	0.4618	0.3027	0.3056	0.3651
	0.0714	0.4041	0.3177	0.5758	0.4922	0.3960	0.6780	0.3909	0.3106	0.5536
	0.0333	0.5359	0.3227	1.4186	0.6327	0.4010	1.3007	0.5170	0.3156	1.3671
	0.0313	0.5988	0.3277	1.5010	0.6773	0.4060	1.3655	0.5776	0.3206	1.4439
	0.0133	0.7266	0.3327	1.5060	0.8189	0.4110	1.3705	0.6971	0.3256	1.4489
	0.0091	0.8078	0.3377	1.5110	0.9168	0.4160	1.6098	0.7721	0.3306	1.4539
	0.0023	1.0768	0.4692	1.6844	1.2064	0.5134	1.8994	1.0226	0.4591	1.5861
	0.0019	1.2078	0.6003	1.8154	1.3365	0.6435	2.0295	1.1574	0.5939	1.7209
Alt_A_i_2085	0.1250	0.2622	0.2656	0.3057	0.3376	0.3406	0.3945	0.3027	0.3056	0.3651
	0.0714	0.3237	0.2706	0.4362	0.4180	0.3456	0.5624	0.3909	0.3106	0.5536
	0.0333	0.4103	0.2756	0.6147	0.5273	0.3506	0.7224	0.5170	0.3156	1.3671
	0.0313	0.4207	0.2806	0.6420	0.5352	0.3556	0.7240	0.5776	0.3206	1.4439
	0.0133	0.5171	0.2856	0.8806	0.6295	0.3606	1.0514	0.6971	0.3256	1.4489
	0.0091	0.5906	0.2906	1.1253	0.7220	0.3656	1.3617	0.7721	0.3306	1.4539
	0.0023	0.8206	0.2956	1.3552	0.9823	0.3706	1.6220	1.0226	0.4591	1.5861
	0.0019	0.9379	0.4033	1.4726	1.0946	0.4549	1.7343	1.1574	0.5939	1.7209
Alt_A_low_2085	0.1250	0.2621	0.2655	0.3045	0.3351	0.3381	0.3894	0.2578	0.2613	0.2985
	0.0714	0.3221	0.2705	0.4320	0.4119	0.3431	0.5522	0.3154	0.2663	0.4210
	0.0333	0.4068	0.2844	0.5292	0.5197	0.3767	0.6626	0.3968	0.2776	0.5159
	0.0313	0.4105	0.2916	0.5295	0.5234	0.4019	0.6676	0.4005	0.2823	0.5187
	0.0133	0.4858	0.2966	0.8103	0.6017	0.4069	1.0073	0.4752	0.2873	0.7842
	0.0091	0.5558	0.3016	0.9309	0.6956	0.4119	1.1453	0.5407	0.2923	0.8959
	0.0023	0.6569	0.3066	1.0320	0.7839	0.4169	1.2336	0.6391	0.2973	0.9944
	0.0019	0.8067	0.4316	1.1818	0.9537	0.5040	1.4033	0.7852	0.4300	1.1405

Table 95. Stage-Frequency – C-14 East – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_B_2035	0.1250	0.2610	0.2644	0.3028	0.3313	0.3344	0.3835	0.2836	0.2862	0.3529
	0.0714	0.3201	0.2694	0.4281	0.4052	0.3394	0.5412	0.3816	0.2912	0.5405
	0.0333	0.4031	0.2850	0.5212	0.5102	0.3712	0.6493	0.4906	0.2962	1.3188
	0.0313	0.4066	0.2909	0.5223	0.5138	0.3957	0.6543	0.5508	0.3012	1.4114
	0.0133	0.4815	0.2959	0.7933	0.5902	0.4007	0.9909	0.6713	0.3062	1.4164
	0.0091	0.5478	0.3009	0.8955	0.6834	0.4057	1.1208	0.7468	0.3112	1.4214
	0.0023	0.6369	0.3059	0.9847	0.7635	0.4107	1.2009	0.9863	0.4333	1.5392
	0.0019	0.7784	0.4306	1.1262	0.9373	0.4999	1.3747	1.1317	0.5788	1.6847
Alt_B_h_2085	0.1250	0.2897	0.2922	0.3634	0.3728	0.3751	0.4513	0.2575	0.2610	0.2987
	0.0714	0.3939	0.2972	0.5615	0.4838	0.3801	0.6681	0.3157	0.2660	0.4231
	0.0333	0.5080	0.3022	1.3546	0.6135	0.3851	1.1961	0.3989	0.2710	0.5587
	0.0313	0.5693	0.3072	1.4489	0.6519	0.3901	1.2493	0.4058	0.2760	0.5829
	0.0133	0.6948	0.3122	1.4539	0.7793	0.3951	1.2875	0.5003	0.2810	0.8332
	0.0091	0.7773	0.3172	1.4589	0.8851	0.4001	1.6067	0.5652	0.2860	0.9325
	0.0023	1.0377	0.4351	1.6402	1.1739	0.4523	1.8955	0.6763	0.3090	1.0436
	0.0019	1.1809	0.5784	1.7835	1.3192	0.5976	2.0408	0.8334	0.4661	1.2007
Alt_B_i_2085	0.1250	0.2614	0.2649	0.3042	0.3348	0.3378	0.3889	0.2575	0.2610	0.2987
	0.0714	0.3219	0.2699	0.4341	0.4114	0.3428	0.5542	0.3157	0.2660	0.4231
	0.0333	0.4093	0.2749	0.5748	0.5230	0.3548	0.6912	0.3989	0.2710	0.5587
	0.0313	0.4164	0.2799	0.5962	0.5285	0.3703	0.6962	0.4058	0.2760	0.5829
	0.0133	0.5117	0.2849	0.8612	0.6219	0.3753	1.0500	0.5003	0.2810	0.8332
	0.0091	0.5813	0.2899	0.9732	0.7167	0.3803	1.1847	0.5652	0.2860	0.9325
	0.0023	0.6984	0.3065	1.0903	0.8184	0.3853	1.2865	0.6763	0.3090	1.0436
	0.0019	0.8580	0.4661	1.2499	0.9989	0.5308	1.4669	0.8334	0.4661	1.2007
Alt_B_low_2085	0.1250	0.2615	0.2650	0.3035	0.3325	0.3356	0.3857	0.2578	0.2613	0.2985
	0.0714	0.3209	0.2700	0.4306	0.4077	0.3406	0.5468	0.3153	0.2663	0.4209
	0.0333	0.4058	0.2837	0.5280	0.5157	0.3722	0.6592	0.3967	0.2781	0.5154
	0.0313	0.4095	0.2885	0.5306	0.5194	0.3958	0.6642	0.4004	0.2806	0.5202
	0.0133	0.4874	0.2935	0.8074	0.5995	0.4008	1.0099	0.4774	0.2856	0.7815
	0.0091	0.5550	0.2985	0.9228	0.6942	0.4058	1.1470	0.5404	0.2906	0.8874
	0.0023	0.6575	0.3035	1.0253	0.7828	0.4108	1.2356	0.6396	0.2926	0.9866
	0.0019	0.8097	0.4419	1.1775	0.9619	0.5091	1.4147	0.7875	0.4405	1.1345

Table 96. Stage-Frequency – C-14 East – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_C_2035	0.1250	0.2609	0.2643	0.3026	0.3325	0.3356	0.3857	0.2573	0.2609	0.2977
	0.0714	0.3199	0.2693	0.4279	0.4077	0.3406	0.5468	0.3144	0.2659	0.4184
	0.0333	0.4029	0.2850	0.5207	0.5157	0.3722	0.6592	0.3942	0.2791	0.5092
	0.0313	0.4064	0.2913	0.5215	0.5194	0.3958	0.6642	0.3977	0.2825	0.5129
	0.0133	0.4808	0.2963	0.7918	0.5995	0.4008	1.0099	0.4722	0.2875	0.7689
	0.0091	0.5470	0.3013	0.9017	0.6942	0.4058	1.1470	0.5339	0.2925	0.8717
	0.0023	0.6425	0.3063	0.9972	0.7828	0.4108	1.2356	0.6291	0.2975	0.9669
	0.0019	0.7723	0.4176	1.1269	0.9619	0.5091	1.4147	0.7539	0.4161	1.0917
Alt_C_h_2085	0.1250	0.2965	0.2991	0.3648	0.3755	0.3779	0.4496	0.2912	0.2939	0.3559
	0.0714	0.3931	0.3041	0.5628	0.4803	0.3829	0.6607	0.3828	0.2989	0.5459
	0.0333	0.5191	0.3091	1.3793	0.6118	0.3879	1.2013	0.5053	0.3039	1.3533
	0.0313	0.5806	0.3141	1.4619	0.6506	0.3929	1.2565	0.5661	0.3089	1.4338
	0.0133	0.7049	0.3191	1.4669	0.7812	0.3979	1.2701	0.6859	0.3139	1.4388
	0.0091	0.7851	0.3241	1.4719	0.8797	0.4029	1.5793	0.7604	0.3189	1.4438
	0.0023	1.0515	0.4504	1.6527	1.1730	0.4735	1.8726	1.0073	0.4498	1.5649
	0.0019	1.1816	0.5804	1.7827	1.2996	0.6000	1.9991	1.1411	0.5835	1.6987
Alt_C_i_2085	0.1250	0.2614	0.2648	0.3041	0.3345	0.3375	0.3887	0.2575	0.2610	0.2986
	0.0714	0.3217	0.2698	0.4337	0.4112	0.3425	0.5534	0.3156	0.2660	0.4229
	0.0333	0.4088	0.2748	0.5954	0.5217	0.3475	0.7015	0.3988	0.2710	0.5777
	0.0313	0.4177	0.2798	0.6192	0.5283	0.3591	0.7065	0.4073	0.2760	0.6045
	0.0133	0.5129	0.2848	0.8608	0.6198	0.3641	1.0302	0.5023	0.2810	0.8379
	0.0091	0.5821	0.2898	0.9783	0.7099	0.3691	1.1641	0.5678	0.2860	0.9449
	0.0023	0.7043	0.3082	1.1005	0.8149	0.3741	1.2691	0.6854	0.3083	1.0625
	0.0019	0.8572	0.4611	1.2534	0.9774	0.5232	1.4316	0.8384	0.4613	1.2155
Alt_C_low_2085	0.1250	0.2614	0.2649	0.3034	0.3322	0.3353	0.3853	0.2578	0.2613	0.2984
	0.0714	0.3208	0.2699	0.4303	0.4073	0.3403	0.5460	0.3153	0.2663	0.4207
	0.0333	0.4055	0.2833	0.5278	0.5149	0.3720	0.6578	0.3965	0.2774	0.5157
	0.0313	0.4093	0.2883	0.5302	0.5186	0.3963	0.6628	0.4003	0.2796	0.5209
	0.0133	0.4868	0.2933	0.8035	0.5978	0.4013	0.9996	0.4775	0.2846	0.7803
	0.0091	0.5535	0.2983	0.9160	0.6902	0.4063	1.1296	0.5400	0.2896	0.8852
	0.0023	0.6542	0.3033	1.0168	0.7745	0.4113	1.2139	0.6391	0.2940	0.9843
	0.0019	0.8023	0.4398	1.1649	0.9426	0.5032	1.3819	0.7847	0.4395	1.1298

Table 97. Stage-Frequency – C-14 East – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ALT RO_2035	0.1250	0.2614	0.2649	0.3033	0.3315	0.3346	0.3837	0.2579	0.2614	0.2983
	0.0714	0.3206	0.2699	0.4288	0.4054	0.3396	0.5415	0.3151	0.2664	0.4193
	0.0333	0.4038	0.2852	0.5223	0.5108	0.3705	0.6511	0.3950	0.2796	0.5104
	0.0313	0.4073	0.2905	0.5241	0.5145	0.3940	0.6561	0.3985	0.2822	0.5147
	0.0133	0.4829	0.2955	0.7955	0.5924	0.3990	0.9888	0.4737	0.2872	0.7713
	0.0091	0.5491	0.3005	0.9054	0.6836	0.4040	1.1347	0.5354	0.2922	0.8727
	0.0023	0.6460	0.3055	1.0023	0.7819	0.4090	1.2330	0.6304	0.2931	0.9676
	0.0019	0.7829	0.4266	1.1392	0.9394	0.4884	1.3905	0.7612	0.4240	1.0985
ALT RO_h_2085	0.1250	0.3347	0.3373	0.4013	0.3970	0.3994	0.4713	0.3283	0.3310	0.3910
	0.0714	0.4289	0.3423	0.6073	0.5020	0.4044	0.6938	0.4170	0.3360	0.5860
	0.0333	0.5700	0.3473	1.2748	0.6492	0.4094	1.2619	0.5513	0.3410	1.2212
	0.0313	0.6175	0.3523	1.3400	0.6887	0.4144	1.3361	0.5965	0.3460	1.2784
	0.0133	0.7562	0.3573	1.3450	0.8530	0.4194	1.3688	0.7236	0.3510	1.2834
	0.0091	0.8382	0.3623	1.5258	0.9462	0.4244	1.6668	0.8009	0.3560	1.4552
	0.0023	1.1748	0.4872	1.8624	1.2752	0.5547	1.9958	1.1236	0.4694	1.7779
	0.0019	1.2936	0.6060	1.9812	1.3949	0.6743	2.1154	1.2469	0.5927	1.9012
ALT RO_i_2085	0.1250	0.2617	0.2651	0.3046	0.3354	0.3384	0.3899	0.2576	0.2611	0.2988
	0.0714	0.3224	0.2701	0.4352	0.4125	0.3434	0.5561	0.3159	0.2661	0.4238
	0.0333	0.4103	0.2751	0.6151	0.5246	0.3484	0.7234	0.3997	0.2711	0.5934
	0.0313	0.4206	0.2801	0.6413	0.5326	0.3534	0.7284	0.4094	0.2761	0.6219
	0.0133	0.5173	0.2851	0.8717	0.6273	0.3584	1.0439	0.5052	0.2811	0.8462
	0.0091	0.5879	0.2901	0.9908	0.7180	0.3634	1.1821	0.5720	0.2861	0.9506
	0.0023	0.7113	0.3085	1.1141	0.8296	0.3655	1.2936	0.6867	0.3081	1.0653
	0.0019	0.8746	0.4718	1.2774	1.0038	0.5397	1.4678	0.8508	0.4722	1.2294
ALT RO_low_2085	0.1250	0.2620	0.2655	0.3044	0.3332	0.3363	0.3866	0.2584	0.2619	0.2992
	0.0714	0.3220	0.2705	0.4323	0.4087	0.3413	0.5485	0.3161	0.2669	0.4219
	0.0333	0.4073	0.2827	0.5320	0.5173	0.3710	0.6635	0.3976	0.2767	0.5185
	0.0313	0.4112	0.2880	0.5345	0.5212	0.3934	0.6685	0.4015	0.2794	0.5235
	0.0133	0.4892	0.2930	0.8178	0.6034	0.3984	1.0114	0.4785	0.2844	0.7911
	0.0091	0.5594	0.2980	0.9386	0.6965	0.4034	1.1474	0.5441	0.2894	0.9027
	0.0023	0.6633	0.3030	1.0424	0.7887	0.4084	1.2397	0.6449	0.2944	1.0035
	0.0019	0.8152	0.4360	1.1943	0.9667	0.5157	1.4176	0.7912	0.4327	1.1498

Table 98. Stage-Frequency – C-14 West – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ECB 2035i	0.1250	0.2207	0.1862	0.2059	0.2221	0.2261	0.2502	0.1812	0.1853	0.2049
	0.0714	0.2547	0.1912	0.2821	0.2618	0.2311	0.3397	0.2147	0.1903	0.2810
	0.0333	0.3038	0.2147	0.3249	0.3251	0.2611	0.3892	0.2688	0.2134	0.3242
	0.0313	0.3059	0.2537	0.3299	0.3257	0.3078	0.3942	0.2693	0.2523	0.3292
	0.0133	0.3503	0.2587	0.6305	0.3374	0.3128	0.7391	0.2805	0.2573	0.6310
	0.0091	0.3866	0.2637	0.7765	0.4571	0.3178	0.9090	0.3846	0.2623	0.7770
	0.0023	0.4693	0.2687	0.7811	0.4629	0.3228	0.9148	0.3892	0.2673	0.7816
	0.0019	0.5010	0.2737	0.9337	0.6414	0.3278	1.0932	0.5419	0.2723	0.9342
FWOP_h_2085	0.1250	0.1836	0.1877	0.2071	0.2237	0.2276	0.2516	0.1827	0.1868	0.2060
	0.0714	0.2168	0.1927	0.2856	0.2631	0.2326	0.3439	0.2157	0.1918	0.2845
	0.0333	0.2748	0.2170	0.3326	0.3309	0.2630	0.3988	0.2739	0.2158	0.3321
	0.0313	0.2752	0.2584	0.3376	0.3314	0.3104	0.4038	0.2744	0.2573	0.3371
	0.0133	0.2872	0.2634	0.6370	0.3465	0.3154	0.7459	0.2866	0.2623	0.6375
	0.0091	0.3907	0.2684	0.7912	0.4641	0.3204	0.9239	0.3904	0.2673	0.7923
	0.0023	0.4045	0.2734	0.8049	0.4839	0.3254	0.9436	0.4045	0.2723	0.8063
	0.0019	0.5567	0.2784	0.9572	0.6562	0.3304	1.1159	0.5568	0.2773	0.9586
FWOP_i_2085	0.1250	0.1821	0.1861	0.2063	0.2222	0.2261	0.2506	0.1812	0.1852	0.2053
	0.0714	0.2163	0.1911	0.2848	0.2624	0.2311	0.3426	0.2153	0.1902	0.2838
	0.0333	0.2727	0.2129	0.3326	0.3283	0.2587	0.3979	0.2719	0.2117	0.3321
	0.0313	0.2735	0.2498	0.3376	0.3291	0.3021	0.4029	0.2726	0.2485	0.3371
	0.0133	0.2889	0.2548	0.6222	0.3468	0.3071	0.7304	0.2883	0.2535	0.6226
	0.0091	0.3859	0.2598	0.7536	0.4585	0.3121	0.8824	0.3855	0.2585	0.7541
	0.0023	0.3920	0.2648	0.7597	0.4661	0.3171	0.8900	0.3917	0.2635	0.7602
	0.0019	0.5449	0.2698	0.9125	0.6441	0.3221	1.0680	0.5447	0.2685	0.9132
FWOP_low_2085	0.1250	0.1821	0.1862	0.2061	0.2222	0.2261	0.2503	0.1812	0.1853	0.2051
	0.0714	0.2160	0.1912	0.2834	0.2620	0.2311	0.3407	0.2150	0.1903	0.2823
	0.0333	0.2712	0.2124	0.3301	0.3264	0.2567	0.3960	0.2703	0.2113	0.3293
	0.0313	0.2719	0.2480	0.3351	0.3273	0.2964	0.4010	0.2710	0.2471	0.3343
	0.0133	0.2875	0.2530	0.6237	0.3475	0.3014	0.7296	0.2867	0.2521	0.6244
	0.0091	0.3854	0.2580	0.7563	0.4577	0.3064	0.8764	0.3850	0.2571	0.7577
	0.0023	0.3916	0.2630	0.7625	0.4656	0.3114	0.8843	0.3912	0.2621	0.7640
	0.0019	0.5432	0.2680	0.9141	0.6426	0.3164	1.0613	0.5430	0.2671	0.9157

Table 99. Stage-Frequency – C-14 West – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_A_2035	0.1250	0.1782	0.1824	0.2004	0.2151	0.2191	0.2414	0.1775	0.1816	0.1995
	0.0714	0.2095	0.1874	0.2735	0.2523	0.2241	0.3268	0.2086	0.1866	0.2724
	0.0333	0.2630	0.1924	0.3459	0.3137	0.2291	0.4085	0.2622	0.1916	0.3454
	0.0313	0.2658	0.1974	0.3586	0.3169	0.2341	0.4224	0.2650	0.1966	0.3583
	0.0133	0.3257	0.2024	0.5648	0.3850	0.2391	0.6596	0.3252	0.2016	0.5655
	0.0091	0.3755	0.2074	0.6363	0.4425	0.2441	0.7446	0.3753	0.2066	0.6368
	0.0023	0.4421	0.2124	0.7029	0.5203	0.2491	0.8224	0.4416	0.2116	0.7031
	0.0019	0.5333	0.2725	0.7941	0.6285	0.3264	0.9306	0.5333	0.2717	0.7948
Alt_A_h_2085	0.1250	0.1783	0.1824	0.2005	0.2153	0.2193	0.2418	0.1776	0.1817	0.1996
	0.0714	0.2097	0.1874	0.2784	0.2527	0.2243	0.3326	0.2088	0.1867	0.2774
	0.0333	0.2696	0.1924	0.3579	0.3214	0.2293	0.4220	0.2689	0.1917	0.3576
	0.0313	0.2724	0.1974	0.3641	0.3246	0.2343	0.4282	0.2717	0.1967	0.3638
	0.0133	0.3316	0.2024	0.5675	0.3916	0.2393	0.6657	0.3312	0.2017	0.5683
	0.0091	0.3807	0.2074	0.6415	0.4494	0.2443	0.7548	0.3806	0.2067	0.6420
	0.0023	0.4496	0.2124	0.7105	0.5291	0.2493	0.8345	0.4491	0.2117	0.7106
	0.0019	0.5520	0.2911	0.8128	0.6477	0.3423	0.9531	0.5522	0.2908	0.8137
Alt_A_i_2085	0.1250	0.1782	0.1824	0.2004	0.2151	0.2191	0.2415	0.1775	0.1817	0.1995
	0.0714	0.2096	0.1874	0.2739	0.2524	0.2241	0.3273	0.2086	0.1867	0.2729
	0.0333	0.2635	0.1924	0.3473	0.3144	0.2291	0.4101	0.2627	0.1917	0.3468
	0.0313	0.2664	0.1974	0.3605	0.3176	0.2341	0.4244	0.2656	0.1967	0.3602
	0.0133	0.3270	0.2024	0.5706	0.3866	0.2391	0.6671	0.3266	0.2017	0.5715
	0.0091	0.3779	0.2074	0.6449	0.4455	0.2441	0.7574	0.3777	0.2067	0.6454
	0.0023	0.4464	0.2124	0.7134	0.5272	0.2491	0.8391	0.4458	0.2117	0.7135
	0.0019	0.5363	0.2693	0.8033	0.6314	0.3195	0.9433	0.5363	0.2687	0.8039
Alt_A_low_2085	0.1250	0.1782	0.1824	0.2004	0.2151	0.2191	0.2414	0.1775	0.1816	0.1995
	0.0714	0.2096	0.1874	0.2737	0.2523	0.2241	0.3270	0.2086	0.1866	0.2727
	0.0333	0.2633	0.1924	0.3465	0.3140	0.2291	0.4089	0.2625	0.1916	0.3460
	0.0313	0.2661	0.1974	0.3590	0.3172	0.2341	0.4225	0.2653	0.1966	0.3587
	0.0133	0.3261	0.2024	0.5651	0.3852	0.2391	0.6608	0.3256	0.2016	0.5658
	0.0091	0.3758	0.2074	0.6490	0.4430	0.2441	0.7619	0.3756	0.2066	0.6491
	0.0023	0.4534	0.2124	0.7266	0.5344	0.2491	0.8533	0.4526	0.2116	0.7262
	0.0019	0.5348	0.2616	0.8080	0.6302	0.3113	0.9491	0.5348	0.2613	0.8083

Table 100. Stage-Frequency – C-14 West – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_B_2035	0.1250	0.1782	0.1823	0.2002	0.2150	0.2189	0.2411	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2718	0.2519	0.2239	0.3250	0.2084	0.1866	0.2707
	0.0333	0.2609	0.1923	0.3411	0.3115	0.2289	0.4046	0.2601	0.1916	0.3404
	0.0313	0.2637	0.1973	0.3533	0.3148	0.2339	0.4200	0.2628	0.1966	0.3528
	0.0133	0.3215	0.2023	0.5635	0.3827	0.2389	0.6560	0.3208	0.2016	0.5644
	0.0091	0.3731	0.2073	0.6241	0.4398	0.2439	0.7244	0.3728	0.2066	0.6254
	0.0023	0.4253	0.2123	0.6763	0.5034	0.2489	0.7879	0.4252	0.2116	0.6778
	0.0019	0.5301	0.2791	0.7811	0.6253	0.3408	0.9099	0.5300	0.2774	0.7826
Alt_B_h_2085	0.1250	0.1782	0.1824	0.2003	0.2151	0.2191	0.2414	0.1775	0.1816	0.1994
	0.0714	0.2095	0.1874	0.2729	0.2523	0.2241	0.3266	0.2085	0.1866	0.2718
	0.0333	0.2622	0.1924	0.3455	0.3135	0.2291	0.4090	0.2613	0.1916	0.3449
	0.0313	0.2652	0.1974	0.3603	0.3168	0.2341	0.4242	0.2643	0.1966	0.3599
	0.0133	0.3264	0.2024	0.5733	0.3860	0.2391	0.6715	0.3259	0.2016	0.5743
	0.0091	0.3781	0.2074	0.6215	0.4464	0.2441	0.7297	0.3779	0.2066	0.6229
	0.0023	0.4232	0.2124	0.6667	0.4981	0.2491	0.7814	0.4233	0.2116	0.6683
	0.0019	0.5488	0.3054	0.7923	0.6446	0.3613	0.9279	0.5490	0.3040	0.7940
Alt_B_i_2085	0.1250	0.1782	0.1823	0.2002	0.2150	0.2190	0.2412	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2722	0.2520	0.2240	0.3254	0.2084	0.1866	0.2711
	0.0333	0.2613	0.1923	0.3439	0.3121	0.2290	0.4065	0.2605	0.1916	0.3433
	0.0313	0.2643	0.1973	0.3597	0.3153	0.2340	0.4234	0.2634	0.1966	0.3594
	0.0133	0.3258	0.2023	0.5709	0.3851	0.2390	0.6665	0.3253	0.2016	0.5718
	0.0091	0.3768	0.2073	0.6610	0.4440	0.2440	0.7747	0.3766	0.2066	0.6618
	0.0023	0.4602	0.2123	0.7443	0.5423	0.2490	0.8729	0.4599	0.2116	0.7451
	0.0019	0.5329	0.2487	0.8171	0.6282	0.2975	0.9588	0.5328	0.2476	0.8181
Alt_B_low_2085	0.1250	0.1782	0.1823	0.2002	0.2150	0.2190	0.2412	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2720	0.2520	0.2240	0.3252	0.2084	0.1866	0.2710
	0.0333	0.2612	0.1923	0.3430	0.3118	0.2290	0.4055	0.2603	0.1916	0.3423
	0.0313	0.2641	0.1973	0.3577	0.3151	0.2340	0.4213	0.2632	0.1966	0.3572
	0.0133	0.3244	0.2023	0.5644	0.3837	0.2390	0.6589	0.3239	0.2016	0.5651
	0.0091	0.3743	0.2073	0.6471	0.4411	0.2440	0.7578	0.3740	0.2066	0.6472
	0.0023	0.4511	0.2123	0.7239	0.5318	0.2490	0.8485	0.4503	0.2116	0.7235
	0.0019	0.5311	0.2583	0.8039	0.6265	0.3098	0.9431	0.5310	0.2578	0.8041

Table 101. Stage-Frequency – C-14 West – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_C_2035	0.1250	0.1782	0.1823	0.2002	0.2150	0.2190	0.2411	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2717	0.2519	0.2240	0.3248	0.2083	0.1866	0.2706
	0.0333	0.2608	0.1923	0.3420	0.3113	0.2290	0.4044	0.2599	0.1916	0.3413
	0.0313	0.2636	0.1973	0.3565	0.3146	0.2340	0.4203	0.2628	0.1966	0.3561
	0.0133	0.3236	0.2023	0.5613	0.3829	0.2390	0.6558	0.3230	0.2016	0.5620
	0.0091	0.3729	0.2073	0.6580	0.4397	0.2440	0.7689	0.3726	0.2066	0.6579
	0.0023	0.4622	0.2123	0.7473	0.5433	0.2490	0.8724	0.4612	0.2116	0.7465
	0.0019	0.5294	0.2444	0.8144	0.6247	0.2955	0.9538	0.5292	0.2439	0.8145
Alt_C_h_2085	0.1250	0.1782	0.1824	0.2003	0.2151	0.2191	0.2414	0.1775	0.1816	0.1994
	0.0714	0.2095	0.1874	0.2728	0.2522	0.2241	0.3264	0.2085	0.1866	0.2717
	0.0333	0.2621	0.1924	0.3456	0.3132	0.2291	0.4102	0.2612	0.1916	0.3450
	0.0313	0.2650	0.1974	0.3616	0.3167	0.2341	0.4291	0.2641	0.1966	0.3612
	0.0133	0.3273	0.2024	0.5872	0.3893	0.2391	0.6835	0.3268	0.2016	0.5887
	0.0091	0.3826	0.2074	0.7019	0.4510	0.2441	0.8121	0.3825	0.2066	0.7034
	0.0023	0.4828	0.2124	0.8021	0.5669	0.2491	0.9280	0.4825	0.2116	0.8033
	0.0019	0.5474	0.2281	0.8667	0.6429	0.2818	1.0040	0.5476	0.2267	0.8684
Alt_C_i_2085	0.1250	0.1782	0.1823	0.2002	0.2150	0.2190	0.2412	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2720	0.2520	0.2240	0.3253	0.2084	0.1866	0.2709
	0.0333	0.2612	0.1923	0.3428	0.3119	0.2290	0.4052	0.2603	0.1916	0.3421
	0.0313	0.2640	0.1973	0.3571	0.3151	0.2340	0.4207	0.2631	0.1966	0.3566
	0.0133	0.3240	0.2023	0.5625	0.3833	0.2390	0.6577	0.3234	0.2016	0.5632
	0.0091	0.3736	0.2073	0.6568	0.4407	0.2440	0.7686	0.3733	0.2066	0.6575
	0.0023	0.4606	0.2123	0.7438	0.5415	0.2490	0.8694	0.4603	0.2116	0.7445
	0.0019	0.5329	0.2497	0.8161	0.6280	0.3000	0.9559	0.5328	0.2486	0.8170
Alt_C_low_2085	0.1250	0.1782	0.1823	0.2002	0.2150	0.2190	0.2411	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2719	0.2520	0.2240	0.3251	0.2084	0.1866	0.2708
	0.0333	0.2610	0.1923	0.3424	0.3116	0.2290	0.4048	0.2601	0.1916	0.3417
	0.0313	0.2638	0.1973	0.3569	0.3148	0.2340	0.4204	0.2629	0.1966	0.3565
	0.0133	0.3239	0.2023	0.5618	0.3830	0.2390	0.6566	0.3233	0.2016	0.5625
	0.0091	0.3733	0.2073	0.6632	0.4402	0.2440	0.7783	0.3730	0.2066	0.6632
	0.0023	0.4668	0.2123	0.7568	0.5508	0.2490	0.8890	0.4659	0.2116	0.7561
	0.0019	0.5309	0.2409	0.8208	0.6261	0.2880	0.9643	0.5307	0.2405	0.8209

Table 102. Stage-Frequency – C-14 West – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ALT RO_2035	0.1250	0.1782	0.1823	0.2002	0.2147	0.2187	0.2408	0.1774	0.1816	0.1993
	0.0714	0.2093	0.1873	0.2719	0.2516	0.2237	0.3247	0.2083	0.1866	0.2708
	0.0333	0.2610	0.1923	0.3424	0.3113	0.2287	0.4044	0.2601	0.1916	0.3417
	0.0313	0.2638	0.1973	0.3568	0.3145	0.2337	0.4199	0.2630	0.1966	0.3564
	0.0133	0.3238	0.2023	0.5622	0.3826	0.2387	0.6567	0.3232	0.2016	0.5630
	0.0091	0.3734	0.2073	0.6625	0.4399	0.2437	0.7755	0.3731	0.2066	0.6628
	0.0023	0.4656	0.2123	0.7548	0.5478	0.2487	0.8833	0.4649	0.2116	0.7546
	0.0019	0.5316	0.2424	0.8207	0.6265	0.2910	0.9621	0.5315	0.2418	0.8212
ALT RO_h_2085	0.1250	0.1782	0.1824	0.2003	0.2149	0.2189	0.2412	0.1775	0.1816	0.1994
	0.0714	0.2095	0.1874	0.2734	0.2521	0.2239	0.3270	0.2085	0.1866	0.2724
	0.0333	0.2630	0.1924	0.3473	0.3140	0.2289	0.4104	0.2621	0.1916	0.3467
	0.0313	0.2659	0.1974	0.3623	0.3173	0.2339	0.4258	0.2651	0.1966	0.3620
	0.0133	0.3281	0.2024	0.5777	0.3873	0.2389	0.6744	0.3276	0.2016	0.5790
	0.0091	0.3802	0.2074	0.6145	0.4479	0.2439	0.7239	0.3801	0.2066	0.6155
	0.0023	0.4157	0.2124	0.6500	0.4925	0.2489	0.7685	0.4153	0.2116	0.6507
	0.0019	0.5514	0.3172	0.7857	0.6466	0.3706	0.9226	0.5517	0.3163	0.7871
ALT RO_i_2085	0.1250	0.1782	0.1823	0.2002	0.2147	0.2187	0.2409	0.1774	0.1816	0.1993
	0.0714	0.2094	0.1873	0.2722	0.2517	0.2237	0.3252	0.2084	0.1866	0.2711
	0.0333	0.2614	0.1923	0.3432	0.3119	0.2287	0.4054	0.2605	0.1916	0.3425
	0.0313	0.2643	0.1973	0.3571	0.3151	0.2337	0.4202	0.2634	0.1966	0.3567
	0.0133	0.3241	0.2023	0.5635	0.3829	0.2387	0.6582	0.3235	0.2016	0.5644
	0.0091	0.3740	0.2073	0.5877	0.4407	0.2437	0.6931	0.3738	0.2066	0.5885
	0.0023	0.3985	0.2123	0.6122	0.4737	0.2487	0.7261	0.3983	0.2116	0.6130
	0.0019	0.5349	0.3213	0.7485	0.6296	0.3772	0.8820	0.5349	0.3202	0.7497
ALT RO_low_2085	0.1250	0.1782	0.1823	0.2002	0.2147	0.2187	0.2409	0.1774	0.1816	0.1993
	0.0714	0.2094	0.1873	0.2722	0.2517	0.2237	0.3251	0.2084	0.1866	0.2711
	0.0333	0.2614	0.1923	0.3430	0.3117	0.2287	0.4051	0.2605	0.1916	0.3424
	0.0313	0.2642	0.1973	0.3571	0.3149	0.2337	0.4202	0.2634	0.1966	0.3567
	0.0133	0.3241	0.2023	0.5624	0.3829	0.2387	0.6572	0.3236	0.2016	0.5632
	0.0091	0.3737	0.2073	0.6601	0.4404	0.2437	0.7741	0.3734	0.2066	0.6602
	0.0023	0.4637	0.2123	0.7501	0.5462	0.2487	0.8799	0.4629	0.2116	0.7497
	0.0019	0.5332	0.2467	0.8196	0.6279	0.2942	0.9616	0.5331	0.2463	0.8200

Table 103. Stage-Frequency – Hillsboro Canal – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ECB 2035i	0.1250	0.2222	0.2263	0.2465	0.2553	0.2591	0.2853	0.2219	0.2259	0.2461
	0.0714	0.2566	0.2313	0.3199	0.2977	0.2641	0.3758	0.2562	0.2309	0.3194
	0.0333	0.3056	0.2595	0.3516	0.3581	0.3013	0.4149	0.3051	0.2591	0.3511
	0.0313	0.3057	0.3015	0.3566	0.3582	0.3530	0.4199	0.3052	0.3010	0.3561
	0.0133	0.3084	0.3065	0.5812	0.3617	0.3580	0.6993	0.3079	0.3060	0.5799
	0.0091	0.3918	0.3115	0.7042	0.4649	0.3630	0.8525	0.3911	0.3110	0.7025
	0.0023	0.3937	0.3165	0.7061	0.4682	0.3680	0.8558	0.3930	0.3160	0.7044
	0.0019	0.5054	0.3215	0.8178	0.6066	0.3730	0.9942	0.5044	0.3210	0.8158
FWOP_h_2085	0.1250	0.2233	0.2274	0.2478	0.2565	0.2604	0.2867	0.2219	0.2259	0.2461
	0.0714	0.2580	0.2324	0.3206	0.2991	0.2654	0.3764	0.2562	0.2309	0.3194
	0.0333	0.3057	0.2599	0.3515	0.3582	0.3017	0.4146	0.3051	0.2591	0.3511
	0.0313	0.3059	0.2994	0.3565	0.3584	0.3505	0.4196	0.3052	0.3010	0.3561
	0.0133	0.3102	0.3044	0.5804	0.3635	0.3555	0.6987	0.3079	0.3060	0.5799
	0.0091	0.3922	0.3094	0.7020	0.4653	0.3605	0.8535	0.3911	0.3110	0.7025
	0.0023	0.3966	0.3144	0.7065	0.4740	0.3655	0.8622	0.3930	0.3160	0.7044
	0.0019	0.5061	0.3194	0.8159	0.6082	0.3705	0.9964	0.5044	0.3210	0.8158
FWOP_i_2085	0.1250	0.2222	0.2262	0.2465	0.2553	0.2592	0.2853	0.2219	0.2259	0.2461
	0.0714	0.2566	0.2312	0.3202	0.2978	0.2642	0.3763	0.2562	0.2309	0.3197
	0.0333	0.3059	0.2569	0.3550	0.3588	0.2968	0.4208	0.3055	0.2565	0.3545
	0.0313	0.3063	0.2948	0.3600	0.3593	0.3416	0.4258	0.3058	0.2943	0.3595
	0.0133	0.3138	0.2998	0.5762	0.3708	0.3466	0.6904	0.3133	0.2993	0.5748
	0.0091	0.3921	0.3048	0.6856	0.4652	0.3516	0.8208	0.3913	0.3043	0.6838
	0.0023	0.3943	0.3098	0.6879	0.4695	0.3566	0.8251	0.3934	0.3093	0.6860
	0.0019	0.5057	0.3148	0.7992	0.6070	0.3616	0.9627	0.5046	0.3143	0.7972
FWOP_low_2085	0.1250	0.2222	0.2262	0.2465	0.2554	0.2592	0.2854	0.2219	0.2259	0.2461
	0.0714	0.2566	0.2312	0.3200	0.2978	0.2642	0.3760	0.2562	0.2309	0.3195
	0.0333	0.3057	0.2550	0.3563	0.3583	0.2945	0.4221	0.3052	0.2547	0.3557
	0.0313	0.3061	0.2897	0.3613	0.3590	0.3350	0.4271	0.3057	0.2893	0.3607
	0.0133	0.3169	0.2947	0.5733	0.3746	0.3400	0.6870	0.3163	0.2943	0.5720
	0.0091	0.3920	0.2997	0.6744	0.4651	0.3450	0.8059	0.3912	0.2993	0.6728
	0.0023	0.3947	0.3047	0.6771	0.4689	0.3500	0.8096	0.3939	0.3043	0.6755
	0.0019	0.5056	0.3097	0.7880	0.6069	0.3550	0.9477	0.5045	0.3093	0.7861

Table 104. Stage-Frequency – Hillsboro Canal – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_A_2035	0.1250	0.2199	0.2240	0.2437	0.2515	0.2554	0.2810	0.2199	0.2239	0.2437
	0.0714	0.2536	0.2290	0.3159	0.2931	0.2604	0.3699	0.2535	0.2289	0.3157
	0.0333	0.3020	0.2318	0.3722	0.3526	0.2665	0.4387	0.3018	0.2317	0.3719
	0.0313	0.3042	0.2340	0.3743	0.3553	0.2689	0.4416	0.3040	0.2340	0.3739
	0.0133	0.3491	0.2390	0.5261	0.4109	0.2739	0.6311	0.3488	0.2390	0.5253
	0.0091	0.3858	0.2440	0.5898	0.4566	0.2789	0.7102	0.3853	0.2440	0.5887
	0.0023	0.4455	0.2490	0.6496	0.5303	0.2839	0.7839	0.4448	0.2490	0.6482
	0.0019	0.4997	0.2956	0.7038	0.5996	0.3459	0.8532	0.4991	0.2957	0.7025
Alt_A_h_2085	0.1250	0.2201	0.2241	0.2439	0.2517	0.2555	0.2811	0.2199	0.2239	0.2437
	0.0714	0.2538	0.2291	0.3166	0.2933	0.2605	0.3712	0.2535	0.2289	0.3157
	0.0333	0.3028	0.2318	0.3739	0.3542	0.2669	0.4416	0.3018	0.2317	0.3719
	0.0313	0.3050	0.2339	0.3761	0.3569	0.2705	0.4433	0.3040	0.2340	0.3739
	0.0133	0.3507	0.2389	0.5307	0.4126	0.2755	0.6358	0.3488	0.2390	0.5253
	0.0091	0.3880	0.2439	0.5948	0.4592	0.2805	0.7111	0.3853	0.2440	0.5887
	0.0023	0.4480	0.2489	0.6549	0.5285	0.2855	0.7805	0.4448	0.2490	0.6482
	0.0019	0.5058	0.2989	0.7126	0.6070	0.3550	0.8589	0.4991	0.2957	0.7025
Alt_A_i_2085	0.1250	0.2199	0.2240	0.2438	0.2516	0.2554	0.2810	0.2199	0.2240	0.2437
	0.0714	0.2536	0.2290	0.3160	0.2932	0.2604	0.3700	0.2535	0.2290	0.3158
	0.0333	0.3021	0.2315	0.3727	0.3527	0.2663	0.4391	0.3019	0.2314	0.3724
	0.0313	0.3043	0.2331	0.3755	0.3554	0.2681	0.4427	0.3041	0.2330	0.3751
	0.0133	0.3500	0.2381	0.5301	0.4116	0.2731	0.6358	0.3497	0.2380	0.5294
	0.0091	0.3873	0.2431	0.5967	0.4583	0.2781	0.7197	0.3869	0.2430	0.5956
	0.0023	0.4496	0.2481	0.6590	0.5358	0.2831	0.7972	0.4488	0.2480	0.6576
	0.0019	0.4998	0.2904	0.7093	0.5999	0.3384	0.8613	0.4992	0.2905	0.7079
Alt_A_low_2085	0.1250	0.2199	0.2240	0.2438	0.2515	0.2554	0.2810	0.2199	0.2240	0.2437
	0.0714	0.2536	0.2290	0.3160	0.2931	0.2604	0.3699	0.2535	0.2290	0.3158
	0.0333	0.3020	0.2318	0.3723	0.3526	0.2665	0.4387	0.3019	0.2317	0.3720
	0.0313	0.3042	0.2340	0.3745	0.3553	0.2688	0.4417	0.3040	0.2339	0.3741
	0.0133	0.3493	0.2390	0.5270	0.4110	0.2738	0.6320	0.3490	0.2389	0.5262
	0.0091	0.3861	0.2440	0.6038	0.4569	0.2788	0.7270	0.3857	0.2439	0.6027
	0.0023	0.4572	0.2490	0.6749	0.5445	0.2838	0.8146	0.4566	0.2489	0.6737
	0.0019	0.5000	0.2823	0.7177	0.5993	0.3292	0.8694	0.4993	0.2823	0.7164

Table 105. Stage-Frequency – Hillsboro Canal – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_B_2035	0.1250	0.2199	0.2240	0.2437	0.2515	0.2554	0.2809	0.2199	0.2239	0.2437
	0.0714	0.2536	0.2290	0.3159	0.2931	0.2604	0.3699	0.2535	0.2289	0.3157
	0.0333	0.3020	0.2319	0.3721	0.3526	0.2667	0.4385	0.3018	0.2319	0.3718
	0.0313	0.3042	0.2345	0.3738	0.3552	0.2694	0.4410	0.3040	0.2346	0.3734
	0.0133	0.3487	0.2395	0.5242	0.4105	0.2744	0.6294	0.3484	0.2396	0.5234
	0.0091	0.3850	0.2445	0.5720	0.4559	0.2794	0.6888	0.3846	0.2446	0.5708
	0.0023	0.4308	0.2495	0.6178	0.5122	0.2844	0.7451	0.4300	0.2496	0.6163
	0.0019	0.4997	0.3127	0.6867	0.5995	0.3666	0.8324	0.4990	0.3128	0.6853
Alt_B_h_2085	0.1250	0.2201	0.2241	0.2439	0.2517	0.2555	0.2811	0.2200	0.2241	0.2439
	0.0714	0.2538	0.2291	0.3166	0.2933	0.2605	0.3707	0.2537	0.2291	0.3164
	0.0333	0.3027	0.2317	0.3738	0.3536	0.2666	0.4405	0.3026	0.2317	0.3735
	0.0313	0.3049	0.2339	0.3760	0.3562	0.2694	0.4430	0.3047	0.2339	0.3756
	0.0133	0.3505	0.2389	0.5307	0.4122	0.2744	0.6368	0.3502	0.2389	0.5300
	0.0091	0.3879	0.2439	0.5653	0.4591	0.2794	0.6734	0.3875	0.2439	0.5647
	0.0023	0.4217	0.2443	0.5991	0.4941	0.2798	0.7084	0.4214	0.2442	0.5986
	0.0019	0.5057	0.3283	0.6831	0.6069	0.3926	0.8212	0.5050	0.3278	0.6823
Alt_B_i_2085	0.1250	0.2200	0.2240	0.2438	0.2516	0.2554	0.2810	0.2199	0.2240	0.2437
	0.0714	0.2536	0.2290	0.3160	0.2932	0.2604	0.3700	0.2535	0.2290	0.3158
	0.0333	0.3021	0.2315	0.3727	0.3527	0.2663	0.4391	0.3019	0.2314	0.3724
	0.0313	0.3043	0.2331	0.3754	0.3553	0.2682	0.4425	0.3041	0.2331	0.3750
	0.0133	0.3499	0.2381	0.5298	0.4116	0.2732	0.6354	0.3496	0.2381	0.5291
	0.0091	0.3872	0.2431	0.6033	0.4581	0.2782	0.7257	0.3868	0.2431	0.6024
	0.0023	0.4555	0.2481	0.6716	0.5412	0.2832	0.8087	0.4550	0.2481	0.6706
	0.0019	0.4997	0.2836	0.7159	0.5997	0.3322	0.8672	0.4991	0.2834	0.7147
Alt_B_low_2085	0.1250	0.2200	0.2240	0.2438	0.2515	0.2554	0.2810	0.2199	0.2240	0.2437
	0.0714	0.2536	0.2290	0.3160	0.2931	0.2604	0.3699	0.2535	0.2290	0.3158
	0.0333	0.3021	0.2315	0.3727	0.3526	0.2665	0.4387	0.3019	0.2317	0.3720
	0.0313	0.3043	0.2331	0.3754	0.3553	0.2688	0.4417	0.3040	0.2340	0.3741
	0.0133	0.3499	0.2381	0.5298	0.4110	0.2738	0.6318	0.3489	0.2390	0.5259
	0.0091	0.3872	0.2431	0.6033	0.4568	0.2788	0.7229	0.3856	0.2440	0.5979
	0.0023	0.4555	0.2481	0.6716	0.5410	0.2838	0.8070	0.4525	0.2490	0.6649
	0.0019	0.4997	0.2836	0.7159	0.5994	0.3334	0.8655	0.4990	0.2866	0.7113

Table 106. Stage-Frequency – Hillsboro Canal – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_C_2035	0.1250	0.2207	0.2248	0.2447	0.2515	0.2554	0.2810	0.2205	0.2246	0.2444
	0.0714	0.2547	0.2298	0.3177	0.2931	0.2604	0.3699	0.2543	0.2296	0.3171
	0.0333	0.3037	0.2332	0.3742	0.3526	0.2665	0.4387	0.3031	0.2329	0.3734
	0.0313	0.3058	0.2366	0.3751	0.3553	0.2688	0.4417	0.3053	0.2362	0.3743
	0.0133	0.3502	0.2416	0.5253	0.4110	0.2738	0.6318	0.3495	0.2412	0.5239
	0.0091	0.3865	0.2466	0.6135	0.4568	0.2788	0.7229	0.3856	0.2462	0.6120
	0.0023	0.4675	0.2516	0.6946	0.5410	0.2838	0.8070	0.4666	0.2512	0.6930
	0.0019	0.5008	0.2738	0.7279	0.5994	0.3334	0.8655	0.4995	0.2731	0.7259
Alt_C_h_2085	0.1250	0.2218	0.2259	0.2459	0.2515	0.2554	0.2810	0.2213	0.2254	0.2453
	0.0714	0.2558	0.2309	0.3183	0.2931	0.2604	0.3699	0.2552	0.2304	0.3176
	0.0333	0.3040	0.2336	0.3744	0.3526	0.2665	0.4387	0.3034	0.2331	0.3737
	0.0313	0.3062	0.2353	0.3771	0.3553	0.2688	0.4417	0.3056	0.2349	0.3763
	0.0133	0.3516	0.2403	0.5304	0.4110	0.2738	0.6318	0.3508	0.2399	0.5293
	0.0091	0.3886	0.2453	0.6197	0.4568	0.2788	0.7229	0.3878	0.2449	0.6184
	0.0023	0.4708	0.2503	0.7019	0.5410	0.2838	0.8070	0.4698	0.2499	0.7004
	0.0019	0.5061	0.2750	0.7373	0.5994	0.3334	0.8655	0.5048	0.2742	0.7354
Alt_C_i_2085	0.1250	0.2208	0.2248	0.2448	0.2525	0.2563	0.2822	0.2206	0.2246	0.2445
	0.0714	0.2548	0.2298	0.3179	0.2945	0.2613	0.3723	0.2544	0.2296	0.3172
	0.0333	0.3038	0.2333	0.3744	0.3550	0.2683	0.4416	0.3033	0.2330	0.3736
	0.0313	0.3060	0.2366	0.3754	0.3576	0.2722	0.4429	0.3054	0.2363	0.3745
	0.0133	0.3504	0.2416	0.5254	0.4126	0.2772	0.6310	0.3497	0.2413	0.5241
	0.0091	0.3866	0.2466	0.6130	0.4580	0.2822	0.7384	0.3858	0.2463	0.6116
	0.0023	0.4673	0.2516	0.6936	0.5562	0.2872	0.8367	0.4663	0.2513	0.6921
	0.0019	0.5008	0.2745	0.7271	0.6008	0.3203	0.8812	0.4995	0.2737	0.7253
Alt_C_low_2085	0.1250	0.2207	0.2248	0.2448	0.2524	0.2562	0.2821	0.2205	0.2246	0.2445
	0.0714	0.2547	0.2298	0.3178	0.2944	0.2612	0.3722	0.2544	0.2296	0.3172
	0.0333	0.3038	0.2332	0.3743	0.3548	0.2682	0.4414	0.3032	0.2329	0.3734
	0.0313	0.3059	0.2366	0.3752	0.3574	0.2721	0.4427	0.3053	0.2363	0.3744
	0.0133	0.3503	0.2416	0.5255	0.4124	0.2771	0.6310	0.3495	0.2413	0.5241
	0.0091	0.3866	0.2466	0.6155	0.4579	0.2821	0.7440	0.3857	0.2463	0.6139
	0.0023	0.4693	0.2516	0.6983	0.5609	0.2871	0.8470	0.4683	0.2513	0.6965
	0.0019	0.5010	0.2720	0.7299	0.6009	0.3148	0.8871	0.4997	0.2714	0.7279

Table 107. Stage-Frequency – Hillsboro Canal – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ALT RO_2035	0.1250	0.1359	0.1400	0.1588	0.2515	0.2553	0.2809	0.2199	0.2240	0.2437
	0.0714	0.1683	0.1450	0.2435	0.2931	0.2603	0.3698	0.2535	0.2290	0.3158
	0.0333	0.2362	0.1500	0.3387	0.3525	0.2667	0.4384	0.3019	0.2319	0.3718
	0.0313	0.2396	0.1550	0.3495	0.3552	0.2694	0.4409	0.3040	0.2346	0.3734
	0.0133	0.3105	0.1600	0.5937	0.4104	0.2744	0.6292	0.3484	0.2396	0.5233
	0.0091	0.3695	0.1650	0.6664	0.4558	0.2794	0.7371	0.3846	0.2446	0.6118
	0.0023	0.4377	0.1700	0.7345	0.5548	0.2844	0.8361	0.4661	0.2496	0.6933
	0.0019	0.5582	0.2613	0.8551	0.5992	0.3179	0.8805	0.4990	0.2718	0.7263
ALT RO_h_2085	0.1250	0.1389	0.1430	0.1661	0.2516	0.2555	0.2811	0.2201	0.2241	0.2439
	0.0714	0.1774	0.1480	0.2630	0.2932	0.2605	0.3701	0.2537	0.2291	0.3161
	0.0333	0.2530	0.1530	0.3798	0.3528	0.2664	0.4393	0.3022	0.2316	0.3727
	0.0313	0.2578	0.1580	0.3856	0.3555	0.2686	0.4424	0.3044	0.2336	0.3751
	0.0133	0.3288	0.1630	0.6252	0.4114	0.2736	0.6353	0.3496	0.2386	0.5281
	0.0091	0.3919	0.1680	0.6985	0.4581	0.2786	0.6678	0.3866	0.2436	0.5501
	0.0023	0.4554	0.1730	0.7621	0.4899	0.2802	0.6996	0.4095	0.2460	0.5730
	0.0019	0.6194	0.3127	0.9261	0.6064	0.3967	0.8161	0.5044	0.3409	0.6680
ALT RO_i_2085	0.1250	0.1364	0.1405	0.1605	0.2515	0.2553	0.2809	0.2199	0.2240	0.2437
	0.0714	0.1705	0.1455	0.2490	0.2931	0.2603	0.3699	0.2536	0.2290	0.3158
	0.0333	0.2412	0.1505	0.3464	0.3526	0.2668	0.4384	0.3019	0.2320	0.3719
	0.0313	0.2446	0.1555	0.3555	0.3552	0.2696	0.4408	0.3041	0.2347	0.3735
	0.0133	0.3164	0.1605	0.6002	0.4104	0.2746	0.6301	0.3485	0.2397	0.5237
	0.0091	0.3752	0.1655	0.6268	0.4561	0.2796	0.6509	0.3848	0.2447	0.5389
	0.0023	0.4040	0.1705	0.6555	0.4779	0.2831	0.6728	0.4017	0.2476	0.5558
	0.0019	0.5707	0.3191	0.8222	0.5993	0.4044	0.7941	0.4990	0.3449	0.6531
ALT RO_low_2085	0.1250	0.1361	0.1403	0.1597	0.2515	0.2553	0.2809	0.2199	0.2240	0.2437
	0.0714	0.1694	0.1453	0.2464	0.2931	0.2603	0.3699	0.2535	0.2290	0.3158
	0.0333	0.2390	0.1503	0.3430	0.3526	0.2667	0.4385	0.3019	0.2320	0.3718
	0.0313	0.2423	0.1553	0.3529	0.3552	0.2694	0.4410	0.3040	0.2347	0.3734
	0.0133	0.3138	0.1603	0.5970	0.4105	0.2744	0.6295	0.3484	0.2397	0.5235
	0.0091	0.3726	0.1653	0.6655	0.4559	0.2794	0.7375	0.3847	0.2447	0.6109
	0.0023	0.4382	0.1703	0.7311	0.5550	0.2844	0.8366	0.4651	0.2497	0.6913
	0.0019	0.5644	0.2715	0.8573	0.5991	0.3175	0.8807	0.4989	0.2727	0.7251

Table 108. Stage-Frequency – North New River Canal West – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ECB 2035i	0.1250	0.1419	0.1460	0.1687	0.1755	0.1794	0.2065	0.1432	0.1473	0.1699
	0.0714	0.1797	0.1510	0.2650	0.2194	0.1844	0.3135	0.1810	0.1523	0.2663
	0.0333	0.2556	0.1694	0.3418	0.3008	0.2084	0.3931	0.2570	0.1708	0.3432
	0.0313	0.2570	0.2098	0.3468	0.3023	0.2521	0.3981	0.2584	0.2115	0.3482
	0.0133	0.2877	0.2148	0.6836	0.3349	0.2571	0.7553	0.2888	0.2165	0.6864
	0.0091	0.3979	0.2198	0.8166	0.4519	0.2621	0.8985	0.3997	0.2215	0.8206
	0.0023	0.4056	0.2248	0.8242	0.4618	0.2671	0.9083	0.4074	0.2265	0.8282
	0.0019	0.6006	0.2298	1.0192	0.6633	0.2721	1.1098	0.6038	0.2315	1.0247
FWOP_h_2085	0.1250	0.1532	0.1570	0.1889	0.1939	0.1975	0.2340	0.1545	0.1582	0.1902
	0.0714	0.2036	0.1620	0.3015	0.2507	0.2025	0.3586	0.2049	0.1632	0.3029
	0.0333	0.2824	0.1632	0.4016	0.3363	0.2144	0.4582	0.2839	0.1637	0.4040
	0.0313	0.2864	0.1964	0.4066	0.3399	0.2489	0.4632	0.2878	0.1970	0.4090
	0.0133	0.3292	0.2014	0.7235	0.3876	0.2539	0.8071	0.3308	0.2020	0.7268
	0.0091	0.4340	0.2064	0.8966	0.4983	0.2589	0.9799	0.4361	0.2070	0.9011
	0.0023	0.4981	0.2114	0.9607	0.5600	0.2639	1.0417	0.5008	0.2120	0.9658
	0.0019	0.6785	0.2159	1.1411	0.7472	0.2656	1.2289	0.6826	0.2176	1.1477
FWOP_i_2085	0.1250	0.1432	0.1471	0.1725	0.1784	0.1822	0.2124	0.1445	0.1484	0.1737
	0.0714	0.1846	0.1521	0.2759	0.2265	0.1872	0.3272	0.1858	0.1534	0.2770
	0.0333	0.2646	0.1721	0.3572	0.3120	0.2110	0.4131	0.2659	0.1733	0.3585
	0.0313	0.2663	0.2120	0.3622	0.3140	0.2503	0.4181	0.2675	0.2136	0.3635
	0.0133	0.3015	0.2170	0.6860	0.3553	0.2553	0.7576	0.3026	0.2186	0.6886
	0.0091	0.4064	0.2220	0.8086	0.4632	0.2603	0.8796	0.4080	0.2236	0.8124
	0.0023	0.4172	0.2270	0.8194	0.4766	0.2653	0.8930	0.4189	0.2286	0.8234
	0.0019	0.6176	0.2320	1.0198	0.6811	0.2703	1.0975	0.6209	0.2336	1.0254
FWOP_low_2085	0.1250	0.1425	0.1465	0.1704	0.1766	0.1804	0.2090	0.1445	0.1484	0.1737
	0.0714	0.1819	0.1515	0.2704	0.2225	0.1854	0.3203	0.1858	0.1534	0.2770
	0.0333	0.2604	0.1718	0.3490	0.3065	0.2095	0.4035	0.2659	0.1733	0.3585
	0.0313	0.2619	0.2148	0.3540	0.3082	0.2517	0.4085	0.2675	0.2136	0.3635
	0.0133	0.2924	0.2198	0.6830	0.3448	0.2567	0.7548	0.3026	0.2186	0.6886
	0.0091	0.4011	0.2248	0.8129	0.4570	0.2617	0.8857	0.4080	0.2236	0.8124
	0.0023	0.4081	0.2298	0.8200	0.4672	0.2667	0.8959	0.4189	0.2286	0.8234
	0.0019	0.6069	0.2348	1.0188	0.6702	0.2717	1.0989	0.6209	0.2336	1.0254

Table 109. Stage-Frequency – North New River Canal West – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_A_2035	0.1250	0.1360	0.1402	0.1594	0.1669	0.1709	0.1941	0.1378	0.1419	0.1612
	0.0714	0.1691	0.1452	0.2466	0.2053	0.1759	0.2915	0.1709	0.1469	0.2485
	0.0333	0.2395	0.1502	0.3448	0.2819	0.1809	0.3956	0.2414	0.1519	0.3470
	0.0313	0.2429	0.1552	0.3550	0.2855	0.1859	0.4046	0.2449	0.1569	0.3573
	0.0133	0.3153	0.1602	0.6065	0.3622	0.1909	0.6707	0.3175	0.1619	0.6098
	0.0091	0.3762	0.1652	0.6586	0.4267	0.1959	0.7216	0.3786	0.1669	0.6625
	0.0023	0.4255	0.1702	0.7079	0.4752	0.2009	0.7701	0.4284	0.1719	0.7123
	0.0019	0.5615	0.2791	0.8439	0.6256	0.3306	0.9205	0.5651	0.2812	0.8490
Alt_A_h_2085	0.1250	0.1403	0.1443	0.1711	0.1782	0.1819	0.2134	0.1419	0.1459	0.1728
	0.0714	0.1839	0.1493	0.2817	0.2280	0.1869	0.3345	0.1855	0.1509	0.2834
	0.0333	0.2707	0.1543	0.3961	0.3197	0.1919	0.4595	0.2723	0.1559	0.3976
	0.0313	0.2745	0.1566	0.4011	0.3244	0.1969	0.4645	0.2762	0.1582	0.4026
	0.0133	0.3474	0.1616	0.6484	0.4031	0.2019	0.7270	0.3493	0.1632	0.6516
	0.0091	0.4111	0.1666	0.7388	0.4716	0.2069	0.8172	0.4133	0.1682	0.7430
	0.0023	0.4909	0.1716	0.8186	0.5517	0.2119	0.8974	0.4939	0.1732	0.8236
	0.0019	0.6452	0.3175	0.9729	0.7167	0.3710	1.0623	0.6493	0.3196	0.9790
Alt_A_i_2085	0.1250	0.1371	0.1412	0.1625	0.1693	0.1732	0.1989	0.1388	0.1429	0.1642
	0.0714	0.1730	0.1462	0.2558	0.2112	0.1782	0.3032	0.1747	0.1479	0.2576
	0.0333	0.2476	0.1512	0.3574	0.2917	0.1832	0.4097	0.2494	0.1529	0.3594
	0.0313	0.2511	0.1562	0.3648	0.2954	0.1882	0.4166	0.2529	0.1579	0.3670
	0.0133	0.3245	0.1612	0.6195	0.3735	0.1932	0.6910	0.3266	0.1629	0.6226
	0.0091	0.3862	0.1662	0.6937	0.4402	0.1982	0.7662	0.3884	0.1679	0.6975
	0.0023	0.4552	0.1712	0.7627	0.5087	0.2032	0.8347	0.4581	0.1729	0.7671
	0.0019	0.5759	0.2683	0.8835	0.6417	0.3157	0.9677	0.5795	0.2705	0.8886
Alt_A_low_2085	0.1250	0.1363	0.1405	0.1608	0.1677	0.1717	0.1962	0.1381	0.1422	0.1625
	0.0714	0.1709	0.1455	0.2510	0.2079	0.1767	0.2970	0.1726	0.1472	0.2529
	0.0333	0.2433	0.1505	0.3507	0.2864	0.1817	0.4018	0.2452	0.1522	0.3529
	0.0313	0.2467	0.1555	0.3593	0.2900	0.1867	0.4091	0.2487	0.1572	0.3616
	0.0133	0.3195	0.1605	0.6096	0.3668	0.1917	0.6770	0.3217	0.1622	0.6127
	0.0091	0.3799	0.1655	0.6747	0.4318	0.1967	0.7388	0.3822	0.1672	0.6785
	0.0023	0.4417	0.1705	0.7366	0.4892	0.2017	0.7962	0.4447	0.1722	0.7409
	0.0019	0.5694	0.2746	0.8642	0.6341	0.3271	0.9411	0.5730	0.2768	0.8693

Table 110. Stage-Frequency – North New River Canal West – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_B_2035	0.1250	0.1360	0.1401	0.1592	0.1681	0.1721	0.1952	0.1377	0.1419	0.1610
	0.0714	0.1689	0.1451	0.2460	0.2064	0.1771	0.2921	0.1707	0.1469	0.2479
	0.0333	0.2390	0.1501	0.3433	0.2823	0.1821	0.3945	0.2409	0.1519	0.3455
	0.0313	0.2423	0.1551	0.3523	0.2859	0.1871	0.4024	0.2443	0.1569	0.3546
	0.0133	0.3134	0.1601	0.5965	0.3610	0.1921	0.6634	0.3156	0.1619	0.5996
	0.0091	0.3723	0.1651	0.6548	0.4242	0.1971	0.7249	0.3747	0.1669	0.6586
	0.0023	0.4281	0.1701	0.7106	0.4818	0.2021	0.7825	0.4311	0.1719	0.7150
	0.0019	0.5597	0.2772	0.8422	0.6234	0.3228	0.9241	0.5632	0.2794	0.8471
Alt_B_h_2085	0.1250	0.1390	0.1430	0.1685	0.1773	0.1811	0.2113	0.1406	0.1446	0.1702
	0.0714	0.1808	0.1480	0.2727	0.2253	0.1861	0.3265	0.1824	0.1496	0.2743
	0.0333	0.2614	0.1530	0.3776	0.3116	0.1911	0.4382	0.2630	0.1546	0.3790
	0.0313	0.2649	0.1580	0.3802	0.3156	0.1961	0.4414	0.2666	0.1596	0.3817
	0.0133	0.3390	0.1630	0.6524	0.3950	0.2011	0.7285	0.3409	0.1646	0.6554
	0.0091	0.4061	0.1680	0.7521	0.4661	0.2061	0.8258	0.4082	0.1696	0.7561
	0.0023	0.4911	0.1730	0.8372	0.5501	0.2111	0.9097	0.4941	0.1746	0.8420
	0.0019	0.6377	0.2916	0.9838	0.7093	0.3496	1.0690	0.6418	0.2938	0.9897
Alt_B_i_2085	0.1250	0.1367	0.1408	0.1619	0.1702	0.1741	0.1993	0.1384	0.1425	0.1636
	0.0714	0.1723	0.1458	0.2542	0.2114	0.1791	0.3021	0.1740	0.1475	0.2560
	0.0333	0.2462	0.1508	0.3556	0.2909	0.1841	0.4080	0.2480	0.1525	0.3577
	0.0313	0.2497	0.1558	0.3642	0.2946	0.1891	0.4154	0.2515	0.1575	0.3663
	0.0133	0.3236	0.1608	0.6190	0.3724	0.1941	0.6873	0.3257	0.1625	0.6221
	0.0091	0.3852	0.1658	0.6846	0.4385	0.1991	0.7528	0.3874	0.1675	0.6884
	0.0023	0.4473	0.1708	0.7467	0.4990	0.2041	0.8133	0.4502	0.1725	0.7511
	0.0019	0.5733	0.2739	0.8728	0.6390	0.3247	0.9533	0.5769	0.2760	0.8778
Alt_B_low_2085	0.1250	0.1363	0.1404	0.1603	0.1691	0.1731	0.1970	0.1380	0.1421	0.1621
	0.0714	0.1703	0.1454	0.2496	0.2086	0.1781	0.2966	0.1721	0.1471	0.2515
	0.0333	0.2421	0.1504	0.3488	0.2863	0.1831	0.4005	0.2441	0.1521	0.3510
	0.0313	0.2455	0.1554	0.3578	0.2899	0.1881	0.4075	0.2475	0.1571	0.3601
	0.0133	0.3181	0.1604	0.6077	0.3657	0.1931	0.6731	0.3203	0.1621	0.6108
	0.0091	0.3784	0.1654	0.6670	0.4302	0.1981	0.7312	0.3808	0.1671	0.6709
	0.0023	0.4351	0.1704	0.7236	0.4840	0.2031	0.7849	0.4382	0.1721	0.7283
	0.0019	0.5657	0.2772	0.8543	0.6300	0.3290	0.9309	0.5694	0.2793	0.8594

Table 111. Stage-Frequency – North New River Canal West – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_C_2035	0.1250	0.1358	0.1400	0.1587	0.1672	0.1713	0.1936	0.1376	0.1418	0.1605
	0.0714	0.1681	0.1450	0.2430	0.2045	0.1763	0.2882	0.1699	0.1468	0.2450
	0.0333	0.2358	0.1500	0.3379	0.2789	0.1813	0.3898	0.2378	0.1518	0.3400
	0.0313	0.2392	0.1550	0.3486	0.2824	0.1863	0.3992	0.2411	0.1568	0.3508
	0.0133	0.3098	0.1600	0.5912	0.3577	0.1913	0.6572	0.3119	0.1618	0.5942
	0.0091	0.3684	0.1650	0.6709	0.4200	0.1963	0.7346	0.3707	0.1668	0.6750
	0.0023	0.4430	0.1700	0.7456	0.4930	0.2013	0.8076	0.4462	0.1718	0.7505
	0.0019	0.5548	0.2522	0.8573	0.6185	0.3039	0.9331	0.5582	0.2539	0.8625
Alt_C_h_2085	0.1250	0.1373	0.1414	0.1637	0.1704	0.1743	0.2012	0.1390	0.1430	0.1653
	0.0714	0.1746	0.1464	0.2575	0.2140	0.1793	0.3072	0.1763	0.1480	0.2591
	0.0333	0.2477	0.1514	0.3589	0.2942	0.1843	0.4169	0.2493	0.1530	0.3593
	0.0313	0.2514	0.1564	0.3706	0.2983	0.1893	0.4272	0.2529	0.1580	0.3712
	0.0133	0.3275	0.1614	0.6281	0.3792	0.1943	0.6988	0.3294	0.1630	0.6312
	0.0091	0.3898	0.1664	0.7359	0.4455	0.1993	0.8050	0.3919	0.1680	0.7401
	0.0023	0.4907	0.1714	0.8368	0.5452	0.2043	0.9047	0.4938	0.1730	0.8420
	0.0019	0.6067	0.2606	0.9528	0.6759	0.3163	1.0354	0.6107	0.2625	0.9589
Alt_C_i_2085	0.1250	0.1363	0.1404	0.1602	0.1680	0.1719	0.1962	0.1380	0.1422	0.1619
	0.0714	0.1701	0.1454	0.2477	0.2079	0.1769	0.2950	0.1719	0.1472	0.2496
	0.0333	0.2399	0.1504	0.3438	0.2839	0.1819	0.3962	0.2417	0.1522	0.3458
	0.0313	0.2432	0.1554	0.3531	0.2874	0.1869	0.4044	0.2451	0.1572	0.3553
	0.0133	0.3143	0.1604	0.5943	0.3629	0.1919	0.6611	0.3164	0.1622	0.5973
	0.0091	0.3722	0.1654	0.6774	0.4247	0.1969	0.7445	0.3745	0.1672	0.6812
	0.0023	0.4512	0.1704	0.7564	0.5038	0.2019	0.8236	0.4542	0.1722	0.7608
	0.0019	0.5636	0.2584	0.8687	0.6286	0.3088	0.9484	0.5671	0.2604	0.8737
Alt_C_low_2085	0.1250	0.1361	0.1402	0.1595	0.1677	0.1717	0.1951	0.1378	0.1419	0.1613
	0.0714	0.1692	0.1452	0.2456	0.2065	0.1767	0.2919	0.1710	0.1469	0.2475
	0.0333	0.2381	0.1502	0.3409	0.2814	0.1817	0.3927	0.2400	0.1519	0.3431
	0.0313	0.2414	0.1552	0.3507	0.2850	0.1867	0.4014	0.2433	0.1569	0.3529
	0.0133	0.3121	0.1602	0.5920	0.3600	0.1917	0.6585	0.3143	0.1619	0.5950
	0.0091	0.3702	0.1652	0.6851	0.4221	0.1967	0.7512	0.3725	0.1669	0.6891
	0.0023	0.4574	0.1702	0.7724	0.5087	0.2017	0.8378	0.4606	0.1719	0.7772
	0.0019	0.5591	0.2441	0.8740	0.6225	0.2934	0.9516	0.5625	0.2459	0.8792

Table 112. Stage-Frequency – North New River Canal West – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ALT RO_2035	0.1250	0.1359	0.1400	0.1588	0.1659	0.1699	0.1923	0.1376	0.1418	0.1606
	0.0714	0.1683	0.1450	0.2435	0.2032	0.1749	0.2865	0.1701	0.1468	0.2454
	0.0333	0.2362	0.1500	0.3387	0.2770	0.1799	0.3865	0.2382	0.1518	0.3409
	0.0313	0.2396	0.1550	0.3495	0.2805	0.1849	0.3945	0.2416	0.1568	0.3519
	0.0133	0.3105	0.1600	0.5937	0.3539	0.1899	0.6589	0.3127	0.1618	0.5968
	0.0091	0.3695	0.1650	0.6664	0.4187	0.1949	0.7345	0.3719	0.1668	0.6701
	0.0023	0.4377	0.1700	0.7345	0.4847	0.1999	0.8006	0.4407	0.1718	0.7390
	0.0019	0.5582	0.2613	0.8551	0.6187	0.3028	0.9346	0.5618	0.2636	0.8600
ALT RO_h_2085	0.1250	0.1389	0.1430	0.1661	0.1708	0.1746	0.2029	0.1406	0.1446	0.1678
	0.0714	0.1774	0.1480	0.2630	0.2162	0.1796	0.3114	0.1791	0.1496	0.2648
	0.0333	0.2530	0.1530	0.3798	0.2973	0.1846	0.4243	0.2548	0.1546	0.3821
	0.0313	0.2578	0.1580	0.3856	0.3017	0.1896	0.4297	0.2596	0.1596	0.3881
	0.0133	0.3288	0.1630	0.6252	0.3780	0.1946	0.6943	0.3308	0.1646	0.6282
	0.0091	0.3919	0.1680	0.6985	0.4451	0.1996	0.7720	0.3941	0.1696	0.7020
	0.0023	0.4554	0.1730	0.7621	0.5133	0.2046	0.8402	0.4581	0.1746	0.7660
	0.0019	0.6194	0.3127	0.9261	0.6849	0.3580	1.0119	0.6238	0.3159	0.9317
ALT RO_i_2085	0.1250	0.1364	0.1405	0.1605	0.1668	0.1708	0.1950	0.1381	0.1422	0.1622
	0.0714	0.1705	0.1455	0.2490	0.2066	0.1758	0.2943	0.1722	0.1472	0.2509
	0.0333	0.2412	0.1505	0.3464	0.2835	0.1808	0.3970	0.2431	0.1522	0.3485
	0.0313	0.2446	0.1555	0.3555	0.2871	0.1858	0.4050	0.2465	0.1572	0.3577
	0.0133	0.3164	0.1605	0.6002	0.3631	0.1908	0.6668	0.3185	0.1622	0.6032
	0.0091	0.3752	0.1655	0.6268	0.4264	0.1958	0.7012	0.3775	0.1672	0.6300
	0.0023	0.4040	0.1705	0.6555	0.4613	0.2008	0.7361	0.4065	0.1722	0.6590
	0.0019	0.5707	0.3191	0.8222	0.6330	0.3581	0.9078	0.5744	0.3219	0.8269
ALT RO_low_2085	0.1250	0.1361	0.1403	0.1597	0.1663	0.1703	0.1936	0.1379	0.1420	0.1614
	0.0714	0.1694	0.1453	0.2464	0.2049	0.1753	0.2908	0.1712	0.1470	0.2483
	0.0333	0.2390	0.1503	0.3430	0.2807	0.1803	0.3930	0.2409	0.1520	0.3452
	0.0313	0.2423	0.1553	0.3529	0.2843	0.1853	0.4015	0.2443	0.1570	0.3552
	0.0133	0.3138	0.1603	0.5970	0.3599	0.1903	0.6621	0.3160	0.1620	0.6001
	0.0091	0.3726	0.1653	0.6655	0.4229	0.1953	0.7294	0.3750	0.1670	0.6693
	0.0023	0.4382	0.1703	0.7311	0.4865	0.2003	0.7930	0.4411	0.1720	0.7355
	0.0019	0.5644	0.2715	0.8573	0.6256	0.3191	0.9321	0.5681	0.2738	0.8624

Table 113. Stage-Frequency – Pompano Canal – ECB and FWOP

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ECB 2035i	0.1250	0.1285	0.1315	0.1922	0.2286	0.2312	0.2992	0.1242	0.1271	0.1878
	0.0714	0.2187	0.1365	0.3841	0.3285	0.2362	0.5070	0.2142	0.1321	0.3795
	0.0333	0.3462	0.2108	0.4816	0.4630	0.3293	0.5968	0.3418	0.2051	0.4785
	0.0313	0.3478	0.2946	0.4866	0.4640	0.4326	0.6018	0.3435	0.2871	0.4835
	0.0133	0.3824	0.2996	1.0349	0.4844	0.4376	1.1637	0.3802	0.2921	1.0356
	0.0091	0.5706	0.3046	1.2979	0.6866	0.4426	1.4895	0.5684	0.2971	1.2972
	0.0023	0.5950	0.3096	1.3223	0.7314	0.4476	1.5343	0.5939	0.3021	1.3227
	0.0019	0.9282	0.3146	1.6555	1.0709	0.4526	1.8700	0.9315	0.3071	1.6602
FWOP_h_2085	0.1250	0.1842	0.1865	0.2667	0.3046	0.3067	0.3903	0.1841	0.1864	0.2672
	0.0714	0.3008	0.1915	0.5089	0.4259	0.3117	0.6492	0.3016	0.1914	0.5122
	0.0333	0.4575	0.2527	0.6623	0.5985	0.3358	0.8612	0.4608	0.2625	0.6591
	0.0313	0.4626	0.3384	0.6673	0.6072	0.4303	0.8662	0.4652	0.3514	0.6641
	0.0133	0.5253	0.3434	1.3309	0.6786	0.4353	1.5160	0.5265	0.3564	1.3363
	0.0091	0.7496	0.3484	1.8088	0.9092	0.4403	1.9833	0.7526	0.3614	1.8119
	0.0023	0.9480	0.3534	2.0073	1.1001	0.4453	2.1742	0.9450	0.3664	2.0042
	0.0019	1.1988	0.3584	2.2580	1.3258	0.4503	2.3999	1.1911	0.3714	2.2503
FWOP_i_2085	0.1250	0.1420	0.1448	0.2103	0.2473	0.2498	0.3207	0.1386	0.1413	0.2071
	0.0714	0.2386	0.1498	0.4146	0.3511	0.2548	0.5349	0.2355	0.1463	0.4123
	0.0333	0.3735	0.2356	0.5114	0.4885	0.3495	0.6275	0.3711	0.2318	0.5104
	0.0313	0.3748	0.3328	0.5164	0.4897	0.4510	0.6325	0.3724	0.3285	0.5154
	0.0133	0.4020	0.3378	1.1122	0.5148	0.4560	1.2388	0.4009	0.3335	1.1180
	0.0091	0.6111	0.3428	1.4332	0.7290	0.4610	1.6104	0.6116	0.3385	1.4419
	0.0023	0.6507	0.3478	1.4729	0.8039	0.4660	1.6854	0.6531	0.3435	1.4835
	0.0019	0.9818	0.3528	1.8040	1.1444	0.4710	2.0259	0.9887	0.3485	1.8190
FWOP_low_2085	0.1250	0.1375	0.1404	0.2015	0.2375	0.2400	0.3107	0.1332	0.1361	0.1970
	0.0714	0.2281	0.1454	0.3964	0.3410	0.2450	0.5240	0.2234	0.1411	0.3916
	0.0333	0.3591	0.2209	0.4973	0.4777	0.3389	0.6164	0.3547	0.2153	0.4941
	0.0313	0.3607	0.3084	0.5023	0.4789	0.4391	0.6214	0.3564	0.3015	0.4991
	0.0133	0.3946	0.3134	1.0540	0.5047	0.4441	1.1896	0.3920	0.3065	1.0535
	0.0091	0.5852	0.3184	1.3318	0.7065	0.4491	1.5249	0.5825	0.3115	1.3302
	0.0023	0.6187	0.3234	1.3653	0.7666	0.4541	1.5850	0.6170	0.3165	1.3647
	0.0019	0.9492	0.3284	1.6958	1.1080	0.4591	1.9265	0.9520	0.3215	1.6997

Table 114. Stage-Frequency – Pompano Canal – ALTA

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_A_2035	0.1250	0.1165	0.1196	0.1757	0.2203	0.2231	0.2874	0.1155	0.1186	0.1748
	0.0714	0.2003	0.1246	0.3559	0.3152	0.2281	0.4879	0.1994	0.1236	0.3554
	0.0333	0.3215	0.1520	0.4910	0.4474	0.2744	0.6204	0.3209	0.1502	0.4916
	0.0313	0.3264	0.1699	0.4960	0.4517	0.3141	0.6254	0.3259	0.1657	0.4966
	0.0133	0.4257	0.1749	0.9170	0.5385	0.3191	1.0517	0.4282	0.1707	0.9203
	0.0091	0.5377	0.1799	1.1082	0.6623	0.3241	1.2582	0.5392	0.1757	1.1170
	0.0023	0.6735	0.1849	1.2440	0.7814	0.3291	1.3773	0.6844	0.1807	1.2622
	0.0019	0.8899	0.3193	1.4604	1.0570	0.4611	1.6529	0.8931	0.3153	1.4708
Alt_A_h_2085	0.1250	0.1702	0.1728	0.2433	0.2966	0.2988	0.3813	0.1692	0.1719	0.2422
	0.0714	0.2735	0.1778	0.4679	0.4163	0.3038	0.6409	0.2725	0.1769	0.4674
	0.0333	0.4265	0.1828	0.6759	0.5925	0.3088	0.9271	0.4263	0.1813	0.6713
	0.0313	0.4356	0.2058	0.6809	0.6069	0.3138	0.9321	0.4350	0.2113	0.6763
	0.0133	0.5569	0.2108	1.2099	0.7317	0.3188	1.4203	0.5556	0.2163	1.2050
	0.0091	0.7101	0.2158	1.5393	0.8945	0.3238	1.7524	0.7079	0.2213	1.5293
	0.0023	0.9387	0.2208	1.7678	1.1167	0.3288	1.9746	0.9323	0.2263	1.7536
	0.0019	1.1608	0.3316	1.9900	1.3288	0.4709	2.1867	1.1461	0.3248	1.9674
Alt_A_i_2085	0.1250	0.1346	0.1377	0.1954	0.2387	0.2414	0.3067	0.1334	0.1364	0.1943
	0.0714	0.2206	0.1427	0.3806	0.3350	0.2464	0.5084	0.2196	0.1414	0.3797
	0.0333	0.3453	0.1758	0.5148	0.4666	0.2894	0.6438	0.3443	0.1731	0.5154
	0.0313	0.3499	0.1974	0.5198	0.4713	0.3154	0.6488	0.3490	0.1921	0.5204
	0.0133	0.4486	0.2024	0.9691	0.5721	0.3204	1.1578	0.4506	0.1971	0.9752
	0.0091	0.5699	0.2074	1.1535	0.7127	0.3254	1.3931	0.5720	0.2021	1.1614
	0.0023	0.6867	0.2124	1.2704	0.8513	0.3304	1.5317	0.6935	0.2071	1.2829
	0.0019	0.9372	0.3535	1.5209	1.1249	0.4446	1.8053	0.9413	0.3519	1.5307
Alt_A_low_2085	0.1250	0.1257	0.1287	0.1856	0.2295	0.2322	0.2976	0.1246	0.1277	0.1845
	0.0714	0.2105	0.1337	0.3693	0.3258	0.2372	0.4991	0.2093	0.1327	0.3684
	0.0333	0.3350	0.1625	0.5075	0.4572	0.2846	0.6298	0.3343	0.1605	0.5081
	0.0313	0.3399	0.1828	0.5125	0.4616	0.3210	0.6348	0.3393	0.1784	0.5131
	0.0133	0.4399	0.1878	0.9423	0.5512	0.3260	1.0895	0.4423	0.1834	0.9457
	0.0091	0.5550	0.1928	1.1370	0.6817	0.3310	1.3155	0.5565	0.1884	1.1421
	0.0023	0.6906	0.1978	1.2725	0.8125	0.3360	1.4464	0.6981	0.1934	1.2836
	0.0019	0.9137	0.3318	1.4957	1.0894	0.4556	1.7232	0.9163	0.3308	1.5019

Table 115. Stage-Frequency – Pompano Canal – ALTB

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_B_2035	0.1250	0.1163	0.1194	0.1755	0.2200	0.2228	0.2871	0.1153	0.1184	0.1746
	0.0714	0.2001	0.1244	0.3557	0.3149	0.2278	0.4876	0.1992	0.1234	0.3552
	0.0333	0.3213	0.1522	0.4903	0.4471	0.2746	0.6196	0.3207	0.1503	0.4911
	0.0313	0.3261	0.1697	0.4953	0.4514	0.3153	0.6246	0.3257	0.1652	0.4961
	0.0133	0.4259	0.1747	0.9134	0.5372	0.3203	1.0473	0.4286	0.1702	0.9169
	0.0091	0.5365	0.1797	1.0896	0.6605	0.3253	1.2402	0.5382	0.1752	1.0957
	0.0023	0.6614	0.1847	1.2146	0.7671	0.3303	1.3468	0.6702	0.1802	1.2277
	0.0019	0.8866	0.3335	1.4397	1.0526	0.4729	1.6323	0.8899	0.3323	1.4474
Alt_B_h_2085	0.1250	0.1695	0.1721	0.2426	0.2959	0.2980	0.3805	0.1685	0.1712	0.2415
	0.0714	0.2728	0.1771	0.4643	0.4156	0.3030	0.6380	0.2718	0.1762	0.4639
	0.0333	0.4216	0.1786	0.6647	0.5888	0.3080	0.9236	0.4216	0.1822	0.6611
	0.0313	0.4305	0.2053	0.6697	0.6034	0.3130	0.9286	0.4302	0.2109	0.6661
	0.0133	0.5499	0.2103	1.2050	0.7293	0.3180	1.4061	0.5482	0.2159	1.2012
	0.0091	0.7045	0.2153	1.5549	0.8880	0.3230	1.7406	0.7027	0.2209	1.5486
	0.0023	0.9471	0.2203	1.7975	1.1191	0.3280	1.9717	0.9417	0.2259	1.7876
	0.0019	1.1522	0.3018	2.0026	1.3213	0.4687	2.1738	1.1381	0.2922	1.9840
Alt_B_i_2085	0.1250	0.1343	0.1373	0.1951	0.2382	0.2409	0.3063	0.1331	0.1361	0.1940
	0.0714	0.2204	0.1423	0.3802	0.3345	0.2459	0.5080	0.2193	0.1411	0.3793
	0.0333	0.3449	0.1757	0.5140	0.4661	0.2902	0.6421	0.3438	0.1730	0.5147
	0.0313	0.3495	0.1972	0.5190	0.4708	0.3178	0.6471	0.3486	0.1919	0.5197
	0.0133	0.4480	0.2022	0.9686	0.5697	0.3228	1.1440	0.4500	0.1969	0.9746
	0.0091	0.5694	0.2072	1.1768	0.7076	0.3278	1.3776	0.5715	0.2019	1.1896
	0.0023	0.7069	0.2122	1.3143	0.8462	0.3328	1.5163	0.7182	0.2069	1.3364
	0.0019	0.9313	0.3239	1.5387	1.1174	0.4473	1.7875	0.9354	0.3173	1.5536
Alt_B_low_2085	0.1250	0.1256	0.1286	0.1854	0.2292	0.2319	0.2972	0.1245	0.1276	0.1843
	0.0714	0.2102	0.1336	0.3690	0.3254	0.2369	0.4986	0.2091	0.1326	0.3681
	0.0333	0.3348	0.1621	0.5075	0.4568	0.2846	0.6290	0.3341	0.1603	0.5079
	0.0313	0.3397	0.1825	0.5125	0.4611	0.3212	0.6340	0.3391	0.1782	0.5129
	0.0133	0.4398	0.1875	0.9419	0.5504	0.3262	1.0852	0.4422	0.1832	0.9454
	0.0091	0.5548	0.1925	1.1159	0.6799	0.3312	1.3063	0.5563	0.1882	1.1198
	0.0023	0.6722	0.1975	1.2333	0.8075	0.3362	1.4339	0.6788	0.1932	1.2423
	0.0019	0.9104	0.3493	1.4715	1.0839	0.4575	1.7103	0.9133	0.3498	1.4768

Table 116. Stage-Frequency – Pompano Canal – ALTC

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
Alt_C_2035	0.1250	0.1200	0.1231	0.1792	0.2243	0.2271	0.2919	0.1192	0.1223	0.1783
	0.0714	0.2037	0.1281	0.3597	0.3199	0.2321	0.4933	0.2028	0.1273	0.3589
	0.0333	0.3255	0.1552	0.4958	0.4524	0.2778	0.6269	0.3249	0.1532	0.4966
	0.0313	0.3304	0.1681	0.5008	0.4568	0.3102	0.6319	0.3299	0.1648	0.5016
	0.0133	0.4357	0.1731	0.9195	0.5515	0.3152	1.0666	0.4370	0.1698	0.9248
	0.0091	0.5429	0.1781	1.0901	0.6728	0.3202	1.2579	0.5448	0.1748	1.1006
	0.0023	0.6735	0.1831	1.2207	0.7910	0.3252	1.3761	0.6813	0.1798	1.2371
	0.0019	0.8899	0.3428	1.4371	1.0565	0.4714	1.6416	0.8929	0.3371	1.4487
Alt_C_h_2085	0.1250	0.1542	0.1569	0.2245	0.2660	0.2684	0.3450	0.1554	0.1581	0.2259
	0.0714	0.2537	0.1619	0.4410	0.3777	0.2734	0.5895	0.2551	0.1631	0.4424
	0.0333	0.4012	0.1945	0.6079	0.5455	0.3214	0.7695	0.4022	0.1960	0.6085
	0.0313	0.4072	0.2099	0.6129	0.5514	0.3564	0.7745	0.4082	0.2112	0.6135
	0.0133	0.5350	0.2149	1.1895	0.6777	0.3614	1.4377	0.5357	0.2162	1.1881
	0.0091	0.6860	0.2199	1.4252	0.8620	0.3664	1.7506	0.6862	0.2212	1.4238
	0.0023	0.8423	0.2249	1.5816	1.0412	0.3714	1.9298	0.8431	0.2262	1.5807
	0.0019	1.1163	0.3771	1.8556	1.2802	0.3916	2.1689	1.1052	0.3676	1.8429
Alt_C_i_2085	0.1250	0.1340	0.1370	0.1957	0.2383	0.2409	0.3075	0.1328	0.1358	0.1947
	0.0714	0.2213	0.1420	0.3835	0.3362	0.2459	0.5121	0.2203	0.1408	0.3827
	0.0333	0.3476	0.1769	0.5183	0.4693	0.2907	0.6479	0.3466	0.1745	0.5188
	0.0313	0.3522	0.2021	0.5233	0.4741	0.3180	0.6529	0.3514	0.1971	0.5238
	0.0133	0.4486	0.2071	0.9658	0.5749	0.3230	1.1758	0.4506	0.2021	0.9716
	0.0091	0.5698	0.2121	1.1453	0.7202	0.3280	1.4019	0.5718	0.2071	1.1538
	0.0023	0.6798	0.2171	1.2553	0.8446	0.3330	1.5264	0.6873	0.2121	1.2693
	0.0019	0.9331	0.3575	1.5086	1.1177	0.4360	1.7994	0.9373	0.3553	1.5192
Alt_C_low_2085	0.1250	0.1286	0.1317	0.1885	0.2327	0.2354	0.3010	0.1276	0.1307	0.1874
	0.0714	0.2134	0.1367	0.3726	0.3294	0.2404	0.5034	0.2122	0.1357	0.3716
	0.0333	0.3385	0.1654	0.5116	0.4614	0.2863	0.6365	0.3377	0.1634	0.5121
	0.0313	0.3434	0.1833	0.5166	0.4659	0.3173	0.6415	0.3427	0.1802	0.5171
	0.0133	0.4465	0.1883	0.9408	0.5617	0.3223	1.1169	0.4474	0.1852	0.9455
	0.0091	0.5579	0.1933	1.1119	0.6949	0.3273	1.3363	0.5593	0.1902	1.1216
	0.0023	0.6811	0.1983	1.2350	0.8234	0.3323	1.4648	0.6879	0.1952	1.2502
	0.0019	0.9109	0.3570	1.4649	1.0841	0.4428	1.7255	0.9136	0.3513	1.4759

Table 117. Stage-Frequency – Pompano Canal – ALT RO

	Probability	Structures			Roads			Vehicles		
		depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)	depth (ft)	2.5 confidence level (ft)	97.5 confidence level (ft)
ALT RO_2035	0.1250	0.1359	0.1400	0.1588	0.2245	0.2272	0.2932	0.1273	0.1303	0.1887
	0.0714	0.1683	0.1450	0.2435	0.3216	0.2322	0.4963	0.2142	0.1353	0.3738
	0.0333	0.2362	0.1500	0.3387	0.4540	0.2778	0.6302	0.3373	0.1641	0.5105
	0.0313	0.2396	0.1550	0.3495	0.4586	0.3087	0.6352	0.3424	0.1784	0.5155
	0.0133	0.3105	0.1600	0.5937	0.5548	0.3137	1.0783	0.4475	0.1834	0.9489
	0.0091	0.3695	0.1650	0.6664	0.6780	0.3187	1.2583	0.5603	0.1884	1.1346
	0.0023	0.4377	0.1700	0.7345	0.7854	0.3237	1.3658	0.6968	0.1934	1.2711
	0.0019	0.5582	0.2613	0.8551	1.0707	0.4903	1.6510	0.9180	0.3437	1.4924
ALT RO_h_2085	0.1250	0.1389	0.1430	0.1661	0.3009	0.3030	0.3852	0.1738	0.1763	0.2528
	0.0714	0.1774	0.1480	0.2630	0.4201	0.3080	0.6429	0.2855	0.1813	0.4873
	0.0333	0.2530	0.1530	0.3798	0.5944	0.3130	0.9274	0.4390	0.1944	0.6836
	0.0313	0.2578	0.1580	0.3856	0.6088	0.3180	0.9324	0.4477	0.2207	0.6886
	0.0133	0.3288	0.1630	0.6252	0.7417	0.3230	1.4596	0.5719	0.2257	1.2487
	0.0091	0.3919	0.1680	0.6985	0.9103	0.3280	1.7937	0.7313	0.2307	1.5960
	0.0023	0.4554	0.1730	0.7621	1.1362	0.3330	2.0196	0.9708	0.2357	1.8355
	0.0019	0.6194	0.3127	0.9261	1.3368	0.4534	2.2203	1.1631	0.2984	2.0278
ALT RO_i_2085	0.1250	0.1364	0.1405	0.1605	0.2429	0.2455	0.3140	0.1405	0.1433	0.2061
	0.0714	0.1705	0.1455	0.2490	0.3435	0.2505	0.5222	0.2333	0.1483	0.4033
	0.0333	0.2412	0.1505	0.3464	0.4776	0.2976	0.6576	0.3641	0.1851	0.5432
	0.0313	0.2446	0.1555	0.3555	0.4824	0.3256	0.6626	0.3691	0.2079	0.5482
	0.0133	0.3164	0.1605	0.6002	0.5835	0.3306	1.1692	0.4727	0.2129	1.0076
	0.0091	0.3752	0.1655	0.6268	0.7240	0.3356	1.3830	0.5965	0.2179	1.1836
	0.0023	0.4040	0.1705	0.6555	0.8443	0.3406	1.5032	0.7082	0.2229	1.2953
	0.0019	0.5707	0.3191	0.8222	1.1448	0.4858	1.8037	0.9719	0.3848	1.5591
ALT RO_low_2085	0.1250	0.1361	0.1403	0.1597	0.2320	0.2346	0.3034	0.1347	0.1377	0.1972
	0.0714	0.1694	0.1453	0.2464	0.3329	0.2396	0.5125	0.2232	0.1427	0.3886
	0.0333	0.2390	0.1503	0.3430	0.4678	0.2892	0.6464	0.3527	0.1750	0.5304
	0.0313	0.2423	0.1553	0.3529	0.4724	0.3219	0.6514	0.3576	0.1976	0.5354
	0.0133	0.3138	0.1603	0.5970	0.5691	0.3269	1.1159	0.4601	0.2026	0.9733
	0.0091	0.3726	0.1653	0.6655	0.6993	0.3319	1.3171	0.5776	0.2076	1.1507
	0.0023	0.4382	0.1703	0.7311	0.8170	0.3369	1.4348	0.6975	0.2126	1.2706
	0.0019	0.5644	0.2715	0.8573	1.1134	0.4956	1.7312	0.9427	0.3696	1.5159

Appendix D1.E: HEC-FDA Depth-Damage Functions

Table 118. Depth Damage Function – Structures

Occ_Name	Occ_Description	Cat_Name	Parameter	Start_Data																	
AGR1	Average Agriculture, structure only	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10								
AGR1			S		0	5	10	20	30	35	40	53	58								
AGR1			STL		0	0.01	5	12	18	28	33	43	48								
AGR1			STU		0	9	17	27	36	43	48	60	69								
AGR1			Stage		-0.5	0	1	2	3	5	7	10									
AGR1			C		0	2	13	28	37	44	50	55									
AGR1			CTL		0	0.01	10	22	27	33	44	48									
AGR1			CTU		0	5	22	35	44	50	55	70									
AGR1			Stage		0	2	5	12													
AGR1			O		0	94	96	100													
AGR1			ON		0	22	22	22													
AGR1			Struct	N			0.5		T			95	105	T		10	12	13	T	0	0	0	0
COM1	Average Retail	COM	Stage		-1	0	1	2	3	4	5	6	7	8	9	10					
COM1			S		0	0.03	13.8	22.6	31.4	35.2	42.9	49	54.7	62.7	62.8	62.9					
COM1			STL		0	0.02	7	11.4	14	19.2	28	30.8	33	33.2	39	43.6					
COM1			STU		0	1.9	18	28.9	34.6	43.1	49.2	51.5	62.7	65.4	66.9	69.2					
COM1			Stage		-1	-0.5	0	0.5	1	1.5	2	4	6	8							
COM1			C		0	0.02	0.03	12.3	29	38.4	46.3	70	89	97.9							
COM1			CTL		0	0.01	0.02	8	17.8	27.8	35.5	60	78	94							
COM1			CTU		0	0.03	0.04	18	37.8	45.5	54.5	80	96	99							
COM1			Stage		0	2	5	12													
COM1			O		0	96	98	100													
COM1			ON		0	23	23	23													
COM1			Struct	N			1.14		T			95	105	T		33.3	36	40.7	T	0	0	0	0

COM10	Garage	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10			
COM10			S		0	0.1	0.2	6	8.6	12	17	18	28	28.9	34.5	37.2	42.3	46.2	50			
COM10			STL		0	0.01	0.1	3.3	5.7	7.1	9.4	12	14.6	22	22.9	25	25.7	32.1	37.1			
COM10			STU		0	0.8	1.9	11.2	16.2	21.7	27.3	32.3	39.4	43.7	45.8	58.1	60.8	65.1	68.8			
COM10			Stage		-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
COM10			C		0	0.4	11.7	16.4	21.9	28.9	40.9	57.7	63.3	70.7	79.3	84.3	87.1	87.2				
COM10			CTL		0	0.01	5	10	14	20	30	45	55	60	70	75	80	80.1				
COM10			CTU		0	1	17.5	25	30	38	50	65	75	80	90	95	98	100				
COM10			Stage		0	2	5	12														
COM10			O		0	96	98	100														
COM10			ON		0	23	23	23														
COM10			Struct	N			0.87		T			95	105	T		64	66	67	T		0	0	0	0
COM2	Auto Junk Yard, structure	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
COM2			S		0	5	10	20	30	35	40	53	58										
COM2			STL		0	0.01	5	12	18	28	33	43	48										
COM2			STU		0	9	17	27	36	43	48	60	69										
COM2			Stage		-0.5	0	1	2	3	5	7	10											
COM2			C		0	2	13	28	37	44	50	55											
COM2			CTL		0	0.01	10	22	27	33	44	48											
COM2			CTU		0	5	22	35	44	50	55	70											
COM2			Stage		0	2	5	12														
COM2			O		0	94	96	100														
COM2			ON		0	22	22	22														
COM2			Struct	N			1.14		T			95	105	T		36	37	38	T		0	0	0	0
COM3	Average Personal & Repair Services	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
COM3			S		0	5	10	20	30	35	40	53	58										
COM3			STL		0	0.01	5	12	18	28	33	43	48										
COM3			STU		0	9	17	27	36	43	48	60	69										
COM3			Stage		-0.5	0	1	2	3	5	7	10											
COM3			C		0	2	13	28	37	44	50	55											

COM3			CTL		0	0.01	10	22	27	33	44	48										
COM3			CTU		0	5	22	35	44	50	55	70										
COM3			Stage		0	2	5	12														
COM3			O		0	96	98	100														
COM3			ON		0	23	23	23														
COM3			Struct	N			1.14		T			95	105	T		64	66	67	T		0	0	0	0
COM4	Average Prof/Tech Services	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
COM4			S		0	5	10	20	30	35	40	53	58										
COM4			STL		0	0.01	5	12	18	28	33	43	48										
COM4			STU		0	9	17	27	36	43	48	60	69										
COM4			Stage		-0.5	0	1	2	3	5	7	10											
COM4			C		0	2	13	28	37	44	50	55											
COM4			CTL		0	0.01	10	22	27	33	44	48											
COM4			CTU		0	5	22	35	44	50	55	70											
COM4			Stage		0	2	5	12															
COM4			O		0	96	98	100															
COM4			ON		0	23	23	23															
COM4			Struct	N			0.33		T			95	105	T		10	12	13	T		0	0	0	0
COM5	Bank	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
COM5			S		0	5	10	20	30	35	40	53	58										
COM5			STL		0	0.01	5	12	18	28	33	43	48										
COM5			STU		0	9	17	27	36	43	48	60	69										
COM5			Stage		-0.5	0	1	2	3	5	7	10											
COM5			C		0	2	13	28	37	44	50	55											
COM5			CTL		0	0.01	10	22	27	33	44	48											
COM5			CTU		0	5	22	35	44	50	55	70											
COM5			Stage		0	2	5	12															
COM5			O		0	96	98	100															
COM5			ON		0	23	23	23															
COM5			Struct	N			0.26		T			95	105	T		10	12	13	T		0	0	0	0
COM6	Hospital	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				

COM6			S		0	0.1	0.2	7	12.8	17.5	23.5	28.6	42	50.2	60.4	67.4	72.2	80.1	80.8		
COM6			STL		0	0.01	0.02	3.8	7	10	13.8	18	25.2	35	40	43.2	46	51	56		
COM6			STU		0	0.3	0.8	11.7	18.4	24.8	31.2	40.3	52.2	64.1	69.6	79.8	85.9	86.6	87.5		
COM6			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
COM6			C		0	10.3	14.6	18.4	27	37	53.4	70	79.1	85.6	92.5	95.6	96.3				
COM6			CTL		0	5	10	15	23	30	45	60	70	79	85	90	90.1				
COM6			CTU		0	15	20	25	33	45	60	80	85	90	100	100	100				
COM6			Stage		0	2	5	12													
COM6			O		0	85	89	100													
COM6			ON		0	19	19	19													
COM6			Struct	N			1.06		T			95	105	T		27	28	29	T	0	0	0	0
COM8	Average Recreation Facility	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10								
COM8			S		0	5	10	20	30	35	40	53	58								
COM8			STL		0	0.01	5	12	18	28	33	43	48								
COM8			STU		0	9	17	27	36	43	48	60	69								
COM8			Stage		-0.5	0	1	2	3	5	7	10									
COM8			C		0	2	13	28	37	44	50	55									
COM8			CTL		0	0.01	10	22	27	33	44	48									
COM8			CTU		0	5	22	35	44	50	55	70									
COM8			Stage		0	2	5	12													
COM8			O		0	94	96	100													
COM8			ON		0	22	22	22													
COM8			Struct	N			2.48		T			95	105	T		26	27	28	T	0	0	0	0
COM9	Average Theatre	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10								
COM9			S		0	5	10	20	30	35	40	53	58								
COM9			STL		0	0.01	5	12	18	28	33	43	48								
COM9			STU		0	9	17	27	36	43	48	60	69								
COM9			Stage		-0.5	0	1	2	3	5	7	10									
COM9			C		0	2	13	28	37	44	50	55									
COM9			CTL		0	0.01	10	22	27	33	44	48									
COM9			CTU		0	5	22	35	44	50	55	70									

COM9			Stage		0	2	5	12													
COM9			O		0	96	98	100													
COM9			ON		0	23	23	23													
COM9			Struct	N			1.14		T			95	105	T		6	7	8	T	0	0	0	0
EDU1	Average school	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
EDU1			S		0	0.1	0.2	7.6	11.8	15.3	22.9	28.2	35.6	38.8	40.3	40.6	48	49.5	50.6				
EDU1			STL		0	0.01	0.02	4.1	8.9	11	14.7	21.1	27.6	33.9	33.9	33.9	36.7	41.7	44.4				
EDU1			STU		0	0.4	1	12.9	20.8	25.8	31.4	38.8	46.7	51.7	51.7	60.6	72.5	73.3	74.6				
EDU1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
EDU1			C		0	14.3	21.7	26.6	30.4	39	45	47.9	51.9	55.7	59.3	60.6	63.4						
EDU1			CTL		0	10	15	20	25	30	40	45	50	55	58	59	60						
EDU1			CTU		0	20	25	33	40	50	55	66	72.5	75	85	90	90.1						
EDU1			Stage		0	2	5	12															
EDU1			O		0	96	98	100															
EDU1			ON		0	23	23	23															
EDU1			Struct	N			0.59		T			95	105	T		6	7	8	T	0	0	0	0
EDU2	Average college/university	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
EDU2			S		0	0.1	0.2	7.6	11.8	15.3	22.9	28.2	35.6	38.8	40.3	40.6	48	49.5	50.6				
EDU2			STL		0	0.01	0.02	4.1	8.9	11	14.7	21.1	27.6	33.9	33.9	33.9	36.7	41.7	44.4				
EDU2			STU		0	0.4	1	12.9	20.8	25.8	31.4	38.8	46.7	51.7	51.7	60.6	72.5	73.3	74.6				
EDU2			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
EDU2			C		0	14.3	21.7	26.6	30.4	39	45	47.9	51.9	55.7	59.3	60.6	63.4						
EDU2			CTL		0	10	15	20	25	30	40	45	50	55	58	59	60						
EDU2			CTU		0	20	25	33	40	50	55	66	72.5	75	85	90	90.1						
EDU2			Stage		0	2	5	12															
EDU2			O		0	96	98	100															
EDU2			ON		0	23	23	23															
EDU2			Struct	N			0.59		T			95	105	T		6	7	8	T	0	0	0	0
ESSM	Medium Voltage (230 KV) Substation	UTIL	Stage		-0.5	0	0.5	1	2	3	5	7	10										
ESSM			S		0	5	10	20	30	35	40	53	58										

ESSM			STL		0	0.01	5	12	18	28	33	43	48									
ESSM			STU		0	9	17	27	36	43	48	60	69									
ESSM			Stage		-0.5	0	1	2	3	5	7	10										
ESSM			C		0	2	13	28	37	44	50	55										
ESSM			CTL		0	0.01	10	22	27	33	44	48										
ESSM			CTU		0	5	22	35	44	50	55	70										
ESSM			Stage		0	2	5	12														
ESSM			O		0	85	89	100														
ESSM			ON		0	19	19	19														
ESSM			Struct	N			0.75		T			95	105	T	0	0	0	T	0	0	0	0	
GOV1	Average government services	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10									
GOV1			S		0	5	10	20	30	35	40	53	58									
GOV1			STL		0	0.01	5	12	18	28	33	43	48									
GOV1			STU		0	9	17	27	36	43	48	60	69									
GOV1			Stage		-0.5	0	1	2	3	5	7	10										
GOV1			C		0	2	13	28	37	44	50	55										
GOV1			CTL		0	0.01	10	22	27	33	44	48										
GOV1			CTU		0	5	22	35	44	50	55	70										
GOV1			Stage		0	2	5	12														
GOV1			O		0	96	98	100														
GOV1			ON		0	23	23	23														
GOV1			Struct	N			2.44		T			95	105	T	56	69	73	T	0	0	0	0	
IND1	Average heavy industrial	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10			
IND1			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1			
IND1			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41			
IND1			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4			
IND1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10					
IND1			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95					
IND1			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90					
IND1			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100					

IND1			Stage		0	2	5	12														
IND1			O		0	94	96	100														
IND1			ON		0	22	22	22														
IND1			Struct	N			1.35		T			95	105	T		34	38	41	T		0	0	0	0
IND2	Average light industrial	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
IND2			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1				
IND2			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41				
IND2			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4				
IND2			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
IND2			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95						
IND2			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90						
IND2			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100						
IND2			Stage		0	2	5	12														
IND2			O		0	94	96	100														
IND2			ON		0	22	22	22														
IND2			Struct	N			1.35		T			95	105	T		34	38	41	T		0	0	0	0
IND3	Average Food/Drug/Chem	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
IND3			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1				
IND3			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41				
IND3			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4				
IND3			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
IND3			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95						
IND3			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90						
IND3			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100						
IND3			Stage		0	2	5	12														
IND3			O		0	94	96	100														
IND3			ON		0	22	22	22														
IND3			Struct	N			0.3		T			95	105	T		34	38	41	T		0	0	0	0
IND4	Average Metals/Minerals processing	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				

IND4			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1		
IND4			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41		
IND4			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4		
IND4			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
IND4			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95				
IND4			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90				
IND4			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100				
IND4			Stage		0	2	5	12													
IND4			O		0	94	96	100													
IND4			ON		0	22	22	22													
IND4			Struct	N			1.35		T			95	105	T		34	38	41	T	0	0	0	0
IND5	Average High Technology	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
IND5			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1		
IND5			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41		
IND5			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4		
IND5			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
IND5			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95				
IND5			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90				
IND5			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100				
IND5			Stage		0	2	5	12													
IND5			O		0	94	96	100													
IND5			ON		0	22	22	22													
IND5			Struct	N			1.35		T			95	105	T		34	38	41	T	0	0	0	0
PWTM	Medium Water Treatment Plant (50-200 MGD)	UTIL	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
PWTM			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1		
PWTM			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41		
PWTM			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4		
PWTM			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
PWTM			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95				
PWTM			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90				

PWTM			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100					
PWTM			Stage		0	2	5	12														
PWTM			O		0	94	96	100														
PWTM			ON		0	22	22	22														
PWTM			Struct	N			0.75		T		95	105	T	0	0	0	T	0	0	0		0
REL1	Church	COM	Stage		-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
REL1			S		0	0	8	13	18	24	28	40	45	51	56	60	64	66				
REL1			STL		0	0	4.6	10	13	17	22	29	38	43	47	52	56	60				
REL1			STU		0	1.4	13	19	26	33	41	51	58	62	72	75	76	78				
REL1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10					
REL1			C		0	20	29	41	48	60	69	76	81	88	94	97	97					
REL1			CTL		0	15	25	35	43	50	61	68	75	79	88	90	93					
REL1			CTU		0	25	35	48	56	68	78	85	90	94	99	99.9	100					
REL1			Stage		0	2	5	12														
REL1			O		0	96	98	100														
REL1			ON		0	23	23	23														
REL1			Struct	N			2.26		T		95	105	T	5	7	8	T	0	0	0		0
RES1-1SNB	Res 1, 1 Story no Basement	RES	Stage		-1	-0.5	0	0.5	1	2	3	5	7	10								
RES1-1SNB			S		0	0.1	1	10	18	28	33	42	55	65								
RES1-1SNB			STL		0	0.01	0.02	6	10	16	20	30	42	55								
RES1-1SNB			STU		0	5	10	20	30	40	45	60	94	100								
RES1-1SNB			Stage		-0.5	0	0.5	1	2	3	5	7	10									
RES1-1SNB			C		0	0.1	20	40	60	80	90	99.8	99.9									
RES1-1SNB			CTL		0	0.01	5	18	34	60	80	99.7	99.8									
RES1-1SNB			CTU		0	5	30	60	84	100	100	100	100									
RES1-1SNB			Stage		0	2	5	12														
RES1-1SNB			O		0	87	94	100														
RES1-1SNB			ON		0	14	15	15														
RES1-1SNB			Struct	N			0.61		T		85	110	N	43.4	25		T	0	0	0		0
RES1-2SNB	Res 1, 2 Story no Basement	RES	Stage		-2	-1	-0.5	0	0.5	1	2	3	5	7	10							
RES1-2SNB			S		0	0.1	1	5	10	15	20	25	30	50	60							

RES1-2SNB			STL		0	0	0.01	0.02	5	9	15	20	25	40	50					
RES1-2SNB			STU		0	2	3	8	10.1	20	25	30	40	55	70					
RES1-2SNB			Stage		-1	-0.5	0	0.5	1	2	3	5	7	10						
RES1-2SNB			C		0	0.1	5	12	25	35	45	55	70	80						
RES1-2SNB			CTL		0	0.01	0.02	5	15	25	32	40	50	60						
RES1-2SNB			CTU		0	3	8	20	30	40	60	80	100	100						
RES1-2SNB			Stage		0	2	5	12												
RES1-2SNB			O		0	87	94	100												
RES1-2SNB			ON		0	14	15	15												
RES1-2SNB			Struct	N			0.46		T		85	110	N	40.2	25.9		T	0	0	0	0
RES2	Mobile home	RES	Stage		-1.1	-1	-0.5	0	0.5	1	2	3	4							
RES2			S		0	6.4	7.3	9.9	43.4	44.7	97.6	97.6	97.6							
RES2			STL		0	6.1	6.9	9.4	41.2	42.5	92.7	92.7	92.7							
RES2			STU		0	8.6	9.8	13.4	58.6	60.3	99.9	99.9	99.9							
RES2			Stage		-0.5	0	0.5	1	2	3	4									
RES2			C		0	95	96	97	98	99	99.5									
RES2			CTL		0	90	92	94	96	98	99.1									
RES2			CTU		0	99.9	99.9	99.9	99.9	99.9	100									
RES2			Stage		0	2	5	12												
RES2			O		0	85	92	100												
RES2			ON		0	15	15	15												
RES2			Struct	N			2		T		85	110	N	63.6	37.8		T	0	0	0	0
RES3C	Condominium, living area on multiple floors	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10							
RES3C			S		0	5	8	20	28	28.1	38	46	50							
RES3C			STL		0	0.01	5	7	10	18	20	35	35.1							
RES3C			STU		0	8	12	25	29	30	44	50	60							
RES3C			Stage		-0.5	0	0.5	1	2	3	5	7	10							
RES3C			C		0	2	10	15	20	25	30	35	45							
RES3C			CTL		0	1	5	8	15	20	25	30	37							
RES3C			CTU		0	8	15	20	25	30	32	40	50							
RES3C			Stage		0	2	5	12												

RES3C			O		0	81	89	100													
RES3C			ON		0	8	8	9													
RES3C			Struct	N			0.7		T			85	110	N	43.4	25		T	0	0	0	0
RES3E	Condominium, living area on multiple floors	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10								
RES3E			S		0	5	8	20	28	28.1	38	46	50								
RES3E			STL		0	0.01	5	7	10	18	20	35	35.1								
RES3E			STU		0	8	12	25	29	30	44	50	60								
RES3E			Stage		-0.5	0	0.5	1	2	3	5	7	10								
RES3E			C		0	2	10	15	20	25	30	35	45								
RES3E			CTL		0	1	5	8	15	20	25	30	37								
RES3E			CTU		0	8	15	20	25	30	32	40	50								
RES3E			Stage		0	2	5	12													
RES3E			O		0	81	89	100													
RES3E			ON		0	8	8	9													
RES3E			Struct	N			0.54		T			85	110	N	43.4	25		T	0	0	0	0
RES4	Average Hotel, & Motel	COM	Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
RES4			S		0	6	8.6	12	17	18	28	30.9	30.9	35	38.5	43.2	46				
RES4			STL		0	3.3	5.7	7.3	9.7	12.1	15	22.9	22.9	24.3	24.3	29.4	34.9				
RES4			STU		0	11.2	16.2	21.2	26.2	31.6	38	44	44	55.8	57.8	61.2	64.6				
RES4			Stage		-0.5	0	0.5	1	2	3	4	5	6	7	8	9	10				
RES4			C		0	0.02	11.8	16.1	26.3	34.1	39.7	48.7	58.4	58.4	61.3	63.1	64.9				
RES4			CTL		0	0.01	6	10	20	28	33	40	50	50	55	58	60				
RES4			CTU		0	0.03	15	20	31	40	45	55	66	66	75	80	80.1				
RES4			Stage		0	2	5	12													
RES4			O		0	81	89	100													
RES4			ON		0	8	8	9													
RES4			Struct	N			1.39		T			95	105	T	14	15	16	T	0	0	0	0
RES5	Institutional Dormitory	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10								
RES5			S		0	5	10	20	30	35	40	53	58								

RES5			STL		0	0.01	5	12	18	28	33	43	48								
RES5			STU		0	9	17	27	36	43	48	60	69								
RES5			Stage		-0.5	0	1	2	3	5	7	10									
RES5			C		0	2	13	28	37	44	50	55									
RES5			CTL		0	0.01	10	22	27	33	44	48									
RES5			CTU		0	5	22	35	44	50	55	70									
RES5			Stage		0	2	5	12													
RES5			O		0	81	89	100													
RES5			ON		0	8	8	9													
RES5			Struct	N			0.16		T			85	110	T	8	10	11	T	0	0	0	0
RES6	Nursing Home	RES	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
RES6			S		0	0.1	0.2	7	12.8	17.5	23.5	28.6	42	50.2	60.4	67.4	72.2	80.1	80.8		
RES6			STL		0	0.01	0.02	3.8	7	10	13.8	18	25.2	35	40	43.2	46	51	56		
RES6			STU		0	0.3	0.8	11.7	18.4	24.8	31.2	40.3	52.2	64.1	69.6	79.8	85.9	86.6	87.5		
RES6			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
RES6			C		0	10.3	14.6	18.4	27	37	53.4	70	79.1	85.6	92.5	95.6	96.3				
RES6			CTL		0	5	10	15	23	30	45	60	70	79	85	90	90.1				
RES6			CTU		0	15	20	25	33	45	60	80	85	90	100	100	100				
RES6			Stage		0	2	5	12													
RES6			O		0	85	89	100													
RES6			ON		0	19	19	19													
RES6			Struct	N			0.27		T			85	110	T	27	28	29	T	0	0	0	0
WWTM	Medium Waste Water Treatment Plant (50-200 MGD)	UTIL	Stage		-0.5	0	0.5	1	2	3	5	7	10								
WWTM			S		0	5	10	20	30	35	40	53	58								
WWTM			STL		0	0.01	5	12	18	28	33	43	48								
WWTM			STU		0	9	17	27	36	43	48	60	69								
WWTM			Stage		-0.5	0	1	2	3	5	7	10									
WWTM			C		0	2	13	28	37	44	50	55									
WWTM			CTL		0	0.01	10	22	27	33	44	48									
WWTM			CTU		0	5	22	35	44	50	55	70									

WWTM			Stage		0	2	5	12													
WWTM			O		0	85	89	100													
WWTM			ON		0	19	19	19													
WWTM			Struct	N			0.75		T			95	105	T	0	0	0	T	0	0	0	0
C-AGR1	Average Agriculture, structure only	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-AGR1			S		0	5	10	20	30	35	40	53	58								
C-AGR1			STL		0	0.01	5	12	18	28	33	43	48								
C-AGR1			STU		0	9	17	27	36	43	48	60	69								
C-AGR1			Stage		-0.5	0	1	2	3	5	7	10									
C-AGR1			C		0	2	13	28	37	44	50	55									
C-AGR1			CTL		0	0.01	10	22	27	33	44	48									
C-AGR1			CTU		0	5	22	35	44	50	55	70									
C-AGR1			Stage		0	2	5	12													
C-AGR1			O		0	94	96	100													
C-AGR1			ON		0	22	22	22													
C-AGR1			Struct	N			0.33		T			95	105	T	10	12	13	T	0	0	0	0
C-COM1	Average Retail, structure only	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
C-COM1			S		0	0.02	0.03	7	9.6	12.8	18.4	20	32	34.9	39.5	42	45.5	50.2	52		
C-COM1			STL		0	0.01	0.02	4.4	7	8.8	11.4	14	19.2	28	30.8	33	33.2	39	43.6		
C-COM1			STU		0	0.9	1.9	12.3	18	23.5	28.9	34.6	43.1	49.2	51.5	62.7	65.4	66.9	69.2		
C-COM1			Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
C-COM1			C		0	0.02	0.03	12.3	29	38.4	46.3	55.4	70	79	89	95.7	97.9	98	99.3		
C-COM1			CTL		0	0.01	0.02	8	17.8	27.8	35.5	48	60	67.5	78	88	94	94.1	96		
C-COM1			CTU		0	0.03	0.04	18	37.8	45.5	54.5	65	80	85	96	98	99	99.9	100		
C-COM1			Stage		0	2	5	12													
C-COM1			O		0	96	98	100													
C-COM1			ON		0	23	23	23													
C-COM1			Struct	N			0.33		T			95	105	T	33.3	36	40.7	T	0	0	0	0
C-COM10	Garage	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
C-COM10			S		0	0.1	0.2	6	8.6	12	17	18	28	28.9	34.5	37.2	42.3	46.2	50		

C-COM10			STL		0	0.01	0.1	3.3	5.7	7.1	9.4	12	14.6	22	22.9	25	25.7	32.1	37.1			
C-COM10			STU		0	0.8	1.9	11.2	16.2	21.7	27.3	32.3	39.4	43.7	45.8	58.1	60.8	65.1	68.8			
C-COM10			Stage		-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-COM10			C		0	0.4	11.7	16.4	21.9	28.9	40.9	57.7	63.3	70.7	79.3	84.3	87.1	87.2				
C-COM10			CTL		0	0.01	5	10	14	20	30	45	55	60	70	75	80	80.1				
C-COM10			CTU		0	1	17.5	25	30	38	50	65	75	80	90	95	98	100				
C-COM10			Stage		0	2	5	12														
C-COM10			O		0	96	98	100														
C-COM10			ON		0	23	23	23														
C-COM10			Struct	N			0.33		T			95	105	T		64	66	67	T	0	0	0	0
C-COM2	Auto Junk Yard, structure	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-COM2			S		0	5	10	20	30	35	40	53	58										
C-COM2			STL		0	0.01	5	12	18	28	33	43	48										
C-COM2			STU		0	9	17	27	36	43	48	60	69										
C-COM2			Stage		-0.5	0	1	2	3	5	7	10											
C-COM2			C		0	2	13	28	37	44	50	55											
C-COM2			CTL		0	0.01	10	22	27	33	44	48											
C-COM2			CTU		0	5	22	35	44	50	55	70											
C-COM2			Stage		0	2	5	12														
C-COM2			O		0	94	96	100														
C-COM2			ON		0	22	22	22														
C-COM2			Struct	N			0.33		T			95	105	T		36	37	38	T	0	0	0	0
C-COM4	Average Prof/Tech Services	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-COM4			S		0	5	10	20	30	35	40	53	58										
C-COM4			STL		0	0.01	5	12	18	28	33	43	48										
C-COM4			STU		0	9	17	27	36	43	48	60	69										
C-COM4			Stage		-0.5	0	1	2	3	5	7	10											
C-COM4			C		0	2	13	28	37	44	50	55											
C-COM4			CTL		0	0.01	10	22	27	33	44	48											
C-COM4			CTU		0	5	22	35	44	50	55	70											

C-COM4			Stage		0	2	5	12														
C-COM4			O		0	96	98	100														
C-COM4			ON		0	23	23	23														
C-COM4			Struct	N			0.33		T			95	105	T		10	12	13	T		0	0	0	0
C-COM5	Bank	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-COM5			S		0	5	10	20	30	35	40	53	58										
C-COM5			STL		0	0.01	5	12	18	28	33	43	48										
C-COM5			STU		0	9	17	27	36	43	48	60	69										
C-COM5			Stage		-0.5	0	1	2	3	5	7	10											
C-COM5			C		0	2	13	28	37	44	50	55											
C-COM5			CTL		0	0.01	10	22	27	33	44	48											
C-COM5			CTU		0	5	22	35	44	50	55	70											
C-COM5			Stage		0	2	5	12														
C-COM5			O		0	96	98	100														
C-COM5			ON		0	23	23	23														
C-COM5			Struct	N			0.33		T			95	105	T		10	12	13	T		0	0	0	0
C-COM6	Hospital	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-COM6			S		0	0.1	0.2	7	12.8	17.5	23.5	28.6	42	50.2	60.4	67.4	72.2	80.1	80.8				
C-COM6			STL		0	0.01	0.02	3.8	7	10	13.8	18	25.2	35	40	43.2	46	51	56				
C-COM6			STU		0	0.3	0.8	11.7	18.4	24.8	31.2	40.3	52.2	64.1	69.6	79.8	85.9	86.6	87.5				
C-COM6			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
C-COM6			C		0	10.3	14.6	18.4	27	37	53.4	70	79.1	85.6	92.5	95.6	96.3						
C-COM6			CTL		0	5	10	15	23	30	45	60	70	79	85	90	90.1						
C-COM6			CTU		0	15	20	25	33	45	60	80	85	90	100	100	100						
C-COM6			Stage		0	2	5	12														
C-COM6			O		0	85	89	100														
C-COM6			ON		0	19	19	19														
C-COM6			Struct	N			0.33		T			95	105	T		27	28	29	T		0	0	0	0
C-COM8	Average Recreation Facility	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-COM8			S		0	5	10	20	30	35	40	53	58										
C-COM8			STL		0	0.01	5	12	18	28	33	43	48										

C-COM8			STU		0	9	17	27	36	43	48	60	69								
C-COM8			Stage		-0.5	0	1	2	3	5	7	10									
C-COM8			C		0	2	13	28	37	44	50	55									
C-COM8			CTL		0	0.01	10	22	27	33	44	48									
C-COM8			CTU		0	5	22	35	44	50	55	70									
C-COM8			Stage		0	2	5	12													
C-COM8			O		0	94	96	100													
C-COM8			ON		0	22	22	22													
C-COM8			Struct	N			0.33		T			95	105	T	26	27	28	T	0	0	0	0
C-COM9	Average Theatre	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-COM9			S		0	5	10	20	30	35	40	53	58								
C-COM9			STL		0	0.01	5	12	18	28	33	43	48								
C-COM9			STU		0	9	17	27	36	43	48	60	69								
C-COM9			Stage		-0.5	0	1	2	3	5	7	10									
C-COM9			C		0	2	13	28	37	44	50	55									
C-COM9			CTL		0	0.01	10	22	27	33	44	48									
C-COM9			CTU		0	5	22	35	44	50	55	70									
C-COM9			Stage		0	2	5	12													
C-COM9			O		0	96	98	100													
C-COM9			ON		0	23	23	23													
C-COM9			Struct	N			0.33		T			95	105	T	6	7	8	T	0	0	0	0
C-EDU1	Average school	COM	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10		
C-EDU1			S		0	0.1	0.2	7.6	11.8	15.3	22.9	28.2	35.6	38.8	40.3	40.6	48	49.5	50.6		
C-EDU1			STL		0	0.01	0.02	4.1	8.9	11	14.7	21.1	27.6	33.9	33.9	33.9	36.7	41.7	44.4		
C-EDU1			STU		0	0.4	1	12.9	20.8	25.8	31.4	38.8	46.7	51.7	51.7	60.6	72.5	73.3	74.6		
C-EDU1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-EDU1			C		0	14.3	21.7	26.6	30.4	39	45	47.9	51.9	55.7	59.3	60.6	63.4				
C-EDU1			CTL		0	10	15	20	25	30	40	45	50	55	58	59	60				
C-EDU1			CTU		0	20	25	33	40	50	55	66	72.5	75	85	90	90.1				
C-EDU1			Stage		0	2	5	12													
C-EDU1			O		0	96	98	100													
C-EDU1			ON		0	23	23	23													

C-EDU1			Struct	N			0.33		T			95	105	T		6	7	8	T	0	0	0	0
C-GOV1	Average government services	COM	Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-GOV1			S		0	5	10	20	30	35	40	53	58										
C-GOV1			STL		0	0.01	5	12	18	28	33	43	48										
C-GOV1			STU		0	9	17	27	36	43	48	60	69										
C-GOV1			Stage		-0.5	0	1	2	3	5	7	10											
C-GOV1			C		0	2	13	28	37	44	50	55											
C-GOV1			CTL		0	0.01	10	22	27	33	44	48											
C-GOV1			CTU		0	5	22	35	44	50	55	70											
C-GOV1			Stage		0	2	5	12															
C-GOV1			O		0	96	98	100															
C-GOV1			ON		0	23	23	23															
C-GOV1			Struct	N			0.33		T			95	105	T		56	69	73	T	0	0	0	0
C-IND1	Average heavy industrial	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-IND1			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1				
C-IND1			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41				
C-IND1			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4				
C-IND1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
C-IND1			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95						
C-IND1			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90						
C-IND1			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100						
C-IND1			Stage		0	2	5	12															
C-IND1			O		0	94	96	100															
C-IND1			ON		0	22	22	22															
C-IND1			Struct	N			0.33		T			95	105	T		34	38	41	T	0	0	0	0
C-IND2	Average light industrial	IND	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-IND2			S		0	0.1	0.2	6.2	8.9	12.4	17.4	19.8	29	31.8	36.7	37.1	45.3	51.4	53.1				
C-IND2			STL		0	0.01	0.02	3.4	6	7.8	10.4	13	16.2	24.4	26	27	29.2	36	41				
C-IND2			STU		0	0.7	1.9	11.3	16.8	22.6	28.4	35.2	40.2	46.7	49.1	60.6	64.7	68.1	70.4				

C-IND2			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-IND2			C		0	12.1	19.3	26.6	31	42.3	52.3	60.7	72	82.1	90.7	94.3	95				
C-IND2			CTL		0	5	12	20	25	33	40	50	60	75	80	85	90				
C-IND2			CTU		0	18	25	35	45	50	66	70	80	90	96	99.9	100				
C-IND2			Stage		0	2	5	12													
C-IND2			O		0	94	96	100													
C-IND2			ON		0	22	22	22													
C-IND2			Struct	N			0.33		T		95	105	T	34	38	41	T	0	0	0	0
C-IND3	Average Food/Drug/Chem	IND	Stage		-1	-0.5	0	0.5	1	2	3	5	7	10							
C-IND3			S		0	0.1	0.2	6.2	8.9	17.4	19.8	31.8	37.1	53.1							
C-IND3			STL		0	0.01	0.02	3.4	6	10.4	13	24.4	27	41							
C-IND3			STU		0	0.7	1.9	11.3	16.8	28.4	35.2	46.7	60.6	70.4							
C-IND3			Stage		0	1	2	3	5	7	10										
C-IND3			C		0	19.3	31	42.3	60.7	82.1	95										
C-IND3			CTL		0	12	25	33	50	75	90										
C-IND3			CTU		0	25	45	50	70	90	100										
C-IND3			Stage		0	2	5	12													
C-IND3			O		0	94	96	100													
C-IND3			ON		0	22	22	22													
C-IND3			Struct	N			0.33		T		95	105	T	34	38	41	T	0	0	0	0
C-IND4	Average Metals/Minerals processing	IND	Stage		-1	-0.5	0	0.5	1	2	3	5	7	10							
C-IND4			S		0	0.1	0.2	6.2	8.9	17.4	19.8	31.8	37.1	53.1							
C-IND4			STL		0	0.01	0.02	3.4	6	10.4	13	24.4	27	41							
C-IND4			STU		0	0.7	1.9	11.3	16.8	28.4	35.2	46.7	60.6	70.4							
C-IND4			Stage		0	1	2	3	5	7	10										
C-IND4			C		0	19.3	31	42.3	60.7	82.1	95										
C-IND4			CTL		0	12	25	33	50	75	90										
C-IND4			CTU		0	25	45	50	70	90	100										
C-IND4			Stage		0	2	5	12													
C-IND4			O		0	94	96	100													

C-IND4			ON		0	22	22	22														
C-IND4			Struct	N			0.33		T			95	105	T		34	38	41	T		0	0	0	0
C-REL1	Church	COM	Stage		-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10					
C-REL1			S		0	0	8	13	18	24	28	40	45	51	56	60	64	66					
C-REL1			STL		0	0	4.6	10	13	17	22	29	38	43	47	52	56	60					
C-REL1			STU		0	1.4	13	19	26	33	41	51	58	62	72	75	76	78					
C-REL1			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10						
C-REL1			C		0	20	29	41	48	60	69	76	81	88	94	97	97						
C-REL1			CTL		0	15	25	35	43	50	61	68	75	79	88	90	93						
C-REL1			CTU		0	25	35	48	56	68	78	85	90	94	99	99.9	100						
C-REL1			Stage		0	2	5	12															
C-REL1			O		0	96	98	100															
C-REL1			ON		0	23	23	23															
C-REL1			Struct	N			0.33		T			95	105	T		5	7	8	T		0	0	0	0
C-RES1-1SNB	Res 1, 1 Story no Basement	RES	Stage		-1	-0.5	0	0.5	1	2	3	5	7	10									
C-RES1-1SNB			S		0	0.1	1	10	18	28	33	42	55	65									
C-RES1-1SNB			STL		0	0.01	0.02	6	10	16	20	30	42	55									
C-RES1-1SNB			STU		0	5	10	20	30	40	45	60	94	100									
C-RES1-1SNB			Stage		-0.5	0	0.5	1	2	3	5	7	10										
C-RES1-1SNB			C		0	0.1	20	40	60	80	90	99.8	99.9										
C-RES1-1SNB			CTL		0	0.01	5	18	34	60	80	99.7	99.8										
C-RES1-1SNB			CTU		0	5	30	60	84	100	100	100	100										
C-RES1-1SNB			Stage		0	2	5	12															
C-RES1-1SNB			O		0	87	94	100															

C-RES1-1SNB			ON		0	14	15	15												
C-RES1-1SNB			Struct	N			0.33		T		85	110	N	43.4	25	T	0	0	0	0
C-RES1-2SNB	Res 1, 2 Story no Basement	RES	Stage		-2	-1	-0.5	0	0.5	1	2	3	5	7	10					
C-RES1-2SNB			S		0	0.1	1	5	10	15	20	25	30	50	60					
C-RES1-2SNB			STL		0	0	0.01	0.02	5	9	15	20	25	40	50					
C-RES1-2SNB			STU		0	2	3	8	10.1	20	25	30	40	55	70					
C-RES1-2SNB			Stage		-1	-0.5	0	0.5	1	2	3	5	7	10						
C-RES1-2SNB			C		0	0.1	5	12	25	35	45	55	70	80						
C-RES1-2SNB			CTL		0	0.01	0.02	5	15	25	32	40	50	60						
C-RES1-2SNB			CTU		0	3	8	20	30	40	60	80	100	100						
C-RES1-2SNB			Stage		0	2	5	12												
C-RES1-2SNB			O		0	87	94	100												
C-RES1-2SNB			ON		0	14	15	15												
C-RES1-2SNB			Struct	N			0.33		T		85	110	N	40.2	25.9	T	0	0	0	0
C-RES2	Mobile home	RES	Stage		-1.5	-1	-0.5	0	0.5	1	2	3	4							
C-RES2			S		0	6.4	7.3	9.9	43.4	44.7	97.6	97.6	97.6							
C-RES2			STL		0	6.1	6.9	9.4	41.2	42.5	92.7	92.7	92.7							
C-RES2			STU		0	8.6	9.8	13.4	58.6	60.3	99.9	99.9	99.9							
C-RES2			Stage		-0.5	0	0.5	1	2	3	4									
C-RES2			C		0	95	96	97	98	99	99.5									
C-RES2			CTL		0	90	92	94	96	98	99									
C-RES2			CTU		0	99.9	99.9	99.9	99.9	99.9	100									

C-RES2			Stage		0	2	5	12												
C-RES2			O		0	85	92	100												
C-RES2			ON		0	15	15	15												
C-RES2			Struct	N			0.33		T			85	110	N	63.6	37.8		T	0	0	0	0
C-RES3C	Condominium, living area on multiple floors	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-RES3C			S		0	5	8	20	28	28.1	38	46	50								
C-RES3C			STL		0	0.01	5	7	10	18	20	35	35.1								
C-RES3C			STU		0	8	12	25	29	30	44	50	60								
C-RES3C			Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-RES3C			C		0	2	10	15	20	25	30	35	45								
C-RES3C			CTL		0	1	5	8	15	20	25	30	37								
C-RES3C			CTU		0	8	15	20	25	30	32	40	50								
C-RES3C			Stage		0	2	5	12												
C-RES3C			O		0	81	89	100												
C-RES3C			ON		0	8	8	9												
C-RES3C			Struct	N			0.33		T			85	110	N	43.4	25		T	0	0	0	0
C-RES3E	Condominium, living area on multiple floors	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-RES3E			S		0	5	8	20	28	28.1	38	46	50								
C-RES3E			STL		0	0.01	5	7	10	18	20	35	35.1								
C-RES3E			STU		0	8	12	25	29	30	44	50	60								
C-RES3E			Stage		-0.5	0	0.5	1	2	3	5	7	10								
C-RES3E			C		0	2	10	15	20	25	30	35	45								
C-RES3E			CTL		0	1	5	8	15	20	25	30	37								
C-RES3E			CTU		0	8	15	20	25	30	32	40	50								
C-RES3E			Stage		0	2	5	12												
C-RES3E			O		0	81	89	100												
C-RES3E			ON		0	8	8	9												
C-RES3E			Struct	N			0.33		T			85	110	N	43.4	25		T	0	0	0	0

C-RES4	Average Hotel, & Motel	COM	Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10				
C-RES4			S		0	6	8.6	12	17	18	28	30.9	33.5	35	38.5	43.2	46				
C-RES4			STL		0	3.3	5.7	7.3	9.7	12.1	15	22.9	23.6	24.3	24.3	29.4	34.9				
C-RES4			STU		0	11.2	16.2	21.2	26.2	31.6	38	44	44.6	55.8	57.8	61.2	64.6				
C-RES4			Stage		-0.5	0	0.5	1	2	3	4	5	6	7	8	9	10				
C-RES4			C		0	0.02	11.8	16.1	26.3	34.1	39.7	48.7	52.4	58.4	61.3	63.1	64.9				
C-RES4			CTL		0	0.01	6	10	20	28	33	40	45	50	55	58	60				
C-RES4			CTU		0	0.03	15	20	31	40	45	55	60	66	75	80	80.1				
C-RES4			Stage		0	2	5	12													
C-RES4			O		0	81	89	100													
C-RES4			ON		0	8	8	9													
C-RES4			Struct	N			0.33		T			95	105	T		14	15	16	T	0	0	0	0
C-RES5	Institutional Dormitory	RES	Stage		-0.5	0	0.5	1	2	3	5	7	10									
C-RES5			S		0	5	10	20	30	35	40	53	58									
C-RES5			STL		0	0.01	5	12	18	28	33	43	48									
C-RES5			STU		0	9	17	27	36	43	48	60	69									
C-RES5			Stage		-0.5	0	1	2	3	5	7	10										
C-RES5			C		0	2	13	28	37	44	50	55										
C-RES5			CTL		0	0.01	10	22	27	33	44	48										
C-RES5			CTU		0	5	22	35	44	50	55	70										
C-RES5			Stage		0	2	5	12													
C-RES5			O		0	81	89	100													
C-RES5			ON		0	8	8	9													
C-RES5			Struct	N			0.33		T			85	110	T		8	10	11	T	0	0	0	0
C-RES6	Nursing Home	RES	Stage		-1	-0.5	0	0.5	1	1.5	2	3	4	5	6	7	8	9	10			
C-RES6			S		0	0.1	0.2	7	12.8	17.5	23.5	28.6	42	50.2	60.4	67.4	72.2	80.1	80.8			
C-RES6			STL		0	0.01	0.02	3.8	7	10	13.8	18	25.2	35	40	43.2	46	51	56			
C-RES6			STU		0	0.3	0.8	11.7	18.4	24.8	31.2	40.3	52.2	64.1	69.6	79.8	85.9	86.6	87.5			
C-RES6			Stage		0	0.5	1	1.5	2	3	4	5	6	7	8	9	10					
C-RES6			C		0	10.3	14.6	18.4	27	37	53.4	70	79.1	85.6	92.5	95.6	96.3					
C-RES6			CTL		0	5	10	15	23	30	45	60	70	79	85	90	90.1					

C-RES6		CTU		0	15	20	25	33	45	60	80	85	90	100	100	100						
C-RES6		Stage		0	2	5	12															
C-RES6		O		0	85	89	100															
C-RES6		ON		0	19	19	19															
C-RES6		Struct	N			0.33		T			85	110	T		27	28	29	T		0	0	0	0

Table 119. Depth Damage Function – Vehicle

Occ_Name	Occ_Description	Cat_Name	Parameter	Start_Data																		
Vehicle	Vehicle	Vehicle	Stage		0	0.5	1	2	3	4	5	6	7									
Vehicle			S		0	3	19.975	37.375	53.075	67.075	79.375	89.9	95.125									
Vehicle			STL		0	0.01	5.04	23.93	40.56	54.62	66.04	75.19	82.43									
Vehicle			STU		0	11.28	29.84	47.71	63.65	78.64	94.03	99.97	99.98									
Vehicle			Struct	N			0.3		T	DRV	61.34021	255.1546	T		0	0	0	T				

Table 120. Depth Damage Function – Road

Occ_Name	Occ_Description	Cat_Name	Parameter	Start_Data																		
Street	Road	Road	Stage		0	0.5	1	2	3	4	5	6	7									
Street			S		0	3	20	37.4	53.1	67.1	79.4	89.9	95.1									
Street			STL		0	0.01	5.04	23.9	40.6	54.6	66	75.2	82.4									
Street			STU		0	11.3	29.8	47.7	63.7	78.6	94	100	100									
Street			Struct	N			0.3		T	DRV	61.3	255	T		0	0	0	T				
Major Road	Major Road	Road	Stage		0	0.5	1	2	3	4	5	6	7									
Major Road			S		0	3	20	37.4	53.1	67.1	79.4	89.9	95.1									
Major Road			STL		0	0.01	5.04	23.9	40.6	54.6	66	75.2	82.4									
Major Road			STU		0	11.3	29.8	47.7	63.7	78.6	94	100	100									
Major Road			Struct	N			0.3		T	DRV	61.3	255	T		0	0	0	T				

Appendix D1.F: Additional Sensitivity testing

(added on April 2, 2026)

The unique nature of the flooding in this dynamic system with multiple loading sources provided a unique use case for HEC-FDA. FDA was developed, primarily, to work with fluvial flooding where flooding is generated from streams, tributaries or canals in terrestrial or estuarian environments. This study focuses on combined rainfall and surge induced flood hazards. The inundation is shallow in many parts of the study area and there are non-contiguous flow areas (frequent events) created by groundwater migration, stormwater system overflow and rainfall. This placed additional emphasis on capturing uncertainty around the different parameters for hydrologic, hydraulic and damage inputs and understanding the effects variation in these inputs had on the economic risk estimates (Expected Annual Damages).

Technical and public review of the flood damage calculations identified opportunities to explore the sensitivity of HED-FDA application with modified assumptions as a means of further understanding the expected performance, and resilience, of the recommended plan. To be responsive to these comments, two independent sensitivity tests were performed. One sensitivity test examined the effect of applying more conservative assumptions in the HEC-FDA damage analysis, while another examined incorporating rainfall changing factors to reflect potential increase in rainfall intensity under future conditions, into the flood damage calculations.. The results of these two sensitivity analyses are summarized below.

I. Sensitivity testing by specifying zero damage depth through an attribute item in the inventory shape file

The first set of sensitivity run was conducted for structures for the base condition scenarios (ECB, FWOP_h, FWOP_i, FWOP_low) and the Recommended Plan/TSP scenarios (TSP_2035, TSP_2085h, TSP_2085i, TSP_2085low). The sensitivity runs specify zero damage depth through an attribute item in the inventory shape file. The sensitivity run EAD and the avoided annual damage results were summarized in Table 121 below. The results indicated approximately 23% percent reduction in estimated annual damage for both base conditions and TSP conditions, while avoided annual damage for TSP_2035, TSP_2085low, TSP_2085i, and TSP_2085h change by -2.7%, -2.5%, -3.8%, and -4.8%, respectively. No sensitivity runs were conducted for vehicles and roads, as the zero-damage depth is already defined within the damage functions, which begin at zero. These results indicate that while the magnitude of the annualized damages appears sensitive to this change, the avoided damage benefit was much less sensitive, indicating that the recommended plan features appear robust across the tested parameter range. In addition, the incorporation of a range of depth-related damages within the sensitivity testing is useful in an uncertainty framework helping to account for global model uncertainties, derived from both H&H modeling and economic damage methodologies. By performing this testing consistently for the ECB, FWOP and all alternatives' simulations, the relative selection of the recommended plan is reinforced and the overall decision-making process is bolstered.

II. Sensitivity testing by applying updated joint probabilities for future rainfall conditions

A set of recurrence intervals (inverse of the joint probabilities) (Table 122), incorporating projected future changes in rainfall (using downscaled results from the Coupled Model Intercomparison Project Phased 6 - CMIP6and associated uncertainties, was developed by University of Central Florida (University of Central Florida, 2026), and sensitivity runs were conducted using the updated representative recurrence intervals. CMIP6 is the latest generation of global climate models, developed around 2018–2020 and supporting the IPCC (The Intergovernmental Panel on Climate Change) Sixth Assessment Report, using SSP (Shared Socio-economic Pathways) scenarios and offering improved physics, higher resolution, and more comprehensive projections of future climate conditions. For comparison, the set of recurrence intervals applied in the production runs reflecting recurrence intervals that do not account for future rainfall change was also included in this table.

The sensitivity runs were performed for the base condition scenarios (ECB, FWOP_h, FWOP_i, FWOP_low) and the Recommended Plan/TSP scenarios (TSP_2035, TSP_2085h, TSP_2085i, TSP_2085low), using the updated recurrence intervals (50th percentile) summarized in Table 122.

For each scenario, a sensitivity test run was conducted by applying updated joint probabilities (inverse of recurrence intervals) to the previously (the production runs) monotonically adjusted H&H raster datasets and the corresponding frequency functions. Sensitivity run EAD and the avoided annual damage results are tabulated in Tables 123 to 125 below. The sensitivity testing results are compared to production run results and summarized below.

- For structures, sensitivity testing indicates an approximate 12–13% increase in estimated annual damages, while avoided annual damage for TSP_2035, TSP_2085low, TSP_2085i, and TSP_2085h change by 158.7%, 166.9%, 16.9%, and 8.3%, respectively.
- For vehicles, sensitivity testing indicates an approximate 1% increase in estimated annual damages, while avoided annual damage for TSP_2035, TSP_2085low, TSP_2085i, and TSP_2085h change by -18.6%, -20.7%, -3.5%, and 16.7%, respectively.
- For roads, sensitivity testing indicates an approximate 15 to 16% increase in estimated annual damages, while avoided annual damage for TSP_2035, TSP_2085low, TSP_2085i, and TSP_2085h change by 18.3%, 22.9%, -25.7%, and 5.5%, respectively.

These results indicate trends that are intuitive with increasing trends in expected damages in consideration of future rainfall which increases the frequency of higher rainfall events. It is also observed that for the most part, the avoided damages (benefits) also tended to increase, further indicating that the recommended plan features appear robust across the tested parameter range. It is important to note, however that given the complexity of the Study Area's hydrologic and hydraulic conditions and an intensively managed, highly complex flood control system, these sensitivity testing results should be considered preliminary, it is recommended that a full set of H&H model simulations be performed for both the base condition scenarios and the recommended plan scenarios, incorporating the future rainfall across all storm events. From a purely H&H standpoint, the use of the monotonically adjusted rasters based on previous probabilities in combination with the new probabilities would not be considered best practice. The decision to perform this limited scope sensitivity for this test was in consideration of project schedule and resource constraints. Therefore, key assumptions, such as the monotonicity adjustment

methodology, and frequency function development, should be further examined in future efforts that consider future rainfall changes to better understand the implications of the updated recurrence intervals, along with observed variability in model outputs that does not consistently align with expected trends.

Table 121: EAD and the Avoided Annual Damages for Sensitivity run I (specify zero damage depth through an attribute field in the inventory shape file.)

Structures; All values for structures in this table represent 2021 dollar.

									Avoided Annual Damages			
	ECB2035	fwop_low_2085	FWOPi2085	FWOPh2085	TSP_2035i	TSP_2085low	TSP_2085i	TSP_2085h	ECB_2035 - TSP_2035	fwopl - TSP_low_2085	fwopi - TSP_i_2085	fwoph - TSP_h_2085
C-11 East	188,953,050	188,893,972	189,631,937	204,461,830	185,704,244	186,174,587	186,979,853	194,023,480	3,248,806	2,719,385	2,652,084	10,438,351
C-11 West	275,774,084	275,998,477	275,795,993	276,800,040	273,593,817	273,535,351	274,188,740	274,531,863	2,180,267	2,463,126	1,607,253	2,268,177
C-12 West	53,135,566	53,227,928	53,153,548	54,178,655	50,705,258	50,765,517	51,008,298	51,512,311	2,430,308	2,462,411	2,145,250	2,666,344
C-13 West	124,180,586	124,538,620	124,706,348	128,191,607	122,730,047	122,969,632	123,184,685	123,935,774	1,450,539	1,568,988	1,521,664	4,255,833
C-14 East	42,883,217	42,997,418	43,357,752	58,072,804	42,080,860	42,275,705	42,595,304	50,310,973	802,357	721,713	762,448	7,761,831
C-14 West	420,481,254	419,079,139	420,440,440	421,226,388	413,950,514	414,017,732	415,091,727	415,270,120	6,530,741	5,061,407	5,348,713	5,956,268
Hillsboro Canal	470,313,594	470,243,368	470,038,982	470,941,830	465,100,598	465,115,793	466,399,743	466,529,806	5,212,996	5,127,574	3,639,240	4,412,024
North New River Canal West	125,164,439	125,209,571	125,522,142	127,354,977	122,882,759	122,997,991	123,431,166	124,049,427	2,281,680	2,211,580	2,090,975	3,305,549
Pompano Canal	23,393,307	23,457,897	23,528,027	24,017,045	23,220,642	23,299,647	23,387,994	23,833,284	172,665	158,250	140,034	183,762
Total	**1,724,279,097**	**1,723,646,390**	**1,726,175,170**	**1,765,245,177**	**1,699,968,738**	**1,701,151,956**	**1,706,267,510**	**1,723,997,038**	**24,310,359**	**22,494,434**	**19,907,660**	**41,248,138**

Table 122: Updated Recurrence Intervals for Future Rainfall Conditions

Rainfall duration	Event		CMIP6 (50th percentile values applied for the sensitivity runs)			Recurrence Intervals applied in the HEC-FDA production runs
	WL	Rainfall	25th	50th	75th	
72-hour	2-year	5-year	10	**10**	8	8
	2-year	10-year	18	**13**	11	14
	10-year	10-year	28	**25**	21	32
	2-year	25-year	38	**24**	17	30
	20-year	25-year	64	**49**	40	75
	2-year	100-year	200	**85**	37	110
	100-year	100-year	383	**218**	164	430
	2-year	500-year	759	**219**	55	538

Table 123: EAD and the Avoided Annual Damages for Sensitivity run II – structures (applying updated joint probabilities for future rainfall conditions)

Structures; All values for structures in this table represent 2021 dollar.												
									Avoided Annual Damages			
	ECB2035	fwop_low_2085	FWOPi2085	FWOPh2085	TSP_2035i	TSP_2085low	TSP_2085i	TSP_2085h	ECB_2035 - TSP_2035	fwopl - TSP_low_2085	fwopi - TSP_i_2085	fwoph - TSP_h_2085
C-11 East	271,830,187	271,785,233	272,635,402	288,497,938	267,688,967	268,377,781	269,902,257	277,653,751	4,141,221	3,407,452	2,733,145	10,844,187
C-11 West	454,791,747	454,981,846	454,801,947	455,871,300	447,973,989	446,342,273	451,796,425	452,857,916	6,817,758	8,639,573	3,005,522	3,013,383
C-12 West	80,408,299	80,476,321	80,421,741	81,676,538	77,804,426	77,908,187	78,266,630	78,818,631	2,603,874	2,568,134	2,155,111	2,857,907
C-13 West	207,937,969	208,376,635	208,645,920	212,882,068	206,231,589	207,478,453	206,818,438	207,665,423	1,706,380	898,182	1,827,482	5,216,645
C-14 East	57,136,800	57,250,287	57,634,390	73,895,553	56,170,982	56,438,835	56,848,694	65,585,214	965,817	811,452	785,697	8,310,339
C-14 West	488,785,735	487,392,589	488,809,924	489,492,252	474,838,442	475,631,646	483,093,368	483,235,341	13,947,293	11,760,943	5,716,556	6,256,912
Hillsboro Canal	775,229,520	775,138,590	774,915,276	775,734,465	744,148,813	744,754,276	769,498,699	769,332,038	31,080,707	30,384,314	5,416,577	6,402,427
North New River Canal West	212,974,838	213,032,359	213,441,630	215,540,951	209,784,759	210,058,388	211,006,425	211,709,900	3,190,080	2,973,971	2,435,204	3,831,051
Pompano Canal	32,823,823	32,909,506	32,992,396	33,611,378	32,667,696	32,770,988	32,883,657	33,406,596	156,127	138,517	108,738	204,783
Total	**2,581,918,919**	**2,581,343,366**	**2,584,298,626**	**2,627,202,443**	**2,517,309,663**	**2,519,760,828**	**2,560,114,595**	**2,580,264,810**	**64,609,256**	**61,582,539**	**24,184,032**	**46,937,634**

Table 124. EAD and the Avoided Annual Damages for Sensitivity run II – roads (applying updated joint probabilities for future rainfall conditions)

Roads, All values for roads in this table represent 2021 dollar.									Avoided Annual Damages			
	ECB2035	fwop_low_2085	FWOPi2085	FWOPh2085	TSP_2035i	TSP_2085low	TSP_2085i	TSP_2085h	ECB_2035 - TSP_2035	fwopl - TSP_low_2085	fwopi - TSP_i_2085	fwoph - TSP_h_2085
C-11 East	25,237,287	25,238,280	25,523,974	29,132,824	24,701,961	24,836,937	25,049,145	26,953,847	535,326	401,342	474,829	2,178,978
C-11 West	32,985,313	33,082,803	33,017,401	33,402,752	32,543,344	32,457,574	32,730,555	32,920,983	441,969	625,229	286,846	481,770
C-12 West	12,126,684	12,141,994	12,157,630	12,605,930	11,703,746	11,725,827	11,758,780	12,007,376	422,938	416,167	398,850	598,554
C-13 West	16,789,055	16,848,532	16,982,874	18,038,080	16,377,662	16,448,465	16,514,373	16,382,710	411,393	400,067	468,500	1,655,370
C-14 East	6,481,331	6,491,894	6,616,649	9,460,163	6,208,902	6,268,589	6,338,855	7,922,135	272,429	223,306	277,794	1,538,028
C-14 West	40,770,080	40,692,362	40,777,453	41,005,141	39,281,560	39,309,090	40,663,587	39,624,341	1,488,520	1,383,272	113,867	1,380,801
Hillsboro Canal	53,491,278	53,226,783	53,430,660	53,620,329	51,479,409	51,474,458	52,392,269	52,409,229	2,011,869	1,752,325	1,038,391	1,211,100
North New River Canal West	18,650,867	18,598,707	18,866,795	19,749,438	17,864,611	17,918,640	18,309,698	18,299,005	786,256	680,066	557,097	1,450,433
Pompano Canal	2,845,457	2,900,558	2,911,830	3,174,649	2,846,338	2,878,438	2,914,026	3,179,501	(881)	22,120	(2,196)	(4,852)
Total	**209,377,352**	**209,221,913**	**210,285,267**	**220,189,307**	**203,007,532**	**203,318,019**	**206,671,288**	**209,699,126**	**6,369,820**	**5,903,894**	**3,613,979**	**10,490,181**

Table 125. EAD and the Avoided Annual Damages for Sensitivity run II – vehicles (applying updated joint probabilities for future rainfall conditions)

Vehicles, All values for vehicles in this table represent 2024 dollar.									Avoided Annual Damages			
	ECB2035	fwop_low_2085	FWOPi2085	FWOPh2085	TSP_2035i	TSP_2085low	TSP_2085i	TSP_2085h	ECB_2035 - TSP_2035	fwopl - TSP_low_2085	fwopi - TSP_i_2085	fwoph - TSP_h_2085
C-11 East	5,360,485	5,434,447	5,519,259	7,511,870	5,183,012	5,249,413	5,362,314	6,618,463	177,473	185,034	156,944	893,407
C-11 West	11,097,133	11,099,676	11,103,133	11,180,492	10,988,011	10,993,011	10,999,404	11,014,954	109,123	106,665	103,728	165,538
C-12 West	5,804,111	5,826,869	5,811,365	6,019,681	5,558,453	5,563,414	5,576,888	5,663,496	245,659	263,455	234,477	356,185
C-13 West	6,513,025	6,594,906	6,576,838	6,952,972	6,423,537	6,579,351	6,465,024	6,554,335	89,488	15,555	111,814	398,637
C-14 East	2,019,534	2,020,974	2,046,676	3,301,078	1,951,977	1,960,211	1,981,060	2,682,459	67,557	60,763	65,616	618,619
C-14 West	16,025,920	16,120,956	16,098,886	16,175,079	15,776,421	15,778,145	15,790,932	15,354,882	249,500	342,811	307,954	820,197
Hillsboro Canal	19,158,250	19,109,751	19,140,402	19,201,074	18,873,505	18,873,957	18,881,667	18,891,936	284,745	235,794	258,734	309,139
North New River Canal West	5,206,723	5,208,020	5,239,121	5,424,042	5,055,473	5,063,072	5,074,122	5,140,153	151,250	144,948	164,998	283,889
Pompano Canal	1,028,114	1,069,606	1,115,002	1,447,626	1,014,588	1,052,060	1,097,844	1,385,308	13,525	17,547	17,158	62,318
Total	**72,213,295**	**72,485,205**	**72,650,681**	**77,213,913**	**70,824,976**	**71,112,633**	**71,229,256**	**73,305,986**	**1,388,319**	**1,372,572**	**1,421,425**	**3,907,928**

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